

BRITISH ASSOCIATION,

DUNDEE MEETING, 1912



HANDBOOK



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BRITISH ASSOCIATION,

DUNDEE 1912.

# HANDBOOK AND GUIDE

TO

# DUNDEE AND DISTRICT

*Prepared for the Members of the "British Association for the  
Advancement of Science," on the occasion of their  
visit to Dundee, under the direction of the  
Local Publications Committee.*

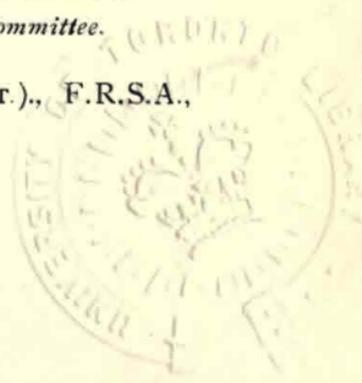
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To the British Association,

Dundee Meeting, 1912.

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*WELCOME.*

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*We worship at the shrine, where Knowledge lifts  
A venerable head; here, in this town,  
This temple, where we lay our willing gifts.  
So now we welcome those of true renown  
To share our city's life and history.  
This is an age of Reason, yet we know  
That Science is the serf of Mystery,  
For, as she lays succeeding curtains low,  
Still larger aisles are opened to our gaze,  
And still more glorious destinies for men.  
Thus Science gladly every barrier lays  
To bring some nobler truth within our ken.  
We worship at this shrine, so that we may  
Both give and take the gifts Truth has in store—  
They are no strangers who their treasures lay  
Upon this altar: Welcome to our shore!*

*W. C. K.*



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## INTRODUCTION.

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FORTY-FIVE years ago, to be exact as to date, on the 4th September 1867, the British Association for the Advancement of Science last opened its meetings in Dundee. Since then the city has shown a remarkable advance in population, in public health, and in all directions which affect the comfort, the wellbeing, or the enlightenment of its citizens. Whether arising from the generous impulse given to local life and thought by these meetings, or from other causes, it is to be noted that in the immediately ensuing years important movements took rise which materially affected for the better our communal life. While many names familiar in those days still figure on the local Committees in connection with the present meetings—including Baxters, Ogilvies, Walkers, Coxes, Dons, Lengs, and Hendersons—only one member of that Executive Committee now remains with us in the much respected person of Mr (now Lord) Armitstead.

Acting on the suggestion of Professor D'Arcy Thompson, the Lord Provost convened a meeting of the Town Council and citizens of Dundee on 2nd March 1910 with the view of considering whether an invitation should not be given to the Association to visit Dundee, and from that meeting generated a cordial and unanimous movement to secure the presence of this important body with us in the present memorable year. Those at the meeting constituted themselves into a general Committee, which was subsequently reinforced by the addition of the names of most of our leading citizens. At a meeting of this general Committee, held on 14th June, Lord Provost Urquhart, Sir George Baxter, LL.D., Professor Thompson, Dr. Sinclair, Mr Wm. Mackenzie (then President of the Chamber of Commerce), Dr. A. H. Millar, and the Town Clerk were appointed to attend the Annual Meeting of the British Association at Sheffield, and convey Dundee's invitation for 1912. This was done, and the Association having accepted the invitation, immediate steps were taken to ensure that all local arrangements would be carried out in a manner becoming the importance of the occasion and the dignity of the city.

An adequate guarantee fund had already been raised to meet the local expenses, and strong Executive and Sub-Committees were appointed. The local Executive Committee was presided over by the Honourable the Lord Provost (James Urquhart, Esq., LL.D.), while Professor D'Arcy Thompson, Dr. A. H. Millar, and Mr W. H. Blyth Martin, Town Clerk, acted as Hon. Secretaries, and Mr W. G. Leggat as Hon. Treasurer. The following Sub-Committees were also formed :—

PUBLICATIONS—

Convener, Ex-Bailie Paton.

RAILWAY FACILITIES—

Convener, Lord Provost Urquhart.

HOSPITALITY—

Joint Conveners, Dr. Macgillivray and Wm. Henderson, Esq., D.L.

LADIES—

Joint Conveners, Mrs Urquhart and Lady Baxter.

EXCURSIONS AND ENTERTAINMENTS—

Convener, Wm. Henderson, Esq., D.L.

RECEPTION AND SECTION ROOMS—

Convener, Bailie Melville.

MEMBERSHIP—

Convener, Lord Provost Urquhart.

FINE ART—

Convener, R. B. Don, Esq., M.A.

That all of these Committees have efficiently carried out the work entrusted to them, I have no doubt, will be more apparent in the results than in anything I can say as to what they have done.

On the occasion of the last Dundee meeting a special Committee was formed on "Local Industries," with a view to the compilation of a publication descriptive of these. Ultimately, however, its work took the shape of the preparation of several valuable papers, read at the Statistical Section of the Association, and subsequently published in an interesting memorial volume issued after the meetings by the local Executive. On the present occasion the work of the Publications Committee took a

different shape, and in its completed form is now respectfully submitted to the Association.

After several meetings and considerable discussion, it was decided to compile a Handbook for presentation to the members, consisting of two parts, descriptive of the city's life and interests, as follows :—

- (1) A Historical and General Survey of City and District: its Institutions, Industries, and Social Conditions—the work of editorship being assigned to myself.
- (2) Archæological, Literary, and Scientific Sketches of City and District—the editorial duties on which were entrusted to my erudite colleague, Dr. A. H. Millar.

A draft index was drawn up, with suggestions as to writers on various subjects, and this was approved by the Committee; in the main the work has been compiled almost identically as originally outlined.

PART I., it will be observed, is divided clearly into Sections, the first being historical, and consisting of a composite paper by three writers; the second, "City Problems and Social Service" incorporates 9 papers; "Public Services" take up 12 papers; "Education" 8; and "Industrial and Commercial Life" 17; 49 papers in all are contained in the 374 pages of space, illustrations being additional. PART II. comprises 24 papers in all, 9 of which are devoted to Biography, and 6 to more strictly Scientific subjects.

While it would be invidious to single out any writer in a publication where all the contributions are good, one cannot forego referring to the fact that Sir Archibald Geikie, who was himself a member and present at the 1867 meeting, has favoured us with some reminiscences of Sir Charles Lyell, one of our great county-men and then a leading worker in the scientific field.

One must also refer to the very handsome and valuable maps which are incorporated in the volume; not only the plan of the Harbour, kindly presented by the Harbour Trust, but also the Botanical and Geological maps in

colour, which cannot but prove of special value to the student of these important sciences.

The 73 papers comprised in the book will, we believe, every one of them be found most readable and interesting. They may not interest all alike, but each reader is sure to find something in the book well worthy of preservation. It presents a bird's-eye view of the City's life and interests which it is believed has never before been compiled, and looking into the future it cannot but prove of immense value when—some 45 years from now—the British Association which lives on, even though its members pass away and, it may be, are forgotten, in the course of its itinerary once more honours our city with its presence.

I need scarcely add that the Handbook represents a very considerable amount of hard, painstaking, and disinterested work. To the writers of the various papers, to those who have helped them in the acquiring of information for same, and to all, not forgetting the printers, who have in any way helped to make the book a worthy memento of this occasion, I tender the Committee's very cordial and hearty thanks. Nor can I, on behalf of my colleague and myself, neglect to record our special thanks to the small Advisory Committee, consisting of Rev. G. R. MacPhail, Ex-Bailies Martin and Fraser, Messrs John Mitchell, Alex. Urquhart, and D. T. Sandeman; these gentlemen have been of material assistance to us in carrying through the preparation of the volume.

We bespeak for it a welcome, not only from the distinguished visitors in whose honour it has more immediately been compiled, but from our fellow townsmen who may, on reading the historical, scientific, industrial, and social records, be stimulated to a closer study, and be further strengthened in their feelings of local patriotism and towards endeavour to raise the standard of life and thought in our community, and to aid all movements which aim at upholding the dignity, the standing, and the importance of a city which we are proud to claim as the place of our habitation.

A. W. PATON,

*Convener of Publications Committee.*

SECTION I.



## Dundee : As it was.

By A. H. Millar, LL.D.,

Librarian and Curator, Dundee Libraries,  
Art Galleries, and Museums.

THE position which Dundee occupied in prehistoric times is faintly indicated by the relics that have been found in the vicinity. During the past hundred years many interesting discoveries have been made at the Stannergate, consisting of urns of unburnt clay, stone coffins with human remains, and similar proofs of early occupancy. Perhaps the most valuable archaeological find was the disclosure of a large shell-bed or "kitchen-midden," which was exposed during the operation of excavating between the river and the railway in 1878 to provide materials for the embankment of a timber pond that formed an extension of the Dundee harbour. This deposit, which measured one hundred feet by sixty feet, contained a large number of the shells of edible molluscs, mixed with a quantity of burned wood, pieces of bone artificially split, porpoise bones, deers' horns, and stone implements. These relics plainly showed that a colony of fishermen had resided at this spot. That the time of its occupancy was a very remote one is suggested by the fact that superincumbent earth, either *detritus* or the result of a landslip, had covered the deposit about twelve feet. The date was very probably long anterior to the Roman occupation of Scotland, since twelve cists or stone coffins of the latter era had been interred eight feet above the shell-bed. Ages must have elapsed between the time when the Stannergate was inhabited by these early fishermen and the period when the interments took place. Specimens of the materials composing the shell-bed, and of urns found in this locality, were placed in the collection of the Dundee Naturalists' Society, Albert Institute Museum.

The western part of modern Dundee has also afforded proofs of the existence of prehistoric inhabitants. While a lair was being dug in the Western Cemetery on 26th October 1881, a crematory urn was found, containing human bones and a small piece of oxidized bronze, which is preserved in the Dundee Museum, and stone coffins of a later date have been discovered at Menzieshill, Invergowrie. Traditionally it is asserted that a great contest took place near Dundee between Alpin, King of Scots, and Brude, King of the Picts; and the place of the interment of the defeated Alpin is still known as Pitalpin, a spot near King's Cross Road, about a quarter of a mile north-west of the Law. In 1732 a "Snake Bracelet" was found near this spot, and is now in the Museum of the Society of Antiquaries at Edinburgh. Excavations made at Pitalpin at the end of last century resulted in the discovery of eight or ten graves with stone coffins containing human bones. Thus it is seen that the country for a considerable distance around the present site of Dundee was peopled by numerous small colonies in prehistoric times. Assuming that the nucleus of Dundee was formed near the shore, these relics suggest that it could claim hoary antiquity.

No very satisfactory theory has been advanced as to the derivation of the name

<b>Name of Dundee.</b>	“Dundee.” Some theorists have maintained that it is a corruption of the Celtic Dun-Tay, the descriptive designation of the hill fort on the Tay, and they have pointed to the remains of a vitrified fort on the summit of the Law Hill as giving the reason for this appellation. Hector Boece, in his <i>Chronicles</i> written about 1525, gives an ecclesiastical derivation transforming the name into Deidonum, which he interprets “the Gift of God.” He further mentions that the ancient name of the place was <i>Alectum</i> , to which he gives the signification of “beautiful.” Neither of these names is to be found in unquestionable documents referring to Dundee. It has been asserted that the oldest Latin form
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of the name was Taodunum, which is supposed to be the equivalent of the Celtic Dun-Tay. An examination of the earliest charters relating to the burgh does not support either of the theories last referred to. The oldest form of the name that has been found in documents dating from the middle of the eleventh century is simply that of Dundee, and this form, with slight variations, has continued till the present day.

**Early  
History.**

There is a current tradition that Malcolm Canmore had a residence in Dundee, and it is related by Andrew Wyntoun in his "Cronykil of Scotland," and by Fordoun, that Malcolm's son and successor, Edgar, died in Dundee in 1107, and was carried thence and solemnly interred at Dunfermline. Edgar was succeeded by his brother, Alexander I., who reigned till 1124. He had a dwelling of some kind at Invergowrie, and intended to build a "palace" there. It is incredible that a monarch in those lawless times would have built his dwelling elsewhere than near some centre of civilization such as Dundee then was. This confirms the idea of the early importance of the burgh. These inferences regarding Dundee become certainties when we approach the period of William the Lion, who ascended the throne in 1165, and reigned till 1214. From the confirming charter of Robert the Bruce (4th March 1327) it is evident that the inhabitants of Dundee had enjoyed burghal rights and privileges in the time of King William, and before the burgh had been conferred by that monarch upon his brother, David, Earl of Huntingdon.

**David,  
Earl of  
Huntingdon.**

There is a well-known tradition which ascribes the foundation of the Church of St. Mary of Dundee to the gratitude of Earl David for his rescue from the dangers of the deep on his return from the Crusades *circa* 1190. That the burgh had a corporate existence before this time is shown by the statement in Fordoun's

"Cronykil" that King William gave to David the Earldom of Huntingdon, "likewise the Earldom of Garviach, the town of Dundee, the town of Inverbervie, and the lordship of Lanforgonde," after the King returned to Scotland in 1174. This statement coincides with the similar assertion made by Balfour in his "Annales," and by the "Acts of the Parliament of Scotland." Hence the founding of the church must have taken place at least fifteen years after Dundee had become "Earl David's burgh." This does not militate against the statement that the Church of St. Mary was founded by the Earl; and it is certain that when he erected the Abbey of Lindores in 1178, he included in his foundation charter the Church of Dundee as one of the gifts. The importance of Dundee is incidentally confirmed by a document now preserved in the Chancery Office, London, and dated 26th October 1199, whereby King John of England "grants to the burgesses of Earl David, brother of the King of Scotland, of Dundee, freedom from toll, and all other customs of the Crown, except in the City of London." This is probably the earliest instance of commercial intercourse between Scotland and England that has been recorded. That this privilege was not a mere empty honour is proved by a document of 1212-13, wherein it is stated that "Gilbert of London owes the third part of £40 for justice against Richard of Bedford, Augustin of Danwiz, and Nicol, son of Agnes, burgesses of Dundee, in Scotland, that they may restore him £40." The title, "burgess of Dundee," appears frequently appended to the names of witnesses to charters about this period. The fishing village of early times had thus developed into a centre of commerce. The position which David, Earl of Huntingdon, occupied in the history of the time has not been fully understood. He is often regarded merely as a soldier of fortune, an unsuccessful Crusader, who owed to the charity of his brother, the King, the property of the burgh of Dundee, which was supposed to have been almost his only possession in Scotland. The obscurity which has hitherto enshrouded his existence has been cleared away to a large

extent by the publication of Record Office documents. From these it appears that Earl David was a wealthy nobleman, holding large possessions in England, bearing an English title, the brother of the King of Scotland, and having the Duke of Brittany and the Count of Holland for his brothers-in-law, and the descendants of Henry I. for his near kinsmen. That the Earl had a mansion of some kind in the burgh can be proved beyond dispute, and its situation towards the close of the twelfth century can be approximately indicated. The place described in charters of that period as "Earl David's toft" (*area domus*) stood in the Nethergait, near Couttie's Wynd, and remains of this house were in existence in 1496, as a charter of that year refers to the gable of "Erle David Huntlentoun's Haw" as a boundary. It is almost certain that the Earl made this his occasional residence, and it was probably because he lived in Dundee that he founded here the Church of St. Mary to supersede the older Church of St. Clement of Dundee. There was another toft held by Earl David in Dundee, the locality of which cannot be so easily identified. It is recorded in the Register of the Priory of St. Andrews that he gave to that foundation "one full toft in my burgh of Dundee," together with an annual charge of one silver merk to be paid from the fermes of Dundee, which payment was continued for centuries.

**Competitors  
for the  
Scottish  
Crown.**

Not only did the Earl himself reside here, but there is ample evidence that all his married children had houses in the burgh. His eldest surviving son, John le Scot, succeeded to the title and estates of his father. His eldest daughter, Margaret, wife of Alan, Lord of Galloway, and mother of Devorgilla, who married John Balliol, also lived in Dundee; his second daughter, Isobel, wife of Robert Bruce, Lord of Annandale, was proprietrix of Craigie; and his third daughter, Ada, wife of Henry de Hastings, had a mansion in the vicinity. These statements can be proved on incontestable docu-

mentary evidence, and it is remarkable that the ancestors alike of John Balliol, John de Hastings, and Robert Bruce, the three principal competitors for the Crown of Scotland, were burgesses of Dundee, and frequently resided there.

**Dundee in  
the  
Thirteenth  
Century.**

Though the recorded names of burgesses confirm the idea of the importance of Dundee in the beginning of the thirteenth century, they would afford us no information as to the size of the burgh were it not possible to identify the positions of some of their houses. Fortunately this can be done, at least to some extent. The tenement furthest west in Dundee belonged to Thomas de Colville, who witnessed a charter of William the Lion anent the Church of Monikie *circa* 1189. The house stood on the south side of the Nethergait, opposite the Church of St. Mary, and after his death came into the hands of the Monks of the Abbey of Coupar in Angus. In the rental book of the Abbey, at a later date, this property is described as their hospital and garden, and the tenant was "to uphold all the walls and the usual repairs of the garden." He was "to preserve the roofs free from rain by sufficient roofing and cement"; the cellarer was "to repair stairs and kitchen at the expense of the Monastery"; and the Lord Abbot was "to have the usual privileges for himself and his officers on their arrival." Next to it on the eastern side was the toft given by John le Scot, son of Earl David, to the Abbey of Balmerino, and this property is described in successive charters so late as 1748. At that date it is mentioned in a sasine as the "land formerly belonging to the Abbot of Balmerino." The ground given by Earl John was subdivided, two portions being tenanted in 1286 by Harvey, called Lamby, and an intervening toft being held at that time by Harvey de Dunde, Canon of Glasgow. The latter Harvey had built a house on his ground, and laid out a garden connected therewith, and by a charter, dated at Dundee, 10th August 1286, he bequeathed this edifice to the Abbey of Balmerino, reserving to himself the right to inhabit it

during his lifetime. The name of Harvey, called Lamby, appears as a witness in several charters of this period. His property seems to have stood near the western side of Couttie's Wynd. Earl David's toft lay to the east of this property, and was separated from it by the passage known at one time as the "Abbottis-Wynd," at a later date as Spalding's Wynd, and now called Couttie's Wynd. There is no early record showing the proprietors between this point and the road called Castle Wynd, sometimes Roger del Wend's Vennel, afterwards Skirling's Wynd, and now Tendall's Wynd. The "King's highway," called *vicus major*, latterly the Marketgait or High Street, extended between these two wynds; and it is important to remember that the Seagait in early times began at the corner of Tendall's Wynd, and ran thence eastward. The Castle Burn crossed the Seagait, nearly on the line of South Commercial Street, and it is likely that the tenement of John of the Burn (*de rivulo*) was almost the eastmost house in Dundee in the thirteenth century. A property in Tendall's Wynd belonged to Norman of the Castle Wynd, and was given by him to the Abbey of Balmerino previous to 1268. When the Abbot demitted this ground in feu-farm to William Welyeuyth, *circa* 1270, a special condition was imposed that he should provide sufficient "hostilage" for the Abbot and his successors, or any of the Monks of that foundation, when they should have occasion to visit Dundee. An adjoining property belonged at this time to Roger del Wend (of the Wynd), which remained in his family for several generations. The Castle Wynd in his charter was designated Roger's Vennel, probably so-called because the frontage of his property impinged upon the Wynd. The tenement next to that of Roger belonged to Waryn Porrok early in the thirteenth century, and came from him to Lord Henry de Hastings, by whom it was granted to the Abbey of Balmerino, as formerly stated. It was afterwards held by Gregory de Schyrhame, tenant of the Abbey, whose wife or daughter, Marjorie de Schyrhame, in 1326, and for several years afterwards, held the high position of

Custumar or Collector of the King's great customs, a position generally assigned to one of the leading burgesses. The rent paid by Gregory to the Abbey or "religious men" was 40 sol. sterling; one-half at the Feast of Pentecost, and the other at Martinmas in winter. The property consisted of two perticates of burghal land with the pertinents, and was bounded on the east by the land of Harvey de Douny. It is likely that Gregory's property included the two gifts of land to Balmerino mentioned above. Harvey de Douny's land is quoted as a boundary in 1268, and also in 1317. Henry, called Hastings, son of Albert of Dundee (not to be confounded with Lord Henry de Hastings), had the tenement nearly adjoining on the east of that of Harvey de Douny in 1281; and he acquired at that date another toft on the eastern side thereof from John of the Burn. The latter place is distinctly described as "in the Seagait of Dundee." Another property to the east of this house which existed in the thirteenth century was that of Gilbert, called Gudgib, and his wife Emma, daughter of Peter of Whitefield.

**The Castle  
of Dundee.**

The properties described were clustered around the hill on which the Castle of Dundee was erected. No trace of this building now remains, and though from its history it is apparent that it was regarded in warlike times as a place of great importance, there are few clues afforded as to its extent or appearance. It is not known when it was built, nor whether it was the chosen residence of King Edgar, although it seems probable that in his time no monarch would have trusted himself in the undefended house of a burges. As a matter of fact, the existence of the castle in the beginning of the thirteenth century is implied by the name of the Castle Wynd, and it is only natural to find that the burgesses erected their houses in close proximity to a place that would afford them refuge and defence. The earliest reference to the building is found in connection with the occupancy of Scotland by Edward I. In 1290 Brian de Fitz-Alan was

Custodian of the Castles of Forfar and Dundee, and the accounts for the provisions received by him for the support of his soldiers are still extant. When the castle was besieged by Sir William Wallace, and the burgesses of Dundee were ordered to maintain the blockade of the citadel, Wallace was suddenly called away to another part of the country. Gilbert de Umfraville, Earl of Angus, succeeded Fitz-Alan in the office of Castellan, and on 10th June 1291 Edward I. undertook to indemnify him for the surrender of the Castles of Dundee and Forfar, issuing a further order two days afterwards that he should not deliver these castles except to the King or his emissary. After Edward had decided the contest for the Crown of Scotland in favour of John Balliol, he issued a mandate as Lord Superior to Brian de Fitz-Alan, dated 18th November 1292, directing that the Castle of Dundee should be handed over to Balliol's custody as King of Scotland. In 1295 Balliol held this castle as an appanage of the Crown, and directed that it should be given as one of the warranties for the payment of 1,000 livres of annual rent, which he bestowed upon his eldest daughter on her marriage with the son of Charles, Earl of Valois. It is often stated that by Wallace's instructions the Castle of Dundee was totally destroyed about this time; but this statement cannot be reconciled with the after history of the castle. If this had been the case, Wallace would not have granted a special charter to Sir Alexander Strymgeour appointing him Constable of the Castle of Dundee on 29th March 1298. Still further proof is afforded of the continued existence of the castle by a series of charters, now in the possession of the Earl of Lauderdale, confirming this office of the Strymgeours in 1302 and 1303, wherein the Castle of Dundee is repeatedly mentioned. From various records of the time, but principally from the Rolls preserved in the Chancery Office, London, many particulars as to the provisioning of the Castle of Dundee may be found. A few of these may here be noted, both as bearing upon the history of the castle and as illustrating the customs of the time. In June 1308 Sir Alexander

Abernethy, Sir Edmond de Hastings, and Sir John de Fitz-Marmaduke were appointed "to be wardens beyond the Scottish sea, between the Forth and Orkeneye, with 120 men-at-arms, besides garrisons, and that in their commissions each be bound to aid the other if need be when required." On 12th May 1309 the King of England sent for the munition of the Castle of Dundee, then under the charge of Sir Edmond de Hastings, 500 stock-fish, 8 bacons, 50 quarters of grain, 50 quarters of barley, 30 quarters of beans and peas, and 30 jars of wine.

The next Governor of Dundee whose name is found in connection with the castle was Sir Piers de Gavestone, Earl of Cornwall, the unfortunate favourite of Edward II., whose fate was one of the tragic incidents in the history of his time. In January and February 1310-11, Sir Piers de Gavestone resided in the Castle of Dundee as Warden and Lieutenant of King Edward in Scotland north of the Forth.

Two curious entries occur in the Exchequer documents of the reign of Edward II. which are suggestive as to the history of the Castle of Dundee. On 24th May 1311, it is recorded that 13 quarters 4 bushels of beans and pease were bought at 8s. 6d. per quarter from Thomas Tresk, merchant in the port of Dundee, by order of Sir Robert Umfraville, Earl of Angus, for the use of Edward's men in the district north of the Forth. This document was signed at Dundee. In January 1313-14, while Edward II. was preparing for his expedition to Scotland, an order was issued for payment of a quantity of malt and beans bought for him in the port of Dundee for the use of the garrison there. Before this account was paid the decisive Battle of Bannockburn had been fought, and even as late as May 1316 the hapless merchant who had effected the transaction was still claiming the account.

After the departure of Piers de Gavestone from Dundee the custody of the castle was committed to Sir Alexander de Abernethy, whose fee for one year amounted to £186. The army list of the period gives full details of the

**Extent of  
the Garrison.**

number of men-at-arms that then formed the Castle of Dundee, and the distinctive marks and value of their horses. The fortress must have been of considerable extent since there were not less than 130 knights and horsemen maintained within its walls. The names of these soldiers show that many of them had been drawn from leading families in Fifeshire, Forfarshire, and Perthshire; whilst the custodian of the castle was that Sir Alexander de Abernethy, already mentioned, who was a scion of an old Perthshire family. His lands were afterwards forfeited and conferred upon Robert Bruce, who was described as "son of Robert I." In 1312, William de Montfitchet was Warden north of the Forth, and commanded the garrison at Dundee, having David de Brechin, nephew of Robert I., conjoined with him as Warden. The Scottish soldiers had closely besieged the place, and Edward sent letters of commendation to the community, thanking them for their services on his behalf. Nevertheless the Castellan was so hopeless of maintaining the castle that he entered into a treaty with the Scots, whereby he undertook to surrender the place and release a number of Scottish prisoners within a given period. King Edward, who was then at York, at once repudiated this treaty, and sent peremptory orders to Montfitchet directing him to violate the truce and to preserve the town under threat of death and confiscation. Montfitchet was further commanded to warn the Scots that if any of the English prisoners were put to death a terrible revenge would be taken upon the Scottish prisoners whom the King held. To relieve the garrison Edward sent John Porlot as an emissary with instructions to Montfitchet to defend the town and the captives, and empowering him to retain the ransom money that might be paid for the release of prisoners. At the same time the King instructed the officials of Newcastle and Berwick to provide vessels and barges to transport men-at-arms and foot soldiers for the rescue of Dundee, and to carry with them "aketonis, hawberks, bacenittes, and victuals for the supply and defence of the aforesaid town of

Dundee." Whether these reinforcements were too late in reaching the town, or whether Montfitchet adhered more faithfully to his plighted word than Edward desired, is not recorded; but it is certain that shortly after this time the Castle of Dundee was in the hands of Sir Edward Bruce, brother of the King of Scotland, and it is likely that the possession of this and other important strongholds made the Battle of Bannockburn possible.

**Last Trace of  
the Castle.**

On reviewing all the available evidence relating to the Castle of Dundee, it seems probable that this fortress was not destroyed by Wallace previous to the Battle of Falkirk, but was dismantled, though not utterly demolished, by Sir Edward Bruce when he razed other fortalices in Scotland, so that the whole of the Scottish forces might be concentrated at Bannockburn. From the date of Bannockburn the Castle of Dundee disappears entirely from history. On the other hand, it is not at all improbable that the English forces, not receiving the support which they expected, abandoned the castle, destroying its fortifications and made their escape by sea. The Scryngeours, who had faithfully adhered to Robert Bruce throughout his struggle, had necessarily been deprived of their hereditary office of Constable of the "Castle of Dundee" during the English occupancy. But when Robert I. regained his kingdom he was not unmindful of those who had served him with unwavering devotion. When peace had been restored the King granted a charter to Nicol Scrymgeour, dated 13th February 1317, whereby he confirmed to him the office of Constable of Dundee, and it is noteworthy that no mention is made in this charter of the Castle of Dundee, though the charter by William Wallace had appointed Alexander Scrymgeour to the *Constabularia Castri de Donde*. It is a legitimate inference that the Castle had ceased to exist before 1317, and it is also remarkable that in the charter confirming the rights of the burgh, granted by Robert I. in 1325, no reference whatever is made to the castle. Nevertheless, it appears

that the office of Constable of Dundee was linked in some mysterious way with the site of the castle, for the Constables held their barony courts for centuries on the Castle Hill. The name survived long after the building had disappeared. The Castle Wynd, the Castle Hill, the Castle Mills, and the Castle Burn, were constantly used to describe localities long after every vestige of the building had gone, and even to this day the name is perpetuated in Castle Street, which was so denominated nearly five hundred years after the castle had been demolished.

**Shipping and  
Commerce.**

The shipping and commercial history of Dundee can be traced back for a very long period. Reference might be made to the ships of Malcolm Canmore that entered the river in pursuit of Macbeth about 1040, and although no records of commerce exist regarding this period, it is certain that a river which was navigable for ships of war would afford equal facilities for those engaged in commercial enterprise. It is remarkable that the earliest charter to the burgh of Dundee—viz., that given by William the Lion, and confirmed by Robert the Bruce—granted a free harbour to the burgesses, thus implying that a harbour had been in existence before his time. The first reference in documents to the existence of an actual shipping harbour is found in connection with the Abbey of Coupar. Dundee was the port at which all merchandise arriving in Scotland for the use of the Abbey was received, and on 11th April 1225 Alexander II. granted a license for a vessel to the Abbot of Coupar "to export wool and other merchandise to Flanders under the charge of Robert of Pert and Friar Gilbert, smith." The confirming charter of Robert the Bruce specially refers to the existence of a harbour in the time of Alexander III. That Dundee was used as a harbour for imports in the thirteenth century is amply proved by numerous entries in the Exchequer Rolls. In 1264 the wine which was brought to Scotland for use in the Castle of Forfar was landed at Dundee, and in the same year there was bought

at the Fair of Dundee, for the King's use, cloth and furs, which must have been imported. The famous letter addressed by Andrew de Moravia and William Wallace to the Mayors of Lübeck and Hamburg, dated 11th October 1297, by which they declared that all the ports of Scotland were open to trade, must have been of special value to Dundee, as that burgh was then one of the principal places engaged in foreign trade. Robert Bruce's charter of 1327 not only confirmed earlier privileges to Dundee, but also forbade "foreign merchants disposing of goods brought by land or sea until they shall have landed and exposed them in the said burgh for sale, under pain of imprisonment and forfeiture of all the goods to the burgesses."

**Naval  
Incidents.**

The situation of Dundee, whilst making it a convenient port for the development of commerce, laid it under peculiar danger from the attacks of an enemy. However extensive might be the landward defences of the burgh, so far as approach by water was concerned, Dundee was what old chroniclers called a "nakit toun." The rapid growth of commerce has been already partially shown, and it may be convenient here to refer to the misfortunes that fell upon Dundee through the operations of her naval enemies. In 1332, when Edward Balliol led his troops through Fife, towards Perth, before the Battle of Dupplin, he directed that his ships should wait for him at the entrance of the River Tay, but his fleet was there attacked by John Crabbe, a Flemish mariner, who came with ten vessels to the mouth of the river and captured one of Balliol's ships belonging to Henry de Beaumont. Shortly afterwards, however, Crabbe's fleet was destroyed in a general engagement, and the disaster ultimately told severely against Dundee. When Edward III. invaded Scotland in 1335, the ships which he sent from Newcastle entered the Tay and burned the greater portion of Dundee, including part of the Franciscan Monastery that had been founded by the ancestress of Edward Balliol. In the

“Chronicle of Lanercost” this incident is described as follows:—“The ships of Newcastle burned the greater part of the town of Dundee, and the dormitories and schools of the Minorite Friars; and the great Bell thereof they took away, and one Friar they burned, who in secular life had formerly been a soldier, but nevertheless a man of good parts and holy character. The bell they exposed for sale at Newcastle, which was bought by the Preaching Friars of Carlisle for ten merks; the one not having the right to sell, nor the other the right to buy.” A more patriotic incident in the history of Dundee is that recorded by Wyntoun, when he relates how Walter of Currie, William Fraser, and William Bullok, in 1341, provided a ship in Dundee, and embarked with the Knight of Liddesdale from the port with the intention of surprising and capturing Edinburgh Castle—a project that was carried to a triumphant issue. In the various historical accounts that are given of this incident by Lord Hailes and others, Walter of Currie is described as a merchant of Dundee, the proprietor of the ship which carried the soldiers of Douglas and his companions. From the account of William Bullok as Chamberlain of Scotland, rendered at Dundee on 11th June 1342, it appears that Walter de Currie and his comrade, William de Fairley, had received 100 lib. from the Parliament which was held by David II. at Scone in that year.

In 1378 the great schism took place in the Church of Rome, whereby Pope Urban VI. was deposed and Clement VII. appointed as Pope in his stead. In this dispute Scotland and England supported the rival claimants, the former country adhering to Pope Urban and the latter to the Anti-Pope. Robert II. of Scotland sent as his emissary to Rome, Duncan Petyte (Small), who set out from the harbour of Dundee, where he had been detained for a considerable time waiting for a ship. Although his mission was not successful in averting the division in the Romish Church, his services, both on this and later embassies, were acknowledged and rewarded by his royal master, and he ultimately became Chancellor of Scotland.

There is one memorable incident connected with Dundee which appears to have been misunderstood by some of the historians. It is well known that in 1390 Sir David Lindsay of Glenesk, afterwards Earl of Crawford, challenged Sir John de Welles, an English knight, to a duel, under the auspices of Richard II. of England. It has been alleged that Lindsay, with his retinue of twenty-nine esquires, men-at-arms, valets, and boys, with thirty horses, embarked at the Craig of Dundee to sail for London in the ship "St. Mary." This statement, however, is not supported by the documents relating to this journey which are still preserved. It is certain that Richard II. granted a safe conduct to Sir David Lindsay and his retinue on 22nd January 1390, which was to extend for two months from 1st April in that year. The privilege had not been utilized, however, because Sir David twice obtained a renewal of it—on 14th May, extending the time to 14th July, and then on 25th May, renewing the safe conduct for two months from 1st June. At the date of the last renewal, 25th May, a special privilege was granted by Richard II. to the "'Seinte Marie,' ship of Dundee, whereof William Snell is master," to permit of the carrying of one whole suit of armour for Sir David Lindsay; and this safe conduct also extended for two months from 1st June. An examination of the dates of these documents discloses two errors regarding this famous duel that have hitherto been unnoticed. The date of the conflict is variously given by different writers. Wyntoun, in describing the duel, distinctly states that it took place on 6th May. Hector Boece, on the other hand, asserts that Sir John de Welles chose London Bridge as the place of the duel, and that Sir David de Lindsay selected the Feast of St. George the Martyr as the day of this encounter; and he further adds that it was in consequence of his victory that Lindsay founded his Altar to St. George in the Church of Dundee. It is evident from the documents quoted that Sir David had not set out for London before 1st June 1390, and therefore could not have fought the duel on St. George's Day, which fell on

23rd April. For the same reason Wyntoun's date is incorrect, and it is likely that he had only heard of the first safe conduct, in which the date of the duel was set down for 6th May. Boece's theory about the foundation of the altar is a mere afterthought, as the altar was not endowed by Sir David Lindsay until 1406, eight years after he had been made Earl of Crawford.

A memorable incident in the naval history of Scotland is connected with the harbour of Dundee as it existed at the close of the fifteenth century. The famous Sir Andrew Wood of Largo, one of the most renowned of the naval heroes of the time, was a merchant trader originally in the burgh of Leith, who had extensive commercial relations with the Low Countries. In those days it was necessary for every trader to carry his merchandise in armed vessels capable of resisting the English pirates who infested the North Sea. There was then no Scottish navy, for the few ships that belonged to the King were usually hired to the merchants when they were not engaged in active warfare. The principal ships of war at this time were the "Yellow Carvel," the "Flower," the "Douglas," the "Cristofir," the "Jakat," the "Mary," and the "Ros." These vessels, though the property of the King, were hired to men like Sir Andrew Wood, Andrew and Robert Barton, and others, who navigated the vessels containing their cargoes across the sea to Flanders, and defended them against the enemies of the nation. It is recorded that the barque "Douglas" and the ship "Cristofir" were both hired in 1496 from the King, the one for £45 per voyage, and the other for £100 per annum. The "Yellow Carvel" was under the command of Sir Andrew Wood, who had been knighted by James III., and was esteemed one of the bravest commanders of the period. His services in suppressing English piracy were rewarded with a free gift of the lands of Largo in Fifeshire, and a curious charter confirming this gift relates that the Tower of Largo was built for him by the English pirates whom he had captured. The crowning act of his career was the famous naval battle which he had in 1489 with Stephen Bull, an

Englishman, whom Henry VII. of England had sent to the north to molest the Scottish traders, though the two nations were then at peace. Stephen Bull having received intelligence that Sir Andrew Wood was returning to Scotland with a rich cargo from Holland, set out with three armed ships to lie in wait for him, and took up his position near the Isle of May. Sir Andrew had two ships under his charge, and was sailing homewards anticipating no interruption when he was suddenly surprised by the appearance of three hostile vessels that sailed down upon his little fleet, and endeavoured to take possession of his ships as prizes. By the exercise of superior nautical knowledge Sir Andrew was able to offer a desperate resistance. The conflict was long and severe, and night found the combatants still fiercely engaged. In the leisurely manner of conducting warfare prevalent in those times the combatants separated, but hostilities were renewed at early dawn. The ships meanwhile had drifted northwards to a part of the North Sea more familiar to Sir Andrew than to his opponent, and in a short space of time he had the English fleet entirely at his mercy. It is related that he towed the dismantled English vessels triumphantly into the harbour of Dundee, and sent Stephen Bull and the English pirates as prisoners to the King, who magnanimously despatched them to England, warning King Henry against making another attempt to break a covenanted peace.

Another historical event which shows the importance of Dundee as a maritime burgh took place in 1547. Henry VIII. had cherished the project of securing the hand of the infant Mary, Queen of Scots, for his son Edward, Prince of Wales, but his intentions had been thwarted, mainly by the policy of Cardinal Beaton. When that astute politician was violently removed in 1546, a peace was patched up between the Governor Arran and King Henry, and on 21st August of that year this peace was proclaimed at the Cross of Dundee; the mariners were forbidden to attack English ships, and it was ordained that no ship should go to sea equipped for war

without a royal license. Before the death of Henry VIII., on 28th January 1547, however, this peace had been broken, for when he found that the youthful Queen was not easily to be gained by him he invaded Scotland, destroying many of the ecclesiastical houses. The Protector Somerset, to whose charge the young King Edward had been committed, carried on the invasion of Scotland, and defeated the army of the Queen Regent at Pinkie Cleuch on 10th September 1547. The details of this campaign need not here be related, it is sufficient to say that the English entered the Tay, captured Broughty Castle, and ultimately obtained possession of the town of Dundee, which they fortified. Sir Andrew Dudley, who was Admiral of the English fleet, and commanded the ship called the "Panncy," protected the town from attack by sea in conjunction with Admiral Wyndham, and it was whilst the burgh was in their possession that the English landed on the southern shore of the Tay, and attacked and destroyed Balmerino Abbey. For eight days the English forces held Dundee, and began the erection of the first wall, which was intended to protect the town on the landward side. Meanwhile a portion of the army of the Queen Regent was sent from Leith under the command of Count Rhinegrave and the Seigneur D'Etanges. A contemporary account of this campaign was written by Jean de Beaugué, and published at Paris in 1556. This work was translated into English and published in 1707, but some of the portions relating to Dundee are not literally in accordance with the original French. The following are several of the references which Beaugué makes to Broughty Castle and Dundee:—"It may seem possible to some that I have been too much in advance in the history of Scotland without having made fuller mention of Lord Gray. I would say, therefore, that this nobleman, willing to favour the English, had voluntarily given up one of his houses called Portygrés (Port-on-Craig—Broughty Castle) splendidly situated on the bank of the river Tay, one of the most navigable rivers in all Scotland, where ships of 300 and 350 tons burden may enter from the sea and

anchor at 100 or 120 paces from the Castle." After describing the unsuccessful siege of Broughty Castle by the Earl of Argyll and his "savages," the writer goes on to explain that the English had built a small fort on a hill about 900 paces distant from Broughty, that they might defend the Tay; "because they assured themselves that thereby they would have an easy entry into Scotland." Alluding to Dundee he describes it as "one of the most beautiful and most populous towns of all the country," and states that "though it was situated in a quarter the richest and best built in all the realm, and could easily be rendered invincible, yet at all times the Scotch care so little for fortifying themselves that the inhabitants of Dundee have no other place of refuge nor fort to which they may retire save their own houses. In consequence of this defect the English found no great resistance," but when they had obtained possession they began the erection of defensive works. The advance of the foreign troops of the Queen Regent before these fortifications were completed forced the English to abandon Dundee, and having pillaged the town and set it on fire, they retired to the refuge of Broughty Castle. Beaugué says that when the foreigners entered Dundee expecting to give battle to the English "they found no one there but some poor women and a few men who were striving to extinguish the fire which the English had applied to their houses." Ample proof of the devastation committed by the English may be found in charters relating to the latter half of the sixteenth century, wherein tenements are described as "wastit and brunt by oure auld innemyies of England."

The next important historical event connected with the harbour of Dundee relates to the escape of the Earl of Bothwell in 1567, after the Battle of Carberry Hill. The exact route chosen by the Earl for his escape has never been clearly traced, but from references found in the Records of the Privy Council it is certain that he made his way to Dundee. For months there were rumours of the fugitive current along the east coast as far north as

Shetland, and special instructions were issued to some of the Dundee shipowners to "serch and sek" for the Earl of Bothwell, and to bring him captive to Edinburgh. Amongst the Dundee shipmasters who were most active in this search were Thomas Crystell, master of the "James"; Thomas Kinloch, master of the "Prymrose"; and Alexander Strauchachin, master of the "Robert." Their quest was unsuccessful, and the hapless Earl paid the penalty of his misdeeds by expiring in the Castle of Malmoe, in Denmark, after ten years of miserable captivity. Even after the Union of the Crowns the shipping was regarded as an important defence. In a proclamation by James I., given at Thetford on the 6th December 1608, it is said that "none ar igorant bot schipping within our dominionis is both necessarye for saiftie, as being one of the most principall bulwarkis and defenses of the Iyland againe all forraine invasioun, and als is expedient and proffitable for traffiquie, one of the great meanis of enriching the same." The few vessels of war that then formed the navy were unable to afford much assistance to the traders, and commerce was carried on under difficulties.

**The Harbour of Dundee.** As a maritime port the prosperity of Dundee has ever been closely associated with the extension of its harbour. Allusion has already been made to the gradual development of a convenient harbour from the natural haven of prehistoric times. It is difficult to tell when the first built harbour came into existence, though the reference in the charter by Robert I., dated 1329, to a "free harbour" existing in the time of Alexander III. shows that works of some kind had been erected in the thirteenth century. There are frequent references previous to 1329 to the sending of batelles from Dundee to Leith with victuals for the King's use, thus showing that Dundee was the principal port for the transmission of home produce from the north to the south of the Forth. In 1447 it was proposed that the harbour of Dundee should be repaired, and James II. gave letters patent ordaining that

money should be lifted for that purpose from vessels frequenting the port. A charter to that effect, ordering also the enlargement of the harbour, and sanctioning the impost, was granted by the King in 1458. This impost was afterwards known as "havin silver," and was regularly levied for centuries. Numerous allusions to the difficulties encountered by the Town Council in the maintaining of the haven and bulwarks are to be found in the earliest extant Minutes of the Council. That the authorities fully appreciated the importance to the burgh of the upholding of the harbour is amply shown by these records. Thus in 1567 the following statute was made by the Guildry in conjunction with the Town Council. "It is prestly considerit be the saids Provest, Baillies, Cunsall, and deacones of crafts, and comitie of this Brugh hes found that the hewin Shoar and Bulwark of this Brugh, Qhilks are the princ<sup>l</sup>l pairtes of the policy and common wiell of this brugh, are greatly decayit, ruined, And able to perish in short Tyme. Throw the qhilk, trafect and exchang of this Brugh be sea is able to be vterly lossed. Therfor, and for support of the saids places and policie, It is statut and ordainit that ilk Time of friemen's guides arryvand at this port, Qhilkes payes no small coustome, whither they be merchand craftesmen, skippers, or mariners, sall pay to the reparatiene of the said Havin, Bulwark, Shoar, and pier, four pennies. And all vther goods conforme to the Tun to pay the said four pennies. And siclike that all awners of shipes, freemen of this Brugh, That payes not the saids small coustomes, Shall pay for the uphold forsaid four pennies of every Tun fra hand in the sd. shippes. And that two Tunes sall only pay four pennies. And the Tun of aill and vther guides and geir wtout exception to pay the sd. four pennies. And this pres dewty to be Takin up for the space of Twa years allennarly." In 1574 the City of Perth applied to the Privy Council complaining that the dues lifted by Dundee were far beyond what was required for the upkeep of the harbour, and after examination into the case the Privy Council ordained that the "towst" should still be levied by Dundee, and that

Auchinlek of that ilk should see that the funds were duly applied for the purpose intended. A severe storm, which occurred in the winter of 1600, had destroyed the harbour so seriously that an application was made to James VI. for assistance. The petition thus described in detail the damage done:—"The pier of Dundee be occasioun of tempestuous wedder, inundations of fluds, vehement stormes, and grit streames, having become ruinous, the port and heavin thair of sua fillit with beildis of sand, grite craigis and rolling stanes, the small remanent of the eisclair work thair of brocht sindrie and schaikin loose, sua that the samyn almaist appeiris to be utherlie rewynit and subvertit." The King was pleased to grant a letter under the Privy Seal to uplift a towst for three years from all ships using the harbour, that the necessary repairs might be made. The money thus obtained was found to be quite inadequate to defray the expenses, and accordingly a new application was made in 1607 for a continuance of the shore dues. The Privy Council renewed the towst for five years, and arranged the tariff of charges to be exacted. On the expiry of this term in 1612 it was again granted by the Privy Council for nineteen years. The important charter given to Dundee by Charles I. on 14th September 1641 not only confirmed the gifts made by the King's predecessors, but also defined the powers of the Town Council with reference to the loading and unloading of ships on both sides of the Tay, and granted a new imposition to enable them to erect sufficient buoys and signals to mark out the approach to the harbour. The extent of the harbour in those days is not distinctly described in any documents of the period, but if the statement of Dr. Gumble, the biographer of General Monck, may be accepted, the harbour accommodation must have been extensive. He relates that when Dundee was captured there were sixty ships of all sizes taken in the harbour, many of them containing the property of the southern Scottish nobles, who had removed their valuables to Dundee for safety. A more exact estimate of the extent of the harbour may be framed from

Tucker's Report of 1656, at which time there were ten vessels registered as belonging to the port, varying from 25 to 120 tons burden. To this number, of course, should be added the foreign trading ships belonging to Norway, Holland, France, and Flanders, for which haven accommodation must have been provided. In October 1658 the harbour was again seriously injured by a violent storm, which, following upon the devastation committed in September 1651 had reduced the town and impoverished its inhabitants. In the following year an Act of Parliament was passed recommending "the condition of the said burgh of Dundee to the Archbishops, Bishops, and ministers of the gospel, and all incorporations within its Kingdome, for a frie and voluntar contribution to be collected and gathered for the helpe and supplie of the said burgh towards the reparation of their harbour and bulwark." It does not appear that this recommendation was of much service to the burgh, for in 1675 the Town Council found it necessary to reconstruct a great portion of the harbour works, taking away the "west goat," removing what is described as the "great stone haid," and using the stones thereof, directing that these "should be built upon the old foundatione wher they stood formerlie." This statement implies that an extensive alteration had been made upon the harbour at an earlier date, and had been found inconvenient. Some idea of the appearance of the harbour at this time may be formed from Slezer's picture of "Dundee from the East," which was drawn in 1678, and published in 1693. Subsequent to this date repeated attempts were made to have the upholding of the harbour defrayed by a suitable scale of dues, but the exposed situation of Dundee, and the damage frequently done by the Tay when in flood, made the task a serious one. In the edition of De Foe's "Tour" published in 1761 the following passage occurs:—"The harbour of Dundee was formerly very good and safe; but of late years it became so ruinous, and choked up with sand, that it would not contain, as antiently, ships of burden, except at the highest tides; and its piers were so out of repair that

ships could not lie in it with safety. At the same time the Tolbooth and public Gaol were so much decayed that they were obliged to be pulled down; and the town being in debt besides could not rebuild the same. Wherefore, to answer all these good purposes, and to pave the streets, discharge their debts, and provide salaries for school-masters to instruct their children, an Act was passed, anno 1731, for continuing the duties imposed by a former Act, then near expired, of two pennies Scots upon every pint of ale and beer sold within the town and its privileges for twenty-five years longer." Bishop Pococke, who visited Dundee in 1760, thus describes the harbour:—"We came to Dundee. The bay is called the Firth of Tay. This town is rather above it on Tay River, well situated on a head of land where they have made what they call a Harbour, or rather a Basin, with two great piers, one to the east, the other to the west, and a pier in front, with an entrance on each side; here a ship of 500 tons can lye." The after history of the harbour need not here be detailed. The accommodation was found insufficient in 1814, and in the following year a Bill for the Improvement of the Harbour became law. The laying of the foundation stone of the extensive new works took place on 13th October 1815, and the local papers say that "We have never heard of such a day of rejoicing in Dundee."

**Civic  
Government.**

Though the very remote civic history of Dundee is involved in obscurity, the development of its local government can be readily traced for seven hundred years. That Dundee had a corporate existence in the twelfth century is shown by references to the burgesses which are found in documents about 1190. Towards the close of the succeeding century the civic government of the burgh was under the charge of a Provost, while a military Governor resided in the Castle. The charter of 1296 by Sir William Wallace appointed a hereditary Constable of Dundee, to whom the military defence of the burgh was committed.

At a much later date the Constable sought to control the whole of the civic affairs, but his claim was successfully resisted by the Provost and Magistrates, who asserted their right to rule in time of peace. These civic rulers were chosen by the burgesses from amongst their own number. In 1442 the charge of the maintenance of the kirk fabric was committed to the Town Council, and thenceforth the Kirk-master became one of the municipal officials. After the institution of the Guildry in 1515 that corporation was empowered to have representatives in the Council. The Nine Incorporated Trades were also entitled to representation at the Town Council, and the whole of the members of the Council held office for one year. The Harbour in the middle of the sixteenth century was under the charge of a special Councillor, designated Pier-master or Shore-master. The secularization of the church endowments in Dundee at the Reformation brought into existence another official called the Hospital-master. In course of time changes were made in the practice of election, by which, without special parliamentary ratification, the Town Council altered its constitution very considerably. In 1708 the method of election was as follows:—The Town Council was composed of twenty-one persons, including the Provost and four Bailies. The latter were chosen, together with the Dean of Guild and the Treasurer, from the Town Councillors of the preceding year. Eight new Councillors were selected, five of them from the Guildry, and three from any separate three of the Incorporated Trades, and the twenty-eight Councillors then proceeded to select the office-bearers for the ensuing year. The Provost had to be chosen from the Bailies of the preceding year; the Bailies from former Councillors; the Dean of Guild from the existing Bailies; and the Treasurer from amongst the new and old Councillors. This method of election continued in force for many years, but the opportunities for corruption in municipal government were so numerous that a reform was proposed towards the close of the eighteenth century. The Convention of Royal Burghs in 1784 obtained reports as to the setts of the principal

burghs, and the following is that which relates to Dundee:—"The Council at present consists of twenty members. The old chooses the new Council. The old and new Council, with the Deacons of the Incorporations, elect a Provost, four Bailies, and a Treasurer." Various proposals were made at this time for the reform of the sett of the burgh, but no definite action resulted, and it remained in force until 1817. Another attempt was then made to improve the constitution of the Council, but the only change seems to have been the admission of the Convener of the Nine Trades as a Councillor *ex officio*. Two years afterwards an appeal was made to Parliament, and a Committee appointed to report to the House of Commons; but the recommendations were not followed by legislation. It was not until the Burgh Reform Act of 1834 came into operation that the old monopoly was effectually broken up. By this Act the right of election was vested in householders paying a clear annual rent of £10 and upwards; the Councillors were elected to serve for three years; the Council consisted of twenty-one persons, seven of whom retired annually in rotation, and they elected the Provost, Bailies, and other officials from the new Council. The franchise was extended in 1868 to include householders who were assessed for and had paid poor rates. In 1871 a local Act was obtained whereby the Council was increased to twenty-eight members, being three members for each of the nine wards, with the addition of the Dean of Guild. On 26th January 1889 Queen Victoria granted a Royal Charter elevating Dundee to the rank of a city; and on 12th February 1892 a Royal Warrant was issued decreeing that "for all time coming the Chief Magistrate of Dundee shall be known by the style and title of Lord Provost." By an Act of Parliament which came into force on 4th October 1894, Dundee was constituted a County of a City, the Lord Provost being *ex officio* Lord-Lieutenant. By this latest arrangement all possible disputes as to civic and military control are finally terminated, since the Lord Provost will henceforth act in both capacities within the boundaries of Dundee.

## Dundee: As it is.

By J. H. Martin, J.P., Ex-Magistrate of City  
of Dundee.

WHETHER as Fishing Village or Burghal Town, Dundee has always been a place of considerable note. For many years it has maintained its position as third city in Scotland as regards population and second in commercial importance. From small and ancient beginnings it has been made by the activity of generations of its sons into a great and progressive modern City; and while not free from blemishes that attach to great communal aggregations, its natural situation and surroundings, combined with the lofty ideals of its leading citizens, bid fair to bring it in the near future into a premier position amongst the cities of the United Kingdom. Owing to the untoward industrial conditions of recent years, Dundee has meantime lost the rapidity of growth that characterised it in the mid-Victorian days; but its progress in population has been an unbroken march for over a century, and in this connection it may be pointed out that whereas in 1867 its inhabitants numbered 104,000, the figures as ascertained in the census of last year stand at over 165,000. But striking as these figures are, they present an incomplete statement unless there be added to them the large number of persons (say 30,000) who reside in the outlying but contiguous townships, most of whom have a vital connection with Dundee, and will at a time not far distant be united with the larger section for purposes of local government and administration. It may also be noted that Dundee is in the midst of a progressive part of the country. In the adjacent Fifeshire coal area the population is rapidly increasing, and at present the combined inhabitants of Dundee and the surrounding district are set down as over 600,000.

Undoubtedly the great factor in the rapid rise of the population of Dundee was the Jute Industry. By laying hold of this commodity in the early stage of its develop-



HIGH STREET LOOKING EAST (SHOWING CITY CHAMBERS).



ment a practical monopoly of a world-wide demand was secured. At that period the City may be said to have advanced by leaps and bounds. In the twenty years from 1861 to 1881 the population increased by 50,000, or at the rate of 2,500 per annum. In the forty years prior to 1861 it did not increase by 900 per annum, whilst in the thirty years since 1881 the increase has averaged less than 700 per annum.

In regard to the City itself, it may be said to be no unworthy home for such a teeming population. Much has been done in the way of improvement since Queen Victoria wrote, on disembarking from the river, "Dundee is a very large place, and the port is large and open; the situation of the town is very fine, but the town itself is not so." Although it were to offend the historic sense to apply the well-known phrase "Bonnie Dundee" to the locality, yet, when regard is had to the natural situation—truly "a City set on an hill"—skirted by the blue waters of the estuary of the Tay and guarded on the north by the local hills and the more distant Sidlaw range, the phrase may be admitted as not inapplicable. And while Nature has thus done much for Dundee, its civic fathers and public-spirited citizens have, very specially during the past generation, busied themselves to re-create the town, so that narrow wynds have given place to broad boulevards and erstwhile congested areas have become wholesome open spaces—a policy which has added greatly to the attraction of the City and improved not a little the general health of the community.

Reference has been made to the River Tay, on the north bank of which Dundee is finely situated. It may be said that physically the City's best asset lies in the fact that she is a seaport. There is regular communication by sea with all the great ports in England and Ireland, and many on the Continent, while the great jute-laden vessels from India form a yearly argosy far exceeding in value and importance those of Ragusa and Venice. At present everything points to the further development of the resources of the port. In this way the volume of the over-sea

trade may be expected to increase and new interest aroused in connection with the shipbuilding industry. Some years ago Dundee Harbour was created a Naval Base and the waters of the Tay utilised as an anchorage for submarine craft. While this may not have brought "grist to the mill," it has undoubtedly aroused fresh interest in the port itself and brought the City into the focus of certain present day movements.

Municipally the City is governed on progressive lines. Its boundaries comprise 5,281 acres, and include 648 streets and roads, the total length of which exceeds 90 miles. During the forty-five years that have elapsed since the former visit of the British Association to Dundee, 306 of these streets, aggregating in length 32 miles, have been constructed. Within the same period much attention has been bestowed on the public health and sanitary conditions. Within the burgh there are over 98 miles of sewers, and these, combined with the natural declivities of the site, have greatly aided in saving Dundee from the ravages and epidemics that were common experiences in former generations. The death-rate last year was 17.23 per 1,000 of the population. Forty years ago the death-rate was 32 per 1,000.

Amongst contributory causes to this improved state of matters may be mentioned (1) the magnificent and almost unlimited water supply, the present daily consumpt being over ten million gallons; (2) the complete and splendidly-equipped series of public baths and wash-houses, planted in every district of the City, the aggregate yearly bathers being 206,378 and those using the wash-houses 245,757; (3) the enlightened methods applied to the cleansing of the City; (4) the general supervision by the Medical Officer of Health, whose staff includes Lady Health Visitors, charged with the duties of the systematic visitation of the houses in the poorer districts with the view of directing attention to the dangers of dirt and darkness and the virtues of domestic and personal cleanliness; and (5) the fuller knowledge and higher tone in regard to matters of hygiene in nearly every class of the community.

Alongside the improved health conditions of the people may be placed the increased valuation of the City. Exclusive of churches, schools, and similar non-assessable subjects, the assessable value of the City in 1867 was £308,504, as compared with £911,546 for the year 1910-11.

An indispensable adjunct to all great cities is a system of tramways, and the Tramway Department of Dundee is one of the most important of its municipal undertakings. Its monetary value represents an outlay of over £300,000. There are 25 miles of track, covering all the important central and main arteries of the City and serving every district of the town. The passengers carried last year numbered 17,295,727, and the total revenue was £62,913.

Notable amongst the amenities of Dundee are its public parks and open spaces, of which there are twelve, their combined extent being 243 acres. These are largely taken advantage of by the people, and in the summer months the Municipality provides open-air concerts by instrumental bands. In most of the parks there are well-equipped bowling greens, which are exceedingly popular; and also gymnasia for the children, who are thus encouraged to spend much of their time in the open air. In the realm of sport, whether it be football, cricket, golf, or other popular cult Dundee is well known for keen interest and good play.

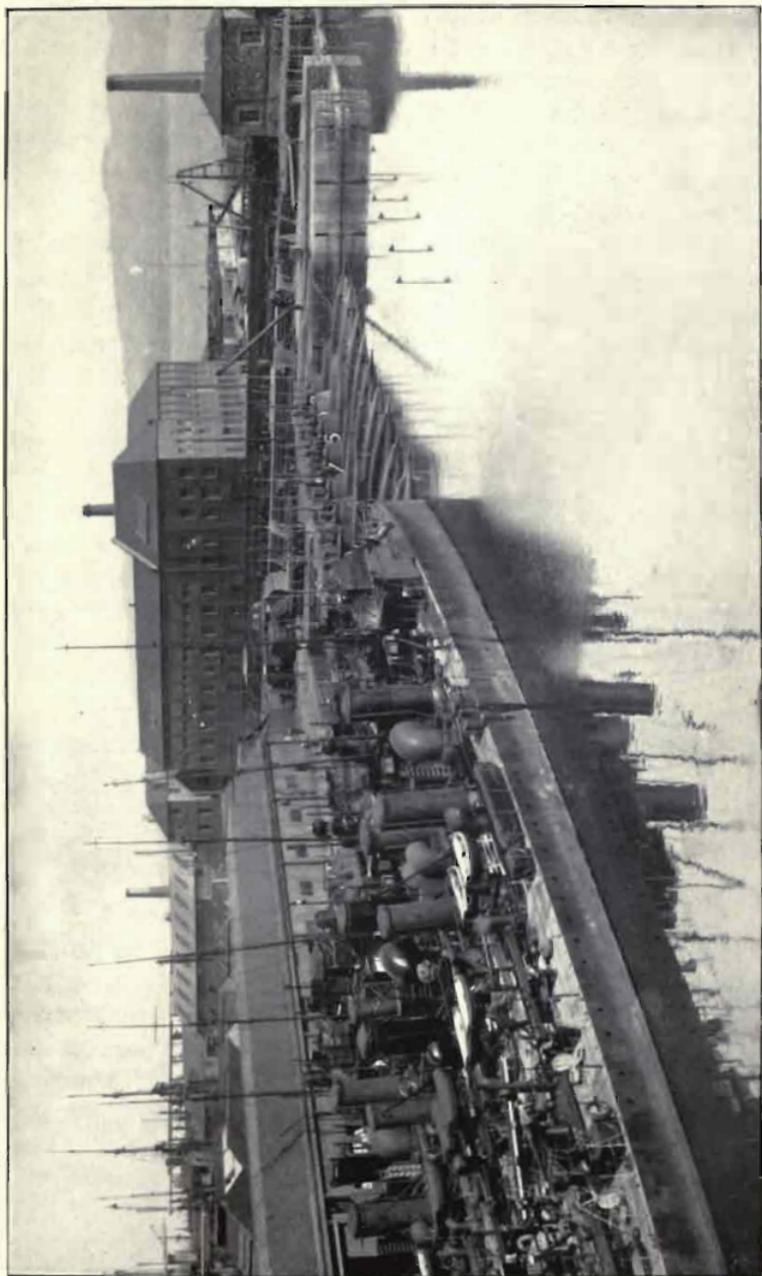
In regard to Educational opportunities, these are now tenfold what they were fifty years ago. In the higher branches the Technical College and University College have many hundreds of students, and together they link the City on the one hand to the highest utilitarian forces and on the other to the classic traditions of our oldest University.

Perhaps nowhere has the Free Library been better developed than in Dundee, which has the distinction of being the first City in Scotland to adopt the Free Libraries Act. Besides the parent institution in the Albert Institute, there are seven branch establishments, all of which are distinct ornaments to the City. The general catalogue contains 134,576 volumes, and the number of books issued

last year to 14,313 readers reached the large total of 429,303.

In fine, it may be said that there are few human activities unrepresented in Dundee. Nor have its inhabitants failed to be touched to the finer issues. Philanthropy and benevolence take full advantage of an ample field. The ameliorative agencies at work in the City are manifold. The Dundee Royal Infirmary, with its medical and maternity wards, is a boon to thousands of the poorer citizens. The Sanatorium at Auchterhouse (an appanage of the Infirmary) has brought new hope to the victims of tuberculosis; while the Municipal Dispensary comes to the help of such as must perforce stay at home. Perhaps no agency is doing better work on these lines than the Sick Poor Nursing Society, popularly known as "Queen's Jubilee Nurses." By this means the benefits of trained nursing are brought to the sick poor in their own homes. The Dundee Society has a staff of 9 Nurses and a Superintendent. Last year the patients nursed numbered 1,897, and the aggregate number of visits paid by nurses was 41,808. For the weary woman worker there is the Bannatyne Home of Rest, where on easy terms the recuperative influences of country life and happy surroundings may be secured. The necessity for a similar home for men has often been spoken of, but, so far, has not materialised.

Such references as we have made clearly show that in the almost half-a-century which has elapsed since the previous visit of the British Association, Dundee has undoubtedly acquired "nobler modes of life, sweeter manners, purer laws." Besides the varied influences and agencies which have been enumerated, there ought to be specially named the religious and moral influences which have been at work. The churches of all denominations are now more than ever actively employed in seeking the wellbeing of the people, and in this they have had no more disinterested and helpful allies than the various branches of what has come to be known as the temperance movement. Cheap and healthy amusement for the people has



SUBMARINE NAVAL BASE, KING WILLIAM DOCK.



been abundant, and many interests calling great masses of the population into the open air have been promoted, with the result that there has been a great advance in sobriety of living and a striking diminution in the cases dealt with by the local police judges. In this connection it is worthy of note that out of eight "maiden" sittings of the Police Court during the past twenty-seven years, four have occurred during the last eighteen months.

Following, and, doubtless, in many ways consequent upon the former visitation from the British Association, Dundee, as we have endeavoured to show, has in many ways been re-created. The extent of this may be seen at a glance, when regard is had to the civic enterprise which has marked the intervening years. Since 1867 there has been the municipalisation of the gas and water undertakings, the inauguration of the tramways, and the start and development of the electric department. There have also been several Improvement Schemes dealing both with the City and the Harbour. Coincident with these we have had the Education Act, and the subsequent development in education. The housing conditions are now on a much higher plane, and earnest efforts are being made to reconstruct on scientific lines the still backward parts of the City. The future of Dundee may be regarded not only without dread, but with hope and confidence.

With a well-spring of life such as the reservoir at Lintrathen, and a magnificent waterway in front such as the River Tay, no limit need be set to the possibilities of this community. But although possessing these natural advantages, it were well to remember the dedicatory words inscribed in the year 1582 on the fly-leaf of Dundee's "Lockit-Book" by Alexander Wedderburne, the Town Clerk of that time:—

"If Reason should rule in cities, it is better certainly for great souls to inhabit small houses than for mere slaves to lurk in magnificent mansions."

## Dundee : As it may be.

By Councillor A. W. Paton.

How covetable that strictly bounded mind,  
 No shreds of twilight hauging loose upon it !  
 Mine own leans out into the Dark, and so  
 Hazards its very balance, in hope to catch  
 The footfall of events ere they arrive,  
 And from the Dark wins nothing. 'Tis to no purpose  
 One plays the eavesdropper about Fate's door.  
 The servants there are incorruptible,  
 And will not sell one secret to the world.

WITH a record stretching back to the dawn of Scottish history, taking an outstanding place in all national movements from then until now, what does the future contain for the City of Dundee? While prophecy is proverbially dangerous, intelligently applied in the light of the past, it may to some extent carry its own fulfilment with it. It would, however, be foolish of me to be dogmatic on the development of Dundee as I see it, and it is therefore with all modesty that I submit the conclusions at which I have arrived in the task imposed upon me; it will be for the members of the British Association, when that august body again honours the City with its presence, to see how far short I have come or how much exceeded in my estimates of City life and progress.

**Its Growth in  
 Area and  
 Population.**

While mere size can never be altogether the measure of a City's importance, one cannot but face the question from this point of view. The writer of the preceding section of this paper on Dundee has pointed out that, while the City at present contains somewhere about 165,000 people, its interests are intimately bound up, much more intimately than is the case with most communities, with those of certain suburban townships in its neighbourhood. This is especially true of the burghs lying immediately to

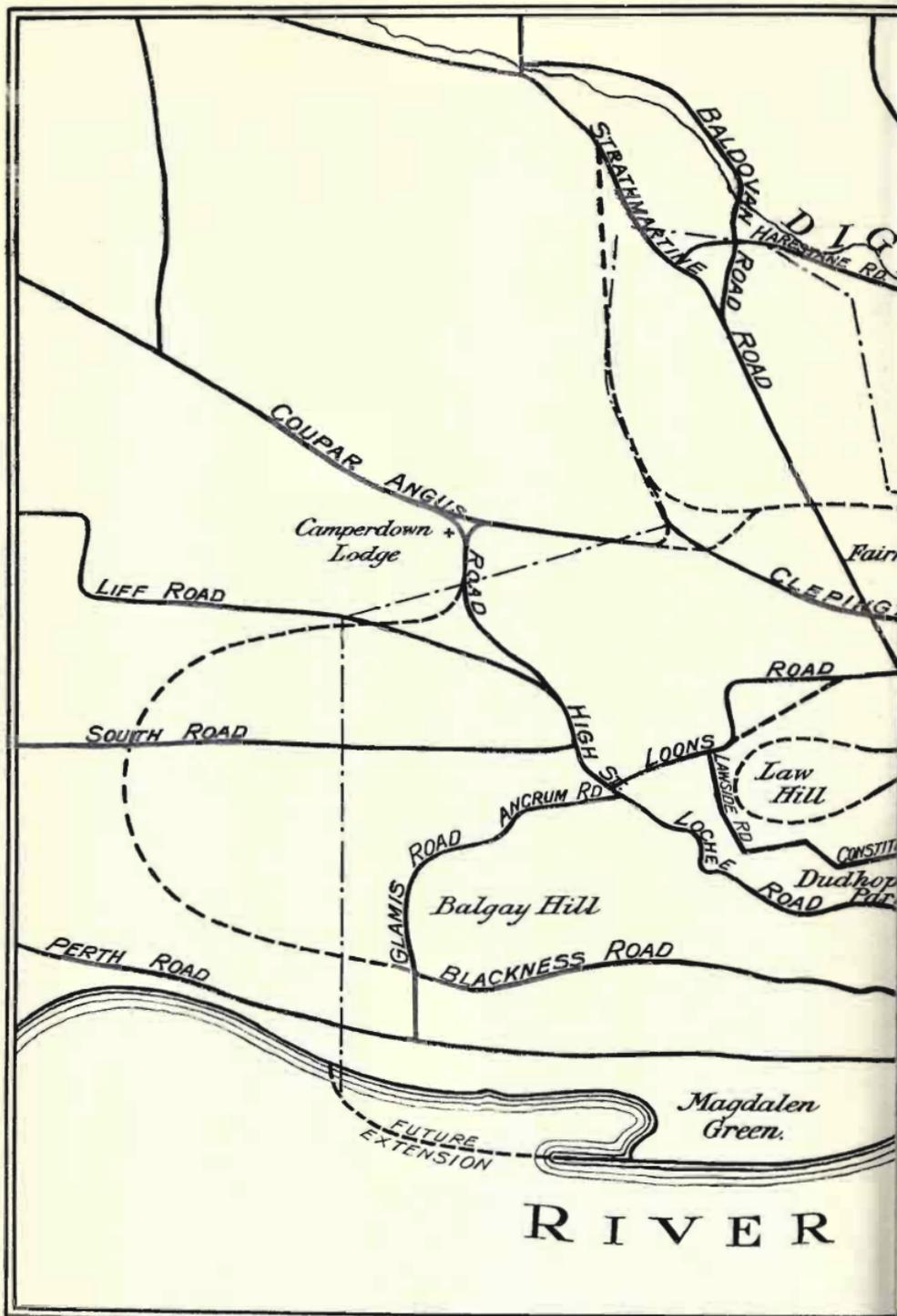
the east, and in a lesser degree of those across the river. For some time a movement has been on foot for the extension of the City's boundaries so as to incorporate the adjacent burghs of Broughty Ferry and Monifieth within the control of the one local authority. It is admitted even by those opposed to this amalgamation that it is *bound to come* sooner or later. If this were done, and no good reason can be shown for separate corporate existence, something like 15,000 people would at once be added to the population, giving a total of 180,000 at which it would stand. On the ratio of increase shown during the last 30 years within this area, one would look for an addition of not less than 1,000 annually to this number, giving thirty years from now a population of 210,000 to the City. The ratio, however, naturally depends to some extent upon the evolution of new industries, and should the present meetings of the British Association give the same stimulus to local life as was observable on a former occasion, one might look for a much more rapid progress in population which, subsequent to 1867, increased at the rate of 3,000 annually; if this latter ratio were to obtain, the City's population at the end of the period taken of thirty years would approximate to something like 270,000. The extension of the City's boundaries mentioned would raise the area to 7,074 acres, with a density of 25.33 to the acre, instead of 31.25 as at present. The net rateable value would also be advanced from £911,546 annually to £995,619. That this is not a too sanguine view of the City's prospects may be deduced not only from its incomparable natural situation, but also to some extent from the efficiency of its present public services, which may be expected to advance with the growth of scientific knowledge and the reaching up to new standards of life such as are called for by sanitary science and the increasing demands of public health, as well as a continual change and improvement in the condition of the people. I append a map showing the new and extended area of the City, which indicates the lines along which the Municipal Authority may be expected to extend. Incorporated in

this map will also be found an indication of the development which may be expected in the main arteries which link town with country.

Of these there are at least seven which call **Main Roads.** for more than a passing attention. Circling the City from west to east they are Perth Road, Coupar Angus Road, Strathmartine Road, Forfar Road, Pitkerro Road, Arbroath Road, and Broughty Ferry Road. It is hoped that each of these may be widened to 70 and in some cases 80 feet. Arrangements have either been made or are in contemplation for the required widening to ensure this much needed improvement which is called for, not only by the growing requirements of a great industrial community, but also through the exigencies of modern systems of traction. Road-making, which for a time did not receive the attention it deserved because of the diversion of traffic by water and rail, is assuming a new importance because of the development of motor traffic. Experts are devoting much time and thought to the subject, and in this they are backed up not only by local authorities, but by the State itself in the shape of substantial grants. Given a proper system of bottoming, road surfaces are at present prepared in three different ways:—(1) Paving setts of granite, whinstone, or wood; (2) tar macadam or some similar system of smooth asphalt; and (3) ordinary macadam; and that system is chosen which will best suit the traffic which the roads are intended to serve.

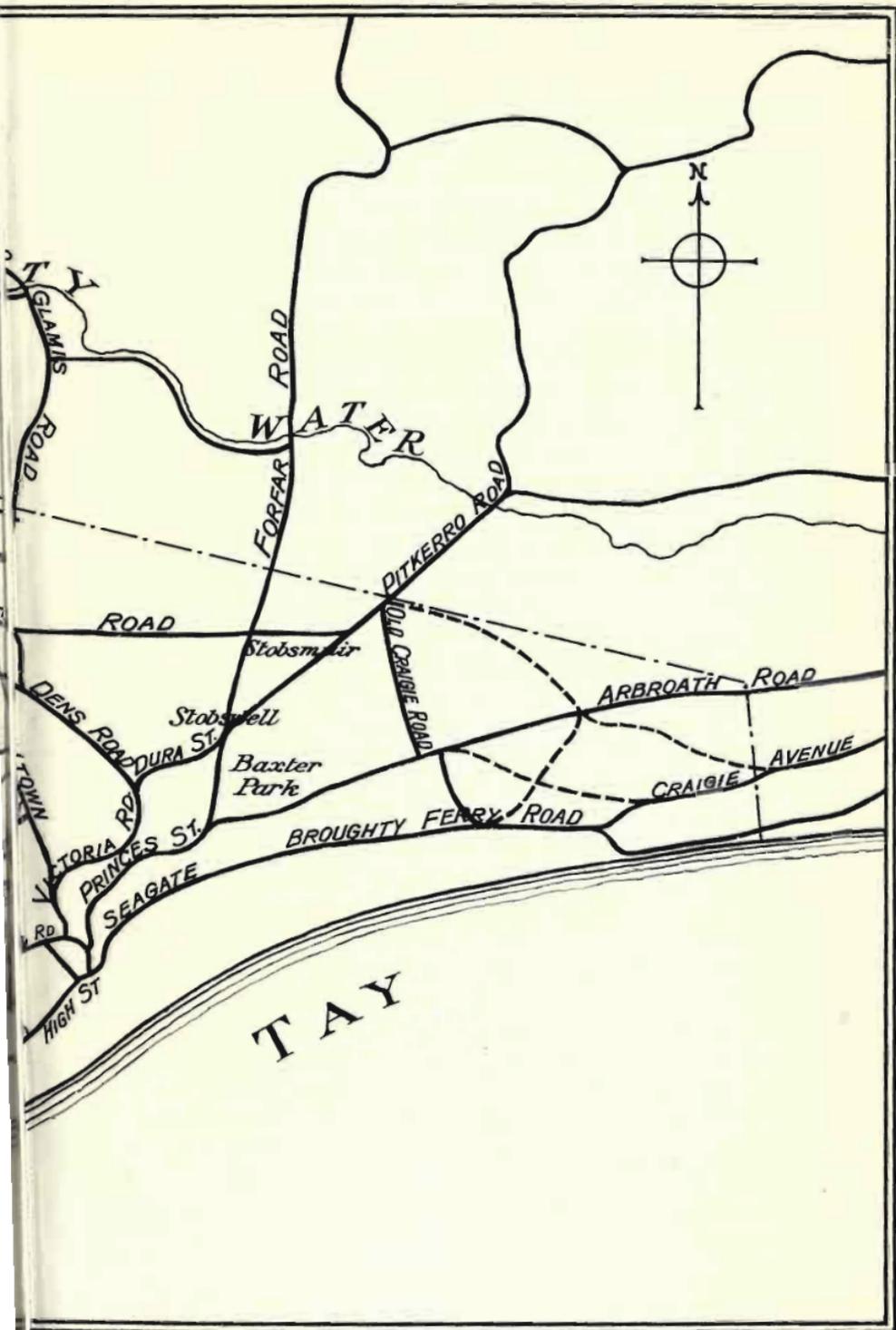
Within the last ten years the character of the traffic on our roads has completely changed. A large part of this is now conducted by motors, where the wheels, instead of simply rolling over the road, tear up the surface. The driving wheels of an automobile, revolving as they do several times more to the mile than front wheels of the same size, thus showing a certain amount of slip, account for the rapid deterioration of brittle macadam surfaces. Main roads are accordingly being increasingly surfaced by bituminous binding materials, and all the arteries referred





Existing Roads —————

Proposed Roads - - - - -



City Boundary - - - - -



to in the near future will be so treated, thus avoiding frequent renewal and reducing dust to a minimum.

In addition, new roads will be rendered necessary, and consequent upon this traffic pressure it will be observed that a new cross main road strikes north from Craigie Avenue near Stannergate spanning the northern boundary of the City to Lochee, thus greatly reducing the pressure on City streets called for by through motor traffic.

**Trees on City  
Streets.**

In the clear air of spring, as I write these notes, one's eyes are gladdened by the wealth of greenery already evidenced in our City streets by the policy of tree-planting recently carried out by the Housing and Town Planning Committee. The various shades of fragrant foliage, especially evident to a daily passer-by skirting the grounds of the Morgan Academy and running down the east side of Baxter Park Terrace, give promise of the beauty of foliage and wealth of cover from the summer heat, which one may expect increasingly in the years to come from the forethought of the local authority of these days. Sixteen miles of trees will form a noble City avenue, and in the time to which I look forward one may with confidence expect to see many City streets thus lined in a way that will rejoice the hearts of the citizens of that coming time. The policy will then be justified, even although it may not be altogether approved of now.

**Tramway  
Service.**

In the City proper electric car traction on a railed system is general, while in the more sparsely populated districts a system of trackless cars with an overhead equipment is preferred because of its greatly reduced capital expenditure and running charges. While Clepington Road, a main cross artery traversing the northern boundary of the City, is at present being experimentally tested by trackless cars, if these prove the success anticipated by the promoters, it may be expected that ultimately a trackless service linking up Broughty Ferry Road with Lochee,

circling Balgay to the Perth Road, and thence skirting the riverside by the Esplanade will eventually be established. Those still more sanguine of the future look forward to trackless lines running into the country by the main arteries above referred to, and thus acting as feeders to the system proper, and creating a new Suburbia in the country. That this ready means of transit will be needed must be at once apparent when one looks to the trend of modern

**City Improvements.** These all aim at decentralising the residential population and altering a system of housing which has grown up from a past of walled cities, a system perhaps imperative at the time it was first initiated, but now rendered entirely unnecessary by the safer and saner conditions of modern life. Narrow central thoroughfares running between huge cliffs of tenement houses must more and more give way before the march of improvement. Dundee Improvement Schemes, presently under consideration, desiderate the clearing away of great masses of central tenement property, notably in the vicinity of the Town House and the Overgate, with the resultant provision of central open spaces, along with more adequate shopping and office accommodation. Whether a new City Hall, commensurate with the importance of the City, will as a result be available for the next meeting of the Association in our City is largely a matter of finance, but one is not without strong hope that, as the outcome of present negotiations, even this much talked of addition to the City's needs will materialise. The question of expense will naturally have an important bearing upon these schemes, but it is not too much to expect that as the result of a carefully thought out plan, carried through on sound business lines, such an improvement will be consummated without undue expense as will practically re-create the central area. At present the matter is in too nebulous a position for me to make more than a passing reference to this aspect of the new "Dundee that is to be." The gradual reclamation of valuable ground on the river front, however, embraced in the

**Esplanade Extension** is something upon which one can be quite definite. Commenced in 1901, this has already added over 20 acres to the City's open spaces, and within the period laid down of thirty years it may be safely predicted that the present Esplanade will be completed, and a total area of 150 acres added to that at the disposal of the local authority for recreation purposes. When laid out properly this will not only provide adequately for the needs of the youth of Dundee for recreation of all kinds, but with its noble vista of mountain and river, along with its surpassingly beautiful sunset effects, it will provide a City boulevard such as will be difficult to match anywhere. The provisions of the new Housing and Town Planning Act also open up possibilities as to future developments in

**Town Planning,** of which full advantage will be taken in the City's interests. The Craigie estate by the time these notes are published will no doubt have come under a definite plan as laid down in the Act, and more and more one must look for the local authority availing itself of this Act in the laying out of unbuilt-on areas. The possibilities of Garden City development in Dundee are not without their interest to the student of sociology, and under present guidance this interest will be directed in an eminently practical manner. To make Dundee a real

**City Beautiful,** despite the restrictions imposed by its age and association with industry, should be a work of no great difficulty. Its natural situation lends itself pre-eminently to this, while the enormous development in the use of electricity for power purposes and gas for domestic requirements in heating and cooking, tending as they do to solve the question of City smoke, cannot fail of their effect with other factors to which I have referred to make this reasonably certain. The possibilities of the new Dundee, especially in its eastern suburbs, from the point of view of a health resort, have

not in the past been so fully appreciated as one may expect them to be in the future. The bracing air of Broughty Ferry, with its open face to the North Sea, the superior facilities for recreation—especially in golf—provided on the links and sand-dunes of Monifieth, combined as they then will be with the high standard of City public services, must increasingly attract visitors, and mark out suburban Dundee as likely to prove the most attractive summer watering-place on the east coast of Scotland. Improvements must take place on the foreshore which will make the most of the wave-washed frontage to the river, and cater for the increasing number of City toilers who require recuperation for the arduous work of a long winter. The natural slope of the residential area, with its magnificent outlook in all directions, the sharp bracing atmosphere, the superior facilities for recreation, the natural convenience of every public service at command, the attractions of the City at hand if desired, all combine to hold out inducements to those wishing rest or recreation to avail themselves of that offered here in a unique degree.

The reconstruction last year of Dundee Harbour Board, with its influx of new life, may, so soon as feeling presently existing has died down, confidently be looked forward to give a new impetus to Dundee's great asset—

**The River Tay.** Flowing as it does between two most prosperous Scottish counties, Forfarshire outstandingly so when associated with the Carse of Gowrie in agriculture and Fifeshire with its immense mineral wealth, the Port of Dundee must take an increasingly important place in the Scottish shipping world. The growth in the size of modern steamers, taxing as it does the limits of our greater industrial ports, must have its effect in securing for the Tay a larger share in the great national industry of shipbuilding. The launching facilities afforded in such a river, its possibilities on adequate dredging, now assured, for the floating of vessels of any size and depth, must attract those desirous of carrying

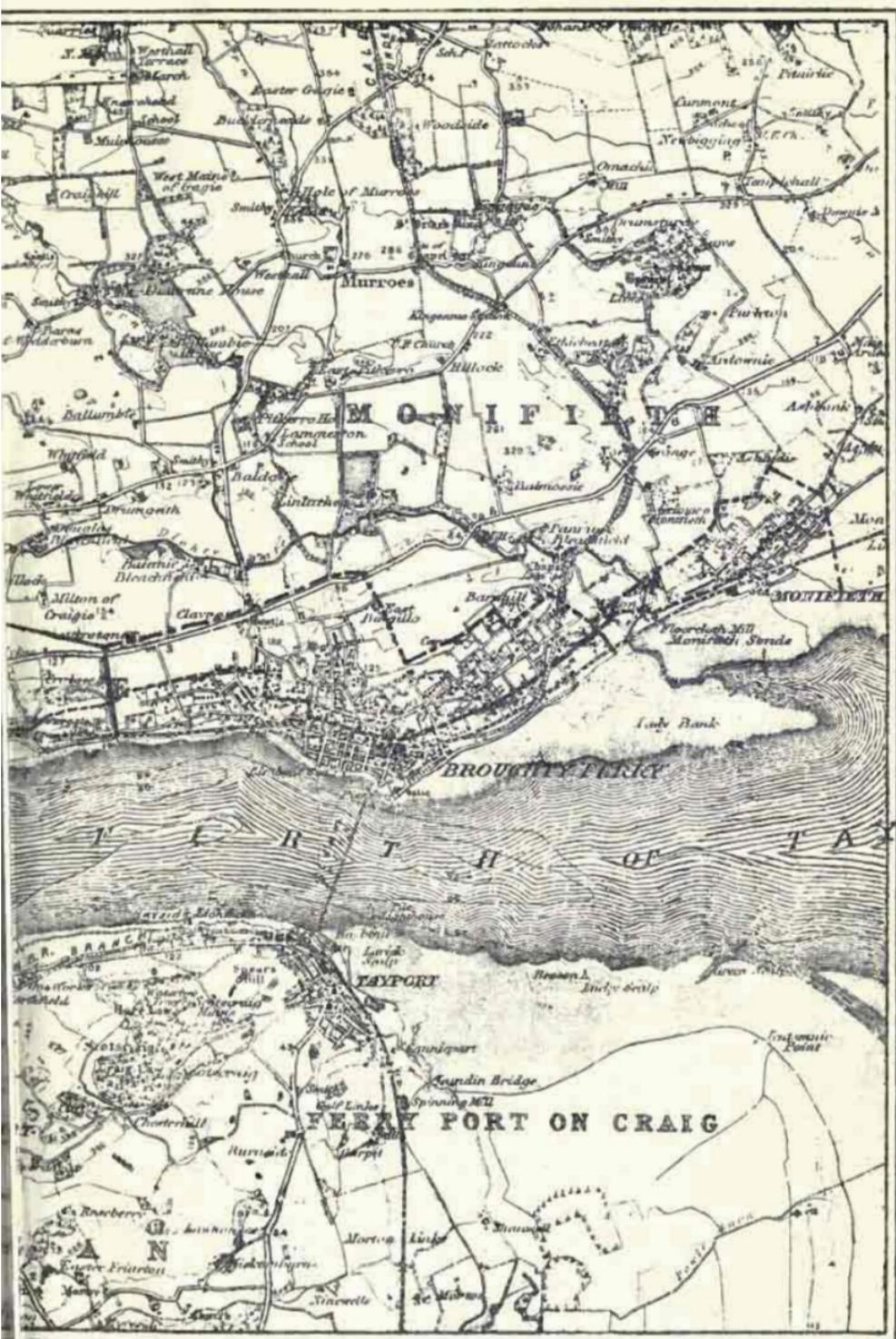




Based upon the Ordnance Survey Map with the

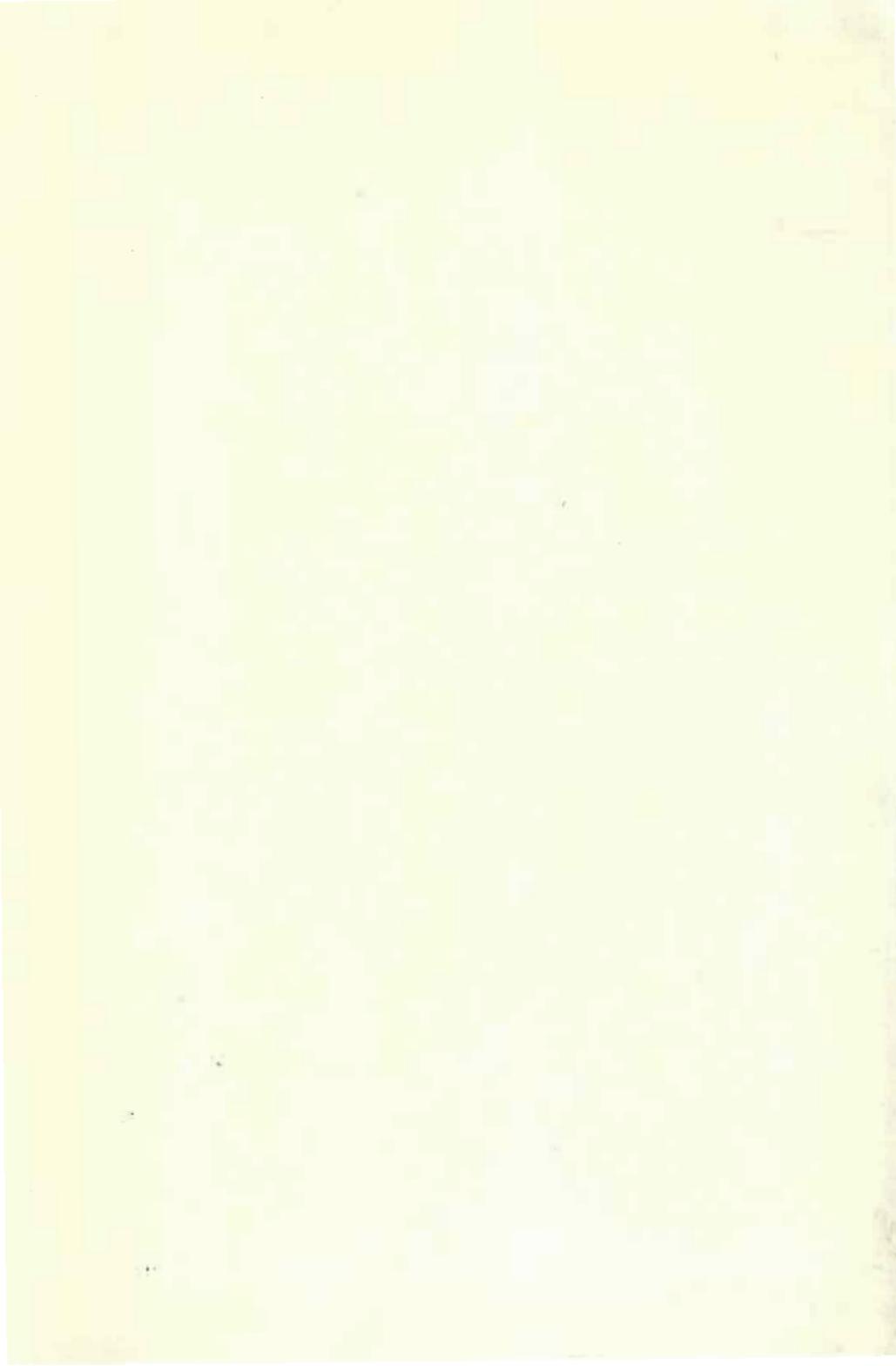
Tramway Routes — — — — —

Present City Boundary —



of the Controller of H.M. Stationery Office.

Boundaries of Proposed Extension - - - - -



on such work under the most favoured conditions, and easily counterbalance the disabilities in the lack of a hinterland providing coal and iron. One is hopeful under new conditions that facilities will be provided such as will adequately meet the requirements not only of trade, but of industry at the port. Its possibilities as a fishing centre have not so far been fully realised, but the harvest of the sea is ready to be reaped by the enterprise of its citizens—the facilities for entrance to the great markets of the country by water and rail are of the first order; while adequate land on favourable terms is available for all the industrial developments associated with the calling.

Our captains of industry have shown themselves capable under the severest competition, when concentrated on their task, of more than holding their own not only locally, but in world-wide spheres of activity. Those trained at our Schools and Colleges, as is evidenced in these pages, occupy the highest positions in the realms of Science, of Literature, of Finance, of Industry. When checked in one direction their energies have turned themselves to another, and with the evolution of new uses for fibre and fabric they have proved themselves fit to take no unworthy place in the industrial life of the nation. The product of mill and factory are more and more proving themselves merely the raw material for some other and possibly larger development. Hessian becomes the basic fabric for linoleum, and, although Dundee has not yet taken such a large place in this industry as she may do in the future, it is not too much to expect that in this direction, as also in waterproofing, in carpet weaving, and otherwise by new processes lending themselves to new uses, by evolution in pattern and machine, still wider fields may be opened up to local manufactures. Our castings and machinery are more and more used not only to build up industry elsewhere, but even to extend competition for ourselves. But competition, when rightly met, is not only the "life of trade," but it is the birth of invention, and in this our citizens will not be found wanting.

And as in material things, so also in others.

**Public Health** constantly shows an advance. The death-rate in less than fifty years has been practically halved. Will history repeat itself? Will we, before another generation has passed away, have seen the passing of that great scourge *Tuberculosis*? Authorities are sanguine that we will. And why not? With an awakened public conscience to the dangers of Dirt, Darkness, and Disease, with improved housing conditions, better and cheaper means of transit, more wholesome conditions of life, better understandings between the twin factors of modern commerce—Capital and Labour—and a general tuning up to higher standards on the condition-of-the-people question, may one not look forward with a considerable measure of hope to a future in which each citizen may be assured of a fair opportunity for himself and his children? And Education will do much, education in the best sense, the drawing out of latent capacity in the individual for the benefit of the community as a whole, when that blessed time sung by the poet will come when “man to man the world ower will brithers be.”

In this movement towards uplift, towards material progress and prosperity, combined with all those sweetening influences that make life really worth while, one may with the utmost confidence anticipate that the “Greater Dundee” to which some of us with the eyes of faith look forward will take a not unworthy place—a place in which it shall be said of her as of the nation of old that it is “righteousness alone that exalteth.”

## SOCIAL SERVICE AND CITY PROBLEMS.

### The Dundee Royal Infirmary.

By H. E. Fraser, M.D., Medical Superintendent.



DUNDEE, in common with other towns in the middle ages, was not without houses for the sick and aged poor, but these were chiefly under monastic regulation, and little was done towards providing medical treatment for those needing it who were unable to pay a doctor, until towards the end of the eighteenth century. In 1782, when Dundee had a population of 15,000 persons, a dispensary for giving advice and medicine to the sick poor was opened, and during a period of 14 years continued admirably to fulfil its function—7657 patients having been treated. In 1793 a Committee was appointed to raise funds for the purpose of instituting a Hospital, and five years thereafter they succeeded in providing accommodation for 20 patients. The work of the Dispensary was then merged in that of the Hospital, and the institution became known as the Dundee Infirmary and Dispensary. The number of in-patients treated during the first year of the Infirmary was 54, and of out-patients 1058. Emergency cases were admitted free, but cases of ordinary medical or surgical ailments (including fever cases) were charged 3s. 6d. per week.

Nor were the necessities of the mentally disordered neglected. At a meeting of the Infirmary contributors in 1800 a subscription list was opened with a view to building an Asylum. Contributions were received from many sources, including £100 from the Magistrates, and in a part of the town then unbuilt upon—on a piece of ground lying between what is now the Baxter Park and Albert Street—the first Asylum was erected in 1812. The Infirmary was in King Street, and much good work was done there. The Governors considered it would give stability to the institutions if they were incorporated, and an application was made to the Crown for a Royal Charter, which was granted in 1819. By it the two establishments were erected into one body corporate under the name of the Dundee Infirmary and Asylum, and the connection continued till 1875, when further charters were granted. The two establishments were then separated under the names of the Dundee Royal Infirmary and the Dundee Royal Asylum.

The demand upon the available accommodation in the Infirmary quickly grew, showing that the disinclination of patients to enter a public hospital had become a thing of the past, and the Directors found it necessary to extend the building. This was done in 1825, and the number of beds brought up to 110. Previous to 1836 no classification of wards into medical and surgical existed; in that year, however, the Directors reorganised the arrangements so as to keep them abreast of the advance of medical knowledge. Within a few years it was evident further extension was required, as many patients sent or coming to the hospital could not be taken in. This was partly due to the occurrence of epidemics of fever, particularly typhus, and partly to the rapid increase of the population consequent on industrial prosperity. By 1850 a considerable sum of money for a new hospital had been collected by the energy of Sir John Ogilvy, Bart., then Chairman of the Board of Directors, and the Directors; plans were obtained, and with the help of Professors Syme and Christison of Edinburgh, that submitted by Messrs Coe & Goodwin of

London, showing 250 beds, and to cost £14,000, was selected. A piece of ground, extending to ten acres, between Dudhope Castle and Park and the Dundee and Newtyle Railway was feued, and the foundation stone of the building was laid on 22nd July 1852, with great ceremony, by the Duke of Atholl, Master Mason for Scotland. Two and a half years thereafter—February 1855—the new Royal Infirmary was opened for the reception of patients. The building, occupying as it does a commanding site near the Law, and overlooking the “ Kingdom ” of Fife, with wide open spaces on east and west, is in the Tudor style, and is one of the most striking in Dundee. For over 30 years it served to fulfil all the medical requirements of the city. The opening in 1890 of the City Hospital for fever patients, of the Parish Hospitals for cases not suitable for active treatment, and more recently of the Hospital for Incurables, relieved to a certain extent the strain on the Infirmary, but even now with a largely increased number of beds found by numerous additions and alterations, and the relief afforded by its own agencies—the Convalescent Home at Barnhill and the Sanatorium at Auchterhouse—pressure is occasionally felt. To keep the nursing of the patients in the Institution up to date and sufficient for its increasing needs, the Directors have at all times given this important branch of treatment their careful consideration. In 1892 a separate building, at the expense of Mrs George Gilroy, Castleroy, was erected for the Nurses engaged in nursing in private families, but, as private Nursing Homes sprung up in the city, private Nurses are no longer supplied from the Infirmary. The increase of the general Nursing Staff about the same time demanded larger accommodation, and in 1896 there was opened a Nurses' Home accommodating 40 Nurses, the sole cost of erection and equipment being borne by Sir William Ogilvy Dalgleish, Bart., the President of the Infirmary.

Within the building the radical changes required to keep the facilities of the Surgeons when operating and the comfort of patients under treatment in conformity with the great advances in Surgical Science have been

rendered possible by the munificence of friends. In 1895 the Trustees of Mr John Sharp, one of the Municipal Presidents of the Infirmary, built and equipped to modern operation theatre.

Fourteen years ago a sum of over £10,000 raised by the Forfarshire Medical Association was handed over to the Infirmary for the establishment of a Maternity Hospital and shortly thereafter Mr J. K. Caird, LL.D., generously offered to erect Wards and a Maternity Nurses' Home. The Maternity Hospital was opened in 1899, and has proved of the utmost advantage to numerous poor mothers. As it has combined with it a large out-door department, a teaching School for Nurses and Students has been successfully organized. The training given to the Nurses has been recognized as complying with the regulations of the Central Midwives Board of England, and a large proportion of the Nurses go up for the examination for the Certificate of the Board.

In the beginning of 1907 a large addition—6 wards of 20 beds each, with operating and other rooms—was built and furnished by Mr Caird primarily for the treatment of cancer. These have been of great service in providing treatment for many cases of cancer, as well as of other surgical ailments. Additional accommodation for Nurses has also been found in the new block.

Mr Caird did not rest satisfied with treatment of malignant disease after it had shewn itself, and at the time of opening the Cancer Pavilion, he arranged for accommodation being made in the building for an Investigator to undertake research work. This has been carried out, and much work has been carefully done from which encouraging results as regards both the solution of many obscure points in the great riddle of cancer and the treatment of the disease are expected. Another part of the building is equipped for electrical treatment, and has been very largely attended by patients suffering from the more superficial forms of cancer, from tuberculosis of the skin, and from other skin diseases.

In addition to the work done at the Infirmary itself, a

work is carried on at the homes of needy patients in the District Dispensaries. For this purpose the city is divided into four districts, and to each of these is appointed a Medical Officer. To these doctors patients who do not desire in-door treatment go and they receive treatment and medicine free.

The question of how to combat tuberculosis has engaged the attention of the Directors for some years. The Municipal Tuberculosis Dispensary is at the Infirmary, and there the Medical Officer and Nurse attend thrice weekly. Many cases come and are investigated with a view to tracing their social and domestic conditions, and to sending a number in the early stages of pulmonary tuberculosis to the Sidlaw Sanatorium, now a branch of the Infirmary. This joint effort of Town Council and Infirmary has resulted in much information being gained and good being done, and has already indicated the lines upon which war must be waged when compulsory notification of pulmonary tuberculosis and the isolation of advanced cases are adopted.

Early in its history the Dundee Royal Infirmary was available for the instruction of medical students, but it was not till recently that the organisation of the St. Andrews and Dundee Medical Schools called upon the resources of the Hospital as is now done. Full clinical courses in medicine and in surgery can be taken at the Infirmary, while in the various specialties the opportunities offered for instruction are excelled by few Schools.

In the various wards the number of patients treated last year was 4,501; out-patients, 21,515; and district patients, 4,609.

To assist the Infirmary in its work, numerous subsidiary agencies co-operate. The Convalescent Home at Barnhill, with its 80 beds, receives patients from the Infirmary and from the general public twice weekly, and the Sidlaw Sanatorium at Auchterhouse can take 34 children, mostly suffering from surgical tuberculosis, and 20 adults suffering from pulmonary phthisis. In addition, there is a much appreciated Dorcas Society to furnish clothing for

necessitous patients; a Samaritan Fund to provide surgical and other appliances for those in need of them; Music Mission, whose choirs come frequently to sing to the patients; and a Flower Mission, in which many kind friends help, and by whose efforts the Nursing Staff are enabled to keep the wards at all times bright and cheerful.

The Management of the Infirmary is vested in the Contributors (Governors), from whom are chosen eighteen Directors—the executive body. Six Directors retire each year and are ineligible for re-election until one year has elapsed. Six Contributors are elected to fill the vacancies thus created. The Directors report quarterly to the Governors, and thus the Management is kept in touch with the subscribers and the public. Under the Directors the Medical Superintendent, the Secretary, and the Treasurer attend to the administration, the ordinary business, and the finance respectively, and these three officials are present at the weekly meetings of the Directors, to whom they report what has occurred in their departments during the preceding week.

The Medical Officers are appointed by the Directors, and hold office for a fixed period of years. Besides the ordinary Physicians and Surgeons are a number of Specialists, both clinical and scientific, and by their co-ordinate work the various aspects of disease can be carefully investigated, and much valuable information regarding treatment obtained.

The confidence of Dundee and the surrounding districts has been gained by the Infirmary, and its record of good work done in the past, and its prospect of better work in the future, will, it is hoped, still keep active the keen practical interest which hitherto has been manifested in its affairs, and help to counteract the effect of what exists in Dundee as in other large centres—the yearly adverse balance in the accounts of the Infirmary.

## Dundee Hospitals.

By Chas. Templeman, M.D., D.Sc., Medical Officer  
of Health.

IN addition to the Royal Infirmary, there are several Hospitals in Dundee for special classes of cases.

These are :—

(1) Official.

- (a) Town Council —King's Cross Hospital.  
                   "          —Smallpox Hospital.  
                   "          —Cholera Hospital.  
 (b) Parish Council—Eastern Hospital.  
                   "          —Royal Lunatic Asylum.

(2) Voluntary.

- Private Hospital for Women.  
 Royal Victoria Hospital.  
 King Street Home for Incurables.

### KING'S CROSS HOSPITAL.

This Hospital, built by the Town Council for the treatment of cases of infectious disease, is situated in the north end of the City. It was opened in 1890.

At that time it consisted of two pavilions, each containing 20 beds. The accommodation has gradually been increased as the necessity arose, till it now consists of seven pavilions, each with 20 beds, a large administration block, a thoroughly-equipped laundry (electrically driven), disinfecter, etc.

An additional site, adjacent to the Hospital, and extending to  $6\frac{1}{2}$  acres, has been acquired, and on this pavilions will be erected for cases of measles and consumption. There is sufficient ground to provide for the needs of the City for a considerable time.

The Hospital is well provided with all the necessary appliances for the treatment of the infections, and is largely taken advantage of by the inhabitants of the City.

The total cost for building, furnishing, and equipment has been about £52,000.

#### SMALLPOX HOSPITAL.

This Hospital of 20 beds for cases of Smallpox was built in 1893.

It is situated on the outskirts of the City on a site extending to about six acres.

It consists of one pavilion, a fully-equipped laundry and disinfecting house, and a lodge for the caretaker.

In the grounds there is also a small Hospital for six beds for the accommodation of any cases of Cholera which may be brought into the port. It is built of wood on a foundation of concrete, but it has never been in use since its erection in 1893.

These Hospitals were built, equipped, and are maintained by the Town Council, and are open to all who are suffering from any infectious disease, whether they are in receipt of parochial relief or not.

#### EASTERN HOSPITAL.

This is a large Hospital, constructed on modern lines, for the treatment of the sick poor under the charge of the Parish Council.

It is built on the pavilion system, and has accommodation for 394 patients.

It was opened in December 1893, and the total cost for building and furnishing was £25,800.

It is well equipped with modern appliances for the treatment of all classes of cases—surgical, medical, and maternity—and has done and is doing an excellent work in the City.

The Medical Staff consists of one Visiting Medical Officer and two Residents.

## ROYAL LUNATIC ASYLUM (WEST GREEN).

This Asylum, a magnificent building, erected on a beautiful site on the braes of the Carse, and about three miles from the City, was opened about 1882 for the reception of persons suffering from mental disease. It was built to replace a similar Institution in the City (Albert Street) which had been erected in 1819, but which had become too small to meet the needs of the community.

The Asylum has large grounds, amounting to about 110 acres, and has accommodation for close on 400 patients. In the grounds a Private Asylum (Gowrie House) was built to accommodate 62 patients.

In 1902 these Institutions were acquired by the Dundee District Lunacy Board for £90,000. The larger building is now utilised entirely for the care of pauper patients, and Gowrie House has been leased to the Dundee Royal Lunatic Asylum Directors for the treatment of private patients.

The purchase price of the Asylum and other investments enable the Board of Directors to receive many of those whose means are somewhat straitened at a price considerably below the cost of maintenance and treatment.

Provision is also made, by arrangement with the Directors of the Dundee Royal Infirmary, for the treatment of a certain number of incipient cases in that Institution.

## PRIVATE HOSPITAL FOR WOMEN.

In 1896 a Committee was formed with the object of providing a Hospital in which women would have an opportunity of being treated by women practitioners. A private house was rented for this purpose, and it provides accommodation for 11 beds.

This Hospital has met a very felt want. Not only are patients suffering from those diseases peculiar to women admitted, but other cases in need of special treatment are also taken in.

This Hospital is intended for women whose circumstances do not permit of them being treated in a private

Nursing Home and who shrink from seeking admission into a General Hospital.

It is supported by voluntary subscriptions, supplemented by the payment by the patients of sums varying from ten shillings to one guinea per week. For a private ward the sum payable varies from two to three guineas a week.

The present premises are in some respects unsuitable, but through the generosity of a lady belonging to the City, who has all along taken a deep interest in this work and who has provided the necessary funds, a beautiful Hospital is being erected on the high ground overlooking the river. It embodies the latest ideas in construction and equipment, and when completed will accommodate 14 patients, and will be provided with all modern appliances for the treatment of that class of diseases it is specially designed to deal with.

#### ROYAL VICTORIA HOSPITAL.

This Hospital was erected to commemorate the Diamond Jubilee of the late Queen Victoria. At that time a sum of £50,000 was raised for the erection, equipment, and endowment of a Hospital for Incurables.

A private Mansion House, standing in a beautiful park, was secured, and was readily converted into a Hospital in every respect up-to-date in construction and equipment. Nothing is wanting to provide for the comfort and the alleviation of the suffering of that class for whom it was erected. The beautiful grounds now extend to about 12 acres, and the Hospital has a southern exposure overlooking the river Tay and the hills of Fife.

A special wing for cancer cases was subsequently erected by a generous citizen at a cost of £5,500. The endowment fund amounts to £60,300, and the capital expenditure on Hospital and grounds has amounted to £25,600. The interest on the investments, along with the contributions from patients, who are expected to pay as their circumstances permit, is practically sufficient to meet the expenditure. Many cases, however, are unable to offer any contribution, and no suitable case is excluded on that

account. Only persons in receipt of parochial relief are ineligible.

The Hospital accommodates 60 patients.

The Home for Incurables in King Street is a self-contained house, with accommodation for 21 adults and a ward of 14 beds for children. It is under the control and management of an Episcopal Sisterhood.

A large proportion of the inmates are old people, who require to be looked after.

The Home is partially endowed, but all the patients have to be paid for, the maximum rate being 7s. 6d. per week.

The Home is doing an excellent work in a quiet unostentatious way.



## The Care of the Children.

By **Jas. S. Y. Rogers, M.B., C.M.**

THIS subject may be viewed from the two aspects of sentiment or hard fact. The sentimentalist becomes a subscriber to a charitable organisation, and is rewarded once a year by the gift of a more or less voluminous Report, and, ensconced in his armchair before the fire, he is able with ill-concealed pride to view his name in large type opposite his modest donation, and there his responsibility ends. The observer of hard fact on the other hand is also a subscriber and receives the same document but, in addition to dipping his hand into his pocket, he spares neither time nor personal effort in trying to better the condition of the children. He knows full well that, in spite of improved sanitation and social conditions, infant mortality is abnormally high compared with that of adults, and realises that the subject of the care of the children requires special and constant supervision.

Child life may be divided into three groupings; first, we have the normal child from the time of its conception to the age of five years; second, the same child during the period of school life (including the half-timer), that is from the age of five to fourteen; and third, we have the abnormal, the cripple, the blind, the deaf and dumb, and the mentally deficient.

### THE INFANT.

Turning our attention first to the subject of infant life, we find that out of a thousand children born, one hundred and seventy on the average over Britain die during the first year of life. During the past year in Dundee we have to congratulate ourselves on the fact that the death rate is only one hundred and fifty-four. Leaving out of account those who have died, we must take note of the fact that of the eight hundred and forty-six who survive, a

certain proportion will live to adult life, and become the parents of our future generation.

All the more need then from the beginning to give the child the best start in life we can, instead of simply trusting to luck as has been done too much in the past. Before one can thoroughly understand the subject of the care of children, one must know something about the reasons for the high infant mortality. These are both ante- and post-natal, thus it behoves us to remember that the care of the unborn is just as important as that of the newborn, and on no account must we devote ourselves only to the child after birth and ignore its conditions before.

The antenatal influences of parental unfitness, alcoholism and industrial employment of women, all involve grave social problems, which so far have proved too difficult for solution. A great number of parents are physically and mentally unfit, and from them we cannot expect to have healthy offspring. Our present marriage conditions are unsatisfactory, and frequently productive of disaster.

The alcohol question has for many years been the centre of grave cyclonic discussions in Scotland. Experts as we are supposed to be in the disposal of alcohol, we ought to realise that its circulation in the maternal blood reaches the child, and either injures its tissues or stops the proper development of its cells, and brings about its death. This question has never been seriously faced by the nation as a whole. But when one is met by the products of alcohol—crime, social degradation, and child neglect—its importance cannot be over-estimated. Alcohol is responsible for a large part of the huge infant mortality, and for the stunted physique and dwarfed mentality of so many surviving children.

The industrial employment of married women is also a potent factor in influencing the child's existence both before and after its birth. Investigations by Sir John Simon and colleagues shew that, where adult women were taking part in factory or in agricultural labour, the mortality of infants rapidly increased. Much has been done under the Factory Acts, by their insistence on certain

hygienic conditions, to protect the health and efficiency of the working mothers as important assets in national life. One good feature is, that it is now compulsory for a woman to remain away from work till one month after the birth of the child, but this provision is unfortunately not always easily enforced. Working mothers are absent from home all day long, except at meal hours and during the evenings, and in their absence the care of the young infant is often entrusted to some old woman or young girl. The child is lifted from its warm cot and taken out into the cold air about half-past five in the morning, as the mother generally starts work at six. Many deaths result from this severe exposure, especially in the winter. The child is fed by scraps from the table, milk from dirty bottles, and is frequently entirely uncared for. What is the sequel to this mismanagement? Fretfulness, restlessness, and bad health. The long hours of toil, the constant standing and the physical strain for months before and after the child's birth are not only a drain on the mother's own strength, but have a serious effect on the future well-being of the child.

The influences after birth are, insufficient and unsuitable food, dirt, over-crowding, want of proper clothing, and exposure. Infant health depends far more on infant rearing than on the physical condition of the parents, the sanitation of the houses, or even poverty; and it is to the intelligence and interest of the mother and the care and attention she is able to bestow on her child, that we have to look for bringing out the best results. The natural feeding of infants is undoubtedly by the breast, and this gives by far the best results. In overcrowded districts in London, New York, and Chicago it has been proved that infant mortality drops in breast fed children, even though the environment may be very unsatisfactory. A great many mothers are willing to, and do breast feed their children, but the results are not always so satisfactory as could be wished. Breast feeding, however, may not be possible for various reasons:—the mother may be delicate, may suffer from tuberculosis, or she may give social duties

the prior claim, and then there is no alternative but artificial—that is, bottle feeding. Whenever we depart from breast and adopt bottle feeding, we at once enter a fresh danger zone so far as the child is concerned. Cow's milk is the substitute we have to fall back on and, as cow's milk is one of the easiest liquids to contaminate with dirt or infection, we must always be on the alert. Scalding or boiling will destroy any micro-organisms, though boiling is believed by some to destroy some of the properties of the milk, but this, I think, is exaggerated; it is better to give the milk boiled than to run any risks by giving it raw. There are, of course, many other suitable ways of presenting milk to the child, such as peptonising or sterilising it, all good in their own way, but frequently beyond the reach of the poorer classes. Cow's milk in any form will disagree with certain infants, and it must be left to the physician to deal with those cases. Dirty feeding bottles are responsible for much serious illness in young infants.

A great deal has been done locally by the Dundee Social Union, which has established restaurants for nursing mothers, and their efforts have been supplemented by similar institutions established and conducted by the Town Council. These aim to encourage breast feeding, to provide for under-fed mothers in order to enrich the milk supply, to keep in touch with the mothers in their homes, and daily at the restaurant to advise and help, to weigh babies weekly and keep charts. Infant visiting has been carried out in three districts of the city, the first being made by a trained worker. The number of cases visited last year was 1,324, 30 per cent. of the total births of the city. Dinners are given to nursing mothers under the following conditions. Mothers must bring their children regularly to be weighed and must not return to work for three months. The total number of meals supplied during the year was 22,336.

The Dundee Day Nurseries are doing a large amount of good work for the poor children of Dundee. Of 28,473 children admitted fully 8,000 were under twelve months. The Nurseries in such cities as ours are havens of rest for the children of working mothers who are toiling for their

daily bread. The children are well fed and cared for, and handed back at the end of the day all the better for the care and attention they have received. It is our duty to provide for female workers, crèches in which the child can be cared for and attended. That up to the present time we have entirely failed to appreciate this is shewn by the fact that these nurseries are not properly supported by the public.

Other sources of danger to children are overlaying, infant insurance, and burning accidents. Cases of serious burning are unfortunately very often heard of, and it should be absolutely compulsory for every parent to place fire guards before the fire where there are children. Recently the Town Council has issued a special instruction in reference to this, and where, through poverty, fire guards cannot be purchased these are provided free of charge.

The slums are one of our stumbling blocks, for they are the natural soil of most infectious diseases, and this problem is one facing all local authorities. In Dundee we are advancing rapidly in sanitation under the guidance of a skilful Public Health Department, and we compare favourably with most large cities. Still much remains to be done if the health of the community at large, and especially of children, is to be preserved. A great many of those undesirable and condemned properties are now either being closed or improved to meet modern requirements.

One of the first essentials to life and health is a constant supply of pure fresh air. Along with food it ranks as an indispensable of life. During the day in many instances the infant is rarely taken out, and one has only to see their white pinched faces to appreciate the ill effects of want of fresh air and sunshine.

#### SCHOOL LIFE.

Turning to the question of the school child, we have now in operation a capable Medical Inspection Staff under the School Board.

In certain of the schools in the poorer districts of Dundee necessitous children are supplied with free meals. Either

the Headmaster or Teachers note any child that looks under fed, or if the visiting Doctor finds any child poorly developed, he reports the case to the Chief Officer and the child is at once looked after.

School life for medical inspection purposes is divided into four stages—infants, junior department, seniors, and supplementary.

Every child is medically examined on entering each department, that is four times in the course of school life, or once every three years. About 25 per cent. of the children examined are found to be defective in some respect. When a defect is discovered a notice is sent in a sealed envelope to the parent, through the child, stating the nature of the defect, and recommending that the child be taken to the family doctor for advice and treatment. Defective children are inspected frequently in order to observe whether treatment has been obtained and to note any improvement made. In the case of verminous children a nurse visits the home and explains how to clean the child. At the same time notices are sent to the parents giving clear and definite instructions as to the treatment necessary. The major proportion shewing want of cleanliness is found in children above the age of six years, indicating that they have largely to look after themselves and are not under the supervision of the mother. Negotiations are presently going on with the Baths Department of the Town Council with a view to the establishment of special district stations, where children suffering in this respect may be adequately dealt with.

#### INFECTIOUS DISEASES.

At the earliest opportunity the Headmaster notifies to the School Medical Officer, who in turn informs the Medical Officer of Health, the outbreak in the school of any cases of infectious disease. In the event of more than three of these being reported from any one school in one day, the whole of the children in the school are at once specially examined.

The number of cases of defective vision is highest in the older schools where lighting and class rooms are deficient. Poorer children get spectacles supplied at special prices. More attention is now being paid to the painting of the walls of class rooms, a matter of extreme importance in this respect.

So far no notices are sent out about defective teeth, but instructions in the hygiene of the mouth might with advantage be given.

#### SCHOOL BATHS.

After a certain age—ten years and upwards—bath tickets are supplied for instruction in swimming at the Public Baths in Dundee and Lochee. Last year 53,196 such tickets were issued, and the benefits accruing to the children were very great.

#### SCHOOL FOR WORKING MOTHERS.

Under the auspices of the School Board there is a school for working mothers at the Cowgate School. About sixty mothers attend, and they are taught cooking, dressmaking, and home hygiene. The school session lasts for four months and the fee is one shilling.

#### HALF-TIME SYSTEM.

There is a great diversity of opinion as to the merits or demerits of this system. Our local Factory Surgeon is strongly of the opinion that it is beneficial and he voiced his opinion in a pamphlet read before the British Medical Association in March 1902. He holds that the puny, feeble half-timer is under this half-day system an unknown quantity. In his experience the fact is that white-faced, delicate-looking children attending school the whole day improve physically and mentally from the day they enter the factories as half-timers. They are better fed and are taught habits of industry and regularity. There are not, he adds, anywhere happier and healthier looking children than these half-timers.

I must say that a great many children who leave school at the age of fourteen years are quite unfit to do a full day's work, and many break down in health after being but a short time at work. The transition from school to work is too sudden; and it might be better if their day consisted of part school and part work between the ages of thirteen and fifteen in order to gradually accustom them to manual labour, and thus prevent the health breaking down through the long continued strain of this full day's work.

#### ABNORMALS.

A great step forward was taken in providing an Invalid School for Cripple Children. The numbers are greatly in excess of the accommodation provided, and an additional school is now much needed. This school is under the School Board and is supervised by a Committee of ladies. It is quite a cheery sight to see the little ones being conveyed in their own bus to and from the school and, from the merry laughter on board, it is hard sometimes to realise that they are other than normally healthy children. In connection with this school there is a holiday home at Kingennie, a few miles out of the city. The period of residence varies from one to six weeks, during which time the children greatly improve in health. During the last season 148 children stayed in the home and with one or two exceptions all gained weight, a testimony to the motherly care they received from the Matron. After the children leave the Cripple School, the Managing Committee try to persuade the parents to place them in suitable occupations but in this they encounter great difficulty.

An Invalid School would be most beneficial in Dundee, to which children convalescing from serious illness, or found unfit to stand the strain of a full day's school work, could be sent. There they would get a mixture of school and play until such time as they were in a condition to resume their ordinary school duties.

## INSTITUTIONS.

The interests of the children are looked after by several well organized Societies and there are well equipped Institutions all under capable management where they are cared for and kindly dealt with. The Dundee branch of the Society for the Prevention of Cruelty to Children protects and rescues children from environments where their moral health is endangered. We have also the Dundee Boys' and Girls' Religious Association and the Children's Free Breakfast Mission, who provide free breakfasts once a week and look after their physical, moral, and religious improvement.

There are several Institutions for the care of both normal and abnormal children when they fall the victims of illness, such as the Royal Infirmary, the Fever Hospital, the Sanatorium at Auchterhouse, and the Comerton Home at Newport. The Dundee Royal Infirmary has thirty-two beds devoted to the diseases of children. This, of course, though insufficient for a city the size of Dundee, renders very valuable service, but to my mind the diseases of children will never be thoroughly attended to until we have a properly equipped hospital for children.

There is an excellent Fever Hospital at King's Cross, which has of late been increased in size to meet the growing demands; and it is thoroughly up-to-date and well managed. Measles and whooping-cough, however, two of our most deadly diseases, are not admitted to this Hospital owing to lack of accommodation, but the Town Council has recently decided to build additional accommodation to meet this need.

The Sanatorium at Auchterhouse also provides a few beds for tuberculous children, but this also is quite inadequate.

At the Comerton Home in Fifeshire health and vigour are restored to many of our poor children. One has only to see the great improvement that takes place in those white-faced, half-starved looking bairns after a period of four weeks residence in such a Home as this to under-

stand the growing demand for many more such havens of rest.

From this list of Societies and Institutions it might appear as if we were well equipped to meet the wants and needs of poor children, but this is not the opinion of all. Only when children are ill or deformed physically or mentally do we waken up to the fact that they require our every attention and care. Of the thousands of infants who die annually in the United Kingdom a large number might be saved. The outstanding causes of this high death rate are ignorance, closely followed by poverty and depravity. If we cannot prevent the mother working, the sale of alcohol, or domestic mismanagement, we can at least minimize their evils by the education of the parents, especially the mother. Schools for mothers, crèches for the children all help in overcoming maternal ignorance and carelessness. A child, be it rich or poor, is a human being whose whole life will be required to perfect it and much depends on the care and attention it receives from its start in life. The better the physical condition the greater chance there will be of a higher mental development. The wealth of a country lies far more in the health of its children than in any other thing. Social effort can be devoted to few better ends than the care of our children.

A philanthropic few have done noble work in pushing the problem on our notice, but the sooner the general public waken up, the more prospect there will be of a substantial forward movement.

## Dundee's Blind Citizens.

By Colin MacDonald.

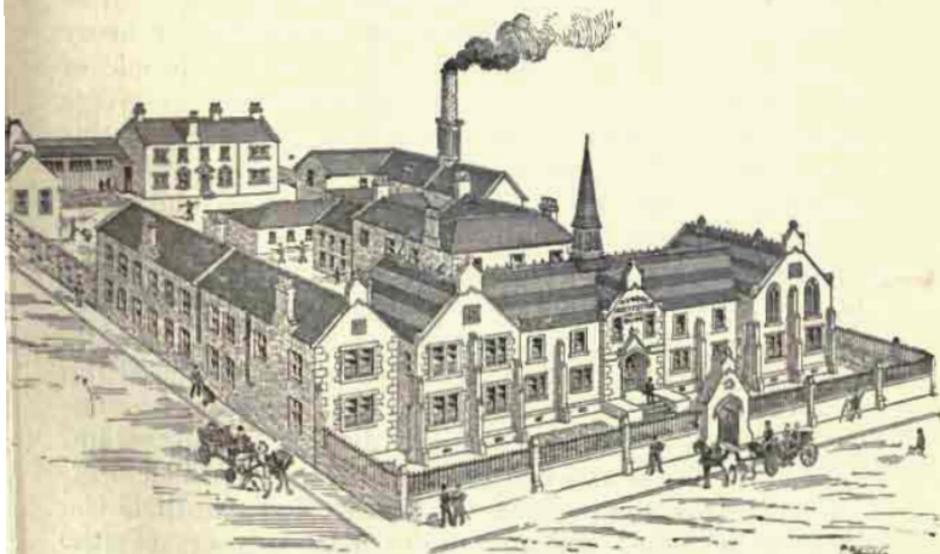
"SURELY we, the Blind, are not the least care of God." So wrote Milton more than two hundred years ago, when, "Fallen on evil days, and evil tongues in darkness and with dangers compassed round," he was trying to find a solace for his affliction in the composition of his immortal epic.

At the present day the care of the Blind is organised and systematised in a variety of forms—Social, Educational, and Industrial—and the admittedly heavy handicap under which our sightless brethren suffer is, to some extent, mitigated by the efforts made to ameliorate their condition. No class of the community evokes so much sympathy and consideration as the Blind. The "Blessed trinity of sound, colour, and form," which ministers so much happiness in general, is only enjoyed in its first element by them. But they, like the old blind bard cited, have their "days of darkness" brightened by the conversations and intercourse of friends, the pleasures of literature and music, and in the industrial and other pursuits now open to them.

It is computed that there are about two hundred and seventy blind persons in Dundee. Of these the larger portion are aged, infirm, and poor, and are cared for by the Outdoor Mission for the Blind, and receive aid from some of the numerous City Funds and Mortifications available. A considerable number who have attained the required age are in receipt of the Old Age Pension, whilst a good many aged blind having no relatives or friends to take charge of them find a home in the Poorhouse. The centre of the activities of the blind, however, is the Institution for the Blind at Magdalen Green, where seventy-six persons (including several who are deaf as well as blind) are employed.

The Institution was founded in 1865 by the munificence of the late Mr Francis Molison, who presented to a Committee of Management Dallfield House and grounds, in which a beginning was made in the Educational and Industrial Training of the Blind. His widow, the late Mrs Molison, in 1883 purchased the site on which the present large and flourishing Institution now stands, and erected the buildings thereon, the total cost of which amounted to £10,000. This handsome gift was formally handed over to the Directors by Sir Wm. Ogilvy Dalgleish, Baronet, the President of the Institution, and son-in-law of Mr and Mrs Molison, on 15th January 1885. The Institution will ever remain a monument to the munificence of the Molison family, and to Sir Wm. and Lady Ogilvy Dalgleish in particular, who have since its foundation taken the deepest practical interest in its progress and development.

There the mechanical faculty is trained and developed in a variety of useful trades, and artizans are produced who, in some cases, are able to earn sufficient to support themselves and families.



The principal industries engaged in are Wicker Work of all descriptions—including Mill and Factory Baskets—Brushes of all kinds, Mats and Mattings, Ship Fenders, Firewood, Firelighter making, and upholstery work. The Bedding Factory employs a large number of men and women, both in the manufacturing and purifying departments. The extent of the industrial operations may be inferred from the annual turnover, which is almost £10,000, whilst the earnings and allowances made to the workers last year totalled £2,498. 3s. 8d., the weekly payments to workers varying in the different departments, as shown in the latest Report of the Institution, being as follows:—

Basket Makers	-	-	-	from 15/-	to 23/-
Brush Makers	-	-	-	„ 14/6	„ 19/-
Mattress Makers and Upholsterers				„ 16/6	„ 20/-
Mat Makers	-	-	-	„ 16/6	„ 18/-
Unskilled Department				„ 11/-	„ 20/-
Firelighter Makers	-	-	-	„ 14/6	„ 18/-
Women Workers	-	-	-	„ 8/6	„ 10/6

Six at least of the Dundee Blind are engaged in the musical profession as Organists, Pianists, and Tuners and Teachers of Music. The achievements of several of these under their serious physical handicap equal that of many sighted artistes. A former pupil of the School is one of the leading choir trainers in the city, and has for years conducted the "Dundee Select Choir," who under his baton have rendered such works as "The Messiah," "The Creation," "Samson," to delighted Dundee audiences. Several others are specially gifted in this profession, one of them being leader of an Orchestra, and himself proficient equally on the Organ, Piano, and Violin. A good many others, evidently influenced by the decision of the late Professor Fawcett, that his "affliction would make no difference in his career," pursue various callings in commerce on their own account, and display enterprise and courage which have earned for them well-merited success.

An important branch of the Institution's work is the education of blind children under sixteen years of age.

The curriculum comprises English in all its branches, including typewriting, kindergarten work, and technical instruction in handicrafts; Music including the Organ and Pianoforte is also taught; whilst there is a well-appointed gymnasium for physical training. The Library attached to the school embraces many classical works in Braille, and the pupils have, in addition, access to the Braille books in the Public Library.

The School, which is conducted under the Elementary Education (Blind and Deaf) Act, 1891, embraces all the most scientific and approved methods of instruction, and its efficiency is annually attested by H.M. Inspector. Blind children coming from country districts are provided for in the commodious boarding-house in the Institution grounds. The number of pupils under instruction at present is only eighteen. There have been as many as twenty-four, and the gratifying diminution is no doubt in large measure due to the operations of the Dundee Eye Institution, which, treating diseases of the eye at the incipient stages, in many cases prevent what, without such attention, would ultimately issue in blindness.

Many of the Blind take an intelligent interest in municipal and educational affairs in the city, and these and other matters are keenly discussed in the various workshops.

The Reading and Recreation Club in connection with the Institution is a centre of much intellectual stimulus. Lectures and Readings in History, Science, and current Literature are given, and the members receive much enjoyment from a variety of games specially adapted for them.

It may be stated that the Industrial and Educational operations of the Institution are confined to Forfarshire, Perthshire, and the North-East of Fifeshire.

Dundee is fortunate in respect that all the Blind in the community and surrounding districts capable of being industrially trained, or of receiving education, are provided for in the Institution at Magdalen Green.

There are still a few who try to earn a livelihood by singing and scripture reading on the street, and vending

wares of various kinds from house to house, preferring such a life to the restraint and discipline of the Institution, but fortunately their number has been diminishing within recent years.

From the foregoing brief statement may be inferred the present position of the Blind in the community. As a class they share largely in the general esteem and sympathy, and their cause has evoked the generous support of many benevolent citizens.

All over the country at the present time public interest is being aroused on behalf of the blind as a class, and it is anticipated that their claims and needs are soon to receive special recognition.

An effort is being made to induce the Government to make adequate provision for the training, employment, and maintenance of all the capable adult Blind in the country. Under the provisions of the Invalidity and Insurance Bill probably the Blind workers in Institutions, and the large body of the Blind outwith their scope, may be to some extent benefited.

It is generally felt that State recognition to supplement voluntary effort is indispensable to raising the status of the industrious Blind to the platform of honourable and independent subsistence, and it is hoped that, as the result of the present movement, a measure will be passed giving substantial benefits to the class, and thus help them

“To break their birth's invidious bar,  
And grasp the skirts of happy chance,  
And breast the blows of circumstance,  
And grapple with their evil star.”

## Work among Women.

By Miss M. L. Walker, of Dundee Social Union.

DUNDEE is pre-eminently a city of women and of women workers. The census figures of 1911 give the number of females as 91,763, out of a total population of 165,004. The proportion of women householders (Census 1901), 12,000 out of 37,000, is the largest in any Scottish town; of these, 6,260 have the Municipal vote. The detailed tables of the Census Report reveal the abnormal conditions of sex distribution, marriage, and equipment. Up to the age of twenty the ordinary proportion between the sexes is fairly maintained, but between the ages of twenty and forty there are almost three women to two men, the actual numbers being 30,240 to 21,823; of these 30,000 women 15,000 are unmarried. Contrary to general belief, early marriages are not very numerous; the percentage of husbands among youths under twenty was .4, of wives, among girls of same age, 1.3. The proportion of "occupied" women over fifteen is striking, 53 per cent., and is the highest in Scotland; the number of married women among these is relatively large. In Edinburgh and Glasgow the ratio of married women employed in remunerative occupations is 5.1 and 5.5 per cent., in Dundee 23.4 per cent. "This high ratio in Dundee is most evident among women of child-bearing age; in Edinburgh 7.3 per cent. of the married women between 20 and 24 are occupied; in Glasgow, 7.5 per cent.; but in Dundee, 41.0 per cent.; in age group, 25 to 44, this ratio in Dundee is 25.2, in Edinburgh it is 5.0, and in Glasgow 5.3." Had the Census of 1901 given corresponding figures, they would have probably been even more startling, for in the jute industry there has been a reduction in the ratio of women to men, and a specially satisfactory decrease in the number of girls employed under thirteen, 70 in 1911, as against 1081 in 1901. The explanation of these figures is found in the fact that the staple trade of

the town—jute—is a women's industry. The total number of workers was given as 34,414, of whom 23,369 were women; while the percentage of men over twenty years of age was 23. Engineering and shipbuilding rank next among Dundee industries, and employ 6880 men and boys.

The abundance of work for women attracts workers from other towns, while there is a steady tide of emigration of men and boys, especially among those who are in skilled trades, owing to the difficulty of their finding employment when their apprenticeship is over. The jute industry relies mainly on the labour of women, girls, and lads. For the latter it is more or less a blind alley occupation, but for women and girls it offers steady employment, and in many departments good wages. The weavers, winders, and sack machinists are a hard-working, thrifty, and self-respecting class of workers. They impress visitors by the neatness of their dress and the decorum of their manners. There is nothing of the typical mill girl about them, though she does exist in some parts of Dundee. It is in the spinning mill and preparing department that the largest proportion of married women, who are the mothers of young children, is found. The total number of married women is 5532, of widows 2107.

From the figures given above it is evident that the conditions affecting the women and girls of Dundee are abnormal, and that these conditions must in great measure determine all efforts towards betterment, whether undertaken by the workers themselves, by the municipal authorities, or by private charitable and philanthropic effort. Over-employment of women and under-employment of men are found associated with the highest infant death-rate in Scotland, a high illegitimate birth-rate, and great poverty.

Owing to the discussions on the Insurance Act much attention has been directed towards the question of the provision for illness already made by working men and women. It is interesting to note that in a community like Dundee the women are as a rule content with securing funeral benefit. For this they are entered as children by their parents at 1d., and as workers pay 2d. or 3d a week.

The Strathtay Lodge (the Women's Court of the Foresters' Society) numbers only about forty members; these receive sick benefit as well as funeral grant. The Rechabites and the Ancient Shepherds have a considerable number of women members in the men's branches. There is a local union for jute workers—the Mill and Factory Operatives Union—under the Rev. Henry Williamson. The numbers are over 6000, five-sixths being women. They pay 1d., 2d., and 3d. a-week, according to the scale of benefit during strikes, lock-outs, etc. A funeral benefit is given up to £3, but there is no sick allowance. Another union—the Dundee and District Jute and Flax Workers—was started some five or six years ago, and has a membership of over 5000. The payments here begin at 2d. a-week; there is no insurance for illness, though it is proposed to open a section for this so that the union may rank as an Approved Society. The workers in the past who wished to provide against sickness joined yearly societies. These pay sickness benefit, and at stated periods divide out their funds. Members must be in good health when they join, and precautions are taken against malingering. In the Dundee Burial Society, a working-class funeral benefit organization, there are about 10,000 women members.

Some ten or twelve miles north of Dundee, on the slopes of the Sidlaw, stands an old mansion house, which has been converted into a Home of Rest for working women and girls. The charge is seven shillings a-week, and subscriptions provide for a certain number of free admissions. This country change has proved of the greatest benefit to many, and is much appreciated.

For many years the high infant mortality has been a matter of grave concern to the Municipality and others interested in the welfare of the city. In 1903 two Lady Health Visitors were appointed to visit the homes of those living in the poorer districts, and a special part of their work has been to enquire into the causes of death among young children. In 1904-5 the Social Union carried out an investigation into social conditions, with special reference to infant mortality. This enquiry showed

that the feeding of the infant was of primary importance, and that the breast-feeding of infants in Dundee was seriously interfered with when the mothers returned to work during the first months of the baby's life. On the other hand, if the mother abstained from work, the low wages earned by the husband could not provide her with the necessary nourishment. Recognizing the significance of these facts a public spirited citizen offered as an experiment to finance a Restaurant for Nursing Mothers for three years. This restaurant was opened in May 1906 by the Social Union, on the lines of those organized by Madame Henri Coulet in Paris, and was the first in Great Britain. Its objects were to encourage the breast-feeding of infants, and to discourage the work of mothers in mills and factories. The experiment was so successful that in 1909 the Municipality took the matter up, opened two other restaurants in poor districts of the town, and gave a grant to the original one. The charge is twopence a dinner, but necessitous cases are put on a free list on the following conditions. The infant must be entirely breast-fed, the mother must not work, and must bring the baby regularly to be weighed. Free dinners are given only during the first three months of the baby's life. The work has steadily extended; it now includes schools for mothers, and a systematic visiting of the homes of all infants born in the poorer districts of the city. This was only possible after the adoption of the Early Notification of Births Act, and it is carried out by trained workers assisted by a large number of voluntary visitors. Lectures for Mothers in Hygiene and Domestic Economy are also provided by the School Board. These efforts to save infant life have borne fruit in a noticeable reduction in the rate of infant mortality in the poor district round the original restaurant. In 1904 one infant out of every four died. In 1909 an enquiry was instituted by the Home Office, and the death-rate in the same district was then one out of five. But a definite limit is set to improvement as long as the conditions remain the same, and a great part of the work undertaken is necessarily palliative rather than remedial.

This is also true of other efforts which aim at caring for the children of wage-earning mothers. Here, too, the Municipality has recognized charitable effort in the grant of £100 to the Dundee Day Nurseries. These are four in number; there is another in Lochee, under separate management, and the Sisters of St. Vincent de Paul carry on a sixth. In the four under the Dundee Day Nurseries Committee the average number of children is 120; in the six, about 180 or 190 can be accommodated. The Committee has done a great deal during the past few years in improving the buildings and bringing the arrangements up to modern standards. The mothers pay 3d. or 4d. a-day, and these payments cover about half the cost of the ordinary yearly expenditure. The children are carefully fed and tended. There must, nevertheless, be a certain risk in carrying babies and young children to the nurseries at 5.30 a.m. in cold winter mornings. Partly for this reason and partly to avoid the additional work, the hard-pushed mothers as a rule prefer to leave the children in the care of a neighbour. In the enquiry for the Home Office already referred to it was found that in that district 60 per cent. of the mothers of young infants worked, and that only 3 per cent. of the babies were taken to the Day Nurseries. Another means of helping the mothers who work has been adopted by a large firm of manufacturers, in the form of a Welfare Visitor. This lady visits the homes of the workers who are ill, aged pensioners, and mothers.

As stated before the lot of the unmarried workers is much more favourable, and in some departments wages run up to £1; 15s. is a common wage in the factory; 11s. or 12s. in the mill. When two working women live together their circumstances are comfortable. Some of the most attractive little homes in Dundee are those of women and girls living as companions. The friendship begins in their youth, often persists till old age, and is only broken by death. It is a frequent complaint that young girls leave home when they begin to earn good money, simply from the love of independence, breaking loose their family ties in a thoughtless and callous manner. No

doubt this is the case, but such girls drift into lodgings. The girl who can save enough to furnish a little home does not take the step lightly. Sometimes her parents are dead; sometimes they drink, and the girl with an instinct for better things can endure no longer the squalor and misery of the two-roomed house. In such cases she leaves her home, sometimes taking some of her brothers and sisters with her, sometimes setting up joint house-keeping with a companion of her own age and sex. The home she makes is bright with gay floorcloth and polished brass. The windows are draped with muslin, the bed with chintz. It is a matter for regret that owing to the scarcity of men earning a good wage these domestic talents often fail to find their natural sphere. These are not the girls who marry casual labourers or mill workers and work after marriage. They are interested in the questions of the day, they attend lectures and classes, take an active part in Church life, are members of various unions and societies, and are ready to help others. There are many working girls whose wages are lower, and who cannot attain to a home of their own, and who yet want something better than lodgings. This need has been recognised, and various agencies carry on hostels or boarding houses for working girls. One is managed by the Sisters of St. Vincent de Paul, the others by committees. One of these hostels was built for the purpose, and is very attractive. It has a large club-room to which outside girls can come, and, though simple, the house is artistic and pleasing. Here there is room for twenty-five girls; they pay six shillings a-week, and have comfortable, airy rooms, good food, and friendly supervision.

There is no central institute for girls' clubs and recreation generally. Every congregation and mission has classes of some kind—sewing, singing, domestic economy. These are well attended. The United Free Church supports a special scheme for the mill workers. Brown Street Hall is situated in one of the poorest parts of the town. It has a number of meetings and classes, and a superintendent who visits the homes of the members.

In some branches of its work the Y.W.C.A. touches the mill girls, in others those who have fallen out of the ranks of the workers, but it makes special provision for the more educated classes of workers—typists, clerks, shop assistants, women in business. It has a large membership, and the Institute in South Tay Street has hall and class-rooms accommodating over 500. The domestic economy classes are much appreciated; last year 1490 students were enrolled, 1390 of whom obtained Government grants. The boarding-houses can accommodate over 50, and the dining-rooms provide good meals at a moderate cost for many more. The dining-rooms were the first in Dundee for women only.

The Salvation Army, on the other hand, directs its social work to the rescue of those who are worsted in life's battle and have fallen out of the ranks of the steady workers. The *Metropole* is a lodging-house for the very poor, for the casual worker, the homeless woman, the tramp. It has accommodation for over 100 at a charge of 4d. a-night. There is a kitchen where the inmates can cook their food, and a washing-house. Food—soup, pudding, bread-and-butter, tea—can be bought. The staff numbers fifteen, and in addition to the work of the *Metropole* and Rescue Home attached, the officers visit in the slums and attend the Police Courts. The extension of the Probation System has increased their duties, and afforded many opportunities of influencing women and girls who are starting on the downward path.

As might be expected there are many aged and lonely women in Dundee. Provision for those between sixty and seventy years of age is made by various mortifications and funds which grant a small monthly pension. There is a small Home of Rest where members of the Church of Scotland find shelter. Many others are saved from an old age of poverty and loneliness by the Little Sisters of the Poor in their home at Wellburn. This succour is extended to Protestants as well as Roman Catholics. The number of old women in Wellburn is seventy-three. The whole work of the house is carried out by the devoted sisters,

who also take turns of begging for help, both in money and kind. The house is managed with wonderful economy combined with comfort, and the smiling faces of the inmates testify to the loving care of the Sisters.

These instances are selected as typical of the work undertaken for women in Dundee; the list is by no means exhaustive. While recognising to the full the work that has yet to be accomplished and deploring the present conditions, the social worker cannot but note the growing sense of the solidarity of the community and the interdependence of its members.



## Welfare of Youth Work.

By David Latto, Town Clerk Depute,  
Clerk to City Committee.

"HEAVEN kindly gave our blood a moral flow." The foregoing quotation expresses the basis upon which all efforts at reform are necessarily based. It would be pleasant indeed to believe that the vast amount of prophylactic or remedial work which is carried on was prompted by altruism. The fact cannot be hid that self-protection compels Society to interest itself in the improvement of conditions which threaten its well-being. In the past the greatest attention has been given to the sanitary condition of the dwellings of the poor. This attention or interest is more and more being directed also to the individual to the end that he may live in greater accord with the established law.

Any one coming into frequent contact with the work of the Courts administering the law with reference to children and young persons cannot fail to notice that such children belong to the poorer classes. This supports the idea that environment and not any special depravity on the part of the children is the cause.

The housing of the poorer class is such that the street rather than the house is their home, and they consequently sooner drift away from parental control than the children of classes in better pecuniary circumstances

It is greatly to be regretted that some of those who make their first acquaintance with Police Courts are brought up for such offences as card playing, pitch-and-toss, stone throwing, playing with hurley on the pavement, acting as street porters without a license, and a number of other offences proceeding from a spirit of adventure and classed under malicious mischief. If these offences are analysed it will be readily seen that none of them deservedly merit police attention. Card playing as a rule endangers no one. Pitch-and-toss is again a game that

cannot possibly hurt anybody. The players are, during the game, enjoying out-of-door recreation. Card playing might engender the gambling spirit, but not any more likely to do so because it is played by children in public parks or streets or on vacant pieces of ground than by fashionable ladies in the parlour.

The height of absurdity in criminal legislation is reached when youngsters are taken before the Court for "Playing with hurley on the pavement," or for "Acting as street porters without a license." It would be sufficient for the policemen to order the children with their hurleys off the pavement, and ask them to play on the carriageway, and as regards the offence of acting as street porters without a license, the travelling public are themselves to blame if they employ as a porter a man who is unlicensed, and their plain duty to themselves is only to employ licensed porters.

Were the surcharge of buoyant animal spirits which constrains youths to commit such offences allowed a proper outlet in congenial surroundings these same youths would be heroes in a greater or less degree. It is quite evident that this very quality is essential to success in life.

These and some other offences should be repealed from the Statute Books along with, in the case of children, the barbaric penalty of whipping. Only two other European countries recognise this penalty.

The object of legislation, so far as regards children, should be to keep them as far away as possible from the baneful influence of prison life. With this object in view, as can be gathered from several of its sections, the Children Act of 1908 was passed. A "child" by that Act is defined as meaning a person under the age of 14 years, and a "young person" is defined as meaning a person who is 14 years of age or upwards and under the age of 16 years. It introduced Juvenile Courts which should be in a different building or in a different room from that in which the Ordinary Court sittings are held, or they should be held on different days or different times from the Ordinary Court sittings, and no child or young person is

allowed to be present at an Ordinary Court. In offences against decency or morality if a child or young person is required to be in attendance at an Ordinary Court as a witness power is given to order the Court to be cleared. Everything has been done to keep the child or young person away from adult criminals, and also away from the prison buildings. A child or a young person cannot now be committed to prison for offences unless such child is of so unruly a character or so depraved as not to be fit to be detained in a place of detention.

Places of detention have been substituted, in the case of children and young persons, for ordinary prisons, and the Local Authority is bound to provide such places of detention, which are as devoid as possible of the suggestion of prison life, and partake more of the nature of a home.

This Act has also consolidated the Reformatory and Industrial Schools Acts. The consolidation has contributed to the portions of the Act of 1908, dealing with Reformatories and Industrial Schools, being put more than ever into operation by the Magistrates.

The City of Dundee has endeavoured to carry out the spirit and intention of this Act, and for that purpose a Meeting of Citizens, consisting of Members of Local Boards, such as the Town Council, School Board, Parish Council, Chamber of Commerce, Directors of Industrial Schools, Society for the Prevention of Cruelty to Children, Dundee Social Union, and also of individual citizens interested, was held in the Town Hall, Dundee, on 29th April 1910, under the presidency of The Honourable The Lord Provost of Dundee. Out of that meeting was formed the Dundee Children's Welfare Committee, which was the first of its kind to be formed in Scotland. Other cities have since followed the example of Dundee and organised similar societies. The Committee meets quarterly, and has become a centre or focus for all matters affecting child life, and more particularly in so far as such matters fall within the four corners of the Children Act. This Committee prepared and issued a circular containing information as to the grounds on which children are liable under Section

58 (1) to be sent to certified Industrial Schools, and invited all parties who knew of suitable cases to send intimation regarding same to the Chief Constable, to whom the Local Authority had delegated their powers in this matter, who would, without further trouble to the informant, enquire into and, if suitable, bring such cases before the Children's Court. It is thought that the issue of the circular might help by enlightening the public as to the way in which they might be of assistance in carrying out the important provisions of that Act. Section 58 (1) (d) has extended the grounds for sending children to Industrial Schools by including the case of a child under the care of a parent or guardian who, by reason of criminal or drunken habits, is unfit to have the care of the child. Since 1st April 1909 no fewer than 101 children coming within the scope of the above provision have been sent from Dundee to Industrial Schools, the parent or guardian being in every case decerned to make payment of a sum named in the order towards the maintenance of the child.

At a meeting of the Children's Welfare Committee held on 29th October 1910, Mr David Dewar, City Procurator-Fiscal, Dundee, thought that attention might be directed to dealing specially with the class of lads who are outwith the scope of the Children Act, 1908, on account of their having reached the age of 16, and who earn a precarious living by selling articles on the streets, and who lodge in common lodging-houses away from parental control. Voluntary efforts were made to reclaim 23 of the lads referred to, and the result of these efforts is as follows:—3 were fitted out and sent to Church of Scotland Farm Colonies. Of those 3, 1 was found physically unfit for farm work, and was subsequently sent to hospital suffering from phthisis; 1 left after one night; while the third deserted after three months. 1 was fitted out and sent to Malta House, Edinburgh, but after about three weeks he returned to his old haunts. 1 was fitted out and sent to a Salvation Army Home in Glasgow preparatory to his being transferred to their Farm Colony at Hadleigh, Essex, but he also only remained one day and came back to his old haunts.

2 had suitable situations provided for them locally, and although persevering efforts were made to get them to keep at work, they were soon found following their old habits. 1 enlisted in the Royal Engineers. 3 or 4 were found unfit for ordinary employment on account of their being defective either mentally or physically. Some got employment in mills or factories, while others rejected offers of employment made to them. Those lads, it is contended, have a tendency to drift into crime, and it was suggested by Mr Dewar that the Prevention of Crimes Act, 1908, if amended to make persons between 16 and 21 convicted of offences under *Summary Complaint* come under the scope of the first section of the Crimes Act of 1908, so as to be liable to be sent to a Borstal Institution, in the same way as it at present applies to such persons convicted on *Indictment*, the training which such an institution provides would be the means of reforming those lads. The Committee approved of that suggestion, and it was arranged that a Conference consisting of representatives of the Corporations of Edinburgh, Glasgow, Aberdeen, and Dundee, and also representatives of other public bodies and of philanthropic institutions should be convened. The Conference was accordingly arranged, and was held on 28th May 1911. It was attended by representatives from those bodies and many others, when the following resolution, amongst others, was unanimously passed:—

“That this Conference, being convinced that voluntary efforts were not sufficient to bring about a reclamation of the members of a numerous class of young persons between 16 and 21 years of age, which existed in all large cities in Scotland, who had contracted idle habits and were in danger of becoming criminals, recommends that the Government be approached with a view to getting statutory powers to permit Courts of Summary Jurisdiction, Scotland, within proper legal safeguards, to send such persons to Reformatories or other Institutions conducted after the manner of Borstal Institutions, or for some other compulsory method of reclamation being provided.”

The above resolution was duly forwarded to the Scottish

M.P.s and to Lord Pentland, then Secretary for Scotland, who was asked to receive a deputation, preferably in Edinburgh, with a view to inducing the Government to give effect to the above resolution. His Lordship replied that he had every sympathy with the objects of the Conference, but that he thought he would be in a better position to consider the suggestion of carrying through legislation on the above lines after the Borstal Institution which has recently been opened at Polmont had been in operation for some time. There this matter now rests.

At present a person can be sent to a Borstal Institution for a term of not less than one year nor more than three years if he be convicted on Indictment of an offence for which he is liable to be sentenced to penal servitude or imprisonment, and it appears to the Court—

- (a) That the person is not less than 16 nor more than 21 years of age; and
- (b) That by reason of his criminal habits or tendencies, or association with persons of bad character, it is expedient that he should be subject to detention for such term and under such instruction and discipline as appears most conducive to his reformation and the repression of crime.

Before such a sentence, however, is pronounced, the Courts must consider any reports or representations which may be made to it by or on behalf of the Prison Commissioners for Scotland as to the suitability of the case for treatment in a Borstal Institution, and must be satisfied that the character, state of health, and mental condition of the offender, and the other circumstances of the case are such that the offender is likely to profit by such instruction and discipline.

A Borstal Institution is a place in which young offenders whilst detained may be given such industrial training and other instruction and be subjected to such disciplinary and moral influences as will conduce to their reformation and the prevention of crime.

No definition can be given as to when an offence falls to be tried by Indictment or Summary Complaint. A list

of some of the cases which fall to be dealt with in either way could be given, but offences which would ordinarily fall to be tried on Summary Complaint will fall to be tried on Indictment if the offences are of sufficient gravity to warrant their being tried before a Sheriff and a Jury, or before the High Court of Justiciary. Preparatory to a person being tried on Indictment the information in the case is forwarded to the Crown Office, who instruct as to the form of complaint.

I think difficulties would arise in trying to amend the Prevention of Crimes Act, 1908, so as to meet the class of lads and girls beyond the age of 16 and under 21, and I think were a Reformatory for persons between 16 and 21 established on the same lines, but separate, as for persons under 16, all that is wanted could be obtained. By Section 57 of the Children Act, 1908, it is enacted that—

“Where a youthful offender who in the opinion of the Court before which he is charged is 12 years of age or upwards but less than 16 years of age is convicted whether on Indictment or by a petty sessional Court (this means the Sheriff or any two or more Justices of the Peace or any Magistrate or Magistrates) of an offence punishable in the case of an adult with penal servitude or imprisonment the Court may in addition to or in lieu of sentencing him according to law or to any other punishment order that he be sent to a certified Reformatory School ; provided that where the offender is ordered to be sent to a certified Reformatory School he shall not in addition be sentenced to imprisonment.”

The Treasury contributes towards the expenses of any youthful offender or child detained in a certified industrial or reformatory school, and the Education Authority in the case of Industrial Schools, and the Town Council in the case of Reformatories are bound to provide for the reception and maintenance of such children.

It will be seen that, whatever legislation should be passed to deal with the class of lads now under consideration, in all likelihood the expenses will be laid upon the Local Authority.

The suggestion of a Senior Reformatory occurs to me to

be the easier way out of the present difficulty, and is in harmony with the spirit of the above resolution, and would be along the line of least resistance. In any case, the subject is one of very great importance to the community, and the efforts of the Committee and other similar Committees which have been established elsewhere it is hoped will result in some appropriate legislative measure being passed.



## The Dwellings of Dundee.

HOUSING CONDITIONS AND TOWN PLANNING PROJECTS.

By **Rev. Walter Walsh, D.D., Convener of Housing and Town Planning Committee.**

"MAGISTER Alexander Wedderburne, Archigraphus, Civitatis Deidonanæ"—a great Town Clerk of Dundee about the end of the fifteenth century—thus inscribed his name and style on the fly-leaf of the Lockit Book, and in the Latin tongue added this much more,—“If it be thy design to ornament the City by thy gifts, be thou thyself dedicated, in the first place, to whatsoever is loveliest, and of Clemency, Justice, and Beneficence thou shalt raise aloft the best and most memorable monument within the Republic, not merely an inconsiderable building. For if Reason should rule in cities, it is better certainly for great souls to inhabit small houses than for mean slaves to lurk in magnificent mansions:—The Eubœans and Spartans did not build and repair their walls with stones only, but with Discipline and Zeal for Good Morals, which are the visible ornaments alike of cities and of rulers. Flourishing, truly, and peaceful they made the Republic, by uniting together, not logs and stones, but living souls.”

A City which gave birth to a Town Clerk inspired by classic reminiscences of Epictetus on the one hand and democratic anticipations of Walt Whitman (“Where the Great City stands”) on the other,—such a City might be expected to endeavour to make its dwellings worthy of its people; and in this brave endeavour Dundee has not been wanting; with what result it is the object of the following pages to describe.

## PAST CONDITIONS

The development of Dundee, considered as a community requiring to be *housed* under conditions determined by the social usage of one age after another, has been governed by the influences of Nature, War, and Trade; and successive Town Plans (if such an anticipation may be permitted) due to these influences may be roughly traced.

In earliest times, the inhabitants lay along the level shore to the east of the Black Rock, bounded by the two burns which flowed, the one from the westward through the Meadows into the Tay near the point now known as Commercial Street, the other bickering down from the heights of Clepington, past the western side of Wallace Craigie, entering the firth near the spot where now stand St. Roque's Reading Rooms. The heights and hollows behind yielded them all the game they required, and the waters in front all the fish they could take. Shelter and a ready livelihood were the conditions that determined what we may describe as the first Town Plan. From the margin marked by our single street Seagate they caught their first sight of the Roman galleys, and shouted in the tribal wars of Scot and Pict.

Later, having provided for defence by building their Castle on the Black Rock, they crept with their dwellings along the lower levels within the folds of the bay to St. Nicholas Rock on the west, making their harbour between the two sheltering rocks, in the place now known as Greenmarket. The great folk would build round the Castle Rock and the Harbour head; the simple ones would lie along the water edge. That would be Town Plan number two.

Now the developments of Trade began to exceed the ravages of War, so that population increased till it jammed itself inside the limits of the circumscribing walls, within a series of tunnel-like lanes and wynds; going to air itself westward on the pleasant beach of Sea Braes, eastward to the little cliffs of Stannergate, or north to the ridge of Windmill Hill and the flowery slopes of the Pleasance. That would be the third Town Plan.

Coincident with what we may call the Wedderburne period,—English forays and Monck massacres having failed to arrest its progress,—Dundee overflowed its ancient walls, and the inhabitants began their slow movement west and north, over the heights and hollows formed by the Meadows and the Wards, across the rolling lands of Blackness and Corbie Hill, bending round between Balgay and the Law through the umbrageous vale of Logie Den to meet or make Lochee, swarming up the slopes of Law Hill and over the eastern shoulder to Clepington, so joining hands with the ancient barony of Rotten Raw, now also creeping northwards, then sweeping into Strath Martin to link up with Downfield and Baldovan. This may be described as Town Plan number four, bringing us to our own time, within sight of the Greater Dundee, which will lie, bonnily and healthfully, between the sand-dunes and flowery links of Monifieth on the east to Invergowrie Bay on the west, and north to the sunny slopes of the Sidlaw Hills, housing a community of twice its present number. With that enlivening glance into the future we turn to describe the actuality of to-day.

The housing of the Dundee of 1912 involves the provision of dwellings fit for human habitation for no fewer than 165,044 people, being the population estimated to the middle of 1911. Available for this purpose is a Burgh area of 4,881 acres, which does not include 400 acres of foreshore, and gives an average density of 33·8 persons to the acre, and an average standing-ground for each separate inhabitant of 14·3 square yards. The unequal distribution of the population, from a few persons per acre in one place to many hundreds in another, will be dealt with later. Of the gross area of 5,281 acres, 400 consist of foreshore and 331½ of Parks and Cemeteries, leaving 4,549½ acres available for domestic and business purposes. Of this, again, the City owns 44 acres, about half of which are occupied by departmental yards, offices, and other permanent buildings. Land yet unbuilt on amounts to about 2,500 acres. Locomotion and transit are provided by 648 roads and streets, aggregating over 90 miles, 8 miles of which are tree-planted.

As a walled City, ancient Dundee sent down to posterity a full proportion of that congested area which is the greatest burden of modern communities, described by the present Lord Provost as "terrible congestion in certain parts of the City." Into these "black spots" had been crushed populations varying in degree of density up to 962 persons per acre. It was therefore to be expected that Dundee would stand high in the unenviable scale of pauperism, tuberculosis, infant mortality, and general death-rate. We now know that these evils are exactly and statistically in proportion to the amount of overcrowding into dark, damp, ill-ventilated dwellings with their almost inevitable concomitants of slovenliness, dirt, and drunkenness. Enlightened by the principles of social science, the Town Council has, in recent times, pursued a steady policy which, after the manner of Carlyle, may be called a "diffusion-of-the-people-policy." By successive Improvement schemes, by firm enforcement of the laws against insanitary dwellings, and by the encouragement of cottage building in the outlying districts, the congested populations have diminished by about 20 per cent. Further extensions of the same policy are in contemplation. The problem for Dundee is how to secure a fuller economic use of its natural advantages, and at the same time a fuller social existence for its industrial dwellers.

The influence of the principal local industry has undoubtedly told in the direction of monotony and dreariness so far as the dwellings of the working people were concerned; whilst at the same time its distinctively Scottish methods have saved the town from the long miles of uniform desolation one sees in the working people districts of the larger English towns. The Scottish system of housing has vices enough of its own; though deadly dullness is perhaps not one of them. The great numerical preponderance of women employed in the jute trade necessitates that a large number remain unmarried and live on with their parents, which, again, tends to overcrowding into the two-roomed type of house. The single-roomed, or "attic," house is encouraged by the number of elderly unmarried women.

In addition to much old property, Dundee possesses a considerable number of "back lands,"—*i.e.*, dwellings which are connected with the street only by a "pend" or "close." Some of these are of comparatively recent date; but it is certain the Local Authorities will in future regard unfavourably the erection of houses having no direct street frontage.

The sum of these local influences has been aggravated by the past general indifference to Town Planning from which all communities alike have suffered,—Dundee not less than others. The mass of rookeries inherited from of old has been emulated by the modern crowded tenement, which, in its turn, has been elbowed by the mill and jostled by the factory, relieved from which the worker vanished into the adjacent "close" or "pend,"—and this, up to quite recent times, represented industrial Dundee. Thanks to the happier ideas of our time, it is certain that such districts as that lying between Lochee Road and Hawkhill can never be repeated.

### THE TENEMENT SYSTEM.

The influence of the Scottish tenement, as indicative of the peculiar housing habit of the Scottish people, ought not to be overlooked. The four-storey "land" or tenement, with a population of 400 per acre, is, unluckily, not yet banned by Local Authorities, with the result that some so-called "Improvements" have actually produced greater congestion than they were designed to remedy. In the Perth Road district, to give one instance, old dwellings of the self-contained cottage type, housing less than 100 to the acre, have made room for imposing four-deckers, housing four times that number. Such buildings look well for a few years, and attract the most self-respecting part of the population; but when they lose their freshness they pass to a lower grade of tenant, and yet lower; and we can see the process of slum-creation proceeding under our very noses. In Blackness and

Clepington also the typical Scottish tenement can be studied, running in straight rows against the sky-line, practically sunless in the ground-flats, compelling the children to play and the way-farer to pass as if between two tall, draught-creating, and sun-obstructing stone dykes, almost completely blocking out the fine views of the Sidlaw hills on the north, or the stretches of the Tay on the south. From other points of view the populous "land" is objectionable. By diminishing the sense of responsibility among tenants it is less favourable to cleanliness, while it increases the liability to friction. It cannot fail to have injurious effects upon the housewives one continually meets toiling up and down those numerous flights of stairs with babies, or with baskets of clothes to and from the wash-house. Notoriously, it presents all the conditions favourable to consumption. The tenement system will probably survive in Dundee for a long time to come, but the newer tendency towards the cottage type of dwelling—"one family one house"—will gradually modify it, restrict its number of storeys, and break its straight line up into groups affording the maximum of sun and air and of the views beyond. The Municipal Authorities may be expected to encourage that evolution.

#### HOUSING CONDITIONS.

The foregoing general description makes luminous a closer statistical study of the housing conditions of the City.

A table (which follows) compiled from the Valuation Roll by the Police Treasurer shews the total dwelling-houses within the Burgh to be 41,292 (of which 2,893 are unlet), and the total rental £408,773 (of which (£21,661 represents the unlet rentals). The detailed rents afford a clear index to the relative poverty and wealth of the inhabitants. The Poor Law Authorities calculate that there are upwards of 10,000 dwellings in Dundee rented at £5 and under.

## NUMBER AND VALUE OF DWELLING-HOUSES.

CLASSIFICATION.	YEAR 1911-1912.		UNLETS.	
	No.	Rental. £	No.	Rental. £
Dwelling-Houses—				
Under £5 -	7,700	29,391	989	3,492
Of £5 and not ex. £7 -	11,123	67,055	846	4,929
Above £7 " £10 -	11,491	97,654	558	4,643
" 10 " 15 -	6,010	74,162	347	4,256
" 15 " 21 -	1,877	33,350	55	962
" 21 " 30 -	1,284	32,823	37	977
" 30 " 40 -	626	22,349	16	567
" 40 " 60 -	443	22,266	8	417
" 60 " 100 -	179	13,639	7	558
" 100 -	51	8,522	3	530
	40,784	401,211	2,866	21,331
Dwelling-Houses with Byres, Stables, etc. -	64	1,812	(included above.)	
Dwelling-Houses and Shops—				
Not exceeding £10 -	221	1,864	11	92
Above £10 and not ex. £21	196	2,773	13	170
" 21 -	27	1,113	3	68
Total -	41,292	408,773	2,893	21,661

Further analysis (from the "Report of an Enquiry by the Board of Trade," 1908, p. 593) discloses the percentages of the total population occupying houses of

One Room to be 11·3 per cent., }  
 Two Rooms to be 51·7 per cent., } = 63 per cent.,  
 Three Rooms to be 20·1 per cent.,  
 Four Rooms to be 6·6 per cent.,  
 Five or more Rooms to be 10·3 per cent.

The total dwellings, viz., 41,292, being distributed in varying degrees of density over the area of 4,881 acres, yield an average of 8·45 dwellings per acre. Considering, however, that the built-on land amounts to only 2,781 acres, the actual density of dwellings is 14·8.

The predominant Rents of Dundee houses, calculated on a weekly basis, and adding Rates, are stated (Board of Trade Report, p. 520) as :—

Single Rooms, 2s. to 2s. 3d.

(Or up to 2s. 6d. for Single Room and Bed Closet, or two Attics. In older and more crowded districts, as necessary in a City where the staple trade is low-wage, single rooms can be had for 1s. 6d., or even less.)

Two Rooms, 3s. to 4s. 9d.

(The wide range here also is accounted for by differences in wage and locality.)

Three Rooms, 5s. 2d. to 7s. 1d.

Four Rooms, 7s. 10d. to 9s. 5d.

(Rents vary a little according to flat occupied.)

As compared with other Scottish towns, taking Edinburgh as the standard and 100 as the index number, the place of Dundee is seen to be 92, so that the City shares with Greenock the third highest place in the scale of rental:—

Edinburgh	-	-	-	-	100
Glasgow	-	-	-	-	99
Greenock	-	-	-	-	92
Dundee	-	-	-	-	92
Falkirk	-	-	-	-	91
Paisley	-	-	-	-	90
Aberdeen	-	-	-	-	84
Perth	-	-	-	-	76

The internal arrangements of Dundee houses are determined by the prevailing type of tenement, and conform to type with almost unbroken regularity. We have seen that 63 per cent. of the inhabitants live in houses of two rooms or under. This is the result of the expensive stone tenement system, which tends to crowding, though it also gives larger apartments. But the advantage of the larger kitchen is neutralised, in turn, by the unwholesome Scottish habit of having a bed in it, always used in preference to "the room." In the newer tenements a recess is generally made for the bedstead, happily, as yet, never enclosed. In houses of three apartments, the parlour sometimes contains an enclosed bed-recess; but more generally a folding bed is used. In more recent dwellings,

the kitchens measure about 13 or 14 feet by 11 feet, with hot and cold water scullery, and the rooms 12 or 14 feet square. The required height is 9 feet 6 inches on the ground floor and 9 feet on the floors above. Some of the newer tenements are equipped with water-closets in each house, more rarely with a bathroom. In general, however, the closets are on the stairs, sometimes one for each family, more usually one for the two or four families on each flat. Each tenement is supplied with a wash-house and some kind of back space or drying ground. The drying of clothes is accomplished by means of a tall pole erected in the rear, to which ropes run on blocks from the kitchen windows. In rare cases, a drying chamber is fitted under ground, with direct ventilation.

#### MUNICIPAL EFFORT.

It is noticeable that the Municipal rulers of Dundee, singularly advanced and successful as they are in varied Municipal enterprises, have not hitherto seen the necessity of embarking upon any scheme of Municipal housing. It is held that the number of unlet subjects proves the demand to be fully met by private enterprise. For similar reasons, it has established no Municipal lodging-house, contenting itself with the supervision of several privately-managed houses. Municipal land-ownership is in the same position, the civic rulers contenting themselves with the purchase of lands necessary for parks, cemeteries, offices, and yards. The Small Dwellings Acquisition Act, 1899 (which empowers the Town Council to advance loans for house purchase) has not been put into operation. No "Public Utility" or "Co-partnership" company has undertaken to develop any local estate. No Trade Union has invested its funds in dwellings for its members. Through Building Society operations a small number of working men, something under 200, have become the owners of the houses they occupy; while 80 per cent., or something like 1,000, of the "villa" residents—*i.e.*, those rented at £30 and upwards—are, it is calculated, owners as well as

occupiers of their dwellings. So far as the housing of its people is concerned, Dundee has trusted unreservedly to private enterprise.

On the other hand, the Local Authorities have made efforts to guard against the possible defects of private ownership, by stricter enforcement of the laws against insanitary properties. Profiting by the experience of other cities, they have not proceeded by way of the wholesale purchase and clearing of insanitary areas, either under the Housing of the Working Classes Act, 1890, or the Housing and Town Planning Act, 1909. The City's "slum crusades," as they are popularly called, have been carried out under the local "Police and Improvement Consolidation Act, 1882." The large heritage of decayed property has already been referred to. As is to be expected from the nature of its staple trade, Dundee possesses a full average of persons afflicted with the baneful slum-habit, who detest the Sanitary Inspector almost as much as they do the landlord. The policy of the Town Council is to keep the property owner up to the level of the legal requirements on the one hand, and on the other hand to improve the social feeling of the tenant. From time to time the Council has made inroads upon dwellings proved to be injurious to health, or unfit for human habitation, has entirely closed many, and has caused the owners to improve many more. During the last four years they have entirely closed 298 houses with a population of 836 persons, and have caused the owners to improve 800 others with a population of about 4,000. This is the steady policy it is likely to pursue with the approbation of the public, and the co-operation of the landlords themselves, who are usually quite alive to the advantages all round of the policy and ready to co-operate.

When it comes to the *demolition* of insanitary dwellings, difficulties again arise peculiar to the Scottish tenement system. The buildings are tall, enduring, costly; one flat may remain habitable while the rest are decayed, or *vice versa*; the decayed portion may get a new lease of life through being turned into a store or workshop; shops on

the street front make clearance costly, and prevent that process of "loop-holing," or cutting away one house out of three, by which some English towns have let light and air into their most congested areas. For these reasons, a Scottish Town Council is almost forced back upon the policy of clearing whole areas by Improvement schemes. Dundee Town Council is even now considering an extensive scheme of central improvement which will have the effect, if carried out, of entirely removing one of the City's "black spots," dishousing some hundreds of families, for whom other dwellings must be provided, either by the Municipality or by private enterprise.

#### TOWN PLANNING.

While availing itself of existing powers to improve the housing of the existing City, Dundee Town Council is alert to protect the City of the future against similar errors by utilising the Housing and Town Planning Act, 1909. Anticipating that Act, the Town Council, in 1907, appointed a Special Committee to enquire into the whole question of Housing as it affected Dundee, and a Report was presented which contained an exhaustive examination of the City's powers under the various Acts, both local and general, making also definite recommendations under three heads:—(1) The improvement of the existing City; (2) the planning of the unbuilt-on areas; (3) Municipal methods, especially the creation of a permanent Housing and Town Planning Committee.

The Housing and Town Planning Committee, which was thus constituted in 1907, took over from the Public Health Committee the responsibility of dealing with insanitary properties. In addition, it was entrusted with the administration of the Town Planning powers conferred by the Act of 1909. Since that time, the City has steadily pursued a policy of gradual and opportune improvement of the older areas, as described in the previous paragraphs, while planning the City of the Future on the yet unbuilt areas. Town plans for three small districts

are already passing through their constitutional stages, preparatory to receiving the sanction of the Local Government Board; and first steps have already been taken for the preparation of a Plan for the entire Burgh. The City Engineer's first draft now hangs in the Committee Room of the Town House.

A large part of the City area being yet unbuilt on, Dundee has a great opportunity for Town Planning; and the undeveloped territory possesses, moreover, so many natural advantages—such “amenities” as the Town Planning Act desiderates—that future extensions cannot fail to avoid the mistakes of the past, and to embody housing ideals that could not have been expected from an earlier generation. If old Dundee presents some of the anachronisms common to all ancient cities, new Dundee holds the promise of surpassing most of its compeers; and there is a manifest desire on the part both of Local Authorities and private landlords to realise the potentialities of the situation. By common consent and co-operation the development of the City on Garden Suburb lines is proceeding with all the despatch permitted by the somewhat slow growth of the population. A ramble through the newer parts of Blackness, Downfield, Maryfield, or Craigie will furnish examples of general estate lay-out, or of individual house architecture, which would confer additional credit upon Bournville or Port Sunlight. With the industrial development of the City, the artisan Garden Suburb will fill a larger portion of the scene. District plans are ready and waiting, pigeon-holed in various architects' offices, provided for in the City Engineer's draft Town Plan. The complete, elastic, and low-fare Tramway system of Dundee lends itself admirably to Garden Suburb schemes; and these, by attracting the better-paid worker from the centre to the outskirts, satisfying his just social aspirations, will also bring sure relief to the poorer labourers compelled by work or poverty to live at the centre, by promoting a general move up,—the poorest gradually rising to the better dwellings vacated by those who have migrated higher or to the Garden Suburb, every stratum being raised, the population being spread out, the slums fall-

ing into disuse, and the City becoming, as Aristotle defined it, "a place where men live a common life for a noble end."

With the revival in local industry, bringing increase of population and stimulation of building, Dundee may be trusted to realise the possibilities of its unexcelled natural situation and the projects of its more advanced citizens. Within the semi-circle extending from the unbrageous slopes of Balgay on the west, sweeping round by the plains of Strath Martin on the north, to the wave-washed Strips of Craigie on the east, lie all the possibilities of a real City Beautiful, which the Authorities are fully minded to secure by well-considered schemes of Town Planning. A walk east and west, say, by Perth Road, or along the higher shoulder of Blackness, or round to the noble heights of Clepington with, on the north, glorious views of the hills, and, on the south, far vistas of the river widening out into the Firth and great North Sea,—such a walk will reveal possibilities of health and beauty capable of making Dundee the envied among the cities of our native land. And if the pilgrim will ascend to the summit of Balgay Hill, and from thence survey the unrivalled prospect of plain and hill, of sea and inland water; or, crossing to the yet higher summit of Dundee Law, allow his eyes to roam over the magnificent panorama extending from the Carse o' Gowrie on the west to the German Ocean, with Buddon Ness and Bell Rock on the east; and the great Grampian chain—Schiehallion, Ben-y-gloe, Ben-Macdhui—encircling him on the north, and southwards, at his feet Tay's watery plain, with, beyond, the Fife hills—the Lomonds, Norman's Law, Largo Law, sloping far down to a gigantic needle-point at the East Neuk, across the great Bay of St. Andrews, at the head of which the historic city beckons with all its towers over the shoulder of Scotsraig—the pilgrim who will do this may be heard admiringly to adapt the words of King Duncan before the Castle of Macbeth, murmuring to himself—

"This [city] hath a pleasant seat : the air  
Nimbly and sweetly recommends itself  
Unto our gentle senses."

## What Dundee Contributes to the Empire.

By H. T. Templeton, "Dundee Courier."

DUNDEE'S contribution to the British Empire is a large and an honourable one. The City has given and continues to give of her best to His Majesty's forces, and to the services, and Dundonians constitute a gratifying proportion of those enterprising Scots who in the Colonies and Dependencies are assisting to build and consolidate the outposts. Greater commercial diversity would undoubtedly have accelerated the City's material prosperity, but through all the cycles and tides of trade there is no sign of decadence in her population. Their outlook is wide, their temperament optimistic, and this is in accordance with the City's traditions. In trade and commerce Dundee is more than "the place where they make the marmalade," or even the centre of the jute trade in the United Kingdom. Shipbuilding at the port, although not on the scale that could be where facilities second to none are possible, is nevertheless a very flourishing industry. It is a strong link with the distant parts of the Empire and the world at large. Dundee built ships are to be found on every sea, and in recent years the number of vessels constructed for owners in British possessions has been very gratifying. Into the Arctic regions, away from the beaten tracks of navigation, Dundee ships each year carry the British flag. Of the whaling industry in the Arctic, Dundee practically holds a monopoly. The City is thus no mere parochial community, sleeping on a river bank and knowing nothing of the mighty ocean beyond. Dundee's interests are world-wide. Patriotism and love of nationality have ever dominated the inhabitants, and recent history proves that these admirable qualities still animate them. This was unequivocally demonstrated when the South African War broke out.

## DUNDEE AND THE ROYAL NAVY.

The establishment of a submarine base at Dundee has quickened the interest in naval affairs in the district. Ten years ago the arrival of a torpedo boat in the Tay was so unusual that its presence amounted almost to a nine days' wonder, but now, due to the establishment permanently of a gunboat and a submarine flotilla, such a state of affairs has passed away.

Yet Dundee had an honourable connection with the navy of an earlier period chiefly through the great victory at Camperdown by Admiral Duncan, a native of Dundee, and ancestor of the Earl of Camperdown. The victory at Camperdown was nearly as important as Lord Nelson's achievement at Trafalgar, and had almost as far reaching effects. Adam Duncan, the future Admiral, was born in 1731 in a house long since demolished in the Seagate of Dundee, and was the son of Alexander Duncan of Lundie, then Provost of the town. The Town House is a monument to the latter's memory, the building being begun during his tenure of office. Adam Duncan joined the frigate *Shoreham*, then commanded by his cousin, Captain Haldane. It was a century of war, and to use Duncan's own phrase, he got "into the midst of the enemy" in the many fights for the supremacy of the sea. He was raised to the rank of Admiral at a critical season. The American Colonies had been lost, Ireland was in rebellion, Holland had formed an alliance with France and Spain, and Great Britain stood alone against the nations of Europe. In February 1795, Duncan became Commander-in-Chief of the North Sea Fleet, and for a whole year he blockaded Texel, where the Dutch Fleet was anchored, and keeping it securely in the roadstead, he thereby defeated the proposed invasion of Ireland. When the mutiny at the *Nore* broke out, Admiral Duncan was deserted in front of the enemy by all his ships with the exception of the *Adamant* and his own ship the *Venerable*. With his own vessel and the *Adamant* he continued to blockade Texel, manœuvring and signalling as if the whole fleet were at hand to support him, and by

that ruse he succeeded in deceiving the enemy who never knew that they were being kept at bay by only two vessels. When the mutiny was suppressed Duncan was joined by the rest of the fleet, and on October 11th, 1797, the battle of Camperdown was fought. The battle raged for three hours, and in the course of it a terrific duel occurred between the Venerable and the Vryhaid, which had on board De Winter, the Dutch Admiral. De Winter's ship was totally dismasted, while the Venerable lost her main top gallant mast, and this brought down the Admiral's flag. An incident which can never fade followed—Duncan nailed his colours to the mast. That memorable event is the subject of the following lines attributed by Lady Jane Hamilton to the Marquis of Wellesley:—

“ At three o'clock nine mighty ships  
Had struck their colours proud,  
And two brave Admirals at his feet  
Their vanquished flags had bowed.

Our Duncan's towering colours streamed  
All honoured to the last,  
For in the battle's fiercest rage  
He nailed them to the mast.”

The carnage on board De Winter's ship was dreadful, every man on the poop being either killed or wounded, except De Winter, who on seeing that further resistance was impossible struck his flag to Admiral Duncan.

At Camperdown House there is a very interesting collection of relics. On the walls of the public rooms are displayed numerous paintings of the battle and portraits of the Admiral. Among the art treasures is a large picture, painted by J. S. Copley, R.A., representing the scene on the quarter-deck of the Venerable when the Dutch Admiral De Winter surrendered his sword to Admiral Duncan. The painting hangs on the wall of the grand staircase, and was purchased by the Camperdown family for £1000. An outstanding relic is Admiral Duncan's sword, and in the case beside it are the swords captured from the Dutch Admirals, De Winter,

Reyntijes, and Meuren. Among other relics are the bell of De Winter's flagship, a gold medal presented by the nation to Admiral Duncan, and a decoration of the Order of St. Alexander Newsky presented by the Emperor of Russia. The centenary of Camperdown was celebrated in Dundee in 1897, when the Earl of Camperdown was presented with the freedom of the City in recognition of the services given to the nation by his gallant ancestor, and of the interest which his Lordship has taken in promoting the prosperity of Dundee.

During the Napoleonic Wars a naval officer (originally a Lieutenant, but later an officer of the rank of Captain) was stationed at Dundee on Impress Service. When Dundee was visited in 1844 by Queen Victoria with the Royal yacht Victoria and Albert, Her Majesty was attended by a squadron of warships, and Captain John Washington, R.N., reporting on the occasion to the Admiralty on the Tay Navigation said:—"As this roadstead has no name on the Admiralty plans of the river, we have ventured to call it Queen's Road in remembrance of Her Majesty's auspicious visit to this part of Scotland.

. . . The alterations and improvements in the sea face of the town of Dundee since the date of Captain Slater's survey in 1833 are great; but compared with its state within the memory of man 'when its harbour was a crooked wall enclosing but a few fishing or smuggling craft,' they almost exceed belief—every requisite for a first-class commercial port. The good result of such enterprise and energy, directed by a skilful engineer, is shown by more than doubled revenue of the port and the increase in the number of the shipping that frequent it:—In June 1833, the total revenue was £10,291; in June 1844, it was £23,895, while the number of shipping had increased to 3,791, having a burthen of 272,239 tons." In an appendix to a report of Commissioners appointed in 1842 to inquire into tidal harbours, there is a communication from Mr John Sturrock, Dundee, urging the suitability of the port as a depôt for the construction and repair of war steamers. That demand is still made. The immense

improvements effected in the interval and the great dredging schemes in contemplation will provide a water way sufficient for the launching of the largest ships.

The submarine base at Dundee has familiarised the people with naval affairs and naval methods. Navymen are constantly in our streets, and as many of them reside in the town they have in a measure become an organic part of Dundee, and have an interest in its welfare and progress. Under the arrangement entered into between the Admiralty and Dundee Harbour Board, a rent of £4000 a year is paid for the use of the West Graving Dock and the half of King William Dock. The Graving Dock is used for the repair and overhaul of naval craft, and the submarines can be berthed in the dock, and also have moorings in the river off Newport. The flotilla consists of twelve submarines, the parent ship Vulcan, and one gunboat, and there is usually a destroyer in attendance. The base necessitates keeping at the port a complement of 600 navymen, a considerable proportion of whom reside in Dundee. Of the total, 500 officers and men have quarters on board H.M.S. Vulcan moored near the Fife shore off Newport. The Vulcan is of 6,620 tons displacement, her engines are of 12,000 I.H.P., and her speed is eighteen knots. Next there is the torpedo gunboat Hebe, which has a speed of nineteen knots. The submarines have each a displacement of 380 tons, and attain an average speed of fourteen knots. The engines are driven by petrol when the craft are on the surface, and by electricity when they are moving under water. On board each submarine are two lieutenants and a crew of fourteen men. These interesting vessels can dive safely to a depth of 100 feet—they would withstand the pressure at an even greater depth—and sufficient air can be stored to keep the crew alive for eighty hours under water. But the submarine is really only effective as an assailant at an average depth of eighteen feet, and it is at this depth that the practice takes place. Fitted with two torpedo tubes each submarine carries out very frequent practice with torpedoes, and attacks are also made on the various vessels attached

to the flotilla. The practice takes place in the North Sea, dummy heads being attached to the torpedoes, and the flotilla makes periodic cruises on the East Coast of Scotland, visiting Aberdeen, Invergordon, and other ports.

As showing the interest which the Admiralty takes in Dundee, it should be stated that under the Harbour Act of 1911 the Admiralty obtained a seat on the Harbour Board, and their representative is Commander Donald J. Munro, R.N., King's Harbour-Master at Rosyth.

In many districts of Scotland the claims and attractions of the Navy have not been brought so vividly before young men as those of the Army, and that has doubtless much to do with the disproportion of recruits for the Navy when contrasted with the Army. A higher standard is, of course, insisted on for admission to the first line of offence and defence, and as practically everything is done by machinery on board a modern ship muscle merely does not suffice. Intelligence is needed, and experience shows that the young artisans and shop assistants of fair education who have gone into the Navy from Dundee have made good progress. In most districts of the country the rejections largely outnumber the admissions, and in this neighbourhood faulty teeth have barred the admission of many likely youths. But these are days of change, and now that the School Board have a fully equipped medical department it is believed that a corollary will be an increased standard of health, and while what are known as the home ports will always have a pull over all other parts of the country in relation to the Navy, Dundee may be expected to contribute more liberally in suitable men. The existence of the submarine base will undoubtedly give an impetus to recruiting.

Dundee is one of the few ports in these islands which can boast of having a share in the Royal Naval Volunteer Reserve. There are but three such ports in Scotland—Govan (the headquarters), Greenock, and Dundee, the Dundee Companies forming part of the Clyde Division. The Royal Naval Volunteer Reserve was established by Act of Parliament in 1903, and through the agency of the

force an increased interest in the Royal Navy and in naval matters has been stimulated. The men who join it become closely associated with the fleet. Under the terms of enlistment they undertake to serve and are liable to be called upon to serve in any part of the world, and whereas the territorials never lose their identity as units, the Royal Naval Reserve men are automatically absorbed in the Navy. When the Dundee Company was formed nine years ago the numbers did not exceed forty, but there has in the interval been practically continuous growth until to-day the strength has reached 200 men divided into two companies with a complement of ten officers. A high standard of intelligence is essential to the making of an efficient naval volunteer. The work is of a kind which needs men who can be trusted to be of service to the country on board ship in time of war. The recruits are drawn principally from the young artisan class, preferably shipwrights, mechanics, engineers, painters, and plumbers, and the training not only fits them for naval service but contributes to their efficiency as craftsmen. The home training takes place on board the old wooden wall Unicorn and on the river Tay, and the men have opportunity from time to time of embarking for sea training on a Dreadnought for optional periods of fourteen or twenty-eight days. The enlistment is for a period of three years, and the minimum number of drills is forty the first year and twenty-five in each of the succeeding years. The Dundee men do not work upon the minimum plan, the average number of drills put in last year being seventy-six. The training adheres as closely as possible to the scheme for the training of recruits in the Navy, and consists chiefly of gunnery, seamanship, signalling, boatwork, rowing, sailing, steering, and using the log and line. When the men ship for temporary training in the Navy they are regarded as part of the Dreadnought's crew, and they have there the advantage of tuition under special instructors. About one-third of the Dundee Companies are afloat each year on His Majesty's battle-ships. When at sea these men can do well for themselves

in remuneration as well as training. If they succeed in passing the examination set for the particular trade they profess they are accorded the naval trade certificate—a diploma which carries with it the standing of an artificer, and as such the young man at sea is not only given his naval pay but the naval standard of payment for his capacity as an artisan should he be employed as such on board.

The Dundee Companies have seven guns, viz., a 6 inch q.f.c., a 47, a 5 inch b.l., a 3 pounder Hotchkiss, a 12 pounder field gun, a Maxim, and a Nordenfeldt, along with a 6 inch loading teacher, and the sailing craft include a steam pinnace, two cutters, three whalers, and a dinghy. The Companies have had a number of distinctions. They supplied the guards of honour on various occasions when Queen Alexandra embarked at Dundee for Denmark and Norway, and a number of Dundee men were on board H.M.S. Venus when King George (then Prince of Wales) visited Canada on the occasion of the Tercentenary of Quebec. A common experience is that after having been associated with the Dundee Companies for four or five years, many of the men seek to discover personal advancement in the Colonies and their training is thus not lost to the Empire. Lieutenant Commander H. S. Glenny, who had command of the Dundee Companies until a few months ago, was the officer in charge of each of the Guards of Honour, and as senior officer he was selected for the command of the men from the Division who went to Canada. Mr Robert Still now holds the post of Lieutenant Commander of the Dundee Companies.

A branch of the Navy League was established in Dundee in 1898 chiefly through the exertions of Commander Maitland Dougall, R.N. The branch has a membership of sixty, and seeks to inspire interest in the Navy by lectures and the distribution of literature.

Dundee's connection with the Royal Navy is of outstanding importance in another way. There is not a ship in His Majesty's fleet which does not bear the impress of Dundee, because it is here that the bulk of the canvas is

made for the Admiralty, just as the War Office has annually to make a call upon Dundee for tent duck and kindred articles for the Army. According to an official communication issued by the Admiralty for the purposes of this article, "the greater part of the ships' canvas for the Royal Navy has been for many years and is still manufactured at Dundee." Various firms, including the Boase Spinning Company, Ltd., have a share of this Government work. The contract is very largely undertaken by Messrs Baxter Bros. & Co., Ltd., Dens Works, a firm which has an honourable connection with Dundee, and gives employment to about 4000 operatives. The canvas contract consists of the following—Royal Navy canvas (for sails), Merchant Navy canvas (for awnings), duck (for seamen's clothing), hammock cloth, sheetings, osnaburgs (for coverings for beds), coal sack cloth, Navy hessian, biscuit bagging, and twines. The Government canvas contract runs into hundreds of thousands of yards, and the annual Dundee canvas output would stretch from the city to London and far beyond it. In order to produce a high class and servicable canvas, especially for sails, the yarns have to be carefully selected and boiled, and it says much for the Dundee manufactured article that it has for so long been in such high repute in the Navy.

One of the Members of Parliament for Dundee, Mr Edmund Robertson, K.C., LL.D., D.L. (afterwards Lord Lochee of Gowrie), had a seat on the Board of Admiralty, from 23rd August 1892 to 3rd July 1895 as Civil Lord, and from 21st December 1905 to 15th April 1908 as Parliamentary and Financial Secretary. The present First Lord of the Admiralty, the Right Hon. Winston S. Churchill, M.P., has represented Dundee in Parliament since May 1908.

The Mars training ship has long been a feature of the Tay. Anchored off the Fife shore at a point to the east of the Tay Bridge, the Mars was brought to the Tay in 1869 at the instigation of the late Mr W. E. Baxter, then First Secretary to the Admiralty. The Mars, which is the

property of the Admiralty, has a tonnage of 3842, and under the charge of Captain-Superintendent Scott, has an average of 400 boys on board. Mr Baxter, who was Member for the Montrose Burghs for precisely thirty years, was First Secretary to the Admiralty from 18th December 1868 to 11th July 1870, and Parliamentary Secretary from 12th July 1870 to 16th March 1871.

#### DUNDEE AND THE ARMY.

While the patriotic instinct remains with the Scottish people they will always regard with pride the response Scottish Volunteers made to the Empire's call in the days of the South African War. In that magnificent rally to the colours Dundee Volunteers were not surpassed by any other district. On the call for Volunteers for the front the Dundee officers had shoals of applications from young men ablaze with military enthusiasm. The task of the officers delegated to select the active service detachments was difficult because of the large number of men sound in physique and efficient in training presenting themselves for enrolment. When the active service draft was picked and ready to join the regiment all classes showed an interest in the preparations. Encouraged by the widespread desire that they should be fitly honoured, the Town Council bestowed on the Volunteers the freedom of the City. This ceremony took place on 18th January 1900, the burgess tickets bearing that the freedom of the city was conferred in recognition of the men's patriotism in volunteering for active service in the South African War. Each man was presented by Mr William Hunter, the then Lord Provost, with a silver commemorative medal. The detachment left Dundee amid a demonstration of unsurpassed enthusiasm. At Perth the Dundee contingent joined the active service company, composed of complements from the various Black Watch Volunteer Battalions, and proceeded to South Africa. Two smaller contingents left later. The Volunteers marched through the Orange Free State to Bloemfontein where they joined

the Highland Brigade. One of the principal events they participated in was the enveloping movement which resulted in the capture of General Prinsloo and some 4000 Boers at Fouriesberg.

Dundee has an enviable reputation as a prolific recruiting centre for the military forces, and at no time was the Army more popular amongst the youth than to-day. A steady stream of eligible young men "take the shilling," although there is no such coin given now, and the vast majority of them do well. The records kept by the Authorities prove that the class of men who enlist are above the average standard, and a feature of the Dundee recruit is that he gains in physique at a rapid pace and makes an efficient soldier after he has been but a few months under discipline. And from what class are these men drawn? In every centre of the country unemployment affects enlistment, and idle men with no great predilections for a military life are obliged to seek the Army. But it is not by any means this class which furnishes the great proportion of recruits in Dundee. The bulk of the men who join the service are youths who have spent some years at a trade or in a textile establishment, and whose only reason for enlistment is a love of soldiering, and it frequently happens that after acceptance the recruiting officers have to allow the men time to enable them to work off a "warning." Moreover, the standard of education amongst them is steadily rising, and many of them, had they stuck to civilian life, would have made positions for themselves. Under the new regulations men can either enlist in the Regular Army or in the Special Reserve, and if they join the latter they have the option of entering the Army, and the majority of Dundee recruits do so.

For gold the merchant ploughs the main,

The farmer ploughs the manor ;

But glory is the sodger's prize,

The sodger's wealth is honour :

The brave, poor sodger ne'er despise,

Nor count him as a stranger ;

Remember he's his country's stay

In day and hour of danger.

Ask these men when they return upon furlough how they like the Army, and in nine cases out of ten you will be answered in the Dundee colloquialism "champion," and their martial bearing and gleaming eyes confirm their speech. Government officials are chary of giving details affecting departments, but the War Office Army Council kindly furnished the following statistics bearing upon Dundee recruiting for the Regular Army and the Special Reserve during the past three years:—

	Regular Army.	Special Reserve.
1908-09 - -	265	171
1909-10 - -	240	144
1910-11 - -	298	215

Of these 58, 36, and 54 ultimately joined the Territorial Regiment the Black Watch (Royal Highlanders). Next to the Black Watch, the Scots Guards is the most popular regiment with the Dundee youth, and the others gravitate to the Royal Scots, the Royal Scots Fusiliers, and the various Highland regiments. A fair proportion join the Artillery, and amongst Cavalry units the Scots Greys is the strongest magnet.

This same national spirit is strikingly illustrated in the support the auxiliary forces have received and continue to receive as Territorials. For over half a century the city has been the headquarters of a series of auxiliary corps, artillery, infantry, engineers, and ambulance, each of which has drawn commendation from officers of high standing in military councils. Successful service in the auxiliary forces necessarily entails application and enthusiasm, and makes an appreciable inroad on what would otherwise be leisure time. History records that these essentials have at all times been given freely by officers and men, and this explains the high reputation the city forces hold. At one time volunteering units suffered from the indifference of popular opinion. To-day there exists a clearer perception of the necessity for a strong and efficient auxiliary force, and in this regard Dundee is striving to maintain her traditions.

The Volunteer movement in Dundee had its inception in 1859, a period in the Empire's history when a flood of military ardour swept over Great Britain. Dundee followed the developments with close interest. A meeting was held in the Town Hall on May 20th, 1859, and was attended by a large number of the leading citizens of the day, including Sir John Ogilvy, Bart., Provost Jobson, and Mr Francis Molison. That gathering witnessed the inauguration of the volunteer movement in the city. Recruiting started immediately, and by July 27th 11 honorary and 175 ordinary members had enrolled. A month later the enrolment had risen to 218. A poll was taken for the election of officers, and when the new system of arranging battalions came into force this pioneer corps in Dundee became known as the 1st Volunteer Battalion Royal Highlanders, and later the words "City of Dundee" were added. Under Lord Haldane's territorial scheme the title was changed to 4th (City of Dundee) Battalion, the Black Watch (Royal Highlanders).

Sir John Ogilvy was the first commanding officer of the unit, and he was succeeded in 1865 by Colonel G. Lloyd Alison, the succeeding officers being Colonel Patrick Anderson in 1870; Colonel P. G. Walker in 1874; Colonel W. R. Morrison in 1878; Colonel George Mitchell in 1888; Colonel James Rankin in 1891; Colonel Howard Hill in 1901; and Colonel Harry Walker in 1910.

The 10th Forfar Rifles, afterwards styled the Dundee Highlanders, consisted until 1868 of two companies. In that year the War Office granted permission to raise the establishment to that of a six companies' battalion. The first to have command was Colonel David Guthrie of Carlogie, who on retirement was succeeded by Colonel Lamb. It was during Colonel Lamb's period of command—in 1880—that the battalion discarded the kilt for the trews, assuming the title 3rd Forfar (Dundee Highland) Rifle Volunteers. Colonel R. N. Reid was given command of the battalion in 1882, and he was succeeded in 1887 by Colonel W. Smith, who died in the command in 1905. Colonel Batchelor succeeded and remained in charge till

the Territorial Force became operative in 1908, when the battalion was reduced to two companies in command of Major P. S. Nicoll, and fused with the Forfar County battalion known as the 5th Battalion Black Watch.

The year 1860 also witnessed the inception of an artillery unit, which from the start maintained a healthy standard of efficiency. In 1868 the establishment was extended, and Colonel Frank Stewart Sandeman became commandant, and four years later was given control of the Forfarshire Artillery Brigade, which included batteries at Broughty Ferry, Arbroath, Montrose, and Perth. In succession this appointment was held by Colonel Thomas Couper, 1898 to 1901; Colonel W. Gordon Thomson, 1901 to 1902; and Colonel Luis, 1902 to 1906. Colonel Lindsay Henderson assumed the command in 1906.

One of the drastic changes affected by the introduction of the territorial scheme was the conversion of garrison artillery into field artillery. Dundee had gained a high reputation in garrison artillery work, the skill and smartness of the men having been established at various artillery meetings, and one year a detachment secured the Queen's Cup after a keen competition at Shoeburyness. Dundee artillerymen adapted themselves to the changes, and the work of the Field Artillery Brigade (Dundee is the headquarters of the 2nd Highland Brigade, comprising the City, Forfarshire, and Fifeshire Batteries) is being successfully pursued. The ammunition column attached to the Brigade also has headquarters at Dundee.

On the conversion of the Dundee Artillery to Field Artillery, a new corps, the North of Scotland R.G.A., was established with headquarters at Broughty Ferry, where there is also stationed No. 3 Company of that unit.

In addition to the units specified, Dundee supported for a period of forty-eight years in one form or another a corps of submarine miners (Colonel W. H. Fergusson) with headquarters at Broughty Ferry, and a squadron of Fife and Forfar Light Horse (now Fife and Forfar Yeomanry).

The Officers Training Corps has now been three years in existence in Dundee, and is increasing in popularity among Dundee students. It numbers two officers and sixty cadets. The training consists of drill, musketry practice, route-marching, and camp duty. Cadets who pass the prescribed Government examinations are exempted from the examinations for the promotion of officers in the territorial forces; they also obtain considerable advantages in the event of their taking a commission in the Special Reserve.

Under the provisions of the Territorial Scheme a City of Dundee Territorial Force Association was formed. Lord Provost Urquhart is President (*ex officio*), Mr William Henderson, Chairman, and Major John Vair, Secretary, and the units administered by the Association are:—

Headquarters Black Watch Infantry Brigade—Brigade Commander, Colonel A. de S. M'Kerrell, C.B.; Brigade Major, Captain J. R. Wethered, P.S.C., Gloucester Regiment.

Yeomanry—Fife and Forfar—(one squadron)—Major J. L. Lumsden commanding.

2nd Highland Brigade—R.F.A.—City of Dundee Battery—Hon. Lieutenant-Colonel R. A. Mudie, Commanding City of Dundee Battery (strength, 142); and Major J. C. Robertson, the Ammunition Column (strength, 153).

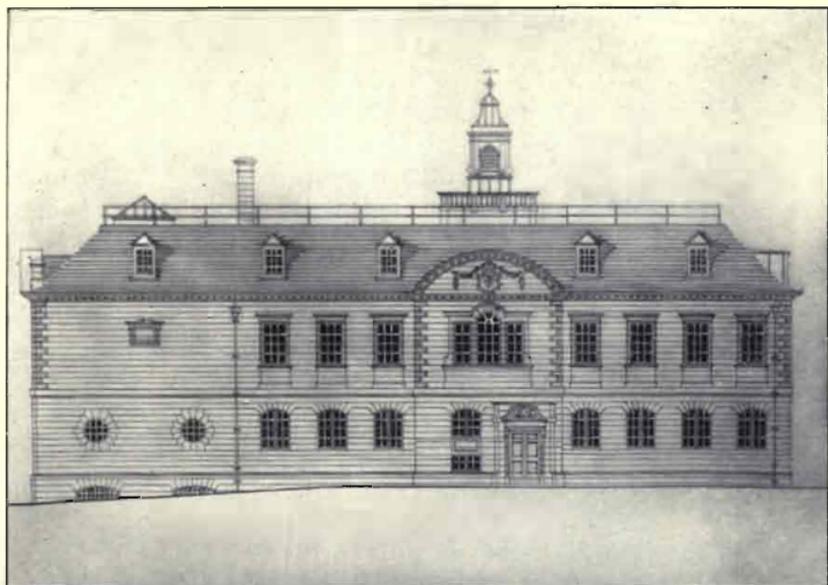
City of Dundee Fortress Engineers—One Works Company—(strength, 115)—Captain H. Richardson.

4th Battalion Royal Highlanders—(eight Companies, 1009 all ranks)—Hon. Colonel Lord Provost Urquhart; Lieutenant-Colonel Harry Walker.

5th Battalion Royal Highlanders—(two Companies, 234 all ranks)—Captain Adam Malcolm.

No. 4 Company Highland Division Army Service Corps—(101 all ranks)—Captain C. W. Cochrane.

3rd Highland Field Ambulance—(296 all ranks)—Lieutenant-Colonel W. E. Foggie. Colonel Kinneir, who has just demitted Command, has been appointed D.A.M.S. to the Highland Division with headquarters at Perth.



PHYSICS LABORATORY, UNIVERSITY COLLEGE.



CAMPERDOWN HOUSE.



Dundee University College Company of the Officers Training Corps (St. Andrews University Contingent)—Lieutenant Hugh Marshall.

A Battalion of National Reserve has also been formed (strength, 814), with Colonel J. Lindsay Henderson as Commandant. This is a most valuable body, consisting of ex-officers and men of all branches of the Service, fully trained. They are classified according to age, the register being kept by the Secretary of the T.F. Association.

A branch of the National Service League exists in Dundee. The branch is not yet a large one as the movement is only in its infancy, but one important feature is that all shades of politics are represented upon it. The immediate object of the League is to provide for universal military training for home defence being made the law by Act of Parliament, the chief principles being (1) that it is the duty of every able-bodied man, high or low, rich or poor, to defend his country in case of national danger, and (2) that to perform this duty efficiently he must be trained in time of peace.

#### THE DUNDONIAN IN THE EMPIRE.

Through her many educational institutions—primary, secondary, technical, and university—Dundee contributes in no unstinted fashion to the building up of Empire. Lord Rosebery once said that Britain could do with fewer people leaving her shores. The exodus unfortunately continues, but there is some satisfaction in thinking that the admirable facilities existing in Dundee amply equip the men who leave her to court fortune in the Colonies and Dependencies. The City spends the stupendous sum of fully £160,000 a year on education, and has considerably over half-a-million sunk in school buildings, although the capital debt has by the operation of the sinking fund been reduced to £133,543. Important building schemes now imminent will considerably increase the capital account. The endowments for education in Dundee run into hundreds of thousands. The following tables indicate what Dundee is doing not only for herself but for the Empire through her educational machinery:—

## ANNUAL EXPENDITURE.

Dundee University College ... ..	£13,809
Dundee Technical College ... ..	6,900
Dundee Training College ... ..	5,300
Dundee High School ... ..	9,500
Dundee School Board (Day Schools)	108,311*
Do. (Evening Schools)	4,450
Dundee Roman Catholic Schools, including Lawside Convent School	13,292
Dundee Episcopal Schools ... ..	1,855
<hr/>	
Total ... ..	£163,417

\*The expenditure for the year now current will be nearly £6,000 additional, the amount estimated for being £114,034, and the education rate is 1s. 9½d. per £.

NOTE.—This expenditure is exclusive of Private Schools.

## DUNDEE EDUCATIONAL BUILDINGS.

Dundee University College ... ..	£122,154
Dundee Technical College ... ..	80,000
Dundee Training College ... ..	65,000*
Dundee High School ... ..	14,161
Dundee School Board Schools ... ..	229,600
All other Schools and Colleges ... ..	72,468
<hr/>	
	£583,383

\*In course of erection.

NOTE.—The St. Andrews Committee for the Training of Teachers have acquired Mayfield Mansion House as a hostel for women and also playing fields (twenty-five acres). This will eventually involve an expenditure of £17,600. A hostel for men is also to be built, and later probably a second hostel for women. These will cost respectively £9,000 and £8,000, making the hostel expenditure £34,600, and bringing up the capital expenditure to almost £100,000.

## ENDOWMENTS.

Dundee University College ... ..	£168,919*
Dundee Technical College ... ..	13,000
Dundee High School ... ..	37,000
Dundee Educational Trust ... ..	61,063†
The Morgan Trust ... ..	86,800‡
	£366,782

\*The Trustees of the late Miss Harris also hold £24,000 for behoof of the College. They make contributions when the need arises, and meantime are paying annually £1,000 from the Trust Revenue—a figure which is being set aside for repayment of the College debt.

†Through its endowments Dundee Educational Trust spends over £3,000 a year on education. The income is expended by means of bursaries, tenable at the Scottish Universities, at Dundee High School, at the Harris and Morgan Academies (Day and Evening), and also at the Technical College. Grants in aid are given in the interests of instruction in domestic economy, and a specific sum has been hitherto annually earmarked to provide school books for poor children.

‡The Morgan Trust Expends about £2,250 per annum on the maintenance of foundationers at the primary and secondary Schools. There are on an average about 200 foundationers on the roll.

NOTE.—The Burgh Committee on Secondary Education have the allocation of about £12,000 received annually from the Scottish Education Department. Out of this sum grants are made to the High School, School Board, and Convent School for Secondary Education, and the sums allocated are included in the tables referring to the expenditure by the High School and School Board. The Burgh Committee also expend £3,000 annually upon bursars taking intermediate and secondary courses, also upon bursars attending Technical Colleges and the Universities, and the balance is divisible among the grant earning schools of Dundee.

Positions of distinction and responsibility are held all over the British Dominions by Dundonians who carry with them to those distant lands the hall mark of her schools and colleges. Established in 1883, University College had as its first Principal Dr. William Petersen, now Principal of McGill University, Montreal, and since 1894 Principal

Yule Mackay has admirably filled the position of his distinguished predecessor. The Chair of Engineering in University College affords an admirable illustration of what the College is doing. The Chair was one of the first five established, and the first Professor was Mr (now Sir) J. A. Ewing (himself a Dundonian), and now a Director of Naval Education. The School of Engineering has had a steady and continuous growth, and a large number of students have left it to fill responsible posts in the wide world of engineering at home and abroad. In the avenue of mechanical engineering proper, some of Dundee's old students have come to be partners or principals in well-known firms, others occupy positions of influence in the works of mechanical engineers or shipbuilders at Glasgow, Edinburgh, Belfast, and Dewsbury, and in the locomotive works of English railways, and there are others who have taken good appointments in the Patent Office, in the National Physical Laboratory at Teddington, and in the offices of eminent London engineers. The majority of the graduating students have preferred to find their occupation in the wider world of civil engineering, and are now to be found in the position of resident engineers, or in some equivalent professional position, superintending the execution of great public works, as for example, the widening of Blackfriars Bridge, London, the construction of water works in Yorkshire and elsewhere, the extension of home railways in Scotland and England, the dock works of Rosyth Naval Base, in the Public Works Department of India, in mining operations in South Africa, and in railway construction in the Malay Peninsula, the Argentine, the United States, and British Columbia.

Secondary Education is provided by Dundee High School and by the Harris and Morgan Academies. The High School, which is governed by a Board of Directors, has an honourable record and stands well in the public eye. The following is a list of the School's most distinguished pupils:—

James Walker, D.Sc., F.R.S., Professor of Chemistry at Edinburgh University; Sir James Alfred Ewing, K.C.B.,

F.R.S., Director of Naval Education (Baxter of Balgavies Scholar, 1871); William Edward Philip, M.A., H.M.I.S., Harris Gold Medallist, 1866-1867; Frank W. Young, F.R.S.E., H.M.I.S.; J. Gordon Lorimer, Indian Civil Service—entered third on list, 1889-1890; Alfred W. W. Mackie, M.A., Indian Civil Service—entered 1900-1901; C. Fred Grant, M.A., Indian Civil Service—entered 1900-1901; Ralph A. Wilson, M.A., Indian Civil Service—entered 1901-1902; Thomas Couper, B.A. (Oxon.), Indian Civil Service—entered seventh on list, 1901-1902; Alexander Gray, M.A. (Edin.), Indian Civil Service—entered second on list, 1905-1906; A. M. Anderson, K.C., Solicitor-General for Scotland.

The Academies are conducted by the School Board, and yearly they furnish recruits for various Universities. Today there are many in Greater Britain who look back with veneration to the Academies. Mr Sinclair Laird, Professor of Education in Queen's University, Kingston, Ontario, is an old pupil of the Harris Academy, and another is Mr Herbert Smith, Lecturer in German in Glasgow University. The Morgan Academy can boast of such former pupils as Mr William Nicoll, M.A., M.B., Ch.B., D.Sc.—Ernest Hart Memorial Fellow, Lister Institute, London, Lecturer on Helminthology, Royal College of Science, London, and a member of the Special Scientific Investigation Committee of the Local Government Board. Dr. Nicoll has made many valuable original contributions to the subject of Zoology. Another former pupil is Mr Russell L. Jones, M.A., author of "International Arbitration as a Substitute for War between Nations." Mr Jones is Lecturer in Political Economy in Queen's College, Belfast. Dr. Peter Fleming Gow, now of the Indian Civil Service, was also educated at the Morgan Academy.

The New Technical College is still in its infancy, but technical education is no new thing in Dundee, the establishment of the New Technical College being due to the fact that the old Technical Institute was inadequate to meet the claims upon it. The Technical College attracts principally textile students, engineers, architects, joiners,

and plumbers, and the records show that the instruction obtained is utilized by its possessors in various parts of the world. Many of the engineering students go to sea as marine engineers, and the Clyde and the Tyne are favourite starting places for Dundee youths. Quite a number of those trained as civil and electrical engineers go to London, and a few have left for the older towns in Canada. Architect students find situations in London, but the most of the men in the building trades have gone to America and chiefly to Canada, while lately a considerable number of students have been finding their way to posts in Burmah, Singapore, New Zealand, Mexico, and elsewhere.

By his will the late Mr James Duncan of Jordanstone bequeathed a share of the residue of his estate for the purpose of founding a School of Industrial Art and Women's Industries at Dundee. The amount of the bequest is expected to be not less than £70,000. It is understood that Mr Duncan's trustees intend to devote the larger portion of the fund to establishing and endowing a School for Women's Industries, including the erection of an Institute. After the scheme has been set agoing the administration will be handed over to a body of official trustees named by the testator, and they are practically the same as the trustees who control the Technical College. In all probability a commencement will be made with the teaching in the coming winter.

#### DUNDEE AND THE INDIAN JUTE INDUSTRY.

Calcutta is Dundee's most formidable opponent in the jute industry, yet Dundee brains and capital have been chiefly instrumental in establishing and developing the trade on the banks of the Hooghly. The overseers, managers, and mechanics in the Indian jute mills are almost wholly recruited from Dundee. There are hundreds of such men who have passed through Dundee's technical classes, and a certificate of attendance at the Technical College has come to be regarded as proving that the holder has been willing to devote part of his spare time to acquire a knowledge of the principles of jute manufacture.



SPINNING DEPARTMENT IN AN INDIAN JUTE MILL.

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The story of the spinning and weaving of jute in India is an interesting one, and, as has been said, Dundee has had a big hand in the business. The spinning and weaving of jute was carried on by natives on a moderate scale by hand long before the introduction of machinery to India, but it was only very coarse fabrics that could be produced by this process. It was not until 1855 that the first jute spinning machinery was erected near Calcutta. In 1859 the second venture, which embraced spinning and weaving, was that of the Borneo Company started by Messrs George Henderson & Co., London, and now known as the Barnagore Jute Factory Co., Ltd. Dundee supplied the machinery for the Borneo Mill, and Mr Thomas Duff, a Dundee man, during the first ten years of its existence watched over the Company's interests in Messrs George Henderson & Co.'s Calcutta office. It was in the Mutiny year (1857) that Mr Duff, along with experts in the different departments of mill work, sailed for Calcutta in the vessel which carried the machinery for this mill. In these days the voyage was looked upon as a considerable undertaking, having to be made via the Cape and taking about six months to accomplish. Of these men it may fairly be said that they were the pioneers of jute manufacturing by machinery in India. In 1873 Mr Duff, some time after his return home, got into touch with a few Dundee men, in conjunction with whom he floated the Samnuggar Jute Factory Co., Ltd., the success of which encouraged them in 1884 to establish the Titaghur Jute Factory Co., Ltd. About this time another group of Dundee capitalists floated what is known as the Victoria Jute Co., Ltd, and the capital, including debentures, invested in the three Companies named, viz., £1,320,000 is largely held by Dundee and district shareholders. These locally owned Companies have a total of 3,714 looms, manufacturing sackings and hessians, which are distributed to all parts of the world, and their consumption of the raw material is nearly equal to the half of Dundee's total requirements. They give employment to 25,000 native workers.

Dundee has played a further part in the expansion of jute manufacture in India, inasmuch as the City is one of the principal centres from which Calcutta mills have drawn their machinery. Complaints have been made that the Dundee capital invested in Indian mills has the effect of diverting the industry from Dundee, but out of a total capital of £10,000,000 sunk in jute mills in India only about one-eighth is from Dundee and district, and Dundee shareholders have benefited by comparatively good and steady dividends. It is claimed that the expansion in India would have taken place sooner or later although Dundee capital had not been forthcoming, and the results show that those Dundee men who entered the field in the earlier stages of the trade's history had the foresight to discern what the probable developments would be.

#### EMIGRATION TO THE BRITISH COLONIES.

During the past five years 10,000 Dundonians have emigrated. The large exodus which begins annually every spring and lasts well through the summer causes many to wonder whether all is well at home. Dundee's loss through the departure of these enterprising Scots is the gain of the Colonies. Of the total it is calculated that 45 per cent. have gone to Canada; 30 per cent. to the Australian Commonwealth, 15 per cent. to New Zealand, and 10 per cent. to South Africa. Again, of the total 20 per cent. have been married men and their families, 70 per cent. single men, and 10 per cent. single women. Through the granting of free and assisted passages, Queensland has received the greater number of single men (for sugar plantation and railway construction work), of single women domestics, and of families having a capital of £50 and upwards, while Western Australia, Victoria, and New South Wales have drawn the bulk of the agricultural workers.

## Social and Philanthropic Institutions.

By T. M. Davidson, M.A., B.Sc., and  
J. Armstrong Barry.

A CASUAL observer viewing the City of Dundee from the Fifeshire coast would be favourably impressed with its situation; it has been liberally provided by Nature with all the conditions that make for health and comfort, it has a noble river, delightful suburbs, and it slopes towards the sun. It might be difficult for such an observer to believe that poverty, disease, and misery are to be found in a City so favoured, and that "the cry of the children" is never absent from the voices of the City. Unfortunately such things are true.

The employment of female labour in the staple industry of the City, too early marriages and a consequent lack of responsibility towards offspring, the housing conditions of the poor, intemperance on the part of parents, and misfortune of various kinds may be regarded as amongst the principal causes which contribute to the existence of poverty, infirmity, and destitution in our midst.

"Suffer little children to come unto Me" and "Bear ye one another's burdens" are abiding commands, and if needs abound in our City, so, also, do sympathy and benevolence; and it is the main purpose of this article to enumerate the various agencies which are endeavouring to ameliorate the conditions of the needy and unfortunate.

### PREVENTION OF CRUELTY.

The Dundonian who is unacquainted with the numerous agencies at work in his native City, or the stranger within its gates, may notice two individuals who make it their business to pay particular attention to young children in the streets, and on inquiry he will be informed that these are the guardian angels of the City children, whose headquarters are at a building known as "The Shelter," situated

about ten minutes' walk from the High Street. These guardians are commissioned by the Dundee Society for the Prevention of Cruelty to Children, which for over twenty years has proved itself to be a necessity in a state of things still far from perfect. During the period covered by the latest report, 645 cases, involving the welfare of 1,784 children, were dealt with; 153 children passed through the Shelter, and through the instrumentality of this Society 50 children were committed to Industrial Schools and other Institutions, Homes, etc. The Society renders valuable assistance to the Police Authorities in the administration of the Children Act. More than anything else, the intemperance of fathers and mothers seems to justify its object—"to protect and rescue children from cruelty, injustice, and degradation." This Society is undoubtedly, to use the phrase of a supporter, a strong screen at the top of one of life's precipices.

#### FEEDING.

Although less deplorable than the actual cruelty of parents to their offspring, the poverty into which so many homes are frequently launched affords, alas! ample opportunity for "feeding the multitude," and through various channels the little hungry mouths are fed. The Children's Free Breakfast and City Mission, which commenced its operations in 1874, has for one of its objects the providing "a hearty meal once a week to poor and destitute children," and on Sabbath mornings several hundreds of breakfasts are served out by sixty willing workers. At the recently-acquired premises of the Catholic Day Nursery in Park Place, under the superintendence of the Sisters of Charity, a similar provision is made for providing 40 to 50 breakfasts; and for some years the Boys' and Girls' Religious Association has given a prominent place to its daily free breakfast work, and under its auspices during the past winter over 17,000 such breakfasts have been given to necessitous children.

The securing of practically free dinners during the winter months to poor children attending the public

schools is the special object of a fund which has been in existence for over a quarter-of-a-century, and since its inauguration over one million dinners have been supplied at a cost of £5,000. The thanks of the ratepayers are due to those responsible for this fund, inasmuch as they have proved that their reliance upon the voluntary contributions of generous citizens has not been misplaced; and thus it is demonstrated that, in Dundee at anyrate, taxation for free-feeding purposes is not called for. It should be pointed out that under the latest Education Act the School Board assists in the carrying out of the dinner scheme, and teachers render valuable help, but the actual cost of food is defrayed by voluntary contributions. The Social Union interests itself in this as in other forms of charity; the Society for the Prevention of Cruelty to Children provides meals in the Shelter; and at the Catholic Day Nursery a warm mid-day meal is provided—mostly during the winter—for some 60 to 80 children. In times of stress, such as during strikes, assistance is forthcoming from many quarters, and notably from the Salvation Army and the Independent Labour Party through its Holiday Home Committee.

#### HOMES IN THE COUNTRY.

Dundee is rich in air-centres, and its parks are numerous, but somehow full advantage is not taken of these breathing spaces; and in the case of City children it is desirable that for some time in the year they should obtain the benefit to be derived from the fuller and fresher air of the country or the seaside. With this purpose in view, there are at least five Holiday Homes, all more or less for the benefit of poor children, for which the generosity of the citizens makes itself either wholly or partially responsible. The Pitlochry Home, where, between April and October last, under the shadow of Ben Vrackie, 77 Dundee children were enabled to spend a fortnight in the Highland air; the Kingennie Home, and Newport Home (Comerton)—both referred to in Dr. Roger's article on "The Care of the Children"; Boys' Holiday Home at Carnoustie (but

which in future is to be situated at Barnhill), where in the course of last summer 38 boys spent a fortnight at the seaside; and the Clarion Home (presently at Liff), which has been instituted for twelve years. The last mentioned is administered by a Committee under the Independent Labour Party, and during the past two seasons over 100 have been benefited through its instrumentality. The Social Union is in particular identified with the Country Homes and Holiday Movement, and makes itself the dispenser of the grant from the Pearson's Fresh Air Fund. The Boys' and Girls' Religious Association and the Children's Free Breakfast and City Mission arrange for sending some of their children to Comerton, and the latter organises annually a "Week's Trip in the Country"; last summer during the local holiday week it secured enjoyment at Montrose for 458 boys and girls.

#### DEAF AND DUMB CHILDREN.

Other articles in the "Handbook" have dealt with the labours of love which are being bestowed upon children who are laid aside either permanently or temporarily through disease, sickness, or deformity; but there still remains to be mentioned the work amongst the Deaf and Dumb. At the Institution, whose headquarters are presently in Lochee Road and which was established in 1846, some 30 to 40 children are boarded and educated, and there, in addition to language acquisition, which is their principal work, and to ordinary school lessons, the girls are taught plain cooking, laundry work, needlework, and paper flower-making; the boys woodwork, clay modelling, cardboard modelling, and repoussé work; and the younger children paper folding and cutting, and basket weaving. The premises have recently been extended, and tuition in boot making and repairing and tailoring has been introduced. It will thus be seen that the Directors are devoting considerable attention to the practical aspect of education, and are equipping the children under their care for taking a place in the work-a-day world. The

school, which is partly self-supporting, has a staff consisting of a headmaster, a matron, and five assistant teachers.

#### ORPHANAGES.

The ORPHAN INSTITUTION was founded in 1815, and for nearly a hundred years has been a home for the orphan boys and girls of the City. It is interesting to recall the circumstances of its beginning: it was due to a sad disaster which occurred on the River Tay, whereby a number of children were rendered fatherless. The following extract referring to the disaster is from the "Dundee Advertiser" of 2nd June 1815:—

"On Sunday forenoon one of the pinnaces plying between Dundee and Newport in Fife suddenly sank about half-a-mile from the latter port, and out of twenty-four persons supposed to have been on board, many of whom were going to Kilmany Church to hear Dr. Chaluners preach his farewell sermon before leaving for Glasgow, only seven were saved."

It is interesting also to note that one of the first inmates of the Institution was the child of a soldier who was killed at Waterloo. Following on the disaster above mentioned steps were at once taken by benevolent citizens to provide for the maintenance and education of the orphan children.

The first Orphanage was situated in Paradise Road, the second (1816-1869) was in Small's Wynd, and the present house in the Ferry Road was occupied in 1870.

The Institution is upheld entirely by endowments and subscriptions, and its affairs are administered by a body of Directors and Lady Governesses.

For many years the average number of children in the Orphanage has been 70. Until the year 1895 the children received their complete education in the Institution. The Directors, however, then resolved that the older pupils should complete their education by attendance for a year or two at a Public School, and thereby obtain the discipline and other benefits pertaining to Public School life. Experience has proved this step to be of considerable benefit to the older pupils, many of whom

have completed their education at the Dundee High School or Morgan Academy by means of bursaries and scholarships. Pupils leave the Orphanage at the age of sixteen; most of the girls are trained for domestic service, a few becoming clerkesses, nurses, and teachers; and, while several of the boys choose a seafaring life and a few commercial pursuits, the greater number are apprenticed to trades, and are maintained by the Apprentice Fund of the Institution until the completion of their apprenticeship.

The LADY JANE OGILVY ORPHANAGE, Baldovan, was instituted in 1854 by Lady Jane Ogilvy, wife of Sir John Ogilvy, Bart., and was established for the education and support of orphan children in connection with the Episcopal Church. The average number of children in the Home is 8, and the girls are mainly trained for domestic service. The affairs of the Institution are administered by a body of Directors, and the Orphanage is upheld by voluntary support.

At the LAWSIDE CONVENT, under the administration of the Sisters of Mercy, about 20 orphan girls are maintained, partly by voluntary subscription. When grown-up the girls have the option of remaining in order to be trained in laundry work and in different branches of domestic service.

At the BARNHILL ORPHANAGE, founded by the late Rev. T. N. Adamson in 1886, a few children are maintained partly by payment and partly by members and friends of St. Margaret's Parish Church, Barnhill, under whose auspices the work is carried on.

#### WORKING BOYS' HOMES.

There are two such Homes in the City. The Dundee Working Boys' Home occupies a part of the premises of the Curr Night Refuge, and was opened in 1884. It has for its object the providing of home comforts with Christian association to orphan, friendless, and destitute boys of fourteen years and upwards; their training in orderly and industrious habits, their apprenticeship to recognised trades, and their voluntary retention in the Home until

able to keep themselves in lodgings. About a dozen lads are generally lodged, and at the local holiday-time arrangements are made for housing them in the country. Under the auspices of the Society of St. Vincent de Paul there is a similar, although smaller Home, where several boys are boarded, and, when necessary, provided with suitable clothing.

#### TEMPERANCE WORK.

There are many valuable agencies in the City for the education of children and others in the principles of temperance. The work is carried on by means of weekly meetings, at which speakers devoted to the temperance cause deliver addresses, and here it might be mentioned that the Dundee Gospel Temperance Union conducts a class for the benefit of speakers in temperance work. The lantern is largely adopted, and proves a valuable medium for conveying temperance truth.

One of the principal agencies for carrying on this work in the City is the Dundee and District Band of Hope Union. There are now 46 Societies enrolled in this Union, with a membership of nearly 9,000 children; other Bands of Hope not affiliated with the Union have a membership of about 1,500. Every Band of Hope is connected with some Church or Mission, and the weekly meetings are a source of great interest and delight to the young people, particularly in Mission districts.

Other agencies carrying on similar work are the Juvenile Good Templar Lodges, which number 18, with a membership of nearly 1,700; and Juvenile Rechabite Tents, which number 17, with a membership of 948.

Temperance workers are greatly gratified at the steady progress the work is making amongst the youth of the City.

#### TRAINING AND DISCIPLINE.

If, as Miss M. L. Walker emphasises at the outset of her article on "Work among Women," Dundee is pre-eminently a City of women and of women workers, and few will contradict her, it is equally true, but possibly in a less degree, that it is also a City where the preponderance of young work-

ing lads is very noticeable. The demand for cheap labour is responsible largely in the latter as it is in the former case for this state of matters. Hence there is a vast scope for social and philanthropic effort amongst the rising male generation, and although much more requires to be accomplished, the organisations in the field are giving excellent results.

Chief amongst the agencies concerned with the welfare of the City youth is the local Battalion of The Boys' Brigade, which was formed in 1891. During its career it has undergone many changes. Of the six Companies which formed the Battalion at that date only two remain; but in spite of the changes and losses which have occurred from time to time it has grown steadily, and in January last it numbered 22 Companies, comprising 94 officers, 45 staff-sergeants, and 1,122 N.C.O's and boys. Second only, and in furtherance of the Brigade's primary and direct object—the advancement of Christ's Kingdom among boys, and the promotion of habits of obedience, reverence, discipline, self-respect, and all that tends towards a true Christian manliness — is the disciplinary training the Battalion provides by means of military drill and physical exercises; and for a Company to gain the trophy for proficiency in either of these departments is no easy matter. The standard of drill is kept at a high level, and the Battalion has been frequently complimented by distinguished officers of His Majesty's Forces, who have inspected it, on the efficiency of its work. The branches of work undertaken include ambulance, signalling, swimming, gymnastics, and instrumental music, all of which, along with recreation, are supervised by special Committees. Besides the local contingent of the original Boys' Brigade, and with a similar object and similar methods, are several independent Brigades. The St. Andrew's Parish Brigade, numbering 8 officers and 92 N.C.O's and boys, has been in existence since 1891; the Blackcroft Brigade, connected with the Mission of Dundee (St. Mary's) Parish Church, numbers 40 officers, N.C.O's and boys; and the St. Mary's (Catholic) Brigade, 50 members. Two valuable branches

of work are the provision made by nearly all, if not all, these Brigades for a summer camp in the local holiday week, and for boys' club-rooms during the winter.

Akin to The Boys' Brigade are the three Companies—having a total membership of 70, excluding Guardians and Assistant Guardians—of The Girls' Guildry, which endeavours to develop in girls capacities of womanly helpfulness. Like the organisation it has imitated, the Guildry is essentially religious; but the physical exercises, drill, nursing, and first-aid, by which it seeks to attain its chief object, are reasons why mention of it should be made here. This movement is especially to be commended to Dundee, where there are so many young girls who are girl-workers and wage-earners, and to whom physical culture and the whole training of the Guildry would be of infinite value.

The Boy Scout movement, although not so strong in Dundee as its leaders would like, is a power for good among its 200 members, and it is satisfactory to know that about a dozen lads who have gone through the ranks are now acting as Assistant Scoutmasters. The diverse work of the boy scout is too well known to require any explanation, and it suffices to state that the Dundee scout is acquainted more or less with them all. One particular feature, however, is the excellent brass band, numbering 35 boys, which the City Scouts possess, and a guarantee of its worth is found in its engagements for Corporation Concerts.

The Boys' Life Brigade and The Girls' Life Brigade are each represented by one Company—the former has about 50 members of all ranks and the latter about 70. The whole principle and tone of The Boys' Life Brigade is life-saving. As stated in the constitution, its objects are sought chiefly by means of drill which is not associated with the use of arms, but with instruction and exercises in the saving of life from fire, from drowning, and from accident. It is intended that the physical training thus given should prepare for helpful service to others, while imparting healthful vigour to the body, and giving the moral discipline which comes from the obedience and self-regard and mutual

trust necessary in effective drill. The object of The Girls' Life Brigade is also the saving of life, and this is accomplished by teaching the girls sick-nursing, ambulance work, hygiene and its relations to household management, swimming, and giving them such other exercises as will enable them to lead clean, healthy, and useful lives.

The local branch of the Y.M.C.A., and the Social Club Rooms of the various P.S.A. and Brotherhood Meetings do considerable work among lads and young men; and while not relying to any very large extent for outside assistance, they are nevertheless indebted partly to voluntary help in services both personal and monetary, and need only to be mentioned.

#### THE POOR AND HOMELESS; AND EX-PRISONERS.

To the poverty-stricken the Dundee Charity Organisation Society, which is supported entirely by voluntary subscriptions, is a veritable good Samaritan. It readily gives assistance where this is required; it makes inquiries as to the merit of every applicant, whether at the door or by begging letter; it prevents imposition and directs charity to the deserving. During the last twenty-six years in the course of carrying out its two-fold object—viz., the proper distribution of charitable relief and the amelioration of the condition of persons in temporary distress—it has enrolled over 36,000 cases and directly relieved over 28,000 at an expenditure of about £10,000. Since its institution in September 1882 the Curr Night Refuge in West Bell Street has given temporary shelter to thousands of the homeless. While the rule of admission is *one night* only, and not again for a month, the re-admission of the applicant is left to the discretion of the Superintendent, this being chiefly intended as a defence against idlers of all kinds. Unless intoxicated or well-known as loafers and impostors, few are refused on a second application. The Prison Aid Society, which has been in existence for forty years, has for its object the rendering of assistance to discharged prisoners of both sexes. This assistance usually includes varied help to the

one individual. Those who have earned no gratuities from Governors of Prisons may be helped with clothing, lodgings, etc., and where there is reason to believe that imprisonment has awakened thought and a desire for a better life, such hopeful cases are upheld until they are settled in employment and in home-life again.

#### SAILORS' HOME.

The philanthropy of the citizens of Dundee is not confined to its own citizens and its own children; it has consideration also for "the stranger within the gates."

For many years British and foreign sailors coming to our port had to find accommodation in boarding-houses in the vicinity of the Harbour. Such neglect of strangers was considered by many a reproach on our City; and in 1879 a movement was originated for the establishment of a Sailors' Home in Dundee. Through the generosity of several benevolent citizens £12,000 was subscribed towards the purchase of a site and the erection of a Home.

For thirty-one years the Home has fulfilled its object, namely:—"To provide for seamen who frequent the Port of Dundee a well-appointed residence at moderate charges during their stay on shore, where they may be supplied with ordinary comforts—embracing medical attendance, means of professional improvement, recreation, and religious instruction—and always find a home."

During the past year nearly 10,000 beds have been occupied by the men of the Royal Navy stationed at the port; over 300 merchant seamen of various nationalities have made the Home their headquarters while at Dundee, and over 100 officers attending the Board of Trade examinations have resided at the Home.

#### PREVENTION OF CRUELTY TO ANIMALS.

For nearly half-a-century the horses, dogs, cats, birds, etc., of the City and district have found a friend in the local Society for the Prevention of Cruelty to Animals. Through the agency of two salaried Inspectors the Society keeps careful watch over their interests, and when neces-

sary it utilises the machinery of the law to obtain its object, which is, to quote from a recent speech, "to foster . . . such reverence of all sentient life as would make cruelty be deemed an impiety and kindness to animals part of everyone's religion." It will thus be seen that the Society is not merely punitive, but seeks to promote the Franciscan spirit of affection for the animal kingdom.

From the foregoing statistics and references it will be seen that not a few of the citizens of Dundee, inspired by Christian ideals, are giving time, energy, sympathy, and means to protect dumb creatures, to help the poor, neglected, unfortunate, and infirm of the City, to guard its orphans, to train and discipline its youth, and to provide hospitality for the homeless and the stranger; and in so doing are rendering valuable service to the City and to the State.



## PUBLIC SERVICES.

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### Introduction.

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THAT the public services of a city, entering as they do so largely into the life of the people, are of supreme value to its wellbeing goes without saying, and the following brief papers are submitted as indicative of the standard laid down for itself by the Local Authority of Dundee.

The subject of municipal trading is, of course, a somewhat controversial one, and it is difficult to get unanimity on such a question. Apart from those services which in the interests of public health it is essential should come under the control of Local Authorities, as well as matters pertaining to streets and policing, there are certain lines upon which all might agree that it is well in the public interest that these should come under the control of Local Authorities. This would to my mind be true of (1) Public utility undertakings which are a practical necessity for all citizens in common, such as Water, Gas, Electricity, and in a lesser degree Tramways, and (2) Where the need is so general, or has such a bearing upon questions of public health, moral or physical, as to justify its provision. This latter is true of such departments as Parks and Cemeteries, Baths and Wash-houses, Markets and Slaughter-houses, Libraries and Museums. In all of these directions it will be found that the City of Dundee takes a high place.

An endeavour has been made in the following pages, as already indicated, to briefly outline these services. Some, however, while most interesting, have so much in common with similar services elsewhere, or, while of the utmost importance, are so difficult to write of otherwise than by mere statistics, that it is not thought desirable to give them a special heading.

Among these latter one might refer to the very efficient POLICE service, so long presided over by Mr David Dewar, and now by his capable lieutenant, Chief Constable Carmichael. There is a total staff of 225 Constables and Officers. While the city has been comparatively immune from serious crime for the past few years, that the watchful care of this department is needed will be apparent when it is pointed out that during the year just ended 5016 offences, involving 5445 persons, were dealt with by the police, 370 of such persons passing the bar of the Police Court (which is presided over each morning by one of the Magistrates) before being remitted to the Sheriff. Under the probation system, first inaugurated in Scotland at Dundee, 290 persons, 164 males and 126 females, were dealt with, in most cases with beneficial results both to themselves and the public interest. Before the Juvenile Court, established under the Children Act, 1908, 849 persons under 16 years of age were brought up, 60 of whom were committed to Industrial Schools or Reformatories.

The PUBLIC LIGHTING of the city is intimately associated with the function of Watching discharged by the Police. This has, during past years, been steadily improved both in regard to gas and electric lighting. An automatic gas lighting system is presently being experimentally tested, which is likely to give important results both in economy and efficiency of working.

The ROADS and STREETS, extending now to 90½ miles, under the watchful care of the City Engineer, are kept in a state of the highest efficiency. During the past two years he has been devoting much time and attention to the treatment of road surfaces, and as a result a Tar Macadam plant has just been installed, and a beginning made in treating road surfaces with this binding material. An extensive scheme of road bottoming has also been approved by the Town Council, which will greatly enhance this department of civic service.

The DRAINAGE system of Dundee, allied as it is with a general improvement in sanitary appliances on the water carriage system, owing to the natural slope of the city, is

of a supremely satisfactory nature, and does much to ensure the good health of a densely packed industrial population, which has not yet found opportunity to follow the natural trend of great urban communities, which, for residential purposes, leaves the city with a hollow heart, and migrates more and more towards the outskirts. That this trend is evident, and will be accelerated in the near future, must be patent to all students of communal progress and development.

Under a FIRE BRIGADE representing the highest standard of efficiency, with the latest equipment in petrol motor vehicles and pumping apparatus, the city's needs in fire fighting are adequately cared for; indeed, the service is so managed and equipped that it is found of the utmost value to a district radiating out for thirty miles into the country.

In Public BATHS and WASH-HOUSES Dundee occupies a specially favourable record. Its proximity to a wide tidal estuary enables it to provide Swimming Baths of a most advanced type. There are now at the Central Institution three swimming ponds, providing a constant supply of the purest sea water, while at Lochee there is also an excellent pond supplied from the city mains. In addition, there are east and west end open-air ponds, as well as the majestic sweep of the river itself available. Facilities for cleanliness in the way of Private and Turkish Baths are also of a high order, and that all of these are fully appreciated must be recognised from the fact that over a quarter-of-a-million bathers annually make use of the service. Excellently equipped District Wash-houses are also provided in central working-class districts, which prove most useful to the housewives who find it impossible in a great city to secure that adequate drying accommodation which is only possible in less congested areas. These Wash-houses provide for 300,000 washings annually, and play a most important part in the city's life—and this practically on a self-supporting basis. Probably no public department is performing a greater service in a less ostentatious manner than this carried on in the interest of personal cleanliness,

and that at a cost to the community approximating (inclusive of Sinking Fund and Interest)  $\frac{1}{2}$ d. per £ of rates.

To the interested visitor fuller particulars in regard to special departments of the city's life and work will be gladly made available; to help in this direction brochures have been prepared in those departments which are more likely to interest in this way, and these will be supplied on application.

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## The Evolution of Public Health in Dundee since 1870.\*

By Chas. Templeman, M.D., D.Sc., Medical Officer  
of Health.

WHEN the British Association last visited Dundee, Preventive Medicine was just beginning to take its place among the sciences. In common with all the large towns, Dundee had been devastated from time to time by epidemics of cholera, smallpox, typhus fever, and other infections, and was just emerging from the period when these were regarded somewhat complacently as a visitation from God, and not recognised as the direct result of the violation and neglect of the simple laws of Nature. The measures devised to cope with these epidemics were often hasty and ill-conceived—carried out in a panic of fear to combat its ravages, but making no attempt to seek out and remedy those permanent conditions which were the real cause of them. Whenever the epidemic which gave

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\* Copies of Dr. Templeman's Report on Public Health in Dundee during 1911 are available on application for Members of the British Association.

occasion to those temporary and palliative measures had passed away, matters were allowed to drift back to the old conditions, till a fresh outbreak gave another warning of the dangers of neglecting the elementary natural laws.

We can fairly claim that since the passing of the Public Health (Scotland) Act, 1867, the Local Authority of this City has recognised its responsibilities in the matter of safeguarding the health of the inhabitants, and has taken advantage of all the machinery provided by Parliament since that time to improve the amenities of the life of its citizens.

#### POPULATION.

In 1868 the population of the City had just reached 100,000. By the census of 1871 it was found to be 118,977, an increase of 28,560 over that of 1861. This is the period of greatest expansion in the history of the City—the increase being greater than that of any decennium since the census was taken in 1821. During the next decennium the increase was next in size—viz., 21,817—the population in 1881 being 140,794. The next ten years shewed a further increase of 14,881—the census of 1891 shewing a population of 155,675. Since then, in spite of an extension of our boundaries, which included the village of Downfield, the increase in the population has been slow, and the census of 1911 shewed that the City contained 165,006 inhabitants.

The early seventies saw the culmination of a municipal policy which had a very marked effect on the health of the City. Under an Improvement Act, the closely-packed area in the centre of the City was taken over by the Corporation and gradually demolished. In this part the streets were narrow, and running off them were narrow closes, flanked on both sides by high buildings, consisting of dwellings into many of which the rays of the sun never penetrated and round which fresh air could not possibly circulate. These were largely occupied by the lowest stratum of the population. There typhus fever found a suitable habitat. Indeed this disease, which only flourishes amongst dirt, darkness, and poverty, was never absent

from the City, and burst out in epidemic form from time to time with direful results. Rarely fewer than 200 cases per annum were treated in the Royal Infirmary before the City Improvement Scheme was carried out, and the narrow streets and rookeries in the centre of the town were swept away, and wide streets with well-ventilated and sunlit dwellings took their place. In 1865-66, when the population only numbered 97,000, no fewer than 1084 cases were treated in the Infirmary, and this, of course, gives no reliable index of the number of cases in the City, as at that time there was no system of compulsory notification in force. By the enlightened policy of opening up this congested and insanitary area, and dealing in a similar manner with other parts of the town, this disease has been practically banished from our midst.

#### DEATH-RATE.

During the forty years under review the death-rate of the City, in common with that of the country generally, has decreased. In the decennium 1870-80 the highest death-rate recorded was 31·74 per 1000 in 1874, and the lowest 21·05 in 1879, while the average was 24·98 per 1000. From 1900-10 the highest recorded in any year was 21·14 in 1900 and the lowest 17·97 in 1905. The average for the past ten years was 19·19, shewing a decrease of 5·79 per 1000, or a saving of 950 lives per annum calculated on the present population. This result is the reflex of an enlightened municipal policy pursued throughout this period. I have already referred to the great Improvement Scheme which did so much to rid us of many of our worst slums, and as the subject of Housing is dealt with elsewhere, I need not detail the measures since carried out to improve the conditions under which the poor of the City live.

The active supervision of our milk supply since the introduction of the first Order by the Privy Council in 1879, and the improvement which has taken place in the conditions under which this important article of food is produced and distributed, has had a very beneficial result

on the health of the community which it is not possible to express in figures. Much, however, remains to be done to put the milk supply of the country in general, and our large cities in particular, on a satisfactory basis.

By the Dundee Police and Improvement Consolidation Act, 1882, we obtained powers much in advance of the general legislation of the country, and this gave a great impetus to the Public Health and Sanitary Service in the City. This Act dealt with such matters as drainage, sewerage, laying out of new streets, mitigation and prevention of disease, etc. Many of the provisions of this Act, such as the power to prohibit the sale of milk from infected dairies, compulsory notification of infectious disease, compulsory closing of houses unfit for human habitation, etc., did not come into operation over the country generally for many years, and in many respects we forestalled the Public Health (Scotland) Act, 1897.

#### INFECTIOUS DISEASES.

The incidence and fatality of the common infectious diseases have undergone a remarkable change since 1870. The introduction of a system of compulsory notification in 1882 did much to bring the ordinary infectious diseases under control. The power to enforce this was sanctioned by Parliament in the Dundee Police and Improvement Consolidation Act of 1882. This has enabled us to study more closely the more or less regular periodicity which characterises outbreaks of infectious diseases. These as a rule move along in waves, the crests of which are separated from each other by more or less regular intervals. These waves vary in height, and sometimes the crest of one may extend over more than a year. The incidence of scarlet fever in Dundee illustrates this, although we have long enjoyed a comparative immunity to this disease which is difficult to explain. The last great wave, in the case of scarlet fever, passed over Dundee in 1886-87. During these two years we find that 5515 cases were notified. Between these years and the present time the yearly incidence has varied greatly. The disease remained at

a lower level till 1896-97, when a wave of lesser height passed over the City. This was followed by another period of quiescence lasting for ten years. In 1906 it again rose somewhat, subsiding in the following year, and then increasing till it culminated in the outbreak of 1910. Of late years its prevalence has decreased very considerably throughout the country, and its fatality has diminished so greatly that it is not now the dreaded disease it once was. Whether this is due to a lessened virulence in the infective agent, or an increased resistance in the population, or to a combination of both, it is impossible to say. The case mortality for the first ten years after the introduction of compulsory notification was 4·5 per cent., and during the outbreak of 1910 this was reduced to 2·7 per cent.

*Typhoid Fever.*—The incidence of typhoid fever in Dundee has been remarkably low during the past thirty years. The City has the advantage of an abundant supply of excellent water, and situated as it is on ground which rises from the river northwards, it affords unusual facilities for an efficient system of drainage; while the proximity of a wide tidal river permits of the sewage being disposed of without offence. While one or two limited outbreaks of typhoid have occurred from infected milk brought in from the country, we have been altogether free from those extensive outbreaks associated with polluted water.

*Typhus Fever.*—As already mentioned, the great improvement which has been effected in the older parts of the City has practically abolished this disease, so that now-a-days it does not constitute a serious factor in our bills of mortality.

*Diphtheria.*—This disease has of late years shewn a tendency to increase in all Urban Districts, and Dundee has been no exception to the rule; but while its incidence has increased considerably, its fatality has been greatly reduced since the treatment by anti-diphtheric serum was introduced. Before this time, in the quinquennium 1886 to 1890, the case mortality was 54 per cent. From 1891 to 1895 it was 36 per cent. About that time the serum

came into use, and in the period from 1886 to 1900 the mortality was reduced to 22 per cent.; and from 1900 to 1905 it was still further reduced to 15·7 per cent.; and from 1906 to 1910 it was equivalent to 15·6 per cent.

*Smallpox.*—During the past thirty years Dundee has been free from any serious epidemic of smallpox. The greatest prevalence of the disease was from 1901 to 1905, when altogether 172 cases occurred. The erection and equipment of a modern Hospital for Infectious Diseases (opened in 1889), a special Hospital for Smallpox (erected in 1894), and the possession of a Reception House for Contacts have enabled us successfully to cope with any threatened outbreaks, and have been the means of saving many lives which would otherwise have been sacrificed. Till this was done the hospital accommodation in the City was very defective, and special accommodation was only provided under the stress of epidemics and available only during their prevalence. Such an institution as a means of preventing epidemics was undreamt of—its only function was to prevent their spread once they had appeared and to treat the individual cases.

The first Public Hospital was a wooden structure erected on the outskirts of Lochee. It was used during an epidemic of smallpox. Previous to that time cases of infectious disease were treated in the Royal Infirmary, but when the accommodation there was overtaxed provision had to be made by the Local Authority. When an epidemic of typhus occurred, and the resources of the Infirmary were again overstrained, another wooden erection was built on the same site. An outbreak of scarlet fever in 1873 necessitated some special provision, and this was made by the provision of a wooden structure at King's Cross on the site of the present Hospital. With the erection of a permanent building those temporary structures were demolished, and from time to time the accommodation at King's Cross has been increased with the needs of the public, till we have now an excellent Hospital of about 140 beds doing a good public service

Of the non-notifiable diseases, measles and whooping-

cough are the chief. Like all other cities, we have a visitation of these diseases every two or three years. They are the most fatal of all the infections in children, and unfortunately modern science has not yet succeeded in evolving any plan which has been successful in preventing their prevalence or diminishing their fatality. An extension of the Hospital is in progress to make provision for the treatment of those cases where their home conditions jeopardise any chance of recovery they may have, and we hope in this way, if we cannot prevent the occurrence of outbreaks, we may at least lessen their mortality.

*Consumption.*—This disease is now classed amongst the infections. Dundee has shared with the country generally in the remarkable decrease which this disease has shewn. During the past forty years its prevalence has steadily diminished, and the mortality reduced from nearly 30 per 10,000 of the population in the early seventies to 17 per 10,000 during the quinquennium 1906-1910. This decline has been in the main due to the great advance which has taken place in general sanitation, and had commenced before any measures had been adopted dealing with the individual, as well as his environment. Of late years public attention has been called to the infectious nature of this disease and to the simple measures which are necessary for preventing its spread from person to person; and as the community comes to realise how much the infected person has it in his power to render himself a safe member of society, the proper care of the cough and spit will in all cases be insisted on.

In Dundee the diminution of our death-rate in the early part of the fall was undoubtedly due to an improvement in the housing conditions, to the closing of narrow courts and alleys, to the prevention of overcrowding, and all these improvements in those conditions of environment which have led to the abolition of typhus; but in addition to these, the great improvement in the social conditions and the general amenities of life have led to the building up in the individual of a greater power of resistance to the invasion of the tubercle bacillus.

Naturally, the improvements which might reasonably be expected from the advance in general conditions has its limitations, and we are now tackling in addition to these the individual himself as a source of infection, and the measures adopted here are the following:—

1. Voluntary notification of cases of the disease. This is admitted to be ineffective, and considerably handicaps our efforts. Without a complete knowledge of the *locale* of the disease it is evidently impossible to deal effectively with it. There is reason to believe, however, that in the immediate future compulsory notification will be obligatory in all parts of the country.

2. Domiciliary visits by a nurse to educate patients in the means necessary for protecting other members of the family and the public generally, as well as protecting themselves from further infection.

3. Disinfection of infected rooms.

4. The provision of sputum flasks.

5. The bacteriological examination of sputum free of charge to medical men.

6. The Municipal Dispensary. This was the first Dispensary of the kind in Scotland. It is managed by the Town Council, and the work is done by a special Medical Officer under the supervision of the Medical Officer of Health. The Directors of the Royal Infirmary have kindly placed at our disposal the splendid suite of Out-Patient Rooms recently erected by the generosity of J. K. Caird, LL.D., and a number of cases are being treated by the Tuberculin method. The institution is being largely taken advantage of by the public, and the fact that many of them who are not found to be suffering from phthisis at all, or are still in the earliest stages of the disease, shows that many who are apprehensive of a general breakdown are willing to go there when they would not otherwise think of going to a doctor. In this way a considerable number come under observation at the stage when the treatment is likely to benefit them, and they can best be taught to carry out those simple precautions necessary to prevent the spread of the disease. Advantage is taken on their application to examine the

other members of the family, and in this way unsuspected cases are sometimes discovered. These cases are kept constantly under observation, and are visited by a trained nurse, who sees that the instructions given at the Dispensary are carried out.

7. Provision at Sidlaw Sanatorium for a few of the early cases.

Under arrangement with the Directors of the Royal Infirmary we have placed at our disposal at the Sanatorium at Auchterhouse seven beds for the treatment of early cases. For this the Town Council pay £546 per annum—that is, 30s. per week per bed. In addition to these measures the Town Council have agreed to make provision for the isolation and treatment of advanced cases at King's Cross Hospital. These cases will be removed from homes in which the conditions are such as to endanger the health of the other inmates, or when the patient is so ill that he cannot take the necessary precautions to prevent him becoming a source of danger to the other members of the family. In view of the fact that the immediate future is likely to see a great addition made to the responsibilities of Local Authorities in connection with phthisis, this project has meantime been postponed till the whole subject can be tackled in the light of the necessities of the case, and the financial help to be given by the Government towards the increased expenditure this will involve.

#### INFANT MORTALITY.

As a result of the exceptional industrial conditions prevailing in Dundee—the very low wages paid to unskilled male workers in our mills and factories and the large number of women (including married women) employed in them—our infant mortality has generally been higher than that of any of the cities in Scotland. Much has been done by the Town Council to lessen this, and their efforts have been on the whole successful. These have been, of course, directed towards the improvement of

the health of the mother, and her education in the elementary principles of infant hygiene.

These measures are as follows:—

1. Distribution of leaflets by Registrars giving simple directions as to Infant Hygiene.

2. Early Notification of Births and Home Visitation by Health Visitors and by a Corps of Voluntary Workers. Each of the Visitors is prepared to act as a friend and counsellor to a few families, and one of the chief points they try to impress on the mother is the great advantage to both the infants and themselves of suckling their child for at least three months. In many cases they procure help—financial and otherwise—to many of these poor mothers, who are ill-prepared for any addition to their households; but they early recognised that if any substantial and permanent benefit was to result from their visitations they must be prepared to give something more substantial than advice and sympathy in the case of those necessitous mothers. Recognising this, the Town Council have for the past four years voted a sum of £250 from the Common Good for the establishment and maintenance of two Restaurants for Nursing Mothers in Lochee and Blackscroft, and have granted £50 to assist in the support of the first Restaurant of the kind started in any city in Scotland, which is carried on by the Dundee Social Union.

The work of these Restaurants include:—

- (1) Infant visiting.
- (2) The providing of good and nourishing dinners at a moderate charge.
- (3) Weighing the babies once a week and giving advice as to management.
- (4) Mothers' evening.

The objects are:—

- (1) To encourage breast feeding of infants.
- (2) To discourage married women's work.
- (3) To provide a centre for educational work among mothers.

The value of this work cannot be overestimated. The mere reduction of the death-rate of infants does not express it. The educational side of the work, as well as the material help afforded, has a lasting beneficial effect on those children who survive, in the improvement of their health, thus helping them to become healthy and useful members of the community.

We also had in Dundee a Municipal Milk Depôt, the object of which was to lessen our infant mortality by supplying a pure and physiological infant food for those children who have to be brought up by hand. Care was taken to provide this as far as possible only to mothers who, for some reason or other, are unable temporarily or permanently to suckle their infant. The supreme importance of breast feeding was always emphasised, but where this was impossible we tried to provide the best physiological substitute. Even this was, of course, not found to be suitable in every case, and had sometimes to be given up. Advantage was not taken of this to the extent anticipated, nor altogether by the class of the community for which it was specially provided, and the preparation and distribution of the milk was for a time handed over to a private company, who carried on the work on the same lines as the Municipality did, and to prevent any financial loss the company received a subsidy per child from the Town Council. This, however, has since reluctantly been abandoned.

Our infant mortality in Dundee during the past 25 years varied from 142 to 217 per 1000 births.

Most valuable work is also being done by two Lady Health Visitors, whose duties are mainly educative. These consist in house-to-house visitation in the poorer quarters of the City to induce cleanliness of house, person, and clothing; giving instructions to mothers on infant feeding and on the steps necessary for keeping children in good health; calling attention to bad clothing and neglected conditions; advising as to the prevention of infectious disease; and the care necessary in cases of such diseases as measles and whooping-cough.

A qualified Veterinary Surgeon is also a member of the Public Health Staff, and his work in supervising the cows in the city dairies and preventing the milk from tuberculous animals being sold is of great public benefit.

Altogether the equipment of the Health Department compares favourably with that of any of the other cities in the kingdom; and the great reduction in our general mortality and in the improvement of the amenities of life in the City are largely due to the forward and enlightened policy our Municipal representatives have always adopted in dealing with matters affecting the health and comfort of the citizens.

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## **Sanitation and Pure Air in Dundee 50 Years Ago and Now.**

**By Thomas Kinnear, Chief Sanitary Inspector.**

FIFTY years ago Dundee was in a state of sanitary chaos; to-day the City may claim to stand comparison from a sanitary point of view with any other large centre of population in the United Kingdom. This change from an unhealthy to a sweeter environment I am able to speak of from personal experience as I can, unlike any of my other colleagues, look back over fifty years of official service, having begun the revolutionary process indicated above as Chief Inspector at the time when the British Association last honoured Dundee with a visit in 1867.

In large towns the process of advance from more primitive methods up to present day requirements of Public Health and Sanitary Laws is not the work of a few years, but with us it has taken half-a-century of persistent work at reconstruction to keep up with developments in Sanitary Science.

When the Public Health Act of 1867 came into force the late Sir John Skelton strongly urged the various local authorities in Scotland, as far as possible, to appoint Police Officers to the then new posts of Sanitary Inspectors. I had been in police service for seven years, when I was then offered and accepted charge of the new Sanitary Department then created. Prior to this time I had, however, been helping in the Sanitary Work of the Burgh. The new conditions which it was my duty to enforce met with a fierce resistance, but resolute and persistent effort on my part were successful in enforcing the first essential elements necessary for improving the sanitation and air of the town; providing increased facilities for cleansing, and thus helping to prolong life and eradicate the insanitary and atmospheric pollutions which were so hideous and fruitful a cause of infectious disease and death.

At this time Dundee was wholly devoid of sanitation. Drainage of even the most meagre description was barely in evidence and what there was consisted of stone built rubble, allowing the liquid to percolate through and soak into the ground, thus poisoning the soil. A few public sewers were put down but these were confined to the leading thoroughfares. There was no proper supply of water for domestic, culinary, or flushing purposes. All there was was largely obtained from wells situated at various places throughout the Burgh, the supply being limited and derived entirely from springs. Many of the population had to carry their supplies at least half-a-mile to their homes in pails. In dry weather water was carted into the Burgh in barrels from outwith the boundaries and sold on the streets. Monikie provided the only permanent supply, but it was very scanty and altogether insufficient. Under such conditions water closets were an impossibility. There were five such places only which came under this designation. Three were in hotels and two in private houses all of them being of a very primitive description, the flushing water having to be carried in buckets. The only other conveniences of this nature were wooden or brick privies (of which there were about 1,000), with holes sunk

in the ground of from four to five feet deep under them as dung pits, into which all filth and foul liquids were thrown. The emptying of these pits was attended with the most horrible odours. The scavengers, equipped with sea boots, started about 4 a.m. to empty them and wheeled the contents out to the streets, on which they were deposited prior to being carted away. A few of the streets in the centre of the town were paved with cobble stones, while the surface of the others was of ordinary earth. The liquid spread about, formed pools, and the operations of the scavenger's broom only accentuated matters. This was the odour which met the mill and factory employees in the mornings ere they reached their work. The effluvium was in evidence throughout a great portion of the day, and if a whiff of fresh invigorating air was desired a pilgrimage had to be made to the foreshore or outskirts. The attempt to disinfect the streets and closes with chloride of lime only emphasised the nausea. The indecencies of children and others were constantly to be met with in the streets, lanes, courts, and entries owing to the inadequacy of the public accommodation of this kind.

The public lavatories, of which there were fourteen, consisted of large open 10 to 30 seated wooden erections with trenches four and five feet deep, which were cleaned out in the same way as above described. After being emptied, these trenches or holes were filled in with two or three feet of mill dust to absorb the liquid. This proved a most valuable financial asset to the town. At that time the Corporation paid about £1,000 per annum for mill dust, while the income from manure totalled between £10,000 and £11,000. Last year only £14 was paid for mill dust, while the total income for all manure sold was between £3,000 and £4,000. One of the largest of these lavatories stood at the top of New Inn Entry, whilst the ground on which the Albert Galleries now stands was a soft, marshy evil-smelling bog. There were no Exchange Buildings then; the merchants congregated in the Cowgate and St. Andrew's Square. The lavatories for males and females at the works were of the same primitive nature before

described and were emptied in the same way. Water for flushing was an impossibility and although this had been available there were no drains to carry it away.

All the courts, footways, and passages in the centre of the town—of which there were about 300—were entirely unpaved. Where there was any attempt at this it consisted of pieces of stone, bricks, or wood used as stepping stones to allow passengers in wet weather to negotiate the quagmires. These courts were also largely used for the deposit of the contents of slop pails.

Overcrowding was rampant and the staff was much too weak to cope with it energetically, inspections being carried out only between midnight and 4 a.m. Many of the buildings in the denser parts of the town were simply rotten, whilst there were between 200 and 300 underground cellars used as dwelling-houses.

There was no attempt made to enforce the Smoke Abatement Act for modifying the pollution of the atmosphere by smoke emitted in dense volumes from factory stalks and which was full of smut and coom. Dairies were of the most insanitary character, being without drainage, paving, light, ventilation, or dung stances, while the milk was drawn from the cows in the most undesirable surroundings. Piggeries were numerous and scattered all over the town in undesirable places, even ben rooms, cellars, and attics being utilised as stys, the pigs mixing freely with the family.

Bakehouses were at this time small and chiefly underground, ill-ventilated places. Workshops were mostly underground with no facilities for the passage of fresh air. Shops in which food supplies were stored and sold were dark, stuffy places, and so carelessly kept that the food was open to considerable contamination.

It cannot therefore be surprising that under such conditions as I have described, the most loathsome of infectious diseases were more or less constantly present in epidemic form. From the year 1860 onwards smallpox, typhus, and typhoid or gastric fevers were serious menaces to the health of the community. In 1865 over 1000 cases of typhus came to light. For many years subsequent to this

there were never less than from 300 to 500 cases per annum, and the treatment of these without proper hospital accommodation other than the Royal Infirmary, which was invariably full, was a problem which the local authority long hesitated to deal with. Occasional cases of cholera cropped up in the warm weather from 1860 to 1867, since which date there has been no recurrence of this.

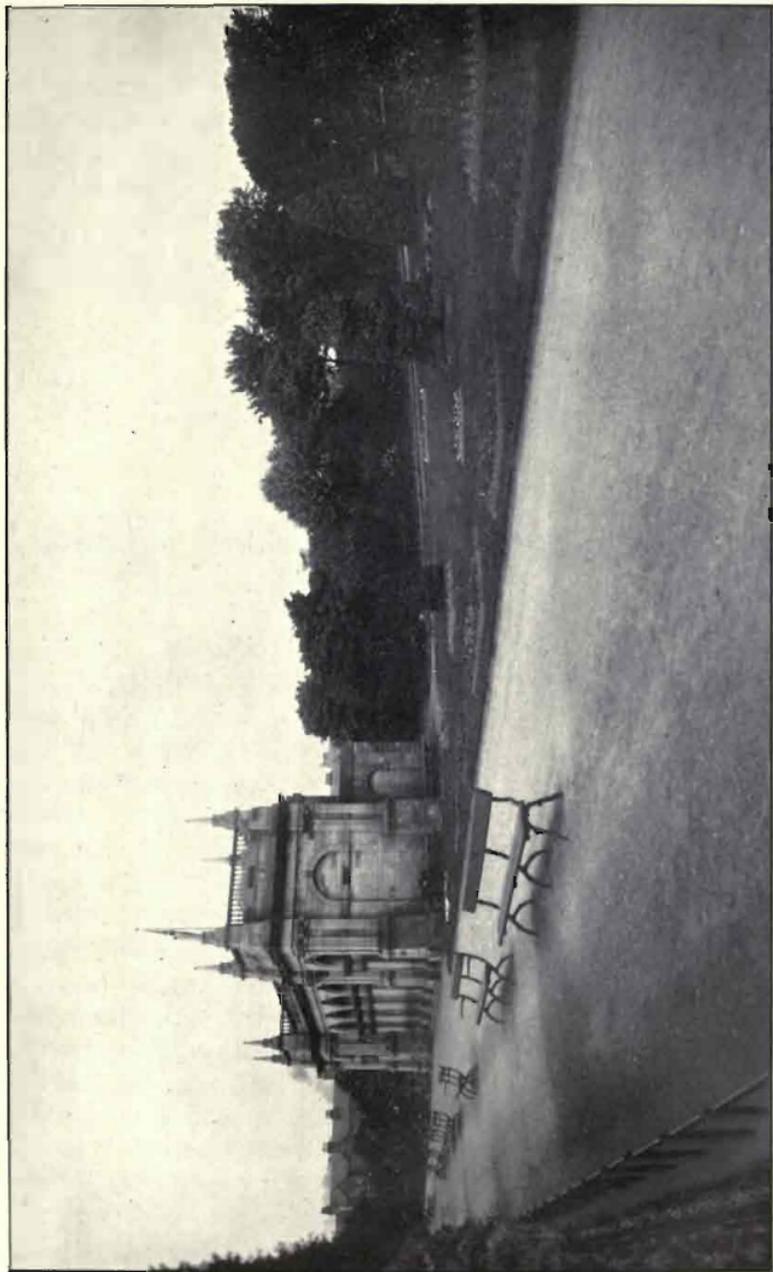
All these deplorable conditions, in fact, have now entirely passed away. A new town has arisen into which has been absorbed the old little Burgh, and although many of the older land-marks and buildings still remain these latter have mostly been modernised. Old buildings which were simply warrens for vermin and filth in back closes, as well as the nurseries of vice and crime, have been demolished, leaving wide streets, open spaces, and stately buildings in their place. After the passing of the Act of 1871 property improvements were begun in earnest. The old sunk holes gave place to cistern stone ashpits properly drained, a good system of house drainage was laid down, the public sewers were extended and the closes, areas, footways, and courts were drained and laid with pavement flags.

Then the sanitarian's greatest asset, a plentiful supply of pure water, was got from Lintrathen in 1875, when another reform was made in supplying water into houses instead of from wells and taps on stair heads, and also the addition of water-closet accommodation. In 1901 the final stages of converting the whole town into one of sanitary convenience on the water carriage system was entered upon, and I am satisfied that there is now no town in Scotland better equipped in this direction, as there is practically not a single building within our 4,755 acres which cannot boast of ample accommodation. Almost every house has a plentiful supply of water brought into the kitchen by water taps and sinks. Since the year referred to 5,500 water closets have been added to properties displacing privies and old and defective closets. On this work alone over £80,000 has been expended by property owners. The wooden public lavatories have been cleared away and the Corporation has provided fireclay enamelled underground

buildings of the most modern type. At the time of writing overcrowding has practically disappeared from our community, any cases discovered being of a trifling nature. There is not a single underground house in occupation. These have all been demolished or been converted into and used as storage premises. The underground bake-houses have disappeared and finely equipped premises with excellent accommodation and the best of facilities for the workers keeping themselves clean, so that the food of the people may be produced under the most hygienic conditions, take their place. Workshops are either on the street level or above it, airy, and with all the requirements necessary for securing that the workers perform their duties under the most healthy conditions. The pollution of the atmosphere by smoke from factory chimneys has been dealt with where necessary, and a great reduction of this nuisance obtained although further improvement is still looked for in this direction. Dundee was the first town in Scotland to deal with this problem.

That part of our milk supply within the Burgh is provided under the most sanitary conditions. Old byres have given way to modern structures, fully drained and provided with water for flushing and cleansing, and proper houses are provided in which to store the milk. Those handling same are instructed on the absolute necessity of personal cleanliness, whilst the animals are under Municipal Veterinary Inspection. In place of the dirty and ill kept shops we have now handsome, well lighted, ventilated, and cleanly kept premises in their stead.

Looking back over the period under review I can better see the importance and value of the work than when I entered upon my duties as a sanitarian. Under existing conditions I have shown our community is living and working in an atmosphere infinitely more conducive to health and happiness than existed fifty years ago. The main cause of air impurities has been removed and as evidence of the beneficial effect that this, in conjunction with improvements in sanitation, has effected, one need only refer to the fact that the death-rate, then about thirty-two



MIDDLE WALK, BAXTER PARK.



per thousand of the population, has now been reduced to an average of about nineteen, whilst the more dangerous and infectious diseases are never with us in epidemic and rarely in any form.

Unfortunately, those responsible for enforcing Sanitary Laws are always fighting on an unpopular side, as their labours necessitate the spending of private money, and this perhaps tends to obscure the enormous economic value of the work carried out by them.

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## Dundee Public Parks and Cemeteries.

By John Carnochan and Alex. Macrae.

THE citizens of Dundee have provided for their use ten parks, consisting of 266 acres or thereby. These are as follows:—

BAXTER PARK (36½ acres), after being laid out in an ornamental manner, was presented to the community by the late Sir David Baxter in 1863. This park was endowed by the donor, and was administered by Trustees up to 1903, when the investments by which the endowment was secured had depreciated to such an extent that the Trustees felt themselves unable to maintain the park. It was then handed over to the Town Council, so that the endowment might be supplemented from the rates as required to maintain it in proper condition

While the greater part was laid out ornamentally, a considerable space is allocated for recreation purposes, there now being three bowling greens and two cricket pitches. One green (laid out by the late Provost Moncur) is occupied by a Club and maintained at the cost of the Parks Department, to whom the members of the Club pay 5s. each per annum and provide their own

bowls and green equipment. All other greens are open to the public, have bowls and all equipments provided, and these are charged for at a penny per hour. The cricket pitches were specially laid out, are maintained at the cost of the Clubs frequenting the park, and are used for matches only, as such Clubs may arrange; of both greens and pitches full advantage is taken, and they are much appreciated.

From the highest point in the park, where a flag-pole stands, a beautiful view can be obtained of the estuary of the Tay and the Fifeshire shore and hills for a considerable distance. An ornamental, substantial, and roomy pavilion stands in the centre of the park, on each side of which ample space is devoted to flowers.

BALGAY PARK ( $35\frac{3}{4}$  acres) was acquired by the Corporation in 1870. This is a naturally-wooded hill, and connected with its cemetery, forms perhaps one of the finest public open spaces in the country. Walks and carriage drives have been laid out, so that the highest point may be reached on an easy gradient, from which a magnificent view in all directions may be obtained. There is not much in the way of ornamental gardening attempted in this park, the naturally-wooded slopes left undisturbed being more in keeping with the nature of the ground. There are a few flower beds at the two entrance gates and some in the centre, but otherwise the park is in its natural state. There is no ground suitable for games.

MAGDALEN GREEN ( $20\frac{1}{2}$  acres) is an open park, the greater part thereof having been reclaimed from the foreshore. As it is of limited extent crossways and close to dwelling-houses, it is unsuitable for football and cricket, and these games are prohibited, but there is one bowling green. The park is, however, largely used for Volunteer drill, also for excursions visiting the town. The Dundee Horticultural Society, one of the most successful of its kind in Scotland, holds its annual show here, and being close to the railway stations, it is specially suited for that

purpose. There is a gymnasium at the east end of the Green, consisting of swings and maypoles, for children under fourteen years of age, which is taken full advantage of, especially during the summer months.

DUNDEE LAW ( $17\frac{1}{4}$  acres) was acquired by the Corporation in 1878. On this natural hill, which dominates the landscape, and is largely responsible for the shape taken by the City circling its base, no laying out has ever been attempted, and it is too precipitous for games of any sort. At the summit is an indicator in the form of a dial, with lines marked pointing out by name the outstanding features in the distant landscape that can be seen therefrom; and as this is the highest point in the vicinity of Dundee, a very extensive view can be obtained.

LOCHEE PARK (23 acres) was presented to the community by Messrs Cox Brothers in 1899 and also partially endowed by them. It is used entirely for recreation purposes. Football is played in winter and cricket in summer, also golf in the early morning all the year round. There are six laid-out pitches for cricket, maintained at the cost of the Corporation, for matches only, and one bowling green, and the ground outwith can be used for cricket practice to any extent. There are two shelters in the park, also a gymnasium for children under fourteen years of age.

This park lies to the north of Balgay, but is separated from it by a parapet wall and iron railing.

STOBSMUIR ( $9\frac{1}{4}$  acres), situated at the north-east end of the town, is divided up into two skating ponds, surrounded by ornamental pleasure grounds. Swans are kept at one of the ponds during spring and summer, but removed when the skating season comes round. The other pond is largely used in summer for sailing model yachts. There is here also a gymnasium for children.

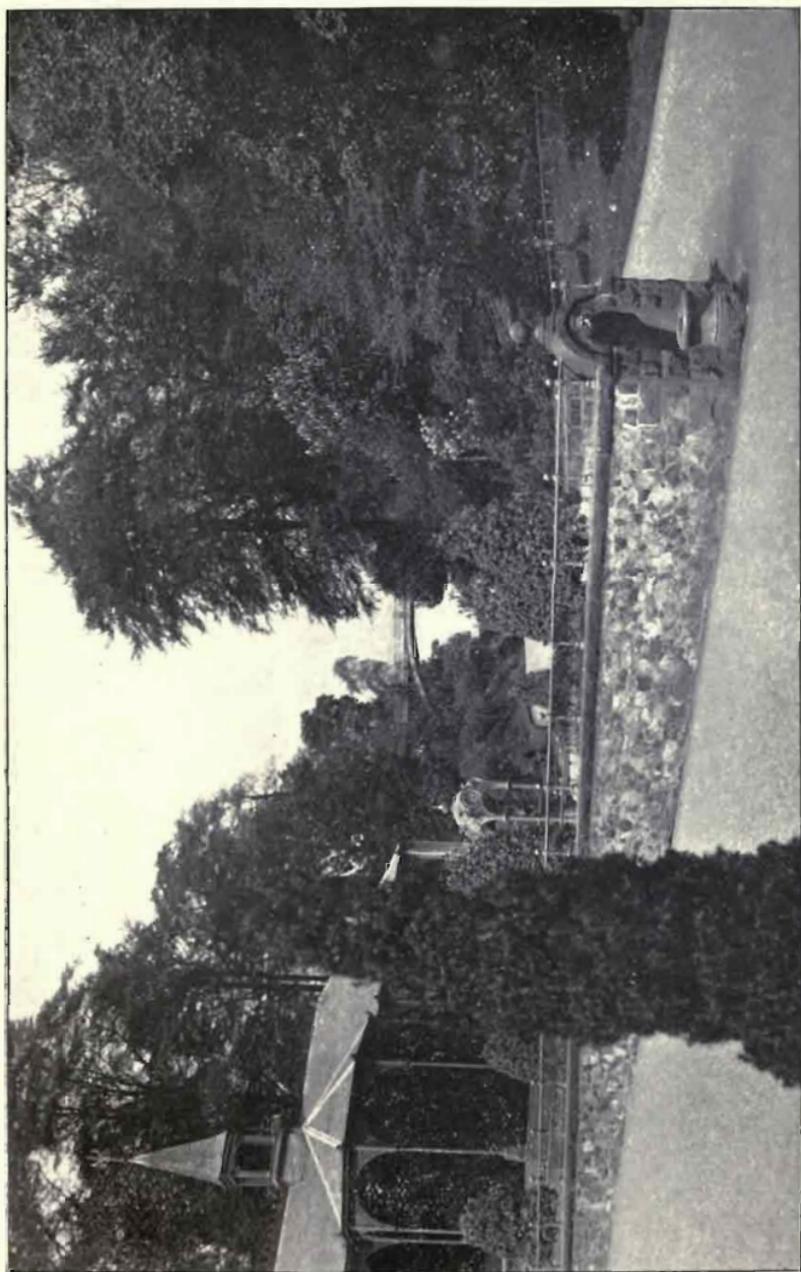
FAIRMUIR (17 acres) is an open park, and at one time was largely used as a market and fair stance, and is still occasionally used as such. It was extended some years ago by the Corporation, and used for recreation purposes, football being played in winter and cricket in summer.

DUDHOPE PARK (23 acres) was acquired by the Corporation in 1893. Previously it was held under lease by the Government as a Military Station, but some time earlier its use had been discontinued. The three buildings in connection with the Military Station are still standing, part being an old castle of historic interest.

Acquired with the view of providing facilities for recreation such as the nature of the ground would permit laying out, this object was kept closely in view. The only ornamental gardening attempted was on steep, sloping banks and contracted corners unsuitable for recreation. There is one bowling green, and cricket (confined to youths) is the only other game allowed in this park. There is a large macadamised square round the buildings in the centre of the park, which is used for Volunteer drill, public meetings, demonstrations, etc., as required. There is also a gymnasium at the west end of the square.

ESPLANADE (at present 30 acres) is being extended year by year by reclamation from foreshore with town's refuse. This is an open park, one-half of which is surfaced with danders, well rolled down, on which football goalposts are kept up at the town's expense, and the ground devoted exclusively to football. The other half is in grass, on which goalposts are erected for youths. Cricket is also played here during the summer months.

VICTORIA PARK (22 acres) has been lately acquired for recreation purposes by the Corporation. It adjoins Balgay Park to the south. A gymnasium was erected for children, while there is also a bowling green, and golf is allowed from 6 to 9 a.m. as season allows.



A SCENE IN BALGAY PARK.



Besides the foregoing parks, there are throughout the town open spaces, on six of which gymnasiums for children have been erected. Some of the spaces are planted out in an ornamental manner.

## CEMETERIES.

Dundee takes a high position in respect of its public services, and in none more than in this. Of the three cemeteries now in use in the City, two belong to the Corporation (the Eastern Necropolis and Western Necropolis), only one (the Western Cemetery) being owned by a private Company.

It obviously is a great advantage to a community when the Local Authority provides burial grounds, as the cost to purchasers and the dues chargeable is thus greatly lessened and a greater public interest is possible.

The Corporation Cemeteries of Dundee and the cost thereof are as follows:—

## EASTERN NECROPOLIS

(Arbroath Road).

Acquired.	Acres.	Cost.	Enclosing, Laying-out, Etc.
1862-3	20	£9,000	£10,421
1876-7	20	18,000	6,698
1905-6	3½	1,575	935

## WESTERN NECROPOLIS

(Balgay Hill).

1869-70	25	7,594	7,985
1893-4	17	4,400	(None of this laid out)
1902-3	15	6,000	(5 acres) 2,312
Totals	100½	£46,569	£28,351

£74,920

The total number of interments made in the above Cemeteries up to 31st December 1911 was :—

Eastern Necropolis	-	-	92,844
Western Necropolis	-	-	42,263
			<hr/>
Total	-	-	<u>135,107</u>

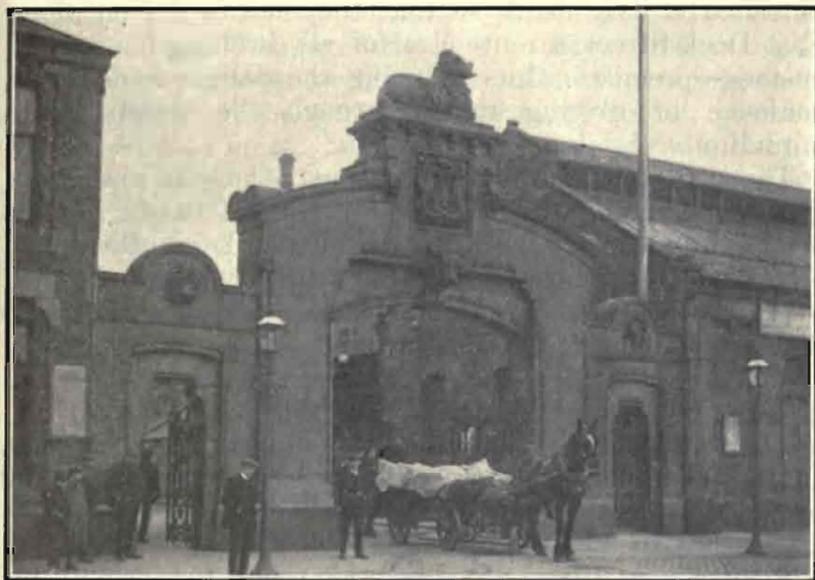
A public assessment of 1½d. per £ was levied in 1862-3, and was continued at a decreasing rate up till 1892-3. Since that time the Cemetery Revenue has been equal to meeting Interest and Sinking Fund on all Capital outlay incurred. The outlay in acquiring and laying out ground during the period the assessment was levied was £56,740, and since the assessment ceased £18,180—a total of £74,920.

Previous to these Cemeteries being acquired, the needs of the citizens were met by six old burying grounds, viz. :—The Howff, Logie, Constitution Road, St. Peter's, St. Andrew's, and Roodyards. When the closing order was made by the Chief Secretary of State on 16th May 1871, under certain conditions right was reserved to a considerable number of old residents, but very few of these now remain. The Howff, however, was definitely closed in 1840, and only one interment has been made therein since that of Mr George Duncan, M.P. for Dundee, whose death took place on 6th January 1878. Before the grave could be opened special permission had to be obtained from the Secretary of State.

The Howff was presented by Mary, Queen of Scots, in 1564, to be used as a burying ground outwith the City. The reason for this, as stated at the time, was owing to the burying grounds then in use being surrounded by dwelling-houses, and consequently a source of danger to the health of the citizens. This being the principal burying-place in Dundee for 276 years, points to the slow growth of the population for a long period. Its interesting history is, however, more adequately dealt with elsewhere in this book.

## Markets and Slaughter-Houses.

By J. A. Baxter and James Walker.



THESE are all owned and controlled by the Corporation. They consist of (1) The Cattle Market, this being the Market for the sale of cattle, horses, sheep, pigs, agricultural produce, vehicles, and agricultural implements; (2) The Public Slaughter-Houses; (3) The Meat Market; (4) The Greenmarket; (5) The Flower and Fruit Market; (6) The Fish Market.

The first three of these, viz., The Cattle Market, Slaughter-Houses, and Meat Market, have been very wisely provided for on one site and are under one management.

The site selected by the Police Commissioners in 1875 is well isolated from dwelling-houses, and is fairly convenient for all parties using the premises. It is situated about three quarters of a mile to the east of the High Street on the Dundee and Monifieth tramway route, and

is conveniently near the Dundee and Arbroath Joint Railway Station, where there is also a loading bank for cattle in Dock Street, within half a mile of the Market; at least three-fourths of the cattle brought to the Market are unloaded at that bank so that they can be driven along East Dock Street, a route clear of all dwelling-houses and business premises, thus reducing the danger and inconvenience of driving cattle through the streets to a minimum.

The site for the premises is about 6 acres in extent; it lies immediately to the east of Market Street, and is bounded on the north by the Broughty Ferry Road, and on the south by East Dock Street, direct access being had to the Cattle Market from Market Street and to the Slaughter-Houses from Dock Street.

#### THE CATTLE MARKET.

The Cattle Market occupies the upper part of the site. It is about  $2\frac{1}{2}$  acres in extent, accommodation being provided for the sale on any given sale day of about 500 fat cattle, 300 to 400 store cattle, 1000 sheep, 125 pigs, and 120 dairy cows; there are also 3 sale rooms for agricultural implements, and an open square, about two-thirds of an acre in extent, on which agricultural produce, such as hay, straw, turnips, and potatoes in carts, also horses, vehicles, etc., are sold.

The pennaage accommodation for fat cattle, dairy cows, sheep, and pigs is all under cover; the equipment includes two sale rings for fat cattle with an automatic dial weigh-bridge in each, sale rings for dairy cows and horses, and steelyards for weighing carts, and cattle or sheep sold by live weight, this method of dealing being largely in vogue here. There is also a range of enclosed sheds for the purpose of housing and feeding animals left over night.

#### THE SLAUGHTER-HOUSES.

The Slaughter-Houses immediately adjoin the Cattle Market to the south with direct communication between them by means of an inclined roadway. They consist of

3 ranges of Slaughter-Houses on the booth system, 10 booths in each range. These are fully equipped with overhead hoists and other appliances for the efficient handling and dressing of the carcasses.

The other buildings comprise—3 Slaughter-Houses for sheep; a pig Slaughter-House; tripery; boiler house; blood-house, where facilities are afforded for separating the serum from the clotted blood; a gut-house; premises for condemned meat; and two hide and tallow collecting stores; in fact, all the necessary equipment of a modern public abattoir.

These were opened in 1876, when all private Slaughter-Houses in the Burgh and within two miles of the boundaries were abolished in virtue of the powers conferred by Clauses 358 and 363 of the General Police and Improvement (Scotland) Act of 1862.

The Superintendent of the Markets and Slaughter-Houses resides on the premises. He is also a certificated Meat Inspector, and acts as such—the Veterinary Inspector of the City being associated with him in this work.

The Clearing House system of meat inspection is in full operation under the following Rule, Order, and Regulation enacted by the Commissioners of Police for the Burgh in 1894, viz. :—

“All dead meat brought or sent into the Burgh for sale or consumption there shall, first of all, be brought or sent to the Slaughter-Houses of the Commissioners at Carolina Port, Dundee, and the said meat, and the meat of all animals killed in the said Slaughter-Houses, shall be examined in the Slaughter-Houses by an Inspector appointed by the Commissioners.

“If such dead meat and meat be found sound and fit for consumption, it shall be passed by such Inspector.

“If, on the other hand, it be found unsound, it shall be forthwith destroyed by, or at the sight of, the Inspector.”

Ever since their adoption, these Regulations have been strictly adhered to. They enable all meat destined for sale or consumption in the City to be examined under the most favourable conditions, the Inspector being provided

with the necessary microscopic equipment for carrying out this work effectively.

During the year 1911 the seizures of diseased or unsound meat from the carcasses of animals slaughtered on the premises were—87,798 lbs. of beef, 555 lbs. of veal, 1,773 lbs. of mutton, and 2,781 lbs. of pork, a total of 92,907 lbs.; and from the carcasses of animals sent in under the Clearing House system, 66,582 lbs. of beef, 1,296 lbs. of veal, 5,549 lbs. of mutton, and 3,876 lbs. of pork, a total of 77,303 lbs., making a total for the year of 170,210 lbs. of meat condemned, besides 4,198 lbs. of cattle livers, 524 sheep's plucks or livers, and 52 pigs' heads; the numbers of carcasses examined being respectively 15,657 cattle, 222 calves, 34,810 sheep, and 3,545 pigs slaughtered on the premises, and the carcasses of 3,358 cattle, 339 calves, 5,810 sheep, and 587 pigs sent in.

#### MEAT MARKET.

The Meat Market occupies the southernmost portion of the site, and abuts on East Dock Street. There is direct communication between it and one of the ranges containing ten slaughtering booths by means of overhead rails, thereby enabling the carcasses to be run across to the Market immediately after they have been slaughtered and examined.

It is rented in sections to six different firms of meat salesmen, and is the medium through which a large number of the retail butchers of the City procure their supplies. It is also largely patronised by butchers from surrounding towns and villages for the same purpose.

The number of carcasses exposed for sale in this Market during last year was 10,488 cattle, 413 calves, 23,687 sheep, and 1,850 pigs.

Separate accounts are kept for the Markets and for the Slaughter-Houses, the charges for the use of the premises being adjusted periodically and so arranged that the establishment shall be at least self-supporting; as a matter of fact, there has been a surplus from both the departments every year since their inception with the

exception of the first two years, the surpluses last year being £145. 3s. 11d. from the Markets and £99. 14s. 1d. from the Slaughter-Houses. These are placed to the credit of the General Police Purposes Revenue Account of the City.

The capital expenditure on the Markets, including purchase of site, has been £33,539. 3s. 10d., and on the the Slaughter-Houses £47,549. 17s. 4d.

#### FISH MARKET, CAROLINA PORT.

Dundee and Monifieth Tramway—Craigie Terrace Station.

Prior to 1902 the business was carried on in Craig Street Market. In this year the fish trade was transferred to the new Market and dock at Carolina Port. The progress made since then has not been so great as could have been wished.

The Fish Dock as yet is in an incomplete state. When finished, it will contain 2,700 lineal feet of quay and 6,700 square yards of depôt and 8 acres or thereby of water space. In addition to that, the Harbour Trustees have at a reasonable rent an unlimited supply of ground adjacent suitable for curing yards, stores, etc.

Railway sidings connect the dock with the Caledonian and North British Railways. A hydraulic hoist, at which vessels can be expeditiously coaled, adjoins the Fish Dock on the east, and in close proximity on the west are the premises of the Dundee Ice and Cold Storage Co., who turn out ice at the rate of 25 tons per day.

During the past year trawlers and liners landed a total of 84,947 boxes of fish and 2,780 scores of cod, equal to 3,800 tons. This supply was supplemented by an additional 200 tons fresh and 320 tons cured fish by rail, making a total supply for the year of 4,320 tons.

#### GREENMARKET.

Behind the Municipal Buildings.

The origin of this Market is lost in the mist of antiquity. On Tuesdays, Fridays, and Saturdays the visitor can purchase anything from the proverbial "needle

to an anchor," and it proves to be an irresistible attraction for the thrifty housewife and eager bargain hunter. It is alike the Mecca of the lover of the antique and the frivolous pleasure seeker, and here also for the modest sum of 1s., 6d., or 2d., according to the status of the vendor, or it may be the credulity of the buyer, one may purchase an infallible remedy that is warranted to cure all the ills incidental to humanity. At holiday seasons all the "fun of the fair" is to be found at the Greenmarket Carnival.

#### FRUIT AND FLOWER MARKET, CRAIG STREET.

Dundee Tramways—Craig Pier Terminus.

Prior to the transference of the Fish Market to Carolina Port there was no covered Market for the sale of fruit, flowers, and vegetables, the business being conducted in the open street—Shore Terrace. In 1904 the old Fish Market was converted into a Fruit and Flower Market, and for three days per week, Tuesdays, Fridays, and Saturdays, it is a busy centre of activity, and has done much to cultivate an interest in and love of flowers amongst the working classes, who are its principal patrons. It is also largely utilized as a popular sales bazaar.

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## Water Supply.\*

By George Baxter, M.Inst.C.E., Engineer and Manager  
to Dundee Water Commission.

FROM the polluted, scanty, and oft parched fountains of our ancient town to the magnificently pure and inexhaustible waters of the Grampian Hills was a long and important step on the march of communal development, meaning, as it did, so much to the health, comfort, and industrial prosperity of the people.

This great achievement was accomplished at a cost of over £1,000,000 during the brief life-span of many who daily go in and out amongst us. The writer has known several citizens who took their stand with the picturesque throng of Water Caddies and Aquadors of Old Dundee, as they good-humouredly jostled each other and strove or schemed for precedence round the old fountains where, at all hours, were to be seen more empty pitchers than flowing spouts.

As a convenient point from which to measure the great progress which has been made, the writer may quote from the authentic records of the public press. The following is culled from an editorial in the "Dundee Courier" of date 1st June 1827:—

"We observe that the complaints of our citizens of want of an adequate supply of water at our wells are likely to be, in a great degree, removed soon. The cast metal pipes conveying water from the new cistern in the neighbourhood of Ladywell have been completely laid to Dog Well in Murraygate."

The author of the article notes with satisfaction that the water rose twenty feet above the street level, and hopes

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\* A comprehensive illustrated brochure on "Dundee Water Undertaking" has been specially prepared by Mr Baxter on the instructions of his Commissioners, and is available on application to all Members of the B.A. who may be further interested in the subject.

that if the supply at the fountain head proves sufficient the water will rise to all the wells in the town.

That there was need for reservation and doubt is unfortunately too apparent from a letter which appeared in the same paper on the 29th August in the following year. It was as follows:—

“Were you, Sir, to witness the distress the poorer part of our community are put to for want of water I am sure you would pity them. Mothers, of a morning, with their infants on their arms, half-dressed, carrying water not fit for a cow to drink—the aged, the infirm, and the sickly, all are allowed to crawl as they best may to seek for the element so essential to their health, and which they can obtain only in quantities limited and very impure.”

The age of sanitary restlessness was not yet, and the deplorable state of affairs depicted by the anonymous writer of the above letter was unfortunately prevalent, not in Dundee only, but in every city in the kingdom. In the large towns at that date, and for long after, water was hawked about the streets and sold from casks at  $\frac{1}{2}$ d. or 1d. per bucket. The fortunate few who could afford it had their favoured Water Caddie, who knew the capacity of the house cistern and regularly replenished it at a fixed retainer of 1d per barrel.

Taking a pennyworth of water as the full supply of a household, it represented barely one twenty-fifth of the quantity now delivered in Dundee for every man, woman, and child of the population. From the financial side it was a very serious tax on the poor, representing, as it does, a yearly charge equivalent to the water rate now assessed on a house of £40 rental.

The sources of supply were chiefly from Logie Spout in Milnbank Road, Smillie's Well off Lochee Road, and Lady Well near the foot of the Hilltown. None of these sources was above suspicion, and one at least, and that the main supply, Lady Well, was horribly polluted by sewage and by animal matters of the most disgusting origin. The reservoir of Lady Well was divided from the Slaughter-House by a not impervious masonry wall, and the 1868

Royal Commission on Water Supply reported on this water as follows:—

“The water is bright, sparkling, and piquant to the palate, but our analysis shows that this is nothing but a very thoroughly purified sewage, to the properties of decomposition of which it owes its pleasant flavour.”

That disease and death lurked in impure water had long been understood and acknowledged, but we were slow to apply the knowledge we possessed.

It was not until 1831 that the Town Council of Dundee made their first serious attempt to supply the town with water. The Burgh had then a population of 45,000 and a rental of £73,000. Mr Thoms, Engineer to the Greenock Water Works, was employed by the Town Council to report, and in 1835 the plans of the project recommended by him came before Parliament. The Local Authorities were to supply at prime cost by compulsory rating. They were opposed by a private Joint Stock Company, who sought powers to supply at prices to be agreed on, with powers to assess users only. The Bills were consolidated after discussion, and the Local Authorities obtained the powers they sought, but, on calmly reviewing the situation after the fight, they realised that by the time they implemented their agreements and provided the water they had guaranteed to the riparian proprietors and the millowners on the Water of Dighty, there would be no water at all for the town and they abandoned the scheme.

In 1836 the same scheme was again revived by a Joint Stock Company, and opposed by the Dundee Town Council, who submitted a new project, their proposal being to tap the River Isla near Meigle and raise the water by three lifts of pumping engines to the depression in the Sidlaw Hills at Pitnappie near Auchterhouse. This Bill passed the Commons but was thrown out by the Lords.

Following this, the Town Council promoted a scheme to tap the Monikie Burn, and obtained Parliamentary powers to execute the Works. The scheme was sanctioned by Parliament, but was immature. Legal difficulties arose,

and a successful issue was prevented by submission to an opinion of Counsel.

The Town Council's imperfectly developed scheme of 1837 was taken up by a private Company and carried to maturity under the Dundee Water Act, 1845.

A review of the steps taken by the Town Council for many years preceding the date of this Act clearly proves that it was not through lack of endeavour or enterprise on their part that the responsibility, which ought to have devolved on the citizens as a corporate body, was by this Act of 1845 left in the hands of a company of speculators.

The Town Council were opposed for years by the Merchants and Traders represented by the Guildry and the Nine Trades. In the words of their Advocate before the House of Lords "they (the Guildry and Traders) did not see the peculiar circumstances that should make men idiots enough to prefer paying by taxation what ought to be a vendible article in the market like any other commodity."

Having successfully frustrated the efforts of the Town Council, these gentlemen, in time, formed a private Company. The affairs of the private concern matured to a nine per cent. dividend, and when the resources of the Water Shed were exhausted they were taken over by the community after prolonged negotiations between the Town Council and the shareholders, the terms being a payment to the shareholders, for all time coming, of £14,315 per annum. This represented a capital sum of over £400,000, which these merchants and their heirs and successors received for Works which could have been erected by the community for considerably under £200,000.

The water supply under the Company was far from satisfactory. The service mains were inadequate, and practically no use whatever for fire purposes. The service was frequently intermittent and sometimes one district was sluiced off to assist another district.

The Company charged their rates according to a sliding scale. Small dwelling-houses were charged 1s. 8d. per £, and the average rate was about 1s. 10d. per £. A house

rented at £9 paid £1. 2s. 6d., which is equivalent to the Water Rate on a rental of £30 under the Commissioners at the present time.

The Works were taken over by the Municipality, incorporated as Water Commissioners, under the Act of 1869, and the improvements and development which have taken place since show that the Town Council have realised from the beginning that the establishment and maintenance of a sufficient water supply is probably the most important duty resting on a Municipal Authority. In providing for the domestic, commercial, and public wants of the large district embraced under the Dundee Water Acts, the authorities in Dundee have discharged this vast responsibility in a manner second to none in the United Kingdom. Whether tested on the ground of purity, quantity, or service, the Dundee water supply is in the very front rank.

The Works belonging to the old Company went dry the first year after they were purchased, and the inhabitants suffered great inconvenience. Water was pumped from the Fithie Burn and brought from other sources to tide the community over the difficulty.

After their incorporation the Commissioners lost no time. Almost immediately they appointed eminent Engineers, first Frederick la Trobe Bateman, Esq., who designed the Glasgow Water Works, and later James Leslie, Esq., Engineer of the Edinburgh Water Works. The Dundee Water Extension Act, 1871, was launched, and under it and the amending Act of 1872 and the Dundee Water Additional Powers Act, 1874, the Lintrathen Scheme was introduced.

The Lintrathen Works have cost, to date, £430,000.

Within the Dundee Water Area are included the police burghs of Broughty Ferry, Monifieth, Carnoustie, Newport, and Tayport, and, in addition, the outlying districts of Meigle, Birkhill, Longforan, Invergowrie, etc., are all dependent upon the Dundee Water Works for this first necessary of life. The total population supplied by the Works is 210,000 or thereby, and the mains and conduits throughout the area of control extend to 330 miles.

## Gas Supply.\*

**By Alex. Yuill, General Manager and Engineer.**

A COMPANY was formed in Dundee in 1823 under the Joint Stock Companies Act for the supply of Gas to the town.

In 1824 they purchased ground at Peep-o'-Day Lane (present position of Works), and proceeded with the erection of Works, which were completed in the year 1826, when Gas was first supplied.

In 1828 a rival Company was formed, and an application was made to Parliament for powers. Certain negotiations took place between the existing Company and the Company proposed to be incorporated, which resulted in the Bill being withdrawn, arrangements having been come to between the parties.

The original Company applied to Parliament for provisional powers, and obtained an Act of Incorporation.

Section 10 of this Act, dealing with price and quality, is interesting, and is worth repeating. It is known as "Hume's" Clause:—

"Provided also, and be it further enacted, that the Gas to be furnished by the said Company shall be of as good quality as that furnished by any other Gas Light Company in Scotland, and the said Company shall be bound to furnish such Gas at a rate or charge as low as shall be the average price demanded for Gas by the Gas Companies in the several towns of Edinburgh, Glasgow, Paisley, Perth, Arbroath, Montrose, and Aberdeen."

It may be interesting to note that the average rate of the above towns for last year was 2s. 7·89d. per 1,000 cubic feet; Dundee for the same period was 2s. 2·66d.

No record of the quantity manufactured during the earlier stages was kept, but we find the price charged was at the rate of 15s. per 1,000 cubic feet.

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\* An interesting illustrated Brochure on Dundee Gas Undertaking has been prepared by Mr Yuill, and, on the instructions of the Commissioners, is available, on application, to all members of the British Association who may be interested.

Meters were first introduced about this period. In the history of Companies who undertook the supply of Gas in other towns prior to this date a charge was made per burner in use for a definite period; this was regulated by Inspectors, who perambulated the town to see that all lights were turned off at the time arranged. It is needless to mention that this arrangement was a source of both trouble to the Gas Company and annoyance to those of a studious nature.

The Dundee Gas Company held absolute sway till 1846, when another Company entered the field as a competitor. This rivalry, no doubt, was fostered by a feeling that the parent Company was making an exorbitant charge and benefiting pecuniarily from the Gas consumers.

As in the case of other towns inflicted with a dual Gas supply, Dundee ultimately paid the penalty when the two Works were taken over by the Gas Commissioners.

The position of Gas matters in Dundee was not to be envied. The two Companies vied with each other in gaining business. Two sets of Gas mains were laid in the streets—dual supplies laid to consumers—Gas sometimes made by one Company and payment received for Gas consumed by the other—was against the best interest of the shareholders. The high percentage of unaccounted for Gas testifies to this, which stood one year at 26 per cent.

The financial position of the two Gas Companies was as follows at date of transfer in 1868:—

OLD GAS COMPANY.			Annuities allowed.			Calculated at
Original Stock	£29,706	18 1	£2,875	0 0	9.677	p.c.
New Stock	- 50,000	0 0	3,250	0 0	6.5	p.c.
	£79,706	18 1	£6,125	0 0		
NEW GAS COMPANY.						
Original Stock	£40,000	0 0	£1,900	0 0	4.75	p.c.
New Stock	- 15,000	0 0	637	10 0	4.25	p.c.
	£55,000	0 0	£2,537	10 0		

which represents a total of £8,662. 10s. for Annuities as the purchase price payable by the Gas Commissioners.

The price of Gas charged and the consumpt from the beginning to the date of transfer was as under:—

	Rate of Gas.	Old Company.	New Company.
1826	15/-	...	...
1830	12/-	7,484,000	...
1840	8/6	27,330,000	...
1847	6/-	36,753,000	7,500,000
1850	6/-	37,317,000	18,660,000
1860	5/6	58,165,000	43,785,000
1868	5/2	103,893,000	68,799,000

Date of transfer to Gas Commissioners, 11th November 1868.

The proximity of the Works of the Old and New Gas Companies to some extent hampered the re-arrangement of the plant after transference to the Gas Commissioners, as they had to deal with two Works spread over the area with small units.

This necessitated structural alterations at the time of transfer, so as to have the two Works united in one complete whole.

Various alterations and improvements have been carried out since then, to keep pace with the increasing demand for Gas.

About 10 years ago a reconstruction scheme was carried out, involving an expenditure of over £120,000, which included new Carbonising Plant, with Hydraulic Stoking and Discharging Machines, which tended greatly to the economical production of Gas.

Every economy requires to be exercised, so that the price of Gas may be given at a reasonable rate to consumers, as it is obvious that a low-selling price conduces to an extended use of same.

At the present time the productive power of the Dundee Gas Works is equal to  $6\frac{1}{2}$  million cubic feet of Gas per 24 hours. No difficulty would be experienced in dealing with 10 million cubic feet per day on the present site.

The maximum output is  $4\frac{1}{2}$  million cubic feet per 24 hours.

The annual make of Gas since the Works were acquired by the Gas Commissioners is as under:—

1869-70	-	200,838,000 cubic feet.
1879-80	-	340,489,000 "
1889-90	-	421,948,000 "
1899-00	-	622,304,000 "
1900-01	-	611,452,000 "
1910-11	-	924,313,000 "
1911-12	-	946,796,000 "

Undernoted are Statistics of our working for the past year (30th April 1912):—

Coal used	-	-	81,733 tons.
Oil used	-	-	165,880 gallons.
Gas made	-	-	946,796,000 cubic feet.
Coke sold	-	-	51,098 tons.
Sulphate of Ammonia made	-	-	983 tons.
Tar made	-	-	893,026 gallons.

With a consciousness of the part that an efficient Gas supply in large towns is destined to play in the lessening of the *Smoke Nuisance*, the Gas Commissioners have placed at the command of their consumers differential rates for Gas, ranging from 2s. to 1s. 6d. per 1,000 cubic feet for power and industrial purposes; public lighting, 1s. 8d.; and for cooking, heating, and lighting, 2s. 2d. per 1,000 cubic feet—all subject to 5 per cent. discount.

Appliances for cooking and heating are given to consumers on loan *free* and fixed *free* ready for use.

As an index of the popularity which has attended the policy of the Gas Commissioners in giving free cookers and fires to their consumers, it may be noted that at the close of the last financial year (30th April 1912) the following apparatus were in use:—

Gas Cookers	-	-	-	-	10,077
Hot-plates	-	-	-	-	1,430
Grillers	-	-	-	-	4,236
Rings	-	-	-	-	7,752
Fires, etc.	-	-	-	-	6,455
					<hr/>
Total	-	-	-	-	29,950
					<hr/>

At the same date there were 28,390 ordinary consumers and 19,673 consumers using automatic meters, or a total of 48,063.

This practically gives one cooking or heating apparatus for every two consumers.

On the authority of the Right Hon. John Burns, M.P., the increasing use of Gas apparatus for cooking, heating, and motive power in the Metropolis has had a beneficial effect on the atmosphere, and, in his opinion, as well as in the opinion of other authorities, it is to the increased use of Gas that the main solution of the smoke problem must be looked for.

By the low prices charged for Gas in Dundee (considering its distance from the coalfields), the Gas Commissioners are giving valuable assistance to the furtherance of this desirable object.

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## Supply of Electricity.\*

By H. Richardson, M.I.E.E., General Manager and  
Engineer.

DUNDEE was one of the first cities in the country to inaugurate a private supply of Electricity, and it is much to the credit of the city that unlike so many other towns it did not shirk its municipal responsibilities and allow a private company to do the work, but immediately secured powers and worked the supply from its very inception, municipally.

After all, the local confidence in the future of Electricity was perhaps not so very remarkable, bearing in mind the close connection with the town which several of the early experimenters had, and notably the revered name of Bowman Lindsay must come to mind directly in connection with all scientific and electrical research. Against considerable difficulty his versatile genius did much to further the interest of experimental Electricity, and his early work affords much interesting study to engineers of to-day, but the greatest lesson of all he teaches is perseverance.

From his time to the present is a big stride as time in modern engineering progress is measured, and much advance has been made, but Dundee can show at the least that she has kept abreast of the times, and to-day her enterprise is evidenced by the facilities afforded for a cheap and reliable source of public Electricity supply.

As giving some idea of the progress which the Department has made since commencing supply in the year 1893, the following figures may be quoted in the form of a table:—

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\*A special illustrated Brochure has been prepared by Mr Richardson on the instructions of his Committee, and is available on application to any members of the B.A. who are interested.

Year.	Units Sold.	Revenue.	Average Selling Price to Consumers.
1893	66,228	£1,379	5d.
1898	451,942	7,267	3·86d.
1903	2,609,718	24,042	2·21d.
1908	4,719,085	35,901	1·90d.
1909	5,173,036	37,610	1·75d.
1910	6,144,927	40,670	1·59d.
1911	7,720,018	46,040	1·43d.
1912	8,340,749	51,383	1·48d.

Thus, it is seen that, while the progress was sure, yet it was slow, and nothing approaching a "boom" occurred until quite recently; indeed the accelerated rise in output is coincident with the provision of greater facilities for supply in the nature of the erection of the large High Pressure Generating Station at Carolina Port, which fact only goes to show all those interested in public works that the enterprise in providing facilities must come first and the advantages of increased trade must follow if there has been the faintest semblance of shrewd judgment in the exercise of such enterprise. This is further borne out by the fact that extensions will have to be gone on with at Carolina Port Station immediately to meet the increasing demand for supply.

The original station was erected on the site of the old Cattle Market in Dudhope Crescent Road, and the public supply was commenced in March 1893. The first plant installed consisted of three Lancashire boilers and six Willans Siemens generating sets, current being generated at 200 volts and consumers being supplied at 100 volts. Additional generating sets were gradually added until all the space on the original plan was occupied.

The original engine-room was lengthened, another engine-room built alongside, and a further boiler-house and new chimney built, while three generating sets totalling 1,150 Kw. were installed.

In 1903 extensive alterations and improvements were made in the arrangements of the plant, steam piping, and

switchboards, while the 100 volt system was suspended and all consumers supplied at 200 volts.

In spite of all the improvements, however, the inherent disadvantages of the site and the want of elasticity in the system of generation gradually made themselves manifest when the problems of supplying large powers over a widely extended area had to be met.

After careful consideration, it was recommended that a new station be built in the most favourable position possible with a high tension transmission system.

This was eventually adopted, and in 1907 a suitable site having been got within the boundary of the Harbour close to the River Tay, the actual work was commenced.

The ground, which consisted of deposited material, was wholly unsuitable for carrying any permanent weights, and as trial boring showed that rock existed at a depth of 30 feet, or so, it was decided to support the whole of the buildings and plant upon piles. Reinforced concrete was chosen as the material for the latter, and over three hundred were used, being arranged in groups according to the loads to be carried. Over the heads of the piles was constructed a reinforced raft, varying in thickness from  $3\frac{1}{2}$  inches to 4 feet, according to circumstances. In general design, the generating station consists of two complete units more or less symmetrically arranged about a centre line through the chimney, and while there is ample room for extension, the buildings are not larger than sufficient for the plant installed at present. Very little inflammable material has been used, and everything possible has been done to render the buildings and plant fireproof.

The generating plant consists of two Willans-Parsons steam Turbines coupled to Dick Kerr Alternators. Each set is rated at 2,000 Kw., but is capable of giving 2,500 Kw. for two hours, or 3,000 Kw. for half an hour. The generators give three phase current at 6,000 to 6,600 volts and 50 cycles per second. The condensers are of the Contra-flo-type, and can maintain a vacuum of  $28\frac{1}{2}$  inches at full load. There are two feed pumps made by G. & J. Weir with a capacity of 8,000 gallons per hour

each, and, contrary to the usual land practice, these are situated in the engine-room between the two hot wells, being thus removed from the dust of the boiler-house, while for equal convenience of regulation, the stop valve spindles are prolonged through the boiler-house.

Two motor generators, each of 300 Kw. normal capacity, are used for transforming down from the main supply at 6,000 volts to direct current at 200 and 400 volts for driving the auxiliary machinery and for public supply in the adjacent area.

There are two main switchboards, one for the direct current supply, and the other for controlling the extra high tension system. The greatest care has to be taken in the interests of safety. All bus-bars, connections, etc., are held in porcelain insulators and are separated from each other by concrete partitions.

The pumping machinery for circulating cooling water through the condensers is situated in an underground pump room sunk at the edge of the river. The main pipe line consists of 30 inch cast-iron pipes supported on a reinforced concrete raft carried on piles, the length between the pump room and the main station being 785 feet.

There are at present four sub-stations (one being situated at the old station at Dudhope Crescent) in which energy supplied from the main generating station at 6,000 volts is transformed down to 400 volts direct current for general supply.

The machinery and gear are identical in type in all sub-stations and differ only in capacity and number of sets.

The British Westinghouse Company's rotaries are used, each one having a three phase to six phase static transformer in which the current is transformed down from 6,000 volts to about 380 volts, alternating at which it is fed into the convertor, thus no part of the moving machinery is exposed to high pressure.

The direct current switchboards are arranged for two separate supplies, one at 400 volts for general purposes, and one at 500 to 550 volts for tramway traction.

The extra high tension mains consist of three core

paper insulated lead covered cables, armoured with two layers of steel tape and, have a layer of compound jute over all to protect the armour. A further coat of compound was served on after the cables were laid. Immediately below the lead, though insulated from it, is the B.O.T. copper earth shields. The cables are laid direct in the ground at a depth of 3 feet 6 inches to 4 feet and covered with a line of specially shaped hard burnt tiles to give warning of their presence and protect them from damage.

Since the new generating station and sub-stations have been opened, the sale of current for power purposes has gone up by leaps and bounds causing quite a boom in the motor business, so much so that it is evident further extensions to the plant will have to be considered in the near future. Stair lighting by Electricity, a scheme which was recently inaugurated, has already made rapid strides, and many applications are being received for a supply for that purpose; in fact, it is only a matter of time before electrically lit stairs and closes will be the rule rather than the exception. In short, the advantages of Electricity are being recognised more and more all over the country, and it is quite evident that the Dundee public are now realising its immense advantages and the very cheap prices at which it is supplied.

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## Dundee Corporation Tramways.\*

By Peter Fisher, Manager and Engineer.

THE Tramways in Dundee have all been constructed at the expense of the Corporation, and have always been and are now the Corporation property. The first section opened was that between Albert Square and the top of Windsor Street *via* Reform Street, High Street, Nethergate, and Perth Road, authorised by the Dundee Tramways Act, 1872, and laid down in 1877. This line was leased to the Dundee and District Tramway Company for 21 years, dating from 1st September 1877, at a rent equal to  $5\frac{1}{2}$  per cent. on the cost of construction, and the acquiring property at Westfield Place as a site for stables. The Company were bound to maintain the lines and paving during the currency of the lease. Over and beyond the above rent, all profits (after paying  $7\frac{1}{2}$  per cent. to the shareholders on the paid-up capital required for the purposes of the lease) were to be divided equally between the Corporation and the Company. Under the Act of 1878 several other lines were constructed and leased to the Company on terms very similar to those of the 1877 lease.

In 1893 a new agreement was entered into with the Tramway Company whereby all former leases and agreements were cancelled and a new lease entered into for 14 years for the working of the then existing lines and proposed extensions to Fairmuir and between Arbroath Road and Stobswell *via* Morgan Street. Under this lease the Corporation relieved the Company of the maintenance and renewal of the roadway, in consideration of which the rent payable by the Company was increased to  $7\frac{1}{2}$  per cent. on the capital outlay instead of the  $5\frac{1}{2}$  per cent. and  $6\frac{1}{2}$  per cent. paid under the former agreements, the arrangement as to division of profits remaining the same as had been provided for in the 1877 and 1878 leases.

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\* "Dundee from the Cars" (an illustrated Brochure) is available to all members of the British Association on application.

Four years later, however, in 1897, negotiations were entered on with a view to the Corporation itself taking over the Company's plant, etc., and working the Tramways under direct Municipal control. This was successfully carried through, and the agreement was confirmed by the Dundee Corporation Tramways Act, 1898, which also authorised the Corporation to work the Tramways under the Acts of 1899, 1901, and 1907. Powers were obtained to make considerable additions to the system. The Corporation accordingly commenced the operation of the Tramways on 1st June 1899.

From this date active steps were taken to have the system converted from the old system of horse or steam to that of electric traction. The first section so dealt with was that between High Street and Westpark Road, and the following list gives the various routes, with their dates of opening:—

Routes.	Date of Opening.	Length.	
		Miles.	Yds.
High Street to Westpark Road	13th July 1900	1	1273
High Street to Liff Road School, Lochee - - -	22nd Oct. 1900	2	461
High Street to Burgh Bound- ary at Maryfield - - -	6th March 1901	1	981
Perth Road (Extension) to Ninewells - - -	11th March 1901	0	1245
(Perth Road total length, 2 miles 758 yards).			
Blackness to Balgay Lodge -	30th April 1901	1	439
(High Street to Balgay Lodge, 1 mile 1066 yards).			
Seagate Route to Craigie Terrace - - - - -	11th Nov. 1901	1	1106
Fairmuir to Muirfield Street	15th May 1902	2	180
Constitution Road to Moncur Crescent - - - - -	20th Nov. 1901	1	737
Arbroath Road, Princes Street, to Dalkeith Road - - -	20th July 1906	0	800
(High Street to Dalkeith Road, 1 mile 317 yards).			
Main Street, Dens Road, to Hilltown - - - - -	5th March 1907	0	516

Routes.	Date of Opening.	Length.	
		Miles.	Yds.
Downfield, Muirfield Street, to Baldovan Road - - -	19th Dec. 1907	0	1553
(Downfield total length, 3 miles 250 yards).			
Union Street, Nethergate, to Craig Pier - - -	12th Nov. 1908	0	366

The system consists of eight principal routes, all radiating from the High Street as a centre, with the result that passengers travelling from any part of the system can get a convenient connection with cars for any other district.

The following statistics apply to the year ended 15th May 1911 :—

Total Capital Expenditure	- -	£347,917.
Street Mileage	- -	15 miles.
Total Revenue per annum	- -	£62,913.
Car Miles Run	- -	1,326,225 miles.
Passengers Carried	- -	17,295,727.

Scale of Fares—Adults—Any distance to or from High Street, 1d. Longest possible journey for 1d., 3 miles 250 yards.

Scale of Fares—Juveniles under 14 years—Any distance to or from High Street,  $\frac{1}{2}$ d.

Blind persons are carried free on cars.

Average number of journeys per head of population per annum, 102.

Amount of Sinking Fund applied in Reduction of Debt, £71,223.

Amount of Reserve or Renewal Funds, £52,397.

Number of Persons Employed on Tramways, 254.

The Department is at present building a trackless line along Clepington Road, linking up Maryfield with the Fairmuir, which it is hoped will be in operation prior to the British Association Meeting in September. This is the first trackless line built in Scotland, and if successful, the experiment will no doubt be followed up by extensions.

## **The Albert Institute of Literature, Science, and Art : Its Libraries, Museums, and Fine Art Galleries.**

**By James Duncan, F.S.A. (Scot.), Sub-Librarian.**

THE Albert Institute, erected as a memorial to Prince Albert, at a cost of £20,000, from designs by Sir G. Gilbert Scott, R.A., was so far completed in 1867 that it was first used for some of the Meetings of the British Association, which visited Dundee in that year.

In 1866 the Free Libraries Act had been adopted by Dundee, and a central site for the Albert Institute was given by the Magistrates at a nominal price, on condition that accommodation should be provided in it for the proposed Free Library. Two rooms on the ground floor were allotted for this purpose, the one on the south being used as a Lending Library and the inner room for Reference purposes. These were opened in 1869, and became so popular that, after only four years' experience, the Committee decided to take another step forward by the erection of an addition to the Institute, which provided for a Museum and Art Gallery. This extension was designed by Mr David Mackenzie, Dundee, and was opened in 1873 with a Fine Art, Archæological, and Industrial Exhibition.

At the conclusion of this Exhibition the Permanent Art Gallery was opened with a loan collection of pictures, and the Museum specimens, which had belonged to the Dundee Watt Institution, were displayed in the three Museum rooms. The Permanent Gallery, which at that time only boasted one picture, the property of the Institute, has now proved too small to contain the pictures presented or bequeathed to the City. Many fine portraits by artists of the highest rank, including Orchardson, Sargent, Reid, MacTaggart, Paul Chalmers, Pettie, Macnee, etc., as well

as landscapes and figure subjects by artists of similar high standing have been generously gifted by local art lovers.

Another new departure was made in 1874. Both books and readers had so largely increased that the rooms provided for the Reference and Lending Departments became far too small, and, at the close of the Fine Art Exhibition, the Reference Library was accommodated in the Albert Hall.

The Exhibition of 1873 proved so popular that another was held in 1877, when pictures were offered for sale. This was so successful that similar Exhibitions were held annually for many years, the sales averaging £5,000.

In 1887 the Fine Art Committee decided that, in honour of Queen Victoria's Jubilee, new Galleries should be erected for these annual Exhibitions, and a wing to the east of the Albert Institute, designed by Mr William Alexander, then City Architect, was built at a cost of £13,000, and called the Victoria Galleries. These were opened in 1889 on the Queen's behalf by the present Duke of Argyll. At the same time, through the generosity of a leading citizen, electric light was installed throughout the whole of the buildings. The addition of this new wing provided for an extension of the Museum, many specimens being added and the whole rearranged.

With the assistance of a grant-in-aid from South Kensington, a large representative collection of casts of Assyrian, Egyptian, Classical, and Renaissance sculpture was acquired, and placed on the ground floor below the Permanent Gallery. This addition to the Museum necessitated further development, and the building in Dudhope Park, formerly used for military purposes when troops were quartered in Dundee, was allocated by the Town Council in 1900, and the Technical and Archaeological Sections were transferred to that building. Both these Sections have developed rapidly, and are now regularly utilised by Engineering Societies, Technical Classes, and scholars from the Board Schools.

With the growth of population in Dundee, and the overcrowded state of both Reference and Lending Libraries,



COLDSIDE BRANCH LIBRARY.



the Committee had long been desirous of establishing Branch Libraries, but while only a penny rate was available, this was found to be impossible, until Mr Thomas H. Cox bequeathed a sum of £10,000 for the erection of a Branch Library in the suburb of Lochee. Mr Cox's Trustees resolved to include Public Baths as part of their scheme, with the result that a large portion of this sum was expended in erecting these, and only a limited space given to the Library. This Branch was opened in 1896, with a stock of over 5,000 volumes and a large selection of the best magazines and newspapers. It proved so successful that the Committee in 1901 decided to solicit the assistance of Dr. Andrew Carnegie, who responded with the offer of £37,000 for District Libraries and Central Reading Rooms, adding to the letter these words:—"Dundee has done so much for herself that it will be a great satisfaction to co-operate with her in further development."

The first Carnegie Branch Library was erected at Arthurstone Terrace, in the north-east end of the City, from plans by Mr Alexander, City Architect, on a site gifted by the late Miss Symers. The foundation-stone was laid in 1902, and it was formally opened in 1905. It at once justified its existence, the number of volumes given out for home reading since the opening being 530,900, whilst of the Reading Rooms for men, women, and juveniles much advantage is taken.

A site at Coldside for a Northern Branch was presented by Ex-Lord Provost Barrie, and a site at Blackness for one in the west end was bequeathed by the late Mr John Robertson of Elmslea. Two handsome structures have been erected on these sites from plans by the present City Architect, Mr James Thomson. These were opened in 1909, with a stock of 6,200 volumes each, the issues since the opening being 115,930 and 169,673 volumes respectively. In the Eastern District, St. Roque's Reading Rooms and Book Delivery Station have been built on a site given by the Town Council, and opened in December 1910.

Sir William Ogilvy Dalgleish, Bart., generously offered to provide a site in Ward Road for the erection of new Central Reading Rooms and Sculpture Galleries. This offer was gratefully accepted, and the handsome building, designed by the City Architect, was erected. This was opened in September 1911 by Dr. Carnegie, who, after inspecting it and the other Branches, congratulated the Town Council and the Free Library Committee on the magnificently-equipped buildings they possessed and the work they were accomplishing. This new central building contains on the ground floor three large reading rooms, the centre one being lit from a dome; the south room is reserved for general readers, the north for ladies and juveniles, and the centre room for newspapers. On the first floor are two handsome Sculpture Galleries, lit from the roof, in which the Collection of Casts, removed from the Albert Institute have been placed. These have all been chronologically arranged, and are displayed to the fullest advantage, facilities for copying being given to art students. In the Centre Gallery, under the dome, the Lamb Collection of "Old Dundee" pictures, a part of the large collection of books, MSS., and paintings purchased by Mr Edward Cox, and presented by him to the Free Library Committee in 1901, is hung on the walls.

Under the care of the late Mr John Maclauchlan, who was Chief Librarian and Curator from 1873 till his death in 1907, the work of the Albert Institute developed rapidly. The Lending Library, opened in 1869, possessed a stock of 20,700 volumes, and the average issue for the first three years, including that of magazines, was 175,964 volumes; it now possesses over 137,184 volumes, and the issue, leaving out the magazines, during last year was over 240,000 volumes. The first large catalogue of the Lending Library, prepared by Mr Maclauchlan in 1901, was probably the most elaborate Lending Library Catalogue ever issued in great Britain, and it is used in large numbers of British Libraries for purposes of literary reference.

It was left to Dr. A. H. Millar, the present Librarian and Curator, to complete this work of extension and

improvement. On his taking up the duties early in 1908, a number of changes were at once introduced. The Lending Library in the Albert Institute, which consisted of the original two rooms, was made into one great room, the entire length of the building, making one of the finest Lending Libraries in Britain; the part underneath was excavated and transformed into fine, well-lit book stores. The removal of the Sculpture to the new Galleries in Ward Road provided additional space for Museum purposes, and this has been entirely rearranged on a scientific plan. The transference of the newspapers and magazines to the new Reading Rooms has relieved the Reference Library, so that the Albert Hall, after painting, reflooring, and having the two great circular windows fitted with stained glass, and new electric lighting arrangements (gifted by a generous citizen), will be entirely devoted to reference readers and students, and is now the finest Reference Library—structurally—in Great Britain.

The electric light installed in 1889 was generated by an engine and dynamos on the premises, but a better and cheaper supply of current is now obtained from the Corporation.

Courses of Lectures were inaugurated in the winter months of 1908, and these have proved immensely popular, the halls being crowded on almost every occasion. The lectures are delivered in the Albert Institute and Branches, on subjects connected with the work of the Institute, such as Art, Literature, History, etc., by the Librarians and others who take an interest in the work of the Institute. A series of twelve to fifteen lectures is given each season.

The Lochee Branch has now proved too small for the work carried on there, and a large addition has just been made on the north side, to be used as a Reading Room, while the old Reading Room and Lending Library has been altered, and is now entirely devoted to Lending Library purposes. This Branch, like the others, is fitted with a new Indicator, a great improvement on the old "Kennedy" Indicator, the first device of the kind, which is still retained in the Central Library, Albert Institute

A second volume to the Catalogue prepared by Mr Maclauchlan, but on a different plan, is now almost completed, the History and Biography, Science, Art, Fiction, and Juvenile Sections having already been issued.

Such in brief is an account of the history of the Albert Institute, which shows that from small beginnings it has developed into a great educative, intellectual, and moral agency eagerly taken advantage of by the inhabitants of our City.

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## **Dundee Under the Poor Law.**

**By Robert Allan, Inspector of Poor.**

WITH a population 83 per cent. of which lives in houses of three rooms and under, it will readily be recognised that Dundee has a more than usually heavy roll of poor under its care, and that the humane, thoughtful, and earnest administration of the Poor Law, as it at present stands, is carried out with conspicuous success no doubt arises from the fact that the Board, while not always of one mind on the various subjects that come under its consideration, is in the main actuated by the desire to do the best it can for those unfortunate enough to be compelled to come under its care.

At 15th May 1912 there was a total of 2,364 on the roll of registered poor, with 1,140 dependents. Of these, 760, with 75 dependants, were in Poorhouses, while 961, with 1,065 dependants, were in receipt of outdoor relief. There were also under the care of the Parish Council, in its capacity as a District Board of Lunacy, 643

mentally affected, 455 of whom were in Asylums, 86 in Poorhouses, and 102 boarded out in the country.

During the year there were 4,887 applications for relief, which were disposed of as follows:—

- 864 were placed on the outdoor or medical relief roll.
- 2,428 were admitted to Poorhouses.
- 595 were offered the Poorhouse, which they declined.
- 65 were sent to Asylum.
- 433 were refused relief.
- 485 withdrew their applications, while
- 17 were sent to their own parishes.

A classification of the applications shows that 365 were from old people without relatives able to assist them, 135 were from widows, 294 arose from consumption or other tubercular diseases, 1,352 through partial disablement, improvidence, or indolence, 642 from criminality, desertion, illegitimacy, immorality, and alcoholism, and the balance from misfortune; 120 children are boarded out in the country, so that as far as possible they may have a chance in life without the taint of pauperism.

The Education Rate is collected by the Parish Council, along with that for the care of the poor. The rates, worked out on a nett assessable rental of £759,205. 4s., are 7·7d. on owners and 8·8d. on occupiers for poor purposes, while education required Dundee Burgh owners 8·9d., occupiers. 10·1d.; landward, 4·7d. and 5·55d.; Broughty Ferry, 7·8d. and 8·2d. respectively. The collections made on account of School Rates are, of course, handed over to the several authorities.

The total income on account of the poor for the year referred to was £48,264. 10s. 1½d. from rates, £7,520. 16s. 5½d. from Government Grants, £927. 6s. 0½d. contributed by relatives on account of paupers, £18. 11s. 6d. interest was repaid by other parishes, £3,255. 10s. 9d. expended on account of other parishes—total, £59,986. 14s. 10½d.



## City Finances.

By John M. Soutar, Honorary Treasurer  
of the City.

A PARLIAMENTARY White Paper recently issued in regard to the financial operations of the principal classes of Local Authorities throughout the country contains some remarkable figures. It shows that receipts from all sources, excepting loans, for the year ending March 1911 were £122,953,000, and that the expenditure was £122,082,000; receipts from loans being £16,137,000, and expenditure £15,300,000; while the outstanding debt at the end of the year was £410,695,000.

The amount of public rates included in the above income was £64,004,000, and Exchequer grants, including licence duties, £21,073,000. The average amount of public rates received by the principal classes of rate-spending authorities was equal to 6s. 2½d. per £ of assessable rental, and £1. 15s. 9d. per head of population.

Dundee is not a highly rated city as compared with the other large cities in Scotland—although, as elsewhere, there is a gradual upward tendency consequent on the demands arising from a higher standard of public health, and also the exigencies of modern legislation. The following comparative figures indicate the course of local City Rates, &c. :—

	1881-2.	1891-2.	1901-2.	1911-2.
City Rates (Occupiers and Owners) -	1s. 10d.	2s. 5d.	2s. 6d.	3s. 0½d.
Water Rates (Public and Domestic) -	1s. 7d.	1s. 1d.	10d.	11d.
Gas (per 1000 cubic ft.), less 5 % -	3s. 8d.	3s. 8d.	3s. 6d.	2s. 2d.
Electricity (per unit) maximum, less 5% -	...	...	4d.	3½d.
Tramway Fares -	...	...	2d. to ½d.	1d. & ½d.

The aggregate Capital Expenditure (exclusive of the Common Good) down to the year 1912, and the total Sinking Funds, etc., applied in reduction of same, have been as under:—

	Capital Expenditure.	Sinking Fund, etc.	Balance Outstanding.
1. Police Department (excluding Tram- ways) - - -	£1,566,918	£673,274	£893,644
2. Tramways - - -	349,854	82,766	267,088
3. Burial Grounds - - -	75,334	62,994	12,340
4. Free Libraries - - -	59,842	59,842	...
5. Water - - -	1,031,067	183,760	847,307
6. Gas - - -	666,111	294,501	371,610
7. Electricity - - -	298,861	59,694	239,167
	<u>£4,047,987</u>	<u>£1,416,831</u>	<u>£2,631,156</u>

For the year 1911-12 the following sums have been set aside out of revenue towards Repayment of Debt:—

1. Police Department (excluding Tramways) ... ..	£18,090
2. Tramways ... ..	5,950
3. Burial Grounds ... ..	590
4. Water ... ..	14,232
5. Gas ... ..	11,749
6. Electricity ... ..	7,437
	<u>£58,048</u>

The Corporation Revenue for the year 1911-12 was:—

1. Police (excluding Tramways) ...	£150,549
2. Tramways ... ..	62,680
3. Burial Grounds... ..	3,732
4. Free Libraries ... ..	7,141
3. Minor Assessments ... ..	11,203
6. Water ... ..	64,068
7. Gas ... ..	128,057
8. Electricity ... ..	49,366
9. Common Good (1910-11) ...	7,143
	<hr/>
	<u>£483,939</u>

The progressive assessable rental of the city has been as follows:—

1861-62 ... ..	£217,521
1871-72 ... ..	387,544
1881-82 ... ..	602,171
1891-92 ... ..	669,818
1901-02 ... ..	801,697
1911-12 ... ..	908,546

Under the existing local Acts Capital Expenditure for the various purposes is defrayed out of borrowed money, the limit of the borrowing powers as regards the Revenue-earning Departments being fixed under Statute, and as regards the Rating Departments being regulated by the limit of the assessing powers; but in the latter case, before borrowing, there must be a formal resolution and advertisement of the purposes to which the money is to be applied.

The various Sinking Fund obligations for redemption of the borrowed moneys are strictly observed, and, speaking generally, at the present rate of repayment, the whole existing Capital Debts of the city—after applying the

value of Improvement Feu-duties, etc., still unsold—will be entirely wiped out well within fifty years from the present time.

The total local rates for 1911-12 (£252,514) work out at the net rate of 5s. 10d. per £ of assessable rental, and £1. 10s. 8d. per head of the population, which, it will be observed, compares more than favourably with that obtaining over the whole country.

It is but fair to point out that, while the Capital balance at the debit of the city's accounts approximates  $2\frac{3}{4}$  millions, in all of the departments the assets greatly exceed the liabilities. This is especially true of the revenue-producing undertakings. In the case of the Gasworks, taken as a going concern, these are estimated to be worth £1000 per million cubic feet manufactured (which would work out at £946,000), whereas the Dundee undertaking at present stands in the books at £396 per million cubic feet. It may be fairly estimated that the Electricity and Tramway undertakings are in a similarly favourable condition.

The same satisfactory financial position also obtains in regard to the Dundee Harbour undertaking, Parish Council property, and, except in the case of the School Board buildings (which are in a constant state of transition because of the increasing departmental demands made upon the Local Authority), generally the trusts administered in the interests of the public are on an eminently sound basis.

It is out of my province to refer to the finances of privately managed institutions, but, as will be observed from figures elsewhere provided, these also, thanks to the generosity of leading citizens, are in an excellent position. The present visit of the British Association offers an opportunity for taking stock generally of the city's interests financially, and this review gives greater reason for optimism than some of us had perhaps fully realised.

## DUNDEE AS AN EDUCATIONAL CENTRE.

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### The University of St. Andrews.

By Prof. M'Intosh, St. Andrews.

As the ecclesiastical capital of Scotland, St. Andrews from early times had various teaching institutions in connection with its monasteries and chapels, the preceptors (who generally taught grammar and logic) in which had been for the most part trained in the Universities of France and Italy, but also in the English Universities of Oxford and Cambridge, the sons of the Scottish nobles and landed gentry, indeed in the 14th century having been frequently boarded in St. Andrews for their education; and this practice continued after the foundation of the University even to the beginning of the 19th century. In the 14th and 15th centuries, however, the friction which existed between the Scotch and their neighbours south of the border rendered attendance at the English Universities, and especially at the Scotch College (Baliol) in Oxford founded by Lady Devorguill, less pleasant, so that the Scottish youth preferred the French Universities of Paris (where a Scotch College had been founded by the Bishop of Moray in 1326), of Orleans, and Angers, and the older Italian Universities of Bologna and Padua. Even this migration to continental Universities was not unattended with risks both by sea and land. since, amongst others, a young Scottish Prince, on his way to the Court of Charles VI. of France, was captured at sea by the English and kept a prisoner in London. More especially were the Scottish students unwelcome at Oxford during the religious troubles connected with their adherence to Peter de Luna (Pope Benedict XIII., a cast of whose skull is in the University Library). Thus in all probability

the thoughts of the cultured, munificent, and influential Bishop Wardlaw of St. Andrews were strongly directed to a project whereby Scottish youth should, on the one hand, be freed from such risks and, on the other, provided with less expensive instruction. Accordingly, aided by several of his colleagues in St. Andrews, especially by Prior Jas. Biset and Archdeacon Stewart, teaching on University lines was begun in 1410<sup>1</sup>, and a foundation Charter of the University was drawn up in 1411 granting a *Studium generale*, including Theology, Canon and Civil Law, Arts, Medicine, and other lawful Faculties, and forwarded by a special envoy to the Pope (Benedict XIII.), who by no less than six Bulls endowed the young institution with all the privileges of a University, and made provision for its teachers, who were chiefly beneficed clergymen, retaining their livings while engaged in teaching, provided efficient substitutes were found for their parish work.

Such was the beginning of a University which largely owed its origin to the impetus of learned men to teach rather than to endowments, for at this time neither salaries nor University buildings were in existence.

The government of the young University was vested in the Chancellor (Bishop Wardlaw) and a Rector, who in early times was chosen from the Provosts of the Colleges by all the members of the University, including the students. Later, however (1642), it was resolved that "no Regents of Philosophy, but the Principals of the Colleges and the public Professors only shall be capable of holding the office of Rector." This was the rule for many years. After the union of the Colleges of St. Salvator and St. Leonard's the two Principals and the two Professors of Divinity in the earlier part of the 19th century were eligible, and were chosen only by the Masters, and thus the students had no official representative in the Senate, of which the Rector was President, until more recent times.

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<sup>1</sup>Joan. de Fordoun, Scotchronicon C. Suppl. et Contin.; Walt. Bowe; vol. II., p. 445, 1769.

In connection with graduation, only those who were fit to teach were to be allowed to receive degrees of Master or Doctor; and it is interesting that in 1414 eleven students obtained the degree of B.A., one of whom was a determinant and another a B.A. of Oxford. Every candidate, indeed, is to be presented to the Bishop or his Vice-Regent, who shall proceed to examine him in his knowledge, eloquence, mode of teaching, and other parts, and if he be found fit, admit him to his degree and give him licence to teach. From an early period a Faculty of Divinity and another of Canon Law existed. Medicine, again, though often referred to as a subject of study, had apparently no organised Faculty until within comparative recent times, though Medicine was nevertheless taught.<sup>1</sup>

The State in the 15th century took a paternal interest in the education of youth, so that the University drew its students from a wide area. Thus in 1494 Parliament, in the reign of King James IV., promulgated the following statute:—

“It is statute and ordained throw all the realme, that all barones and freeholders, that are of substance, put their eldest sonnes and aires to the schules, fra they be sex or nine zaires of age, and till remaine at the *grammar* schules quhill they be competentie founded, and have perfite Latine: And thereafter to remain three zeirs at the schules of art and jure, swa that they may have knowledge and understanding of the Lawes: Throw the quhilks justice may remaine universally throw all the realme.”

This shows that the value of a sound education both in the University and the elementary schools was appreciated in early times.

Whilst at first no special buildings existed for teaching, and the students resided in the city, by and by a Pædago-gy was provided and a chapel built on the site of the present library. A little later than the Pædago-gy the good Bishop Kennedy, stated to be the grandson of Robert II., though Mr Maitland Anderson<sup>2</sup> observes that he

<sup>1</sup> *Vide* an interesting History of Medicine in the University by Dr. Buist; “Memorial Votiva Tabella,” p. 197.

<sup>2</sup> “The City and University of St. Andrews,” p. 41, 1911.

described himself as nephew of the King, founded in 1450 the College of St. Salvator, and the charter was confirmed by Pius II. in 1458. In it were a Provost, who was also a Doctor of Divinity, a Licentiate and Bachelor of Divinity, four Regent Masters of Arts, and six simple students. All lived within the College. Theology and Arts were the subjects taught. The most imposing part of this College was the fine Church of St. Salvator, which now forms the University Chapel, and is the sole survivor of the old buildings of the College, the "Common Schools" with their stone benches and the pigeons swarming in their roofs being the last to be swept away about the middle of the 19th century. The vicissitudes of the fine old church as a place of mediæval worship and of burial, as a common meeting-place for the Reformers, as the temporary Parish Church of St. Leonards, and now of the College Chapel, have been many and varied, and form a fascinating and interesting story.

In 1412, again a second College, viz., that of St. Leonard, was founded by Archbishop Stewart, the natural son of James IV., and who fell with his father at Flodden, and Prior Hepburn, the builder of the wall and towers round the Cathedral and Priory, and who rightly thought that the old and rich Hospital of St. Leonard, originally intended for pilgrims, could thus be made available for more useful purposes. The buildings and grounds were adapted by the Prior to their new functions, and the staff consisted of a Principal, 4 Chaplains (two of whom were to be Regents), and 20 poor students. As this College had  $63\frac{1}{2}$  acres of land within the burgh of St. Andrews, besides farms, titles, and other property, it was, as Mr Maitland Anderson observes, a fortunate addition to the University—both at that time and now. As the College in which Patrick Hamilton, Alesius, Alex. Seton, Henry Forrest, and Gavin Logie expounded the new faith which was to shatter the mediæval religious fabric, it is of special interest, for it also taught John Nair or Major (the Preceptor of John Knox), George Buchanan, and John Wedderburn—names familiar in the history of Scotland.

The third College, viz., that of St. Mary's, or New College, supplanted the Pædagogium, and was founded by Archbishop James Beaton, added to by his nephew, Cardinal David Beaton, but only completed and endowed by Archbishop Hamilton in 1552. It consisted of a Principal, a Licentiate, a Bachelor, a Canonist, 8 Students of Theology, 3 Professors of Philosophy, Professors of Rhetoric and of Grammar, 16 Students of Philosophy, and various offices. All resided within the walls. The Papal Bull of 1537 shows that this College was to promote to the degrees of Bachelor, Licentiate, Doctor, or Master those who may be qualified in Knowledge and Good Morals, in Theology, Civil and Canon Law, or any other lawful Faculty, including Medicine. The uncertainty of human affairs was illustrated when, in 7 years, the majority of the Professors and students joined the reformers, and thus the funds given by Archbishop Hamilton were applied to the very purposes he strove to combat. The Professors of St. Leonard's College followed the example of St. Mary's, but the Principal and most of the Regents of St. Salvator's College loyally adhered to the ancient faith and quitted their offices. The teaching in St. Mary's College, after the inquiry made by order of the King, was confined to Divinity—George Buchanan being one of the "noble worshipful and discreet" persons entrusted with the inquiry. This College has had no student more apt or Principal more masterful (1580-1607) than Andrew Melville.

In its earlier years the University and its Colleges received considerable endowments from the King, the Bishops, and Archbishops in money, lands, churches, and other property. About the time of the Reformation, however, many of these were seized and appropriated for other purposes. The Papal founders of the University and subsequent supporters, indeed, were most generous in their donations, and the Episcopalians were also liberal in this respect; for example, Archbishop Sharp early in 1688 procured from the King a permanent mortification of £200 per annum, with which he augmented the Profes-

sorship of Mathematics and Hebrew. Moreover, from the beginning all the members of the University—and these included masters, students, bedalls, servants, scribes, stationers, parchment-makers, and their families—were freed from the payment of taxes, burdens, and servitudes of all kinds, privileges which their successors in modern times would gladly revive.

Before Edinburgh had a University of its own, its citizens preferred to send their sons to St. Andrews rather than to Glasgow or Aberdeen; and when the Town Council of Edinburgh were looking round for a suitable head for their University, they fixed on Robert Pollock, Professor in the College of St. Salvator, as their Regent and Professor of Divinity. This *camaraderie* between the two Universities exists to this day, and is even indicated in the grouping of the representatives in Parliament.

For a long time (1411-1559)<sup>1</sup> the University to all intents and purposes was a clerical institution, for in the main its staff consisted of clergymen, and its policy was that of the Church; indeed, several of its members joined in heresy-hunts and in condemning the heretics, and had other failings common to the religious men of the period. Yet with all their faults the Professors were cultured men, who trained the youth of every rank from that of the King and nobles to the poorer citizens in a manner that reflected credit on their learning and abilities. As Principal Shairp<sup>2</sup> says their method was not "that of moulding the intellect merely, but the whole man—was in its essence deep and true beyond anything we in these modern days dream of." Science, it is true, had little or no place in the programme, for arts, law, and religion held the field; yet medicine was taught both before and after the Reformation. The Reformers, who followed the Roman Catholic clergy after 1559, do not appear to have had broader views or wider culture in their academic life, and if they, as

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<sup>1</sup> "Rev. C. J. Lyon, St. Andrews," vol. I., p. 317.

<sup>2</sup> "Sketches in History and Poetry," p. 167, 1887.

citizens, did not burn heretics, they acquiesced in the execution of witches—from an equally cruel and mistaken zeal.

Comparatively little is known of the earlier academic life at St. Andrews, though many of its Chancellors and Professors published learned treatises on various subjects, chiefly religious, legal, and classical. Yet natural science, medicine, poetry, and travel were also represented. From its Halls during the five centuries of its existence, however, there has passed a long roll of distinguished Statesmen, soldiers, literary, classical, medical, and scientific men, clergymen, and teachers, whom it would be impossible to mention here; whilst from its staff other Scottish Universities have drawn their Principals and Professors. Such a career is alike honourable to the University and beneficial to the nation.

About the time of the Reformation and after it the unsettled state of the country was reflected in the University; especially when the Reformers in their fanatical zeal even became more arrogant and intolerant than their Papal predecessors, and when by inciting the fury of the mob such splendid piles as the Cathedral of St. Andrews, not to mention the Monasteries of the Black and Grey Friars, the Priory, the Provosty of Kirkheugh, and the Church of St. Regulus, were destroyed without adequate reason. An irreparable injury was thus inflicted on the ancient city and on Scotland. Not all the good work done by John Knox and Andrew Melville can efface the memory of such vandalism. The interference with the University was also considerable, yet not long afterwards there entered, at the age of 10 years, within the walls of St. Salvator's College one of the most brilliant students in any age, viz., the Admirable Crichton. The attendance, however, at the University, then the chief one in Scotland, considerably diminished at this eventful period. For a long time, indeed, its financial affairs were straitened, but a valuable grant of Charles II. in 1681 enabled it to progress more satisfactorily. Taking a broad survey of its career in these times, there is truth in the trite saying of

Mr Lyon<sup>1</sup> that the University owed its early endowments to Papacy and to Prelacy.

The effects of the losses sustained by the University during and after the Reformation, the loss of the Primacy in the city and of the resident Chancellor, a harsh "visitation" by the Earl of Crawford resulting in the turning out of the Masters of the University, together with friction with the civic authorities, seemed to have disheartened the professorial staff, so that, in September 1697, a project to transfer the University to Perth was seriously considered, and as the Earl of Tullibardine, then Chief Secretary for State, had just been elected Chancellor, the time was not unpropitious. Amongst the advantages which appeared to be offered by the change were the following:—Easy access to the University, Perth being in the centre of the Kingdom and near the homes of the county proprietors, the promotion of the civilisation of the Highlands, and a more equable distribution of the Universities. The reasons specially affecting St. Andrews need not be mentioned since they were less cogent, especially in view of the fact that the Pope's Bull in 1414 made special mention of "the peace and quietness which flourish in the said City of St. Andrews and its neighbourhood, its abundant supply of victuals, the number of its *hospitii* and other conveniences for students which it is known to possess." The foregoing reasons together and the citation of the transfer of the University of Prague to Leipsig, and the temporary transference of the University of Oxford to Stamford, were not sufficient for action. Thus the University remains in its original locality, and it is a curious effect of time that Perth is now considerably nearer Edinburgh (by rail) than St. Andrews.

In 1721, shortly after the first Monro was appointed to the Chair of Anatomy in Edinburgh, the Chair of Medicine and Anatomy was founded by the first Duke of Chandos. Before this the granting of degrees in Medicine had existed, and after the foundation of the Chair the number increased.

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<sup>1</sup> "History of St. Andrews," II., p. 179.

The troubled times connected with the Rebellions in 1715 and 1745 caused but slight interference with University work, though it is noteworthy that there was sympathy with Prince Charlie in the former case and a leaning to the opposite side in the latter, for the Duke of Cumberland was asked to become the Chancellor on his return from Culloden.

An important event was the union of the Colleges of St. Salvator and St. Leonards in 1747, an event due to the diminished revenues—the former having the most suitable buildings for teaching, the latter the larger income. A reduction in the staff was thus carried out with mutual benefit, academically and financially, and duplication was avoided by converting one of the Chairs of Humanity into one of Civil History—the forerunner of the present Chair of Natural History. One Principal and eight Professors resulted from this amalgamation, and for more than a century no addition was made to the list. Accompanying the change, the title of “Regent” was disused, and each Professor was assigned a special subject instead of carrying his students through the entire curriculum.

The attendance of students at the University in the 17th and 18th centuries varied, in the earlier period being often below 100. In the beginning of the 19th century it seldom exceeded 150, except under special circumstances. Toward the end of the 19th century, perhaps, it reached the maximum for male students, viz., 214. Yet, as Pennant observes, these may have come from Bath, Bordeaux, or Berne, in addition to native students, such was “the extensive reputation of the University.” They wore red gowns without sleeves, and were forbidden to carry swords, daggers, or knives. Up to the beginning of the 19th century the students were divided in the earlier period, after the manner of the University of Paris, into four classes or nations, viz., *Fifanae*, *Lothianae*, *Augustianae*, and *Albanae*, and more lately into three groups, *primars*, *secundars*, and *ternars*. They then resided within their Colleges and dined together, and strict—almost Spartan—

regulations existed for their discipline, exercise, and comfort. Since 1820 the students have lived in lodgings in the city.

The degree of B.A. was formerly obtained after three years' attendance at the United College, and that of M.A. at the end of the fourth. The degree of M.D. was conferred by the Senatus twice every year after strict examination by the Medical Professor and certain "distinguished members of the profession who are Fellows of the Colleges of Physicians of London, Edinburgh, Glasgow, Aberdeen, or Dublin." Qualifying certificates of attendance at a University or College of repute were necessary or a diploma from a College. Latterly only those having a diploma were admitted. In the case of the Medical degrees history often repeats itself. In the 18th century (1773) complaints were made that these degrees were conferred without due examination, just as in the latter half of the 19th. In the latter case every candidate held a legal qualification, was fairly examined and legitimately capped, and there is no reason to doubt that in 1773 the same honourable method prevailed, though it is not easy to satisfy rival bodies on the subject.

In the early part of the 19th century the University had its two Principals, viz., those of the United College and St. Mary's College, a staff of 8 Professors acting in the former and four in the latter College, and the dignified bearing and the earnest methods of the staff at that period were conspicuous. The stated lecture took place as a rule in the forenoon, with the exception of Political Economy and Chemistry (after 1842), the former occupying a month or two in spring, whilst the latter was daily at 4 p.m. The very janitor of the period had an air of "*roli me tangere*," and indignantly repudiated any attempt by a body of students to pay him his annual fee of 2/6 in coppers, just as his superiors would the reception of a bundle of noisy "Kain hens" on a Saturday night. Amongst those who filled the Principalship at this time no one was better known or esteemed than Principal John Hunter, whose house at the eastern end of the Chapel of

St. Salvator was the centre of University life, whilst the Principal's interest in the welfare of the city will long be remembered. A little later Sir David Brewster added great lustre to the University by his brilliant talents and researches, and the roll of Principals from early times till now includes many able men in Science, Arts, and Divinity.

Practical classes were inaugurated in 1882, and now the scientific side of the University has been strengthened by the addition of Lectureships in Botany (developed by the Natural History Class), Geology, Agriculture, and Rural Economy. The Medical School (for two *Anni Medici*) has the two Chairs of Anatomy and Physiology. A Chair of Education, another of English from the important Berry Bequest of 1889, and Lectureships in almost every department of Arts and in Military History afford the student a wide scope for selection.

Little change has occurred in the constitution of the General Council of the University since its institution, except in its greater interest in University affairs and the service it has rendered in freely criticising University legislation.

The University Library, as apart from those of the Colleges, was founded by King James VI. in 1610, and thereafter the libraries of the three Colleges were amalgamated with it, the earliest library buildings being completed in 1643. Since that period donors within and without the University have greatly augmented its stores, and for a long period it was entitled to every new publication from Stationers' Hall. Now it has £630 annually from Government, and from 40,000 volumes in 1843 it has at present upwards of 150,000, including the medical and other works in Dundee belonging to the University. Formerly it was rich in old MSS. and rare works in block letter, but at the Reformation many of these were lost, some being buried in chests and irretrievably injured before they were unearthed, and others were borrowed and never returned. The library still possesses many remarkable manuscripts and interesting and rare old

works. At first the books were placed in the old library at St. Mary's College, ranged round the walls of the old Parliament Hall, Senate Room, and Supper Hall, then after 1857 they overflowed into transverse rows of shelves in the former and were stored in various lumber-rooms. By and by (1892) a new library was built and entirely occupied; and lately the fine Carnegie Library and Reading Room (the gift of Dr. Carnegie) have still further augmented the accommodation for the ever-increasing influx of works.

The collections forming the Museum of the University in some cases date from the 17th century, but the great bulk of the specimens belong to the 19th and 20th centuries. Though Dr. M'Vicar made a commencement, it was not till the establishment of the Literary and Philosophical Society (1838) that real progress was made, under the auspices of Sir David Brewster, then Principal of the University, especially after the Government provided a suitable building in the United College. Of the many generous donors during the last 80 or 90 years it is impossible here to speak, but the Museum forms now a very valuable collection. Most departments are efficiently represented, viz., Zoology (including Anthropology and Ethnology), Botany, Geology, Numismatics, and Antiquities. Unique collections of Marsupials in the pouches, of British Marine Fishes and Invertebrates, and of Dura Den Fossils are amongst its treasures. Plans had been drawn out for the extension on the present site since 1884, but the munificent gift of the New Museum at the Bute Medical Buildings by Mrs Bell Pettigrew renders the carrying out of these unnecessary.

The University has the distinction of possessing the oldest Marine Laboratory in Britain, for work began in the wooden building in January 1884—by the enlightened aid of the Earl of Dalhousie, and was carried on there in connection with the Scotch Fishery Board till 1896, when, by the munificence of Dr. C. H. Gatty, of Felbridge Place, Sussex, the present substantial one was opened on University ground. Were it only for its early grasp

of the problems of the Sea Fisheries, this Laboratory is interesting, but it has also advanced Marine Zoology and Marine Botany.

In the middle of the "seventies" a connection with Dundee was inaugurated, certain of the professorial staff giving evening lectures in Dundee. Then, not long afterwards, the munificent Baxter Bequest laid the foundation of the Dundee College, which was opened in the autumn of 1883 by Lord Dalhousie and Lord Camperdown in the presence of the Senate of St. Andrews and the public. At first an independent College, this, as University College, has now been affiliated and made part of the University, mainly to form a conjoint School of Medicine, for which the populous City of Dundee, with its large Infirmary, is well adapted. The Universities' Commission of 1889 carried out the arrangements connected with the incorporation, and also altered the administration of University affairs in St. Andrews, all the business arrangements formerly in the hands of the Professors of the United College being transferred to the University Court; but this was not done with the affairs of the Dundee College.

In glancing at the work of the University as it was carried on in 1853-57, it is apparent that then, as formerly, the main features were its Classical and Philosophical teaching and its training in Divinity, and these were of a thorough kind. Science and Medicine had made a beginning, by the presence of able men in certain of its Chairs, but they were overshadowed by the old-established curriculum of Arts and the absence of adequate resources. Nowhere could the student of Arts have more inspiring or congenial surroundings or more distinguished teachers, and this notwithstanding the fact that the students had to rely on their own resources for physical exercise. They had no other University game than football, played usually on the links or on the sands, though golf could, of course, be had at all times. Rarely were other open-air sports organised, though a few occasionally joined in them. The students as a rule were comparatively poor, and many worked with remarkable perseverance and ability in those

frugal times. Two students' Societies existed, viz., the Literary and the Classical, and by the courtesy of some of the Professors, attendance at the meetings of the Literary and Philosophical Society (founded in 1838) was permitted; whilst the lectures on Optics by Principal Sir David Brewster were a source of deep interest. Many students often laboured manfully during the recess to make money for their next session, whilst others taught in schools or privately throughout the whole year for a like purpose. Not a few of these filled high positions in after life, and worthily so. The delicate and idle dropped in the race or sought other pursuits. The student who had to win his way in the world without patronage or money brought every energy to bear on his work, and his Spartan life and freedom from distractions made the University then a fit training for a future career; but there was no field in the University for post-graduate work.

The vast strides which have since been made in every department have revolutionised the University. Its professorial staff has been more than doubled, assistants to every Chair have been provided, numerous Lectureships in Science, Medicine, and Arts have been instituted and equipped, and everything connected with teaching and study placed on the most modern footing. Male and female students have each their Union in St. Andrews, and also in Dundee; whilst in St. Andrews the unique Carnegie Exercise Park, with its fine pavilions for each sex, the spacious gymnasium and drill-room, still further indicate the changes. The Bute Medical Buildings and the extensive additions to the Research and Practical Chemistry rooms, new class-rooms for Natural Philosophy, Education, English, and other departments likewise mark the advancement.

In contrast with the fifties of last century, the student of to-day has many and great advantages. His preliminary education bears directly on his University work, there is more money even in poor families, bursaries have increased in number, the Carnegie fees relieve home payments, the courses of study are widened and varied to suit every capacity, and practical classes afford a training unknown

in the former period. Moreover, after graduation, scholarships of several kinds are available for able men in Science and Arts, and the opportunities for gaining assistantships are more numerous. Further, student-life has been much altered by the foundation of the Students' Representative Council, the arrangements of the Students' Union, the students' dinners, the Gymnasium, the University Battery, and now the Officers' Training Corps, the Carnegie Exercise Park, the firm hold taken by the Total Abstinence Society, various Societies—Literary, Scientific, and Social—and the higher ideals formed of student-life. Looking back to the early fifties, there cannot be a doubt that the culture and *morale* of the young student have greatly improved, though the almost universal habit of smoking contrasts with the simple life of old.

From a professorial point of view, the half-century has revolutionised the status of the members of the staff who formerly managed all the business affairs of the Colleges, and whose position was much more independent than it now is under the University Court with its special Secretary and Factor. Besides, the multiplication of Lectureships has broken down the barriers with which each Chair was formerly surrounded, and which proved so great an attraction to many men, even tempting some to leave lucrative positions for a University Chair. The comparatively small number of students has always rendered the relationships of student and Professor in St. Andrews unique, for each student is thus known to his teacher, and this feature remains to-day as it was in the olden time.

Nevertheless, putting sentiment aside, there can be no doubt that the University of to-day is a teaching force having a much wider influence and a much more potent effect on the welfare of the nation than it ever had before. The oldest Scottish University has engrafted much that is new and progressive, and so long as its Professors adhere to a high ideal in original work, so long will its name and fame continue to extend. It has ever been the goal set before Scottish Universities that, besides the knowledge already gained, the staff should extend its boundaries by their individual efforts.

## University College.

By **J. Yule Mackay, M.D., LL.D.,** Principal and  
Professor of Anatomy.

UNIVERSITY College, Dundee, was founded in 1880; teaching began in 1883. In 1890 it was united to the University of St. Andrews; the union was dissolved in 1895, but reconstituted in 1897. As a consequence the College has enjoyed for fifteen years full academic privileges; the Professors are members of the Senate of the University and the classes and examinations qualify for the degrees in the Faculties of Arts, Science, and Medicine.

The College is constituted under a "Deed of Endowment and Trust," in which the founders direct the Trustees to apply the funds placed in their hands to "founding, establishing, endowing, maintaining, and conducting a College for promoting the education of both sexes and the study of Science, Literature, and the Fine Arts," and which contains also as a fundamental condition the provision that "no Student, Professor, Teacher, or other officer or person connected with the College, or the operations thereof, shall be required to make any declaration as to his or her religious opinions, or to submit to any test of his or her religious opinions, and that nothing shall be introduced in the manner or mode of education or instruction in reference to any religious or theological subject which can reasonably be considered offensive to the conscience." The property is held by a body of Trustees; the Governors consist of those who have subscribed £50 or upwards to the funds of the College and of regular annual subscribers of £5; and there is a Council partly formed of official representatives, specified in the Deed of Endowment, and partly of persons elected by the Governors. The Council is the managing body; it directs and controls the expenditure of the finances, and exercises its authority over all the departments of the College save those belonging to the later years of the School of Medicine; these are

supported by funds coming through the University Court from a Government Grant, and although they are part of the College, they are retained by the Court under its own management. The academic work of the College is carried on in conformity with the conditions set forth in the Ordinances, and is subject to the University, the College being suitably represented upon the several bodies charged with the supervision of the teaching.

The subjects of study offered are English, Latin, French, German, Logic, Education, Mathematics, Physics, with Electric Engineering, Chemistry, Civil and Mechanical Engineering, Botany, Zoology, Geology, Anatomy, Physiology, Pathology, Materia Medica and Therapeutics, Medical Jurisprudence and Public Health, Medicine, Surgery, with many of the special branches of the two latter, Scots Law, and Conveyancing. The work is carried on by fourteen Professors, eighteen independent lecturers, and a large number of associate lecturers and assistants.

The grounds occupy an area of some six acres or thereby in a central situation. The buildings, originally acquired with the site, have been preserved as far as possible, and converted to College uses. In addition, special Laboratories have been constructed for Botany, Zoology, Chemistry, Physics, Electric Engineering, and Mechanical Engineering and Hydraulics, within which in several of the departments space is set apart for the accommodation of Museums. The School of Medicine, erected conjointly by the University Court and the Council of the College, affords equipment for teaching and practical work and the necessary facilities for the display of specimens in the several subjects of medical study. There is a Library, a Gymnasium, and a Students' Union. The Gardens of the College, facing the busy street, make a brave show in summer, and are much appreciated by the citizens; but the original buildings, purchased with the grounds, although fulfilling their purposes at present, constitute a frontage which must sooner or later be replaced. Designs for a new building have been prepared by Sir R. Rowand Anderson, LL.D.; when the Council has been able to give effect to these, the

prospect which the College will present to Dundee will be more worthy than that which it now exhibits and more in keeping with the dignity of the City which gave it birth and has established it.

The total of the contributions made to the capital funds of the College amounts to nearly £350,000, of which about £150,000 has been expended on lands, buildings, and permanent equipment; more than £165,000 has been invested for purposes of maintenance, and £25,000 has been set aside as a permanent fund for the provision of bursaries and scholarships. An annual Grant is received by the Council from the Treasury; and the University Court of St. Andrews yearly devotes a considerable sum to the maintenance of a portion of the School of Medicine, and makes in addition a contribution to the objects included in the fee-fund of the Council.

The Dundee Royal Infirmary, accommodating 400 patients and possessed of many special departments and numerous dispensaries scattered throughout the City, and the District and Royal Asylums, offer productive fields of clinical study to the students of medicine.

The public health laboratories of the town are well equipped, and, in conjunction with the bacteriological department of the College, present ample facilities for practical work and research. Opportunities for observation are extended to students of Science by a number of the departments of municipal and public work and by many of the engineering and shipbuilding firms in the district.

The St. Andrews Provincial Committee, the local organisation for the training of teachers, is closely associated with the College, and provides in the schools of the City, which are thrown open for practice, all the elements of professional instruction to those among the students who seek to qualify themselves for educational work in after life.

A short account of the history of the College will probably prove of interest to readers. University College, Dundee, may be described as an adopted daughter of the University of St. Andrews, forming one of a family of three, the other members of which—the United College of

St. Salvator and St. Leonard and St. Mary's College—have their home at St. Andrews. The University, first in foundation among all the Scottish Universities, was established in 1411; last year, as all the world knows, it celebrated its five hundredth anniversary. The College of St. Salvator received its earliest charter in 1450, that of St. Leonard in 1512; they were joined into one as the United College in 1747. The foundation of the College of St. Mary was authorised in 1538, but a few years elapsed before the actual establishment was effected. Like the parent University, the Colleges at St. Andrews owed their origin and their early maintenance to the Church, and when the older form of worship was dispossessed in Scotland, an event which took place in 1560, they suffered severely, being shorn both of influence and emoluments. Indeed, the University gradually but steadily declined during the succeeding three centuries, until, apparently crippled with age and misfortune, it seemed to have little left to it save the traditions of its past and the pride of its pre-eminence in time among its neighbours in Scotland. Then there came a rejuvenescence, which may be said to have begun in 1880, and has given rise within the short period that has followed since then to a remarkable development of vigour and activity. In the particular case of St. Andrews the change was probably due to the co-operation of many factors; but there, as everywhere throughout the country, the most important element was without doubt the tide of commercial prosperity which earlier in the century had swept through the whole kingdom, bearing with it among the people the desire for better conditions of life, and rousing the nation to a sense of the importance of education. The year 1851 had seen the establishment of Owen's College, Manchester, the pioneer of the movement; the Armstrong College at Newcastle was founded in 1871, the Welsh College at Aberystwyth in 1872, the Yorkshire College at Leeds in 1874, the Bristol College in 1876, and the College at Liverpool in 1882. The ancient University of St. Andrews felt the influence and stirred to it, doubtless slowly at first,

but unmistakably. The birth of University College, Dundee, and the new birth of the University may be said to have taken place simultaneously under the same influence, and the two institutions have progressed with equal steps. For a few years they kept mutually apart. Happily, however, as prosperity grew the common interests of both were recognised, and a union was established "dissoluble only by Act of Parliament."

The citizens of Dundee are to be credited with what is indeed a notable achievement in the making of their College, a work which, though involving an enormous expenditure, has been carried on from the first with unremitting enthusiasm; but it is not to be forgotten that success could not have come so quickly or in the same measure had it not been for the co-operation of the University of St. Andrews. The gift of University status has been all-important. The gratitude of the City is due to those academic statesmen at St. Andrews through whose wisdom and foresight the idea of union was approved and under whose labours the scheme was matured and accomplished.

The story of the foundation of the College begins in the early seventies of last century. For more than a decade the town had enjoyed a period of great commercial prosperity, and the activity had spread into the neighbouring counties. The whole community had benefited, the conditions of life had altered, and higher ideals had arisen. A prominent feature of the times was the generosity which was displayed by all who had reaped of the harvest, and many benevolent schemes, rich with blessings to the poor amongst the people, took their origin. Art flourished. And, with it all, the desire to increase the educational advantages of the City sprang into articulate expression. There can be no doubt that the visit of the British Association to Dundee in 1867 did much to stimulate those aspirations and gave an impetus among the many to a movement the full appreciation of which must naturally at first have been confined to a few. The actual proposal for the foundation of a College was first

definitely and formally made by Boyd Baxter, LL.D., the Chairman of the Directors of the Albert Institute, the Public Museum, Library, and Art Gallery of the town, on November 28th, 1874, and the scheme, which bore the marks of the most careful consideration on the part of its authors, was submitted to a large and representative meeting of the citizens convened by the Provost on December 16th of the same year.

The proposal contemplated the formation of an initial endowment of £150,000 and a subsequent extension to £225,000. A clear indication of the spirit which animated the promoters will be got from the following paragraph quoted from their report:—

“This to many may no doubt appear a very large sum, and may cause them at first to cherish distrust of the whole plan; but when our well-disposed citizens shall have carefully considered the magnitude to which Dundee has attained—its rapid increase in size, population, and wealth—and the vast benefit which would result to her people from the establishment of a College within her own bounds, it is hoped that the large sum above indicated may not be deemed too high a price with which to purchase the means of placing alongside of our material prosperity an enlargement of mind and an elevation of character, and of ennobling and purifying the spirit of trade by the influence of culture and scientific knowledge.”

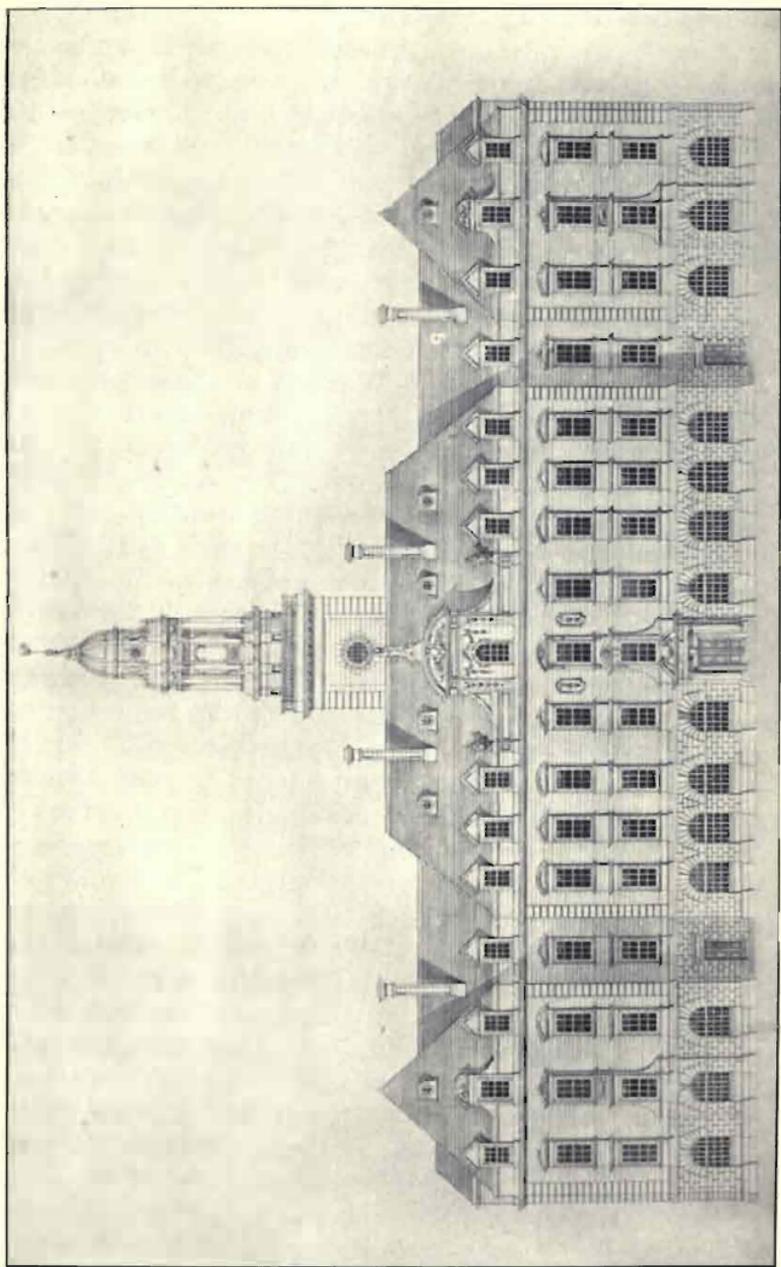
The Chairs to be established at the outset were English Literature and Logic, Chemistry, Natural Philosophy, Engineering, Natural History or Greek and Latin, and Mathematics. Later on were to follow Natural History or Classics, the one not already established, Mental and Moral Philosophy, Ancient and Modern History, Geography and Astronomy, Physical Geography, and Navigation. It is evident that Dr. Boyd Baxter and his colleagues were animated by lofty ideals and that they possessed broad views upon education, recognising as the first essential the element of culture. They go on to suggest that the new College should be affiliated to the University of St. Andrews, retaining its own freedom, but adapting its teaching to the degree standard.

Although it was from the helping hand of the University that the College, after its coming, received the gift of academic status, without which the value of its great endowments could never have been adequately realised, it was undoubtedly in the near presence of the University that the early promoters found the most serious obstacle to their scheme. There were those who feared that the birth of the new might entail the death of the old institution, and there were some who had contemplated as a possible last resort the entire removal of the ancient University from its historic seat to the northern bank of the Tay, and naturally did not approve of a plan which proposed to occupy the ground. These fears found some expression at the public meeting of December 1874, but nevertheless the following resolutions were adopted un-animously:—

- (a) "That having respect to the importance of the advancement of Literature and Science, along with the growth of the population and wealth of Dundee, it is desirable to establish a College for the promotion of the higher branches of education in the town and district."
- (b) "That a Committee be appointed to devise a scheme for the establishment of a College in Dundee, to confer with the University of St. Andrews with a view to the incorporation of the proposed College, by affiliation or otherwise, with that University, and with power to take all necessary steps to carry out the object contemplated."

The tenor of the resolutions shows that a leading aim in the minds of the citizens was to combine together as far as possible all the educational potentialities of the district in order to develop a harmonious and conservative co-operation. Ample time was given for full consideration, and most of the leading authorities in matters of education throughout the country were called upon to advise.

Meanwhile the University of St. Andrews instituted as an experiment courses of extension lectures in Dundee.



UNIVERSITY COLLEGE (AS IT WILL BE ON COMPLETION).



The subjects chosen were Chemistry, Physical Geography and Geology, Physiology, Natural History, and Education. The work was carried on in the evenings during portions of two winters (1875-6 and 6-7), each course consisting of from ten to twenty lectures. The attendance was large, and the experiment, so far as it went, may be said to have been successful in demonstrating that even educational crumbs were eagerly sought for in the City. In the following year a more serious request was made to the University, to the effect that it should establish in Dundee a set of regular qualifying classes in extent and standard sufficient to educate students to the level required for University graduation. After much consideration the appeal from the City was approved at St. Andrews, but the good intentions of the Senate were never carried into effect. The difficulties in the way were undoubtedly great. The staff of the University was inadequate to carry on a double system of classes, and the equipment needed for scientific teaching was altogether wanting in Dundee. Thus time ran on until it became clear to all that the University of St. Andrews in carrying on the extension classes had done for the City all that it could, unless it were to migrate bodily across the Tay, a course often discussed in the dark days of St. Andrews, but always set aside—wisely or not, who shall say? It became evident that if the aspirations of the City were to be realised it must have a College of its own.

It was towards the close of 1880, six years after the historic meeting of the citizens in the Town House, that Dr. Boyd Baxter intimated on behalf of Miss Baxter of Balgavies a donation of £120,000, with an additional sum of £10,000 from himself, for the foundation of a College in Dundee. It was indeed a noble gift to the City, not only from its magnitude, but from its nature, being one in which all classes were free to participate. Many others have followed the splendid example, and have given of their means or have made bequests to the endowment fund. Among those, who like Miss Baxter and Dr. Boyd Baxter are no longer with us, may be mentioned Miss

Margaret Harris, Mr T. H. Cox, Mr David Myles, Miss Helen H. Symers, Miss Jessie Strong, and Mrs Isabella Blyth Martin. In the list of the benefactors of whose interest in its progress the College is still happily assured stand forth prominently the names of Sir William Ogilvy Dalgleish, Lord Armitstead, Mr Edward Cox, Mr John Fleming, the family of the late Mr James F. White, and the sisters of the late Lord Dean of Guild Peters. It is not possible within the limits of this review to give more than a brief list of those among the citizens who have borne a share in the endowment of the College—the actual number is very great; but no historian could be deemed to have adequately performed his task, however meagre the space allotted, were he to omit the name of Mr Andrew Carnegie, at least, an adopted son of the City, whose great services to education are known to all men. During his tenure of office as Lord Rector of the University of St. Andrews, Mr Carnegie presented to the College the Laboratory of Physics, to which, in grateful recognition of the gift and in memory of the association with the giver, the name of the donor has been attached.

The work of teaching was commenced in 1883, with a staff of five Professors, whose subjects were Latin and Greek, English, Mathematics and Physics, Chemistry, and Engineering. The many consultations with the leading authorities upon education in the country had but confirmed the wisdom of the scheme originally drafted by Dr. Boyd Baxter. In the present session, as has been already mentioned, the number of Professors and independent Lecturers, including those of the later part of the Medical School, dealing with separate subjects of study qualifying for University graduation reaches to thirty-two.

During its first three years the young College had no University connection. The earliest privileges came in 1886 from the University of Edinburgh; under them students in Science were permitted to count two years spent in Dundee as part of the three years' attendance required for the Edinburgh degree. Immediately afterwards the University of St. Andrews intimated recognition

of the whole curriculum in Science, and thus by the willing gift of all that could be conferred at the time rendered practical proof of the friendship under which ripened at a later date the proposals for union. A new Act for the better regulation of the Universities of Scotland was passed through Parliament in 1889, and a special clause provided that the College should be affiliated to and made to form part of the University, subject to a mutual agreement as to terms of union. The preliminary steps were quickly taken, and in 1890 the Commissioners under the Act issued an Order declaring the accomplishment. Nothing in the long history of the University is more creditable to its rulers than their action at this time, since by adopting the new College which had sprung up so close to their own doors they ensured the harmony of all the educational energies of the district, and in like manner the Governors of the College in its earlier days merit the warmest commendation for their wisdom in agreeing to submit the academic future of their institution to the supreme guidance of the University.

Under the terms of agreement the College retains its individuality and its financial authority, attributes essential in the eyes of the citizens, who look upon it as the chief among the educational institutions of Dundee; but in all its academic work it is subject to the control of the University. The allocation of the teaching work between St Andrews and Dundee has been most happily carried out. The study of Divinity is confined to St. Mary's College at St. Andrews. In Arts St. Andrews is paramount, but the Dundee College possesses an avenue of its own to the degree of M.A. necessary for general purposes of culture study, and in particular for the special preparation of students seeking the higher degree in Law and demanded by a large and growing number of those who are making use of the practical facilities which the City affords for the training of teachers. The Arts classes in Dundee form a fruitful recruiting field for the Honours courses at St. Andrews. In Science both centres are strongly developed, although in Engineering Dundee adds

a branch of Applied Science which cannot be undertaken at St. Andrews. The University as a whole is greatly advantaged by the duplication of its teachers and its Laboratories in Science. The subjects embraced in the curriculum demand to such a degree detailed practical instruction that they cannot be satisfactorily taught save to comparatively small classes. Proof, if it be needed, will be found in the remarkable output of original papers which has been contributed of recent years by the University as a whole. A list, imperfect since accurate records had not been kept in all the departments, compiled in 1908, showed that up to that time from the Dundee College alone more than three hundred and fifty published researches in Science had emanated. The earlier years in Medicine are likewise represented in both places, the subjects embraced belonging equally to the Faculty of Science; the later years are confined to Dundee. The Dundee College also possesses the rudiments of a Faculty of Law.

There remains still to be told one episode in the history of the inter-relations of the College and the University—a grave and important one—which threatened to destroy the union permanently and for a time did actually interrupt it. There were opponents at St. Andrews from the first who resented the newcomer as an intruder upon their academic privileges, and the act of affiliation or incorporation never having occurred before in Scotland, the arrangements necessary for the definition of the relative positions in the future of the contracting parties to the union offered abundant material for discussion and difference. With the growing prosperity of the University a group of objectors were encouraged to carry the whole matter to the Law Courts, challenging particularly the terms of the agreement and the validity of the declaratory deed or order of the Commissioners under which the union was actually constituted. The proceedings, which were unduly protracted, lasted throughout five years, during which period the College suffered severely, and to some extent also the progress of the University was hindered.

Indeed, at one time it appeared as if the objectors had triumphed, for a decision was given in the House of Lords, on an appeal from the Court of Session, setting aside on a technical ground the order of the Commissioners, and the union between the College and the University was dissolved five years after its first formation. Foreseeing the possibility of the result, the Commissioners had prepared a new bond, which they were ready to carry into effect without delay; but further litigation was commenced attacking the terms of the agreement, and thus putting a barrier in the way of the reconstitution of the union, and was allowed to drag its way to an unsuccessful issue in the House of Lords some two years later. Meanwhile the College, bereft of University status, was largely deserted by its students, the great majority of whom were working towards graduation, and at the same time was subjected to a heavy financial drain to meet the expenses of the law. In 1897, the agreement having been legally vindicated in all its details, the union with St. Andrews was re-established. Another attempt to continue the litigation, based on highly technical grounds, met with but scant courtesy at the hands of the Law Courts, and since 1898 a period of peace has prevailed, with the most beneficial results on both sides of the Tay. In the session of 1890, the first year of the union, the College began its University career with 21 matriculated students, and those at St Andrews numbered 212. Twenty years later, in 1910, the College, despite the five years' break in its progress, showed a total of 218, and at St. Andrews the numbers had risen to 353. The combined advance appears all the more gratifying when it is remembered that during the period mentioned the figures of the other Universities had declined owing to the introduction everywhere throughout the country of severe entrance tests. It may be said without hesitation that the College in its as yet brief career has incontestably proved the wisdom of its promoters and has justified the great sacrifices which the City has made for it.

## St. Andrews Provincial Committee for the Training of Teachers.

By James Malloch, M.A., F.S.A. (Scot.), F.E.I.S.,  
Director of Studies.

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### THE PROVINCIAL TRAINING COLLEGE.

**Minute of Council of 30th January 1905.** THE system of Provincial Training Colleges in Scotland for the Training of Teachers became possible when in January 1905 the Committee of the Privy Council on Education in Scotland issued their Minute providing for the establishment of Committees for the Training of Teachers. Previous to that date the task of maintaining a sufficient supply of adequately trained teachers for the public schools was under the charge of various church organisations. These bodies throughout a long series of years had rendered admirable service, but it was felt that the time was ripe for a change in the administration of the funds provided by Parliament for the specific purpose of securing an efficient and national body of well trained teachers.

The main purpose aimed at by the Minute of Council is expressly stated to be "to enlarge and improve existing facilities for the training of teachers" and "to ensure that that training shall be brought into as close connection with the University organisations as the attainments of the students upon entering admit of, and to provide means whereby School Boards and others directly interested in the question of the supply of teachers shall be in a position to secure due consideration for their views."

**Existing  
Colleges and  
the New  
Committees.**

Within four years of the issue of the Minute the several Colleges in Edinburgh, Glasgow, and Aberdeen, under the supervision of the authorities of the Church of Scotland and the United Free Church of Scotland, were transferred to the newly constituted Committees, and that "under adequate guarantees for the continuance of the religious instruction" that had continuously been given in them. No church institution existed in the St. Andrews Province, but there were energetic Local Committees working both at St. Andrews and Dundee, the former from 1895-1906 and the latter from 1899-1906, under whose care students were prepared for the teaching profession, along with a concurrent course for graduation in Arts or Science at St. Andrews University.

**Constitution  
and Powers of  
the New  
Committees.**

The new Committees were constituted on a very broad and exceedingly representative basis. That ruling the St. Andrews Province now consists of 25 members, along with an Assessor (H.M. Chief Inspector of Training Colleges) of the Scotch Education Department. These members are elected as follows:—Four by the University Court of the University of St. Andrews, two from Central Institutions within the Province, fifteen by the Secondary Education Committees of the Counties of Fife and Kinross, Perth, Forfar, Stirling, and Clackmannan. Four members are co-opted to serve on the Committee, but these members must be "persons actively engaged in the work of Education in Schools or Colleges within the Counties and Burghs represented on the Committee."

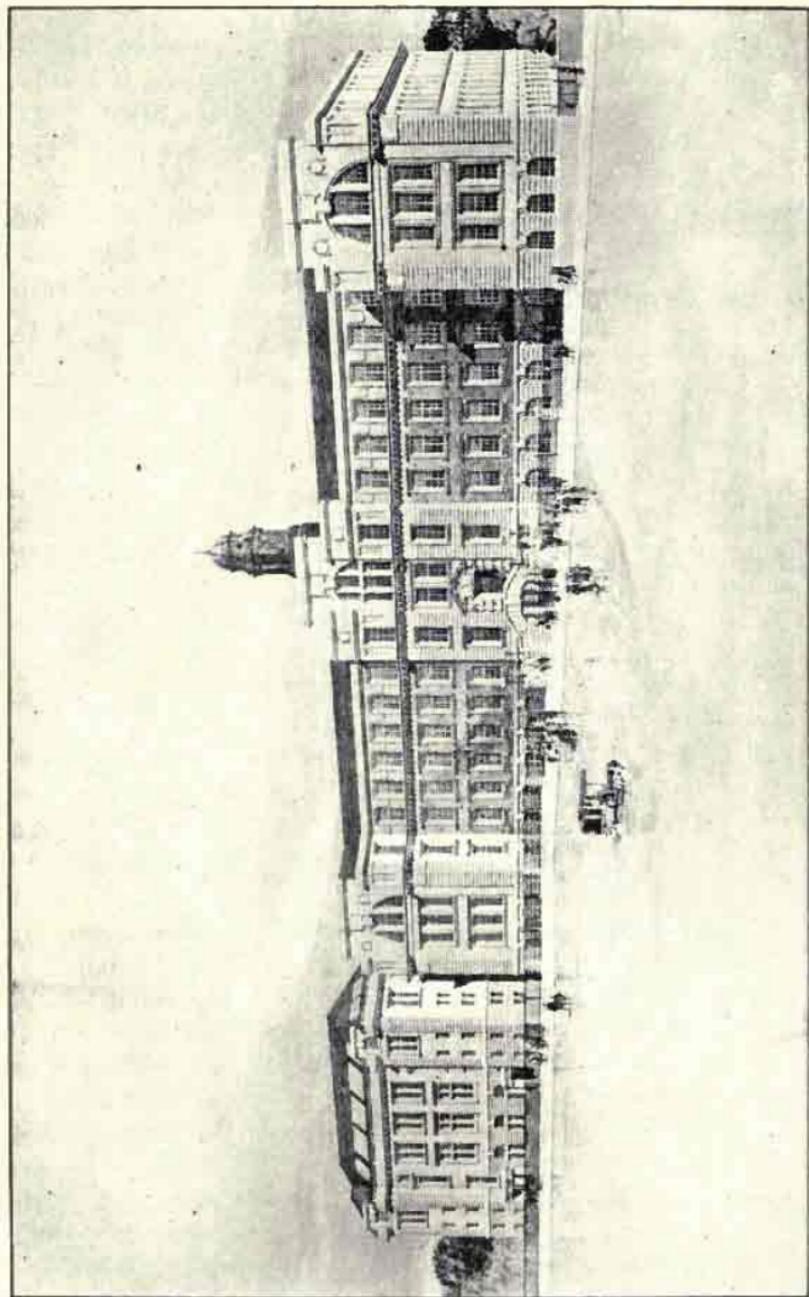
Since the initiation of the first Committee in 1906 the members elected have been mainly those occupying the highest educational positions in the district. The Principal (Sir James Donaldson, LL.D., D.D.) of the University of St. Andrews was the Chairman of the first Committee; the Right Rev. Principal Stewart, D.D., of St. Mary's College, of the second; and Principal Mackay, M.D.,

LL.D., of University College, Dundee, of the third; the membership being principally composed of eminent University Professors, Chairmen of School Boards, and Secondary Education Committees.

The powers of the Provincial Committee are both extensive and varied. They are enjoined to provide courses of instruction suitable for all teachers of the various subjects taught in Primary, Intermediate, Secondary, and Technical Schools, and to frame their courses on the understanding that "while professional training will be the first and chief concern of the Training Centre, students who have reached a certain level of general education will, so far as is consistent with the requirements of proper professional training, be accorded every reasonable facility for pursuing their studies."

Further, the Committee has power to acquire by purchase or lease suitable premises for its work and for the provision of the necessary apparatus. It may also incur capital expenditure in the acquisition of sites or buildings and the erection or enlargement of existing buildings either for training purposes or hostel establishments. It may subsidise approved hostels for the residence of students and may give, on certain conditions, financial assistance to such individual students as in the Committee's opinion require help. It may exact fees, appoint officers for teaching and discipline, and may make regulations for the proper behaviour and conduct of the students. To enable the Committee to secure the best and most systematic instruction in the art of teaching under skilled supervision, all schools in receipt of Parliamentary grant must be made available for the practice of teaching necessary for the students' training, under arrangement between the Committee and the respective School Governors.

It is to be noted that the Committee uses its powers and exercises its functions under the supervision and approval of the Scotch Education Department, and that its term of existence is fixed by the Department. New Committees are to be appointed and elected once, and not oftener than once, in every three years.



PROVINCIAL TRAINING COLLEGE, PARK PLACE (AS IT WILL BE ON COMPLETION).



**St. Andrews  
and  
Dundee Training  
Centre.** The University connection, begun under the Local Committees at both Centres, is still maintained and is being extended under the Provincial Committee, but to provide for the enlarging needs of the Province, the Committee determined in 1910 to erect in Dundee a Provincial Training College in which all classes of students could be instructed, and around which the special and University tuition given at University College and the Technical College and School of Art might get that professional outlook and technical skill requisite for all teachers. It is well to remember that, coincident with the establishment of Provincial Committees, great changes in the earlier training of future teachers were begun. The pupil teacher system was superseded, and a thoroughgoing scheme inaugurated for the sound general education of all candidates who aimed at becoming teachers. Junior students now pass through a Secondary School curriculum, and only obtain the Junior Student Certificate, entitling them to become students in full training and to enter a Training Centre, after having successfully completed that curriculum and given evidence as to their probable fitness for the office of teacher by the possession of those personal characteristics without which success in teaching is impossible.

**Students'  
Courses.** In planning their building the Committee kept in view the widely diversified character of the courses followed by differing groups of students. Provision had to be made for *the full professional training* (1) of students who entered on a three or four years' course with a view to graduation in the University; (2) of students attending only a special group of University classes along with the professional course; (3) of students of two years' training whose general education required further expansion in several important subjects; (4) of students of one year's training who had already served in schools either as untrained

certificated teachers or had obtained the partial recognition of an acting teacher; (5) of graduates in Arts or Science taking a post-graduate professional course; (6) of students of any of the above classes who wished and might be selected by previous attainment to specialise in more extended study of the special subjects of the Primary School; (7) of students who were fitted to take advantage of the organised instruction offered for Supplementary Course work—(a) Rural School Course, (b) Household Management Course, (c) Industrial Course; (8) of students (Honours Graduates) pursuing a carefully planned curriculum of professional subjects for the teaching of the Higher Subjects in Secondary Schools; and (9) of students in possession of the Diplomas of Central Institutions in Art, or Music, or Physical Culture, or Manual Skill, or Domestic Science.

**Provincial  
College.**

An admirable site for the new Provincial College was obtained in May of last year in Park Place, Dundee, in close proximity to the University College, almost in the centre of the City and in its most densely populated school area. The site extends to 1 acre 2 roods 28 poles. Plans have been prepared and approved by the Education Department for the erection of a handsome modern College building containing within it all required accommodation for the Committee's administrative work, laboratories and classrooms, retiring-rooms, etc., etc., for a full teaching staff and 400 students.

**Demonstration  
School.**

To the north of the College and immediately contiguous to it there will be erected a Demonstration School sufficient in accommodation for 400 pupils and providing a school career for the infants' school stage to the end of the Secondary School period. It is hoped that the memorial stone of both buildings will be laid in September 1912.

**Hostels and  
Playing Fields,  
etc.** By the recent purchase of the mansion house and grounds of Mayfield, overlooking the estuary of the Tay, about  $1\frac{1}{2}$  miles from the High Street, the Committee expect soon to be able to offer excellent hostel accommodation to the students. These grounds are magnificently situated for students' halls of residence, and being of the extent of 24 acres, splendidly wooded, and entirely secluded, they give ample opportunity for the thorough organisation of all kinds of outdoor sports and healthful recreations.

It is the Committee's intention to open a hostel for 50 women students in October next by the careful reconstruction and adaptation of the mansion house. Later, and as necessity arises, it is proposed to add to the women's hostel and also to provide similar accommodation for men.

For the purposes of the Rural School Course and the practical side of School Gardening and allied Nature Study, the Committee have leased an area of  $3\frac{1}{2}$  acres on the Glebe of Mains Parish, within 15 minutes' walk of the Downfield car terminus. The ground has been tastefully laid out as a College Garden, with model demonstration gardens and plots for students, and already 50 students are engaged in the active operation of a full School Gardening Course.

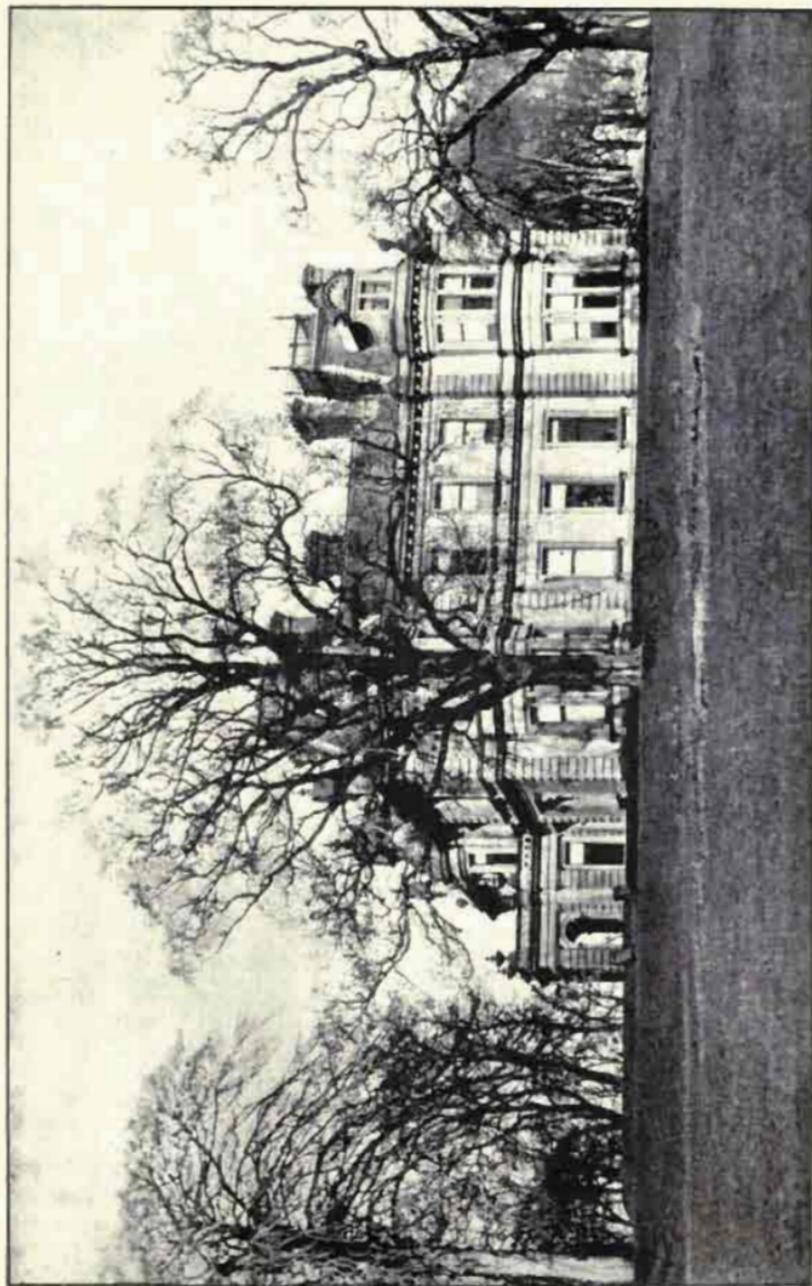
**Supervision of  
Students' Social  
and Domestic  
Life.** At present students whose homes are at a considerable distance from either St. Andrews or Dundee, and who in consequence live in lodgings, are guided and counselled by a large Supervising Committee, consisting of all the members of the teaching staff and by a number of ladies of position in the cities. Their rooms must be taken from an approved list and conform to well-known sanitary and hygienic conditions. The members of the Committee make frequent and friendly visits, and generally strive to make their stay in lodgings as homelike and comfortable as possible. When the hostel arrangements shall have developed, the

necessity for living in isolated rooms will disappear, and the acknowledged benefits of a corporate collegiate life with its undoubted advantages, both in its social and moral aspects, will be within the reach of all students in training.

Religious Instruction is given at both Centres according to use and wont, and care is taken that opportunity is given for all students to associate themselves with church life and organisation.

Appended are some statistics shewing the development of the Province as a Training Centre:—

	ST. ANDREWS.			DUNDEE.			Grand Total.	
	Men.	Women.	Total.	Men.	Women.	Total.		
1898	-	—	3	—	—	—	3	
1899	-	4	6	—	—	—	10	
1900	-	4	10	—	—	—	14	
1901	-	5	7	—	—	—	12	
1902	-	4	10	5	6	11	25	
1903	-	5	3	2	8	10	18	
1904	-	4	10	3	15	18	32	
1905	-	3	8	5	32	37	48	
1906	-	1	8	2	19	21	30	
1907	-	2	10	2	34	36	48	
1908	-	4	11	10	103	113	128	
1909	-	8	13	20	105	125	146	
1910	-	8	9	25	106	131	148	
1911	-	9	16	34	76	110	135	
1912	-	6	13	61	72	133	152	
		67	137	204	169	576	745	949



PROVINCIAL TRAINING COLLEGE HOSTEL AT MAYFIELD.



## The Dundee Technical College and School of Art.

By **John S. Lumsden, D.Sc., Ph.D., Principal.**

ABOUT the time of the last meeting of the British Association in Dundee there arose a widespread desire for evening classes to provide instruction in the principles of science involved in industrial processes. This desire was fostered throughout the country by the Authorities of the Science and Art Department, South Kensington, who prepared courses of instruction, provided examinations, and offered money grants to encourage the promotion of classes in art and science. By this aid it became an easy matter for men of public spirit to organise classes, which, with a limited amount of local financial support, could be carried on under competent educational supervision. Previous to the year 1867 the Directors of the Dundee High School had been conducting evening classes in art subjects, under Mr John Kennedy; but instruction in science was not available in Dundee until 1871, when the Directors of the Young Men's Christian Association formed a Science and Art Committee, and approached the Authorities at South Kensington for assistance to institute evening classes, which, in the words of the request, were intended "for the instruction of our artisans and skilled mechanics in the higher branches of education, and to provide classes in chemistry and natural philosophy."

The first teacher was Mr Stephen Cooke, who in September 1871 enrolled over seventy students, and who for four years conducted very successful classes in mathematics, mechanics, steam, and chemistry. Mr Cooke having received an appointment as Professor of Chemistry in Glasgow, the work was taken up by Mr Robert Chalmers, who had been his pupil and assistant; by Mr Frank W. Young, also his pupil and a student at South Kensington; and by Mr George Malcolm, assistant to Mr Kennedy in

the High School; and these well known teachers, assisted by others as the number of students increased, carried on with much enthusiasm the work of technical instruction in Dundee.

The importance of this evening class education for artisans had aroused the interest of Sir David Baxter, Bart., of Kilmaron, head of the great textile firm of Baxter Bros. & Co., who died in 1872. By his will, drawn out in 1869, he directed his testamentary trustees to appropriate £10,000 out of his estate for the purpose of acquiring ground and erecting the necessary buildings for a Mechanics' Institution, which it was his wish to establish for the education of boys or young men in "those branches of learning necessary or useful for working mechanics and other craftsmen," and also to set apart the further sum of £10,000 for the endowment of the Institution.

At the time of Sir David Baxter's death his trustees considered the funds at their disposal inadequate for the purposes intended, and they delayed action until 1887, when an agreement was entered into with the Council of the University College, which had meantime been established in Dundee, by which the co-operation of the College was obtained in devising and carrying out a scheme of education on the lines specified in the bequest. The trustees then acquired a site in Small's Wynd, in the College grounds, and erected a building called the Technical Institute, in which, in 1888, they were able to offer a series of classes which, with evening classes promoted by the College Council, formed systematic courses of study suitable for skilled workers in various trades, and also formed the basis for a good general scientific education.

The principal teachers of the Y.M.C.A. classes were included in the staff of the new Institute, but the Y.M.C.A. Directors obtained other men and proceeded with their educational programme; the High School Directors also continued successful science and art classes under their energetic teachers Mr Grubb and Mr John Y. Gray, and it so came about that for some fourteen years,

several schools, competing, yet all having distinctive classes of students, were carried on in the city.

In 1902 the Scotch Education Department assumed responsibility for evening class instruction in Scotland, and regulations were then made whereby money grants were only payable when consecutive courses of study, suitable for various trades and involving laboratory instruction, were provided. These restrictions made it desirable that all the technical classes in the city should be conducted by one authority, and by mutual arrangement the classes in the High School were closed and the classes in the Y.M.C.A. rooms were taken over by the Technical Institute Managers. The classes were then reorganised under the existing staffs, and in June 1903 the Technical Institute was raised by the Education Department to the status of a Central Institution.

For some years after this work went on successfully, until the students had so increased in numbers that they occupied all the available accommodation, and in 1906 it was found expedient to raise the entrance standard. The Burgh School Board willingly co-operated in providing preparatory technical and art classes, embracing the elementary work formerly done in the Institute, and by this arrangement more space was left for higher work; but the distribution of the classes in the Institute buildings and University College, in the Y.M.C.A. rooms, and in workshops at Dudhope Castle, was far from satisfactory. In order to concentrate the work and to provide the laboratories and workshops required for a modern technical education, steps were taken in 1906 to secure a new central school. The Scotch Education Department had at that time certain surplus funds which could be allocated for capital expenditure in providing greater facilities for technical education, and an assurance was obtained of a grant from this source equal in amount to whatever sum was raised locally for building purposes.

The Managers, under the guidance of Mr William Henderson, the Chairman, set about raising money, and from generous local donors, and from former students and

others in India, a sufficient sum was obtained, which with the equivalent from the Education Department enabled building operations to be begun in 1907 on a central site which had been secured in Bell Street. Dr. Lumsden, Director of Studies, and Mr Robert Gibson, Architect, visited the principal technical schools in Britain and in Germany, and the accommodation was planned by them, with respect to laboratories and workshops, according to the best modern ideas. In September 1909 the Technical Institute was vacated, and most of the classes transferred to the central school, and a year later all the work was concentrated in the new buildings. To emphasise the status of the school and better to indicate its aims, the name was then changed to the Dundee Technical College and School of Art, and the Director of Studies was appointed Principal.

The formal opening of the College took place on 9th January 1911, when William Henderson, Esq., of West Park, Chairman of the Managers, presided, and Sir William Ogilvy Dalgleish, Bart., of Errol Park, the Senior Trustee, performed the opening ceremony.

The name of Mr William Henderson will always be associated with the erection of this great educational centre. By his efforts the money was obtained, and the whole work was planned and carried out under his supervision. He was ably supported in the executive work by the Vice-Chairman, Bailie Walker S. Melville, and the other Managers gave loyal help in overcoming the numerous difficulties which the erection of such an institution entailed.

The buildings and equipment have cost £80,000, of which £11,000 was contributed by Sir W. O. Dalgleish, £35,000 by the Scotch Education Department, and some £24,000 by other subscribers.

The aim of the college is to provide instruction in the principles of science involved in the various industries carried on in the city and district, and to teach applied art. The courses of study are therefore arranged to suit the requirements of those employed in the different



DUNDEE TECHNICAL COLLEGE.



STOBSWELL SCHOOL.



branches of the engineering, textile, and building trades; of men going to sea as engineers or ship's officers; of naval architects, druggists, lithographers, and others engaged in the lesser industries and art crafts.

A good general education is demanded as an entrance qualification, since the college is intended for advanced work; but provision is made by the Burgh School Board, and the School Boards in the neighbouring towns, whereby lads who have left school at an early age may, by attendance for one or more years at evening classes, reach the entrance standard. These preparatory classes are of a distinctly technical nature, and form a good introduction to the courses of study which are subsequently followed in the College. This close co-ordination with the School Boards is of great importance, as by means of the preparatory classes, and by bursaries which are available, it is possible for any lad of ability, however poor or however neglected his early education, to reach the college and to pass on to the highest work taught therein.

Day classes are held in mechanical and electrical engineering, textile manufacture, and art subjects; and the marine engineering and navigation students attend in the daytime; but evening classes form the most important part of the work of the College: more than a thousand individuals being in attendance in the evening from September until May. The courses of study arranged for evening work extend over three or four years, and a student is present on three or more nights each week. If it is kept in mind that an apprentice during this time is acquiring much information in the foundry, factory, or workshop, and that the class instruction supplements his practical experience, it will be realised that the two sources of knowledge aid each other, and permit of much greater progress and higher attainment than would be possible in the time given to class work alone. At the end of his training a student obtains a Full Course Certificate, which is much valued; it is evidence of steady work, and of a very considerable knowledge of the branch of industry with which he is connected.

In accordance with modern methods of instruction great attention has been given to the provision of laboratories and workshops, where the students individually carry out tests or prepare specimens of work. Thus: the College contains well equipped mechanical and engineering laboratories, with experimental steam and gas engines, material testing machines, and hydraulic appliances; electrical laboratories, with testing apparatus and many types of dynamos and motors; chemical, physical, and botanical laboratories; workshops for plumbers, woodworkers, house-painters, and lithographers; and large rooms containing the machinery for the spinning and weaving of jute and flax. This practical aspect is also a feature of the School of Art, where, after a preliminary training, the work of the students is specialised to suit the requirements of those employed in many different branches of art and design. Although much expense is incurred for equipment, and for the carrying out of this practical type of instruction, it is considered to be well worth the outlay, because it is found that the students show much greater interest in the work, and attain to greater thoroughness by the individual efforts they must make to overcome experimental difficulties.

The regular students at the College number over twelve hundred, many of them travelling from the surrounding towns. Also, in carrying out its functions as a Central Institution, over two hundred students from the Dundee Training College for Teachers are taught drawing and nature study by the College staff, and the teachers of navigation go to the towns on the Fife coast during the winter months to give instruction to fishermen who are then at home from sea.

The staff of the College numbers over fifty teachers and assistants, some of whom devote their whole time to teaching, while others attend in the evening to give special instruction in work with which they are practically engaged during the day.

## The High School of Dundee.

By John MacLennan, M.A., Rector.

### A.—HISTORICAL.\*

THE High School of Dundee, which forms one of the finest architectural features of the City, is the direct successor of the old Burgh Grammar School, and, as such, has a very ancient and notable history. As early as the year 1220 we find that the Abbot and Convent of Lindores, under whose charge the Church of St. Mary—which had recently been founded and had taken the place of the old Church of St. Clement as the Parish Church of Dundee—had been put by its founder David, Earl of Huntingdon, were empowered by Gregory, Bishop of Brechin, to place a Vicar in charge of Dundee, and “to plant schools wherever they please in the said town.” No record remains to prove that this design was then carried out, but that a school was founded at a date not much later than this time seems to be borne out by the tradition—of which mention is made by Blind Harry—that the patriot William Wallace was educated at the School of Dundee about the year 1290.

### THE GRAMMAR SCHOOL BEFORE THE REFORMATION.

For the next century and a half we know almost nothing of the School of Dundee beyond the fact that such an institution existed. About 1434, however, we find mention of a priest, Gilbert Knight, being appointed to the charge of the School by the Abbot of Lindores, and of his being removed by the Bishop of Brechin because his management of the School did not meet with the Bishop's approval. Shortly after this date, viz., in 1443, an

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\*For the historical part of this article I am greatly indebted to Dr. Miller of the Dundee Free Library, who has kindly put at my disposal two admirable articles written by him on the subject.

important change took place in the relations between Lindores and Dundee. Through the agency of Richard de Craig, Vicar of Dundee, an agreement was made whereby the control of the Church of Dundee was handed over by the Abbot of Lindores to the Town Council and Burgesses of Dundee, and it is probable that through the same agency, and with a view to securing greater educational efficiency—for Richard de Craig was keenly interested in education, and had taken an active part in the founding of St. Andrews University in 1404—the control of the Grammar School of Dundee passed, in part, at least, from the hands of the Abbot of Lindores to the Town Council. At all events it is certain that from this time the Abbot ceased to exercise paramount authority over the School, though a fierce struggle took place on this point a century later.

#### THE GRAMMAR SCHOOL AND THE REFORMATION.

The people of Dundee were among the first to declare themselves in favour of the Reformation. In 1554 Thomas Makgibbon had been appointed head of the Grammar School, and, with the connivance of the Town Council, he spread the "Lutheran heresy" among his pupils. A bitter conflict ensued between the Council and the ecclesiastical authorities, which only terminated when the Reformation was at length victorious, and the Abbey of Lindores was demolished and the monks dispersed. The Town Council, now confessed protestants, made proper provision for the maintenance of Thomas Makgibbon as Schoolmaster, and took the control of the Grammar School entirely into their own hands—a control which they continued to exercise until the present High School was built in 1832.

#### THE GRAMMAR SCHOOL OF ST. CLEMENT'S LANE.

Prior to the Reformation, there is no record to show where the Grammar School was located, and it was not till 1589 that the first school of which we have any real



BOYS' HIGH SCHOOL.



knowledge, viz., the Grammar School of St. Clement's Lane, was built. This School, which was a two storey building with an outside stair leading to the upper storey, was situated at the south-east corner of the block now occupied by the Town House, and was removed in 1871 when the Town House was extended. For close on two centuries this small and unpretentious building was the principal school in Dundee, and within its walls were educated, among others, David Lindsay, Bishop of Edinburgh, and Sir George Mackenzie, the founder of the Advocates' Library.

#### THE ENGLISH SCHOOL.

With regard to the curriculum of the Grammar School, the subjects taught were Latin, Greek, and Mathematics, and the importance attached to "perfytting the scholars in Latyne" may be seen from the fact that in 1664 the Town Council ordained that "none of the Latin scholars in the Grammar School shall speak English within or without the School, *sub poena ferulae* for the first fault, and if they transgress again they shall be publicly whipped by the Master, who shall appoint public clandestine captors for this effect." As for Arithmetic, Geography, and such subjects, the curriculum does not appear to have made any provision for them, any more than it did for English. In 1702, however, the Town Council, who had become alive to the necessity of making provision for the new needs of a new time, founded another school, called the English School, at which the subjects taught were English, reading, writing, and, later, book-keeping. Each of these schools, the Grammar School and the English School, was conducted by a Rector and two assistants, called "doctors," a third assistant being added in the case of the Grammar School in 1749.

#### THE KIRKYARD SCHOOL.

During the siege of Dundee in 1651 the nave of St. Mary's Church was destroyed, and the Tower, or "Steeple

of Dundee," was left standing apart from the rest of the building. Here in the vacant space between the tower and the transepts the new English School was housed in a building erected for the purpose, and here also at a later period the Grammar School was transferred from St. Clement's Lane. The joint school, or, rather, the building in which the two schools were housed, was colloquially known as the Kirkyard School, and the passage leading to it, which has now been absorbed in Lindsay Street, was called the School Wynd. In 1789 it was decided to rebuild the nave of St. Mary's, and the schools had therefore to move elsewhere. A new school was erected for their accommodation at the corner of the Nethergate and what is now called Lindsay Street, and here accordingly they were transferred.

#### THE DUNDEE ACADEMY.

Meanwhile the Town Council, who felt the necessity for a further extension of their educational programme, had founded in 1785 a third school, known as the Dundee Academy. Provision had already been made, as we have seen, in the Grammar School for classical studies, and in the English School for English, reading, and writing, but nothing had yet been done for such subjects as modern languages, drawing, and applied mathematics. It was to remedy this defect that the Dundee Academy was founded. It was accommodated in a part of the old building known as The Hospital, which stood in the Nethergate opposite the foot of Tay Street, and the staff consisted of a Rector, an assistant, a teacher of French and Italian, and a drawing master. The Rector, James Weir, and his assistant, James Ivory, were both eminent men, who won great distinction in the field of mathematics, but financially the school was a failure, and was closed in 1792. It was reopened, however, in 1801, and Mr Duncan, who afterwards became Professor of Mathematics at St. Andrews University, was appointed Rector.

## THE PUBLIC SEMINARIES OF DUNDEE.

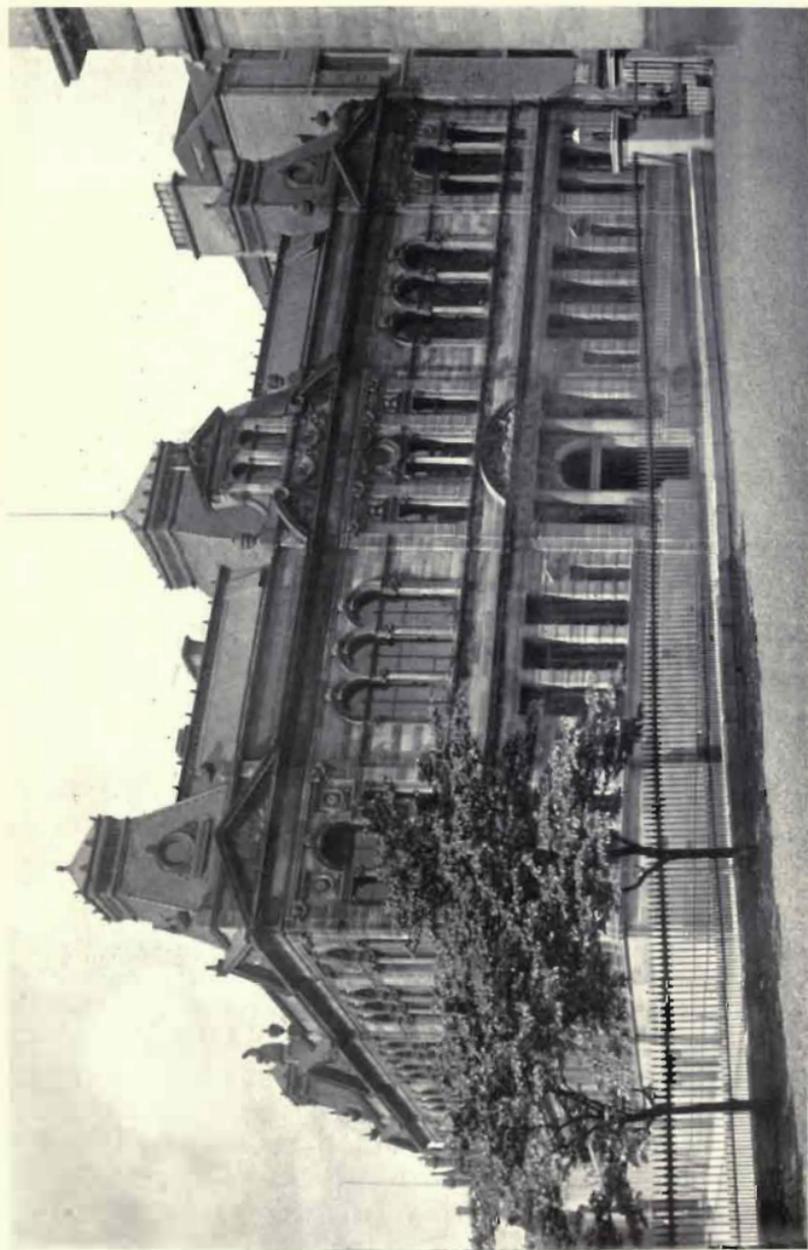
There were now three schools in the town under the management of the Town Council, but the buildings in which they were carried on were very unsatisfactory, and the question of suitable accommodation for them soon became a pressing one. Mr Duncan, the Rector of the Academy, in a pamphlet published in 1815, pleaded ably and eloquently for the building of a new and suitable Academy, but for the time being there was no response, and in 1820 Mr Duncan left Dundee to take up his duties at St. Andrews. At length in 1829, partly as result of the arguments of Mr Duncan, but still more, no doubt, owing to the rapid increase in the population of the town and the total inadequacy of the three existing schools, either in point of accommodation or in the number of teachers (there were, besides, seventeen teachers in various private schools) to meet the educational needs of the town, a public meeting was called to consider the question of building a new Academy. As a result of this meeting an application was made to the Town Council, suggesting that the three schools of Dundee should be combined in one building, and asking that funds should be set apart for this purpose. The Town Council was sympathetic, but the burgh was then in so impoverished a condition that it was felt to be impossible to take money from the rates for building a new school. There were £2,500 available from an old Ale and Beer Tax levied by the Town Council for the support of education, but this sum was totally inadequate. The only course open, therefore, was to organise a public subscription. This was done, and within a month nearly £4,000 was subscribed, and a Constitution for the "Public Seminaries," as the schools were now called, was framed, providing ten Directors from the Town Council and ten from the subscribers as the administrative body.

The next step was to find a suitable site, and, after prolonged and careful consideration on the part of the Directors, a site in the Meadows was chosen, and designs

were invited from several architects. Two designs were regarded with special favour—one by Mr George Angus and the other by Mr George Smith, both of Edinburgh. At length Mr Angus was asked to prepare a design which combined the advantages of both plans. The result was the present High School building, which was begun in 1832 and finished in 1834, at a cost, including playground and enclosures, of about £10,000, the greater part of which was raised by public subscription.

### THE HIGH SCHOOL OF DUNDEE.

The Public Seminaries were now all three located in the same building, but they were kept, as far as possible, distinct from one another. This was not an ideal arrangement, and various difficulties arose. The Academy, which, as we have seen, was a much more recent growth than the Grammar School, was given the chief place, and this was a cause of friction. The headmasters of the two schools also had both the title of Rector, and this was another source of trouble. At length in 1833 the title of Rector was dropped, and at a later date it was arranged that one of the Directors should be appointed as Governor and perform the duties of general supervision usually assigned to a Rector. For the next half-century the title of Rector was in abeyance, till it was revived under the Harris Endowment Act of 1882, Dr. Merry being appointed first Rector of the High School in 1883. The designation, "High School of Dundee," itself dates only from 1859, when, in accordance with a clause in the Constitution of the Public Seminaries and with a view to safeguarding the interests of the subscribers, a petition was presented to the Crown for a Charter of Incorporation. This was granted, and sealed at Edinburgh in November of that year, and under this document the name of "The Public Seminaries of Dundee" was changed to that of "The High School of Dundee."



GIRLS' HIGH SCHOOL.



## THE HARRIS ENDOWMENT ACT.

After the Education (Scotland) Acts of 1872 and 1878 came into force, the School Board of Dundee claimed control of the High School as representing the Parochial School of the Burgh. The Directors of the High School resisted this claim, and an expensive litigation seemed imminent when the late Bailie William Harris came forward and offered to contribute £30,000 for the purposes of education in Dundee, provided a Minute of Agreement between him and the two disputants received Parliamentary sanction. By this Minute he gave £20,000 to the High School, and £10,000 to the School Board, on condition that the latter gave up all claim to the High School and built an advanced school in the Burgh. The Harris Endowment and Dundee Educational Act received the Royal Assent in June 1882, and a new Directorate was appointed, consisting of the Provost of Dundee, the Dean of Guild, the Parish Minister, seven members elected by the Town Council, seven by the subscribers, three by the Chamber of Commerce, and one each by the Guildry and the Nine Trades—twenty-one in all. Following on this, the Harris Academy was erected by the School Board, and opened in 1885.

## THE GIRLS' HIGH SCHOOL.

By his will, Bailie Harris, who was keenly interested in the higher education of women, bequeathed part of his estate for the erection of a girls' department in connection with the High School, leaving his sister life-rented in the property. Miss Harris, however, eager to see this plan carried out in her lifetime, gave up her claim, and handed over to the Directors of the High School the money necessary for building the school. In 1890 the new school was completed, at a cost, including site, of £25,000, Miss Harris having survived to see it in full working order.

## THE HIGH SCHOOL IN RECENT YEARS.

Of the recent history of the High School, and of the many distinguished alumni educated within its walls, considerations of space forbid our giving any account here. Suffice it to say, first, that while, like most of the secondary schools of Scotland, the High School has had to encounter difficulties of various kinds, it has weathered them all successfully, and its success and prosperity have never been greater, or its prospects brighter than they are at present; and, secondly, that, as in former days the Town Council, so in more recent times the Directors have shown themselves wise and enlightened managers, always open to new ideas, and always willing and anxious to keep the school abreast of every educational advance. In many departments, indeed, *e.g.*, in science, drawing, music, dressmaking and art needlework, cookery, and manual instruction, the High School has played the part of pioneer among the secondary schools of Scotland, making provision for the introduction of these subjects long before most of the other secondary schools had done so, and before the Education Department had yet begun to exert any pressure for their introduction.

## B.—THE HIGH SCHOOL AT PRESENT.

## SUPERVISION.

The High School, as has been explained above, consists of two schools—a Boys' School and a Girls' School. Both schools are under the supervision of the Rector, but in the supervision of the Girls' School the Rector has associated with him a highly qualified Lady Superintendent, whose duty it is to exercise a general superintendence over the girls, to regulate their conduct and manners, and to advise and aid them in the preparation of their work. The High School is a secondary school, but it has also a preparatory department, and thus provides a liberal education for boys and girls from the earliest stages to the time of leaving for the Universities.

## ACCOMMODATION.

The Boys' School contains, in addition to the usual classroom accommodation, a large and well-equipped chemical laboratory, an excellent physical laboratory fitted up to meet the most modern requirements, a spacious and newly-furnished art-room, a workshop, a gymnasium, a school kitchen, and two luncheon-rooms. In the gymnasium, which is of ample size and equipped with the most approved apparatus, the girls as well as the boys have drill, calisthenics, and gymnastics under qualified instructors. The benches and other furnishings of the Boys' School, which had got somewhat out of date, have been gradually cleared out and replaced by new and modern furniture, and the whole school has been repainted and done up within the last three years. The stonework of the exterior of the building, too, including the surrounding wall, has been completely gone over and renovated during the same time. A recreation ground, five acres in extent and within easy access, has been provided for cricket, football, hockey, lawn tennis, and other outdoor games and pastimes, which are conducted under careful supervision. The recreation ground is open to girls as well as boys. On Wednesday afternoons the school closes an hour earlier than usual, and arrangements are made whereby every pupil in the school from the age of ten upwards takes part in some suitable form of recreation under the supervision of the masters and mistresses.

The Girls' School, in addition to the usual classroom accommodation, which is of a very complete and thoroughly modern character, contains a large assembly hall, a science lecture-room, an art-room, an enamelling-room, a suite of eight music-rooms, and a luncheon-room. In the furnishing of the school, every provision has been made for the health and comfort of the girls. This year an entirely new and highly successful system of heating and ventilation has been introduced, which has greatly added to the comfort of the pupils, and the system will be extended to the Boys' School at the end of the present

session. Considerable portions of both schools are already fitted up with electric light, and it is expected that the whole of the two schools will shortly be lighted in this way.

#### SUBJECTS OF STUDY.

In the Boys' School the subjects of study include English, Latin, Greek, French, German, mathematics, science, handwriting, book-keeping, shorthand, commercial correspondence, drawing, painting, manual work in wood and metal, gymnastics, military drill, singing, pianoforte, violin, dancing, and swimming. In the Girls' School the same subjects are taught, with the exception of manual work and military drill, for which are substituted needlework, dressmaking, and cookery.

#### CURRICULA.

The School is divided into ten classes.

Up to and including the fifth class—*i.e.*, up to the age of about twelve—there is a uniform curriculum for each class, which every pupil in the class is expected to take. From the sixth class upwards there are in each class four parallel courses of instruction, *viz.*: (1) the classical, (2) the modern with Latin, (3) the modern, (4) the technical (for boys only); and in the eighth class two further courses are added, *viz.*, (5) the commercial, and (6) the domestic (for girls). The first two courses are more especially intended for pupils who mean to proceed to the Universities, the others for those who have in view a business career; but the modern and technical courses are also a suitable preparation for pupils who mean to enter the Universities as students of science or engineering. While it is expected that all regular pupils of the school will take one or other of the above courses of study, special pupils may, on sufficient reason being shown, take any one or more subjects of the school curriculum as special subjects. This provision, however, generally applies only to pupils doing advanced work.

### EXAMINATIONS, REPORTS, ETC.

Examinations are regularly conducted in all classes and departments of the school, and Reports by the Rector and Masters on the progress and conduct of each pupil are sent to parents and guardians three times a year. The Reports by the Examiners of the Education Department, and the results of the Leaving Certificate Examinations are published annually in the School Prospectus.

### LUNCHEON ARRANGEMENTS.

During the interval allowed for refreshment in the middle of the day dinner or luncheon is served in the school. The arrangements for purveying are in the charge of the Rector and the lady Superintendent, who also preside at dinner. The dinners and luncheons are prepared in the school kitchen under the superintendence of the teacher of cookery.

### SCHOOL CLUBS AND SOCIETIES, EXHIBITIONS, ETC.

The school clubs and societies include a Boys' Literary Society, a Girls' Literary Club, and Cricket, Football, Tennis, Hockey, Rifle, and Swimming Clubs. Exhibitions in singing, music, dancing, gymnastics, athletics, swimming, etc., are given in the course of the year, and the school closes annually for the summer holidays with an exhibition of singing and music, at which the medals and prizes won during the session are presented to the successful pupils.

### BURSARIES AND SCHOLARSHIPS.

Under the schemes of the Dundee Burgh Committee for Secondary Education and the Dundee Educational Trust over a hundred pupils receive bursaries which cover the cost of education at the High School. About ten additional bursaries are offered by various other Trusts for the same purpose. For pupils entering the Universities there are about sixteen preference bursaries ranging in value from £20 to £60 per annum for two to four years,

open, and eight of them confined, to the High School. There are also eight preference bursaries of the value of £30 to £40 a year for two years open to former pupils of the High School entering their second or third session at the Universities of Edinburgh or St. Andrews.

#### NUMBER OF PUPILS.

The number of pupils enrolled at the High School during the present session is 564, an increase of forty on last year's enrolment. During the last six years the enrolment has increased by about 180, the increase being almost equally shared by the Boys' School and the Girls' School.

#### STAFF.

The staff of the High School consists of forty teachers—twenty-four male and sixteen female. In each of the Departments of English, Classics, Modern Languages, Mathematics, Science, and Music there are four specialists, and in the case of Drawing, three, whose whole time is given up to the teaching of their own particular subjects, and in order to secure as complete and thorough a supervision as possible each department has at the head of it a highly qualified and experienced headmaster, who has charge of the whole work of his department, helps and advises his junior colleagues, and keeps the Rector in touch with all the details of his department. The headmasters, of whom there are eight, also act as a consulting committee to the Rector in every matter of importance affecting the School. It is thus evident that no effort is spared to make the High School a thoroughly efficient educational institution.

## Primary, Secondary, and Evening Continuation Schools.

By John E. Williams, Clerk and Treasurer, Dundee  
School Board.

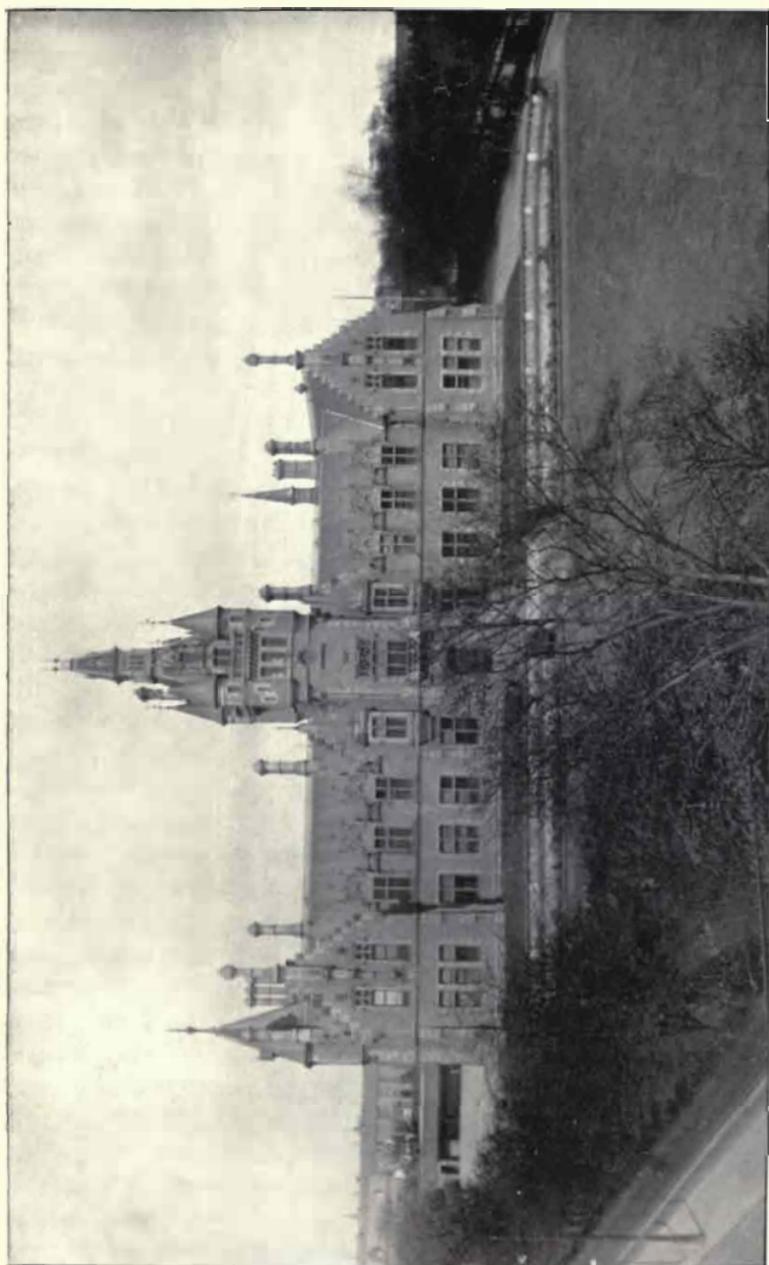
THERE are at present within the Burgh of Dundee 27 Public Schools, consisting of 2 Intermediate or Higher Grade and Secondary Schools, 1 Central School for Supplementary Courses, 22 Primary Schools (9 of which have Supplementary Courses attached to their upper departments), and Schools for the Deaf and Dumb, and for Cripple, Invalid, and Defective Children. Alongside the work of the Public Schools, there is a large volume of State-aided and voluntary educational effort. Within the City are included 8 Denominational Primary Schools, a Half-Time School, 4 Private Schools, 2 Secondary Schools, an Institution for the Blind, an Institution for the Deaf and Dumb, and Industrial Schools for Boys and Girls. These important and varied Institutions combined provide for the educational training of a total population of children of school age, to speak in round figures, of 31,000.

It will be observed that at the base of the system lies the important work of the public and State-aided Primary Schools, to the administration of which a long line of enthusiastic public workers has given unstinted labour and liberal encouragement. For many years prior to the passing of the Education Act of 1872, Dundee, along with other enlightened centres, made voluntary efforts to grapple with the educational and social needs of the masses of her inhabitants. Nor has she been unsuccessful since that period in maintaining a distinguished position among those cities which have been conspicuous in their endeavour to secure better educational advantages for those who, whether rich or poor, are destined to bear part in the work and government of the country in the future. In introducing improved methods of teaching the young, in

providing systematic instruction in subjects of domestic importance for the training of girls in thrifty household management, in organising manual instruction upon a continuous basis through all the stages of the Primary School so that boys and girls may learn to use their hands as well as their heads, in instituting schools of a remedial and alleviative character, in establishing social and recreative institutions with an educational side and other useful agencies of high educational importance, and in a vigorous and philanthropic struggle against ignorance, squalor, and unhealthy social conditions, Dundee has occupied a high place among progressive communities. Nor has she again been slow to recognise, from time to time, the value to a large industrial centre of the development of new resources of public service, of intellectual power, and of business capacity by having a well-organised system of Secondary and Higher education resting upon a sound basis of primary instruction, and by providing for all boys and girls of marked ability from the Primary Schools adequate educational facilities to rise to positions for which they are fitted by their talents, and thus making it possible to secure a return from all the other branches of her educational expenditure.

#### PRIMARY SCHOOLS.

With regard to the curriculum of the Primary Schools, the rudimentary instruction is practically the same in all cases, special regard being given in the preparation of the syllabuses to the circumstances of each particular school. According to the Education Code, the scheme of training must make provision for the instruction of the scholars in every department of the school in the three subjects of Reading, Writing, and Arithmetic, according to the degree of advancement and suitable to the capacity of each scholar. The other subjects which must be included in the Scheme of Work of all divisions are Physical Exercises, Needlework for Girls, Singing, and Drawing, and for the Junior and Senior Divisions, Nature Study, English, History, and



MORGAN ACADEMY.



Geography. All the divisions of the schools are also given some form of Handwork, such as Clay Modelling, Paper Folding, and Cardboard Modelling, and the work under these subjects is closely co-ordinated with the instruction given in the remainder of the curriculum. At or about the age of twelve the pupils of the Primary Schools are expected to be sufficiently well advanced in their educational training to have completed the Primary Course and to pass a Qualifying Examination which is the test laid down by the Scotch Education Department for all pupils prior to their admission to the Supplementary Courses or to the Higher Grade or Intermediate Schools.

#### SUPPLEMENTARY COURSES.

Having passed the Qualifying Examination, the pupil has the choice of entering upon the work of the Supplementary Courses or gaining admission into a Higher Grade School. The Supplementary Courses are intended for pupils who have completed a Primary Course and do not desire, or are unfitted for, a Secondary Course. As the Scotch Education Department puts it, such pupils will employ the latter stages of their school life "better in consolidating the knowledge which they have already acquired and in giving it a practical turn towards those affairs of life on which they are about to enter than in adding to it a smattering of new subjects which they have no intention to pursue."

The Supplementary Courses are in operation at present in most of the schools in the west end of the City and in Lochee, and also in Stobswell Central School, and generally include instruction in the following subjects, with slight deviations to suit particular schools, viz.:—English, including Grammar and Composition, History, and Geography; Arithmetic; Duties of Citizenship; Singing; Drawing and Nature Study; Laws of Health and Physical Exercises; Elementary Mathematics, Algebra, Geometry, and Woodwork for boys; and Needlework Cookery, Laundry, (including Housewifery), for girls. The

pupils enrolled in Supplementary Courses range themselves into three divisions :—(1) Pupils over 13 at date of qualification and leaving school at 14 ; (2) pupils qualified at 12 and who also leave at 14 ; and (3) pupils who remain at school beyond the age of 14.

And this brings us to the latest progressive educational movement in Dundee—the centralisation of the work of Supplementary Courses in the east end of the City. Stobswell Central School for Supplementary Courses—the first of its kind in Scotland—was erected for the purpose of providing a more comprehensive and at once a more economical and more efficient organisation of suitable supplementary training for all the above three divisions than was possible in the several contributory schools from which the pupils are transferred on passing the Qualifying Examination. The principal aims of Stobswell School may be stated in a few sentences. They are :—(1) To avoid waste of effort and money in the process of re-organising the educational resources of the City ; (2) to combine the elements of a liberal education with direct preparation for the practical duties which the pupils are likely to be called upon to discharge on leaving school at 15 or 16 ; (3) to raise the standard of efficiency of the Primary Schools ; (4) to provide preliminary technical training and thus reduce to a minimum the need for and the cost of Evening School Preparatory Classes for specialised instruction ; (5) to produce and maintain a steady supply of well-trained recruits for the industrial, commercial, and domestic pursuits of the City ; and (6) to prepare the pupils for the rational enjoyment of their leisure time.

One of the chief objects of Stobswell School being to ensure that pupils may profitably attend school until they have attained the age at which they usually become apprenticed to trades, or enter upon commercial careers, its curriculum provides for pupils between the ages of 14 and 16 special courses of instruction adapted to prepare them most fitly for their future occupations. The plan of studies is divided into three branches according to the needs of the scholars,

viz. :—(1) An Industrial Course for Boys who are to be apprenticed to constructive trades; (2) a Commercial Course for Boys and Girls intending to enter upon business and commercial careers; and (3) a Household Management and Domestic Science Course for Girls. The local Burgh Committee on Secondary Education, empowered by the Education Act of 1908, have established a system of bursaries to enable pupils to attend these prolonged courses of instruction; and it is anticipated that in due time a large number of parents who are unable to keep their children at school beyond 14 years of age without some financial aid will take advantage of the improved educational opportunities thus placed at their disposal for the equipment of their children in subjects which have an important bearing on the theory and practice of their future employment.

Opened in August 1908—a Pioneer School—Stobswell School has many problems still to solve, but its initial career has been attended by many remarkable results, and amply justifies the prescience of its promoters. The school produces a very favourable impression upon those who study its work. Its great merit consists in its success in cultivating the interests and widening the mental outlook of the pupils, while at the same time it does not neglect their practical needs. Although the equipment of the school is not yet complete, its present roll of students includes a considerable number of pupils between 14 and 16 years of age; the regularity of attendance is very marked; the school is most popular with the pupils and rapidly gaining the confidence of parents, employers of labour, and the community generally, while it has been instrumental in stimulating Education Authorities to institute similar centres in widely separate communities.

#### SPECIAL SCHOOLS.

*The School for Deaf and Dumb Children* in Dudhope Park has been in existence for many years. The children are taught on the combined manual and oral system. The

subjects of instruction include English, History and Geography, Arithmetic, Drawing, Manual Work, and Physical Exercises. The little girls are instructed also in Sewing and Knitting, while the older girls are taught Cookery and the use of the Sewing Machine and Dressmaking. Paper Folding, Clay Modelling, Needlework, and Basket Weaving have recently been added to the list of manual occupations. The number of pupils on the school roll is about 35.

*The School for Cripple and Invalid Children*, which was originally instituted by the Invalid Children's Aid Association Branch of the Dundee Social Union, came under public control in March 1905. The Association, with the assistance of a number of voluntary helpers, still takes charge of the arrangements for supplying the children with their dinner in school—the parents of the scholars in the great majority of cases contributing a small weekly sum to cover the cost.

The courses and hours of instruction are so arranged as to ensure the best results with the least fatigue to the scholars. In the morning, the instruction includes ordinary school subjects—the three R's, Composition, History and Geography, while the afternoon period is devoted to different forms of Hand and Eye Work. Boys and girls alike share in all the instruction. During the warm Summer months as much of the instruction as possible is given out of doors. The number of children on the school roll is 82, and the school is doing most important and much needed educational work of an alleviative character in a very effective manner. It has now, however, reached the limit of its accommodation, and the erection of a larger school upon more modern and hygienic lines for the training of physically and mentally defective children is at present under consideration.

#### SECONDARY SCHOOLS.

The Higher Grade and Secondary Schools under the control of the Education Authority consist of the Harris and Morgan Academies. The erection of the Harris

Academy was the result of a dispute in 1880 regarding the ownership of the High School between the Dundee School Board and the then existing Board of Directors. The late Bailie Harris, who was a warm friend of the High School, offered the School Board the sum of £10,000 on condition that they would relinquish their claim to the school, and to put an end to all litigation the School Board accepted the offer and built the school which now bears his name. It was opened for the reception of scholars in September 1885.

The Morgan Academy, originally known as the Morgan Hospital, was erected in 1868 for the purpose of boarding and educating 100 boys in circumstances requiring assistance in fulfilment of the intention and testamentary bequest of the late Mr John Morgan, a native of the city. The work of the Hospital was carried on under the original scheme for a period of twenty years, but in the year 1888 the Commissioners appointed under the provision of the Educational Endowments (Scotland) Act, 1882, recommended that the scheme be departed from, and empowered the Trustees to sell the buildings, and provided that the funds of the Trust should be administered by a representative body of governors, and be devoted to the education and maintenance of poor children while residing in their own homes, and also to the award of bursaries for Evening Classes in higher or technical education in Dundee. The buildings were acquired by the Dundee School Board at a cost of £15,500, and the school was opened by them under its present title in September 1889 as a Secondary School with a Primary Department attached to it.

The work of these two Academies is well known, and, like many other schools of a similar kind, their curriculum is so arranged as to facilitate the admission of pupils from the Primary Schools at about twelve years of age, covers a period of at least five years, and embraces a broad combination of literary, linguistic, scientific, and artistic studies. At the end of the first three years of the Course, the pupils are as a rule ready to take their Intermediate

Certificate, and the remaining two or three years are devoted to preparation for the Leaving Certificate, the passing of which admits students to the Universities, and besides guarantees that its possessor has undergone a full Secondary Course and a sound intellectual training which will be of supreme utility to him in his future experience. These two public Secondary Schools are also recognised as centres for the training of junior students, where candidates for the teaching profession receive their preliminary training after passing the Intermediate Certificate and before entering the Training Colleges for full training as teachers.

#### EVENING SCHOOLS.

No branch of the public provision of education has shown greater development during recent years than the Evening Continuation Schools, whose work is conducted in fourteen centres conveniently distributed throughout the city.

Consequent upon the reform initiated a few years ago with a view to the better co-ordination of the instruction given in the Elementary Classes with the higher work done in the more advanced schools, there has now been firmly established a well-defined and thoroughly graded scheme of Continuation Schools; and students are required, with few and judicious exceptions, to take groups of subjects, and to follow systematic courses, extending over a period of years, through which they are enabled to enter classes of a higher grade, and to pass to the Advanced Commercial Classes in the Academies and to the Technical Classes in the Technical College.

The schools apportioned to the work are divided into three sections, the first of which, beginning at the bottom, comprises the *Elementary Continuation Schools*. These schools are intended to meet the needs of three types of pupils, viz.:—(a) Those who leave the Day School before reaching the age of 14, (b) those who leave the Day School at 14 without completing the Course, and (c) those who complete the Day School Course satisfactorily, but neglect

thereafter to take immediate advantage of further educational facilities and lose their previous knowledge, without which they find they cannot make any headway in life. Qualified pupils are drafted from these schools to the Preparatory Commercial and Technical and Domestic Schools as the case may be. The subjects taken up under this section are English, Arithmetic, and Drawing, and in some cases Woodwork for boys and Needlework for girls.

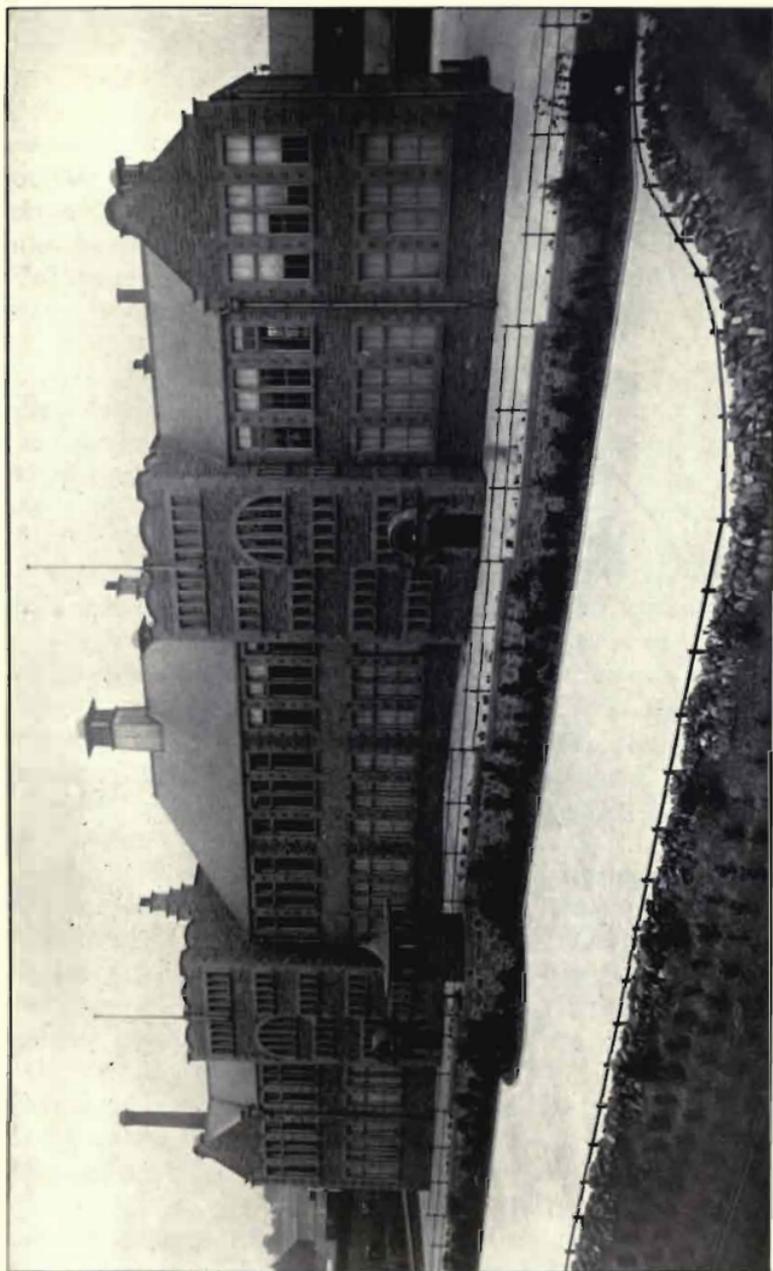
The next section embraces the *Preparatory Commercial and Preparatory Technical Schools* for the reception of students from the preceding section and others not sufficiently prepared to reap full benefit from attendance at the central schools for their further instruction—in the case of the Commercial Course—in English, Arithmetic, History and Geography, and in the case of the Technical Course—in English, Workshop Arithmetic, Free Drawing, Solid Geometry and Scale Drawing, and Manual Training. The purpose of these classes is to lay a solid foundation of general education upon which to build the superstructure—as without it, further attendance at Advanced Classes is mere waste of time, money, and energy.

The second section naturally leads and dovetails into the third—the *Central Commercial and Technical Schools*—which have been instituted for the provision of advanced study in subjects of practical utility to students in their daily occupations, a knowledge of which it is essential they should possess if they aspire to more responsible positions. The second, third, and fourth year courses of the Commercial work are taken at the Harris and Morgan Academies, and the subjects, which are dealt with from the industrial and commercial point of view, are English, French, German, Spanish, Arithmetic, History, Geography, Business Methods and Management, Book-keeping, Short-hand, and Typewriting. The Technical Classes, which include instruction in Practical Mathematics with experimental work, Mechanical Drawing, and Technical Free Drawing, specially adapted to the several branches of the engineering, building, and other constructive trades, form a broad preparation for students who propose to enter

the Technical College, and are accepted as such by the College.

It will thus be observed that there exists in the Evening Schools a varied and highly organised educational provision for thorough equipment in subjects bearing upon the industries and commerce of the City; and the most pressing duty at the present time is that the youth of Dundee, in whose hands will lie much of the economic and civic welfare of the burgh, should take the fullest advantage of the facilities placed at their disposal.

The Education Act of 1908 contains among its many important provisions the discretionary power on the part of School Boards to make attendance at Continuation Classes compulsory upon all young persons under 17 years of age, and to restrict the hours of their employment so as to enable them to attend such classes. The voluntary system has been tried, and, though good work has been done, and with an improved organised effort between Education Authorities and Employers of Labour better results may yet be obtained, still it is difficult to avoid the conclusion that the voluntary system fails to secure the enrolment of the very class who would derive the greatest benefit from attendance at the classes.



DENS ROAD SCHOOL.



## The Voluntary Schools in Dundee.

By Rev. Provost Holder.

Although there exist in the City numerous private educational establishments the chief voluntary or denominational schools are those belonging to the Roman Catholic and the Episcopalian bodies. These are all in receipt of the Parliamentary Grant and are under the direct control of the Scotch Education Department.

### THE ROMAN CATHOLIC SCHOOLS.

When the Catholic body in Dundee was but small and insignificant as compared with the population of the town, the education of the young engaged the serious attention of the Clergy. In the plans for the erection of St. Andrew's Church in the Nethergate, provision was made in the basement for the accommodation of some two hundred scholars and a school was at work there as early as 1836. In the Catholic Directory for 1844 it is recorded, "there are three small schools in various parts of the town." The writer has never been able to trace their location but these "schools" were doubtless typical examples of the "adventure" establishments, killed later by the Education Act of 1872, and seminaries of a very unpretentious and humble order.

In 1847, St. Clement's Academy was opened at Wellburn, Lochee. It was conducted by R.C. Clergymen assisted by lay teachers. Of this Institution a recent writer says: "As a seminary for the board and education of young men who purposed to enter upon learned and commercial professions it was much made use of."

In the early fifties the numbers of the Catholic population rose with great rapidity, and much zeal was put forth in the direction of providing accommodation for the great influx of children of school age. A large property in Blackness Road was secured in 1861, and was converted into well-arranged classrooms, with places for over 800 girls and infants. These buildings, which have since been

greatly extended, are known as the St. Joseph's Girls' School. The school in Larch Street was built in the light of more modern ideals and at very considerable expense; it was opened in 1863. To this were transferred the boys from the basement in the Nethergate, and it became later the St. Joseph's Boys' School. The same activity was shown in the eastern part of the town. The St. Mary's Schools for boys and girls in Forebank Road and Powrie Place were built in 1861 and 1864, and shortly after had attendances of three and four hundred respectively. Similarly, in 1866, a hall and adjoining property was acquired in Burnside, Lochee, and was used for educational purposes. It made way for the commodious Lochee St. Mary's Boys' and Girls' Schools opened in 1872. The St. Andrew's School for girls and infants in the Overgate, then about one-third of its present extent, was built in 1871 and opened, as was also the St. Andrew's Boys' and Girls' School in Tay Street, in the following year.

At the passing of the Education (Scotland) Act in 1872, the Roman Catholic body in Dundee refused to transfer their schools to the newly constituted School Board and, at the cost of very great pecuniary sacrifice, have retained them ever since. Indeed, without exception, the above-mentioned schools have been largely extended; two of them have been more than doubled in their seating capacity since the passing of the Compulsory Clause, while St. Patrick's, in Lilybank Road—a new school with 544 places—was opened in 1891. This last is the only mixed R.C. School in the city; in all the others the boys and girls are in separate buildings, under male and female teachers respectively. These have now a joint average attendance of 1450 scholars. In addition to these elementary schools, there is also a Higher Grade School for young ladies under the charge of the Sisters of Mercy at their Convent, Lawside Road, where pupils are prepared and examined for the Leaving Certificate. The attendance at present is about sixty.

There are now ten Elementary R.C. Schools in the city, possessing a recognised accommodation of 5,602 and

an attendance of well over 5,000. In the Roman Catholic Schools therefore more than one-sixth of the total school population of the Burgh is housed and trained. The schools are all well equipped both in respect of teaching staff and educational furnishings. They are favourably reported on by His Majesty's Inspector of Schools, and are in receipt of Grants that compare well with those of the public elementary schools of the city. They all provide the supplementary courses. In St. Andrew's, St. Mary's, and St. Joseph's, manual instruction (woodwork) is taught to boys by qualified teachers in fully equipped workshops attached to the schools; while cookery, laundry-work, and domestic science are imparted to girls, also in suitable premises in connection with the school buildings.

#### THE EPISCOPALIAN SCHOOLS.

Until quite recent years the voluntary schools maintained by the Scottish Episcopal Church in Dundee bore witness to the strong desire of the Church to provide a sound elementary education, religious and secular, for her children. So late as five years ago these schools had an average attendance of 1,540, and the schools themselves were excellently staffed and equipped. The oldest of the Episcopal Schools, St. Paul's, like the first of the R.C. Schools in the town had a humble origin. Known first as the Roodyards Episcopal School, it was placed in the eastern part of Dundee, opposite the present Cattle Market. It migrated to "more commodious premises" in the Seagate, Meadowside, and Wellgate, till in 1889 the present fine buildings at Castlehill, hard by St. Paul's Cathedral Church, were thrown open. Erected at a cost of over £4,000, St. Paul's is a mixed school, with a department for infants; it provides accommodation for 432 scholars. Supporters of the Voluntary principle deeply regretted to see the Episcopal St. Salvador's School which, with places for 850 pupils, had for fifty-three years been doing excellent work, handed over to the School Board in November 1907, and they will learn with deeper concern that the St. Paul's School is also to be transferred to the same

authority at the end of the present session. There can be no doubt that these capitulations have been reluctantly effected by the financial strain put upon the managers of these schools by the ever-increasing demands of the Department with regard to extended accommodation. For not only must the managers of a voluntary school—deprived as they are of all help from the school rate—defray out of private funds the cost of all structural alterations and additions, but even the maintenance of the school from year to year involves a large expenditure—taken from the same source—over and above the Department's Grants, and corresponding in amounts to the outlays by School Boards to supplement their grants and taken out of the school rate.

With the disappearance of St. Paul's, the Episcopalian body will be left with two schools only, both small and not likely to be extended. St. Martin's, in Derby Street, was opened with a single room in 1863. In 1869 was built the present school, with a recognised accommodation of 271. St. Margaret's in Ancrum Road, Lochee, close to the Church of the same name, has a delightful situation and is a handsome little building. It possesses places for 200 scholars but the present attendance is far short of that figure. It is impossible to look upon these remnants of a once powerful organisation with comfort or hope.

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### Private Schools.

By the Editor.

IN addition to the foregoing endowed State and Rate aided Institutions, providing for all the requirements of modern education, there are still in Dundee a number of private schools with a not inconsiderable clientele. The more important of these are—

SEYMOUR LODGE Ladies' School originally founded by the Misses Walker over sixty years ago, but which is now ably conducted in most attractive surroundings both as to house and grounds by Misses Cumming and Wallis. Its students, who are now as numerous as at any time during its history, are drawn from the best local families, some of those in attendance representing a third generation of its pupils. While girls constitute the major part of its enrolments, small boys under eight years of age are taken in its preparatory department. The teaching is carried on entirely by trained mistresses of high scholastic attainments, and pupils are prepared for the Leaving Certificate, and also for the musical examinations of the Royal Academy and Royal College. It fills a unique place in the educational life of the city and district.

CONSTITUTION ROAD SCHOOL, opened in 1895, is carried on most efficiently by Miss Lloyd. It is recognised by the Scotch Education Department, and pupils are trained successfully for the University, the Leaving and Intermediate Certificates, and all grades of the examinations of the Royal Academy of Music. Music has always been a strong point, and the annual school concert is a most popular feature.

BANK STREET INSTITUTION has for the past forty years been conducted with marked success by Miss Milne. It caters specially for those children who for various reasons, health or otherwise, are unable to mix in a crowd comfortably, and who require individual care with the view of evolving the best that is in them. Two generations of young Dundee have come under Miss Milne's care, and she looks back upon a very happy life spent in their service.

SPECIALISED WORK.—Along with private schools offering an individual care in general education, such as those above referred to, there are also many institutions of a more distinctly specialised character. One of the more important developments of recent years in this way has been that of schools training for matriculation and professional examinations, for the Civil Service, and for

business life. Of the former SKERRY'S COLLEGE, with headquarters at Glasgow, has a Dundee branch under the supervision of Mr P. Cumming Collie, which offers special preparation for matriculation and professional examinations as well as for those conducted by the Civil Service Commissioners, and a large number of students from the city and surrounding district avail themselves of the opportunities it offers. The TRAINING ACADEMY, carried on in Y.M.C.A. rooms, by Mr J. Abrach Mackay, aims at preparing specially for Government service, and also appeals to a clientele of its own. Of schools training specially for commercial examinations and business life, perhaps the most important are PATON'S COLLEGE, carried on by the writer in Reform Street, and BRUCE'S in Albert Square. The requirements of modern business life are now so complex as to call for special training not only in the commoner subjects of handwriting, English correspondence, and arithmetic, but also in shorthand, typewriting, bookkeeping, and the various machinery associated with the conduct of modern business, and this is not to be had otherwise than under conditions which approximate as nearly as possible to those obtaining when actually at work.

Altogether, at the several institutions mentioned, it may be estimated that there are constantly undergoing preparation several hundreds of students, and the tuition being of a most practical kind is of corresponding benefit to those availing themselves of it.

Other specialities called for in acquiring the arts and graces of life, associated with the culture of mind or physique, are all adequately cared for in a centre which only during recent years has become a field of educational force and influence.

## INDUSTRIAL AND COMMERCIAL LIFE.

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### Introduction.

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DUNDEE is essentially a commercial and industrial community, and it has been thought fitting that some space should be devoted to a brief résumé of its manifold activities in this direction. While the larger industries, and those which lend themselves with advantage to more extended description, are dealt with under their appropriate headings, these do not by any means exhaust the interests in which Dundee's men of business are engaged.

As a CENTRE OF EXPORT the city occupies in some respects a unique position, local Consular returns affording but a slight indication of the extent of the operations of a round dozen of firms, which might be named, and which carry on business of enormous magnitude and world-wide in its scope. When one realises that 50,000 tons of jute bags are annually required for handling the crops of the Argentine Republic alone, and that a large proportion of this business is secured by local firms even although the goods in most cases may be shipped direct from Calcutta to Buenos Ayres, one can readily see the possibilities of business carried on in such volume. Or when we learn that a single order for Hessian may involve a quantity of 5,000,000 yards, even at a price of only a few coppers one can readily calculate the amount of money involved. Albeit the local merchant house handles products of all kinds—textile, metal, produce. It must be understood that this is business carried on by Dundee brains, financed by Dundee money, secured by Dundee enterprise, and resulting no doubt to Dundee's profit. Articles of commerce, which in no way have any association with the city, may be shipped on Dundee instructions direct to

South America, the United States or Canada, South Africa or the Far East, and all this in such a quiet, unostentatious way that only those interested in the business themselves realise the magnitude of the interests involved.

SHIPPING.—In olden times when wind and tide alone were responsible for the regulation of business on the great waters, the number of ships registered at the Port of Dundee was much greater than now, although a comparison of the tonnage would, of course, make an enormous difference in favour of the present day. At the same time it is much to be regretted that of late years the tonnage of vessels registered at the port has tended to decline. The sale of the fleets of the "Loch" and "Gem" lines was a misfortune which we could well have been spared, while the transfer of the Thomson line control to Newcastle was also a distinct loss to the community. There are, however, still some not unimportant shipping concerns intimately associated with the city and port. The chief among these is, of course, the "Den" line, so long and ably conducted by Messrs Charles Barrie & Son, whose senior—Ex-Lord Provost, more familiarly known as Captain Barrie—occupies a unique place in the affections of the community, which one would hope he may long be spared to fill. The Dundee, Perth & London Shipping Company has for over a hundred years occupied an outstanding position among coasting liners, its stability as a sound commercial concern never being higher than under present management. Among other local registrations and shipping interests to which reference might also be made are those of the Mudies, the Mitchells, the Nicols, the Angus Shipping Co., and the four masted sailing barque "Westfield," 1020 tons in register, and 1800 in D.W. capacity; while an extensive coast trade is carried on with Newcastle, Hull, Aberdeen, and ports all round the British Isles by means of Langlands and other direct traders. With the improvement in freights evidenced during recent years, it may be hoped that Dundee's register of shipping may show a not inconsiderable advance in the near future.

Coming to manufactured goods, we find that the city and district has an astonishing variety of industries, ranging from *Furniture*, in which at least three firms are engaged, and employ a large number of men, *Oils and Paints*, in which three firms are also engaged, *Clothing*, for which there is one considerable factory, *Linoleum*, which may form the nucleus of an important industry in the future, *Manure and Feeding Stuffs*, *Milling*, *Papermaking*, *Chemical Works*, while extensive *Quarries* are carried on in the vicinity. The outstanding position taken by Forfarshire stone for building purposes naturally gives the county a prominence in this industry. To some it seems a misfortune that Dundee does not possess a hinterland with coal and iron, but as will be seen elsewhere this is to some extent compensated for by the importance of agriculture, evidenced by the fact that in the spring months of this year no less a quantity than 100,000 tons of potatoes were shipped from the port!

Despite the variety in its industries there is always a pressing call for extended opportunity for male labour, and to firms on the outlook for favourable positions for centering new industries, it is believed by those well qualified to judge that from all the points of view which require consideration—ample provision of land on favourable terms, ready access by rail or water, low overhead rates, cheap power, and an abundant supply of labour—Dundee is able to offer inducements which will compare more than favourably with centres which advance more pretentious claims.

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## Trade and Industry in Dundee.

### Textiles.

By David Ritchie.

THE history of the Textile Trade of Dundee has its commencement far back in the centuries, and it has been so well written about that the townspeople have a full knowledge of, and are saturated with, the details, making it in a manner superfluous that this further contribution be otherwise than a short summary for the benefit of those Members of the British Association who may be interested in the Staple Trade of Dundee, and who may be present at this year's meeting.

A loyal adherence to the wise limitations imposed on this paper necessarily implies a qualified incompleteness, by reason, for one thing, of the adoption of a minimum of statistics, which will be used only where imperatively required, thereby probably affording visitors if only *un coup d'oeil*, so to speak, regarding the main facts; yet sufficient, perhaps, to enable one to grasp them.

Dundee has throughout the whole of Scottish history been noted as a commercial centre, and in this connection it may be allowable to diverge a little, to note a few of the articles of commerce, which, although for the most part not partaking of the character of textile, may safely be recognised as the forerunners of what is now the chief staple trade. These articles were thread, cordage, canvas, bonnets, buckles, gloves, sugar, soap, and candles. From one cause or another the most of these trades fell into decay, the exceptions being the three first named.

With reference to this decay, it is more than probable, as gleaned from private sources, that the main contributory cause was the disastrous drain of "liquid cash," having its beginning as far back as the year 1698. There was then launched the gigantic swindle known as the Darien Scheme,

or in popular phraseology "The South Sea Bubble," which spread virtually a financial black plague over this country. By this speculative mania all classes in Dundee, from the richest to the poorest, who could scrape together, by small coteries, the requisite amount to purchase a share, became firmly enmeshed. It may accordingly be easily imagined that many years passed, during which self-denying and acute pinching were universally the tacit order of the day, ere financial equilibrium was restored. England's attitude in the affair, being most unfriendly, actually and directly accentuated Scotland's grave disaster.

Afterwards, although comparative success attended trade in Dundee for a very long period, with the usual "ups and downs," it was in reality only at the beginning of the nineteenth century that Dundee's great development took place, when steam-power revolutionised the old, slow, antiquated systems.

**Hemp.** The first important fibre to be noted is Hemp, the development of which is not without a special interest peculiar to itself. This fibre was grown on several farms in the vicinity of Dundee and in one or two of the neighbouring counties. The quantities brought in by the farmers individually were not by any means large, but relatively so only in the aggregate. Samples were shown in the market, which was then held at the lower end of Rotten Row, afterwards named Bonnet-hill, and now known as the Hilltown. It was believed (according to tradition) that the place was chosen to save "plack" dues exacted by the Burgh of Dundee, the Barony of Hilltown being beyond the boundary of the former, and outwith its jurisdiction. The market stance was afterwards changed to Thorter Row, at the north-west end of the High Street, then later to the Cowgate, and for the past thirty to thirty-two years its location has been, as at present, in the vicinity of the Royal Exchange.

One marked feature, relative to the samples submitted at the market stance, was the implicit confidence of the buyers that the bulk tendered subsequently was in every respect

conformable to samples. *En passant* as to samples and the bulk in those days being equal, it may be permitted to indulge in a comparison, even although "comparisons" are (à la Mrs Malaprop) "odoriferous," viz.:—the thoroughly justified trustfulness then, with the present day's experiences which are painful, wasteful, annoying, as well as entailing loss, inasmuch as the compensation oftener than not is inadequate.

From the earliest days the business in fishing nets attained considerable dimensions. These were made by a more or less primitive method. Some years after, however, a member of a then well known firm of merchants in Dundee hit upon an excellent way of making nets, which being more scientific (whereby greater strength was imparted and endurance attained), was afterwards pronounced eminently practical and therefore successful. The result was a speedy overflow of orders, with a continuity thereof, coming, chiefly, from the coast towns of Scotland, England, and many other places. Fishermen themselves conducted a large amount of business in such nets, transferring them to many small vessels and boats as opportunity occurred, receiving in exchange certain articles which were of necessity landed in the quietest manner possible, oftenest, as may well be imagined, during the silent watches of the night, and the murkier the weather the better for their purpose.

Sunn Hemp as an Indian product was imported here in 1804 and probably at an earlier date. The fibre, although possessing several valuable qualities suitable for cordage, sailcloth, selvages, and a few other uses, has never, however, reached any but inconsiderable proportions even up to the present day.

Hemp Cordage and Canvas also accounted for a goodly proportion of the consumption of the raw material, there being about half-a-dozen firms, chiefly leading citizens, engaged in the branch as Hemp, Rope, and Twine Manufacturers. The ever increasing demand for Hemp continuing, necessitated recourse to foreign countries which first comprised Holland, Prussia, and Russia. As

regards the imports of Hemp, despite the most diligent researches, no trace could be found of the figures between the supposed first import date of 1741 and 1791, when the Custom House records noted the total of 299 tons, rising to 2,733 tons in 1823, and in 1825, 2,307 tons. Thereafter decreases were recorded, until in 1850 the amount stood at 1,104 tons, 1901 shewing an increase to 2,294 tons, and 1910, 2,657 tons. The causes of the falling away of imports were chiefly a succession of bad harvests beginning in the year 1826, and with few breaks to relieve the gloom continuing right up to the eve of the Crimean War. The continued scarcity of ready money for a considerable number of years tended in a very marked manner to the handicapping of business.

**Flax.** Flax was cultivated in Scotland much more extensively than Hemp. As may be supposed, the counties contiguous to Dundee devoted a fair proportion of acreage to growing this crop. For a considerable number of years, and up to within a comparatively recent period, the fields south of the Tay were in the usual rotation sown with Flax seed. Almost the whole of the northern slopes, extending from Maryton (the original name of Newport) right eastwards to near Ferry-Port-on-Craig (now named Tayport), made a fine display when the Flax was in bloom, shewing its pretty blue tint as the wind swayed the stems and the sun shone brightly, especially in the afternoons. The stalks when reaped were conveyed to a scutching mill, known now as Northfield.

After due treatment and preparation, the Flax was then ready for spinning by distaff and spindle. This process was, naturally, a slow one regarding the production of Yarn, and this continued to be the case for a very long term of years, even up to 1533, in which year appeared to the manifest benefit of the trade that most valuable invention, the Spinning Wheel, which, many years after, was superseded by the Spinning Frame, each improvement in machinery bringing in its train great increase in

production, with more uniformity and evenness in the Yarn, all of which speedily resulted in an ever-extending demand, the Yarns and Cloth being more attractive, and tending towards a considerable lessening of cost. The Linen trade has, indeed, had a cyclical succession of vicissitudes all along the path of its most interesting chequered history, right down to the present day. Almost every time the trade got its head above water there quickly followed a reverse. One of the most disastrous of these reverses occurred at the time of the siege of Dundee by one of Cromwell's cruel generals in 1651, from which business took a long series of years to recover. The interregnum between the decay of the old trades (already mentioned) ended only with the advent of the year 1707, when another cheering gleam appeared in the shape of a fresh revival of business, accelerated by Parliament enacting a statute allowing a bounty on all cloth exported. The bounty rate, it is interesting to note, was both liberal in terms and differentiating as to its destination to foreign countries, *e.g.*, to British possessions it was 5d. to 6d. per yard, and to foreign ports as high as 1s. 6d. per yard. The *raison d'être* for this Parliamentary liberality was that Dundee had throughout its whole history suffered exceptionally, and the bounty appeared to be the only solatium ready and simple. The withdrawal of the bounty by Parliament occurred in 1832, as signs were not wanting that trade seemed to be broadening its various bases. At the same time there were not a few of the worthiest citizens who started an outcry that the withdrawal of the bounty would assuredly militate against the interests of the trade; but proof to the contrary from various sources became so irrefutable that all opposition was withdrawn. Only a short period was required to shew that the trade no longer needed such fictitious and adventitious props, or, let us say, "spoon-fed" meat. But to revert to the sequence as to years; the period between 1800 and 1810 was one unbroken decade of leanness, sending trade down to unheard-of depths of financial despair, the prices of Flax falling from £140 per ton (and

in a few instances for very superior quality ranging as high as £150) to £80, latterly receding to even £75 per ton. This financial crisis was really one of the acutest the trade had ever sustained, disaster following disaster in rapid succession, firms of hitherto undoubted stability going down like grain before a sickle, individual losses ranging up to even six figures down to a few hundreds of pounds, thus shewing the wide sweep of the terrible crisis. The total amount of these losses was so grievous that within half of the decade no fewer than 240 banking establishments in Britain had to shut their doors. The others who rode out the gale bravely were, nevertheless, so heavily involved that years passed ere they made up their losses. It is not difficult to imagine that recovery from this cataclysm was painfully slow, commencing about 1815, when a great and much needed impetus was derived from a wise and far-seeing extension of the Harbour, which, up to that date, being sadly incommodious, militated severely against trade and all the other interests of the town. Business gradually increased in volume, the flood-tide of prosperous days flowing right merrily on until the beginning of 1820. The prospects looked bright and gay, when with startling suddenness one of those commercial panics, which inexplicably occur so frequently, burst out in London, Upas-tree-ing the entire Kingdom, leaving in its trail a vast tract of devastation and incalculable loss and ruin; Dundee business actually seeming to have been obliterated. However, rising wonderfully to the occasion, Dundee displayed most manfully its recuperative powers and resources, plus its characteristically dogged energy, aided by liens on warehoused goods amiably granted by a fatherly government, which appeared to many as a piece of far-sightedness, if to others as at variance with the cardinal doctrines of Political Economy. Be that as it may, trade did meet in with a measure of success pointing to comparative stability, when there, unfortunately, recurred the short corn crop of 1826, causing another set-back to the staple trade, which, luckily, was of short duration. So rallying

years once more ushered in fair prospects which continued without a break up to 1847.

That year 1820 ushered in to a marked degree a revival of trade, when extensions of spinning power followed, the number of mills being markedly in contrast to only two in 1811, and increasing to the considerable number of forty-three mills by 1832. The home grown flax, as with hemp, being unable to meet the enhanced demand, recourse to purchasing from Prussia, Russia, etc., then became an absolute necessity. The qualities imported were found to be in almost every respect quite suitable for the manufacturers of the town and district, inasmuch as finer, that is smaller sizes of yarn, were then not only possible but greater regularity of thread was thereby assured, aided of course by the repeated improvement in machinery, resulting in increased production per spindle. The imports of Flax, on an ever increasing scale, necessitated bringing into the field a class of men styled hecklers. These men came to be an important adjunct to the trade. They were highly intelligent, independent, well read, keen and advanced politicians, affiliating themselves to the body called Chartists.

They were *au fait* with the political questions of the day, and so alert were they in their eagerness to obtain details of the most recent news that, whilst they worked at their benches, one of their number was selected to read aloud the newspaper items of particular interest, local as well as political, and the more controversial the subject the greater was the delight in anticipation of a keen, subtle debate, when every paragraph and line were criticised with white-heat fervour. These men may be said to have been the first to have formed themselves into a Trades' Union. What caused the shattering of this hitherto compact union was, that, with business disturbing frequency they put forward demands for an increase of rates for heckling, which it may be stated averaged then about 2s. 6d. per cwt., yielding weekly 16s. to 20s. (when they chose to work), the skilful steady men making more. Again and again these demands were conceded, and not



Breaker and Finisher Cards, the first machine through which the fibre passes after it leaves the softening machine. The latter machine is shown in the article under the heading "What Dundee contributes to the Empire."



Drawing Frames in which the slivers from the finisher card are combined, combed, and drawn out.



infrequently with reluctance, for the valid reason that when bad times returned the rates, seldom if ever, suffered a reduction. The culminating point was reached when what proved the last demand, in 1826, was put forth. The very persistency of these demands becoming intolerable and of chronic recurrence stimulated mechanical minds, which had been quietly busy for some years, into accelerated action resulting in the valuable invention of the "Heckling Machine." Our townsman, the late Mr Peter Carnichael, of the well known firm of Messrs Baxter Brothers & Co., was one of the few inventors, who early in the field, had many of his machines in operation in this town and in other districts. Young lads being found efficient in working these machines, necessarily the services of the "hecklers" were largely dispensed with, a few only being retained (as far as regards flax mills at any rate) to correct and supplement by hand heckles the slight deficiency of the machines. This was done to modify the differences that frequently existed between many portions of the material under process, some parts being of a strong coarser fibre, and others of a softer finer quality, which the machines could not "humour" to the best advantage. Besides the few hecklers referred to working in the mills, there were others who found fairly regular employment in "Heckling Establishments," the employers of which purchased the raw material, getting same heckled, selling the "dressed" portion as Line, the "combings" being sold as Flax Tow. An item not without an interest all its own may not be out of place here, that is as regards the term "heckling" from the word "to heckle" figuratively to "dress down," now a common expression used as meaning the putting of questions at elections.

In Belfast also hand heckling is largely in use. There the finest qualities of Flax in considerable quantities are devoted to the production of cambric and kindred articles.

Flax grown in the homeland was likewise reserved in fairly large quantities for the farmers' households. After the various processes were finished outside, the fibre was

brought into the houses, spun and woven by the respective housewives, their daughters, and the house servants, to the latter of whom was allotted ground to a fair extent for their own use with the object of growing Flax, to be also spun and woven into linen for their own "providin'." The yarn was either woven in the smaller farmhouses, or given out to the neighbouring villages, in almost every house of which was a loom whereat the men worked as soon as daylight appeared. Each daughter of the farm had an equal share of the "providin'" stored in a trunk of goodly proportions, or in a chest of drawers, the quantity respectively being in accordance with the means of the farmer. That the Flax was well selected, carefully spun and woven and the linen scrupulously kept, is evidenced by the writer having recently seen some "laid by" over 95 years ago, and found to be in excellent condition, although used for very many years.

As for the townspeople who wove the yarn, they were, in the great majority of cases, only able to buy sufficient material to suffice for one web. Formerly, their difficulty was through lack of cash to purchase even that quantity, the consequence was the weavers laboured under the disadvantage of being compelled to apply to various hand spinners, thereby causing a variety in both colour and quality, the cloth turned out accordingly shewing a series of kaleidoscopic tints and unevenness of thread. Then arose a race of middlemen, termed dealers, who selected in the first place the Flax, assorting same in various grades, giving out certain quantities to hand spinners to be spun either on hire or for their own account, the most experienced and skilful of whom got the best qualities. The yarn, when returned, underwent similar assorting and distributing to the weavers. All this approach to a species of scientific handling made the cloth more sightly and attractive to merchants, each year witnessing an increasing demand to the manifest advantage of every one concerned in the trade, as also to the townspeople as a whole. While other towns in Scotland and England participated in the linen trade, Dundee retained its lead—

and still does so—the position of the town lending itself readily to the importation of Flaxes from foreign Europe.

The ever-increasing demand for Flax reacted favourably as to shipping, there being in the year 1829 the goodly number of 225 vessels registered in Dundee, a fair proportion of which, no doubt, traded to Baltic ports, bringing back Flax. The first recorded statistics of Flax Imports was in 1791, when 2,348 tons were entered at the Custom House. Previous to 1791, Flax was imported, but no accurate figures can be ascertained. The figures increased to 5,724 tons in 1821, in which latter year the relative or partially corresponding exports of Linen, brown and white, stood in 1821 at 2,725,220 yards, and Sailcloth, 44,946 ells, equal to in yards, 56,182½.

*Flax. Flax Tow and Codilla.*

In 1850 the import was 31,533 tons. 8,962 tons.

In 1871 the import was 39,391 tons. 11,544 tons.

The subsequent years show a series of decreases :—

In 1881 the import was 27,989 tons. 9,394 tons.

In 1891 the import was 18,575 tons. 4,588 tons.

In 1901 the import was 13,261 tons. 5,907 tons.

In 1910 the import was 13,390 tons. 4,276 tons.

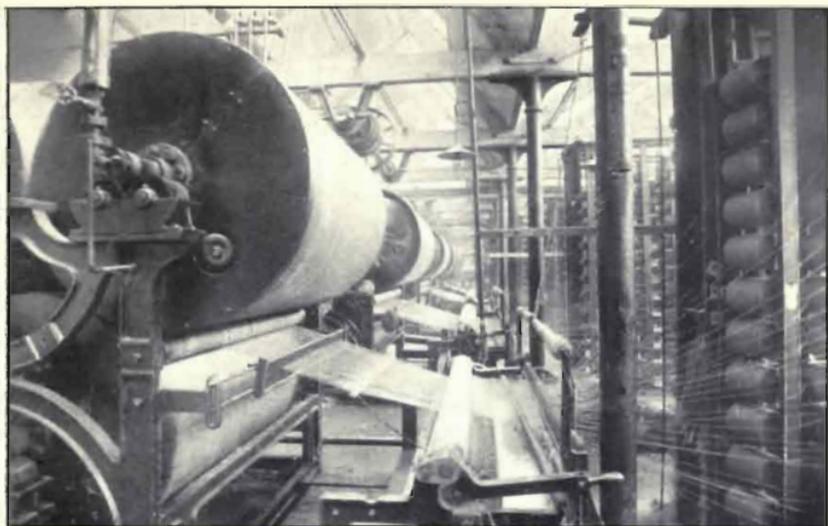
The significant and continuous decreases can be mainly accounted for by the introduction of Jute, as this cheap fibre became more and more to be in world-wide demand, but this fibre will form another chapter, it being since, say, 1855, the leading staple trade.

One important cause operating adversely and universally as to the decline in the demand for Flax was the rapid transition from sailing vessels to steamers. This disorganisation, whilst to a large extent detrimental to the trade in Dundee, was most disastrous to the neighbouring town of Arbroath, the canvas section being well-nigh eliminated.

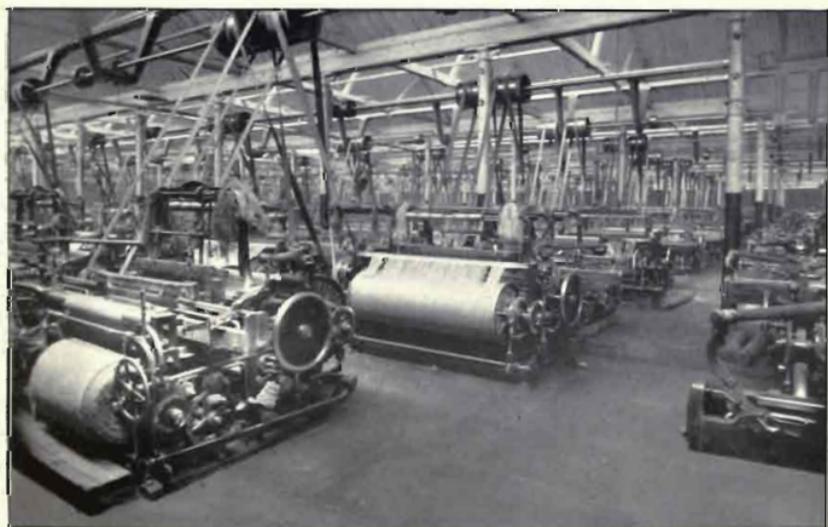
Mention may be made here of the considerate and laudable efforts put forth, chiefly at the instigation of Messrs Baxter Brothers & Company, with a few other firms interested in Flax, towards encouraging the

cultivation of this fibre in various places in this district and abroad as well. The results as to the fibre itself, judging from the samples shewn, gave promise of success with a *sine qua non* condition of earnest and constant attention by skilled men in all the various stages. A few of the conditions may be enumerated, viz., preparation of the soil, sowing, weeding, pulling at the precise time (*i.e.*, between the falling of the flower and the formation of the seed), finally retting and scutching. From the lack of close attention to one or more of these imperative conditions successful results were not attained, one drawback being the scarcity of workers through the many processes. Other efforts were made in 1887, with the happy idea of associating the gifts with the "Jubilee" year, and through the generosity of two highly-esteemed members of the trade, Sir William Ogilvy Dalgleish, Bart., and the late Mr Peter Carmichael (then the senior partners of the eminent firm mentioned above), liberal supplies of linseed were distributed amongst several farmers in this neighbourhood. Here again a repetition of non-success has, unfortunately, to be chronicled, the contributory causes were not a few, namely, and perhaps mainly, the climatic conditions of that year being extremely unfavourable, such as abnormal heat and drought, whereby the growth was almost fatally affected as regards the chief desideratum, viz., Flax. The liberal inducements held out to the farmers were such as to more than compensate them for their trouble, comprising the purchasing from them the flax straw (after the seed had been ripped) at £4 per ton, delivered at the nearest railway station. The bolls were thus retained on the farm and used for cattle feeding purposes.

**Jute.** Great as was Dundee's rise in commercial importance through its manufacture of Hemp and Flax, both these were relatively speaking eclipsed by Jute. The attempts at various times to introduce this fibre, first on the part of the Honourable The East India Company as far back as



A row of six-cylinder dressing machines, by means of which the warp threads are coated with starch or size, dried on the cylinders, and finally wound on to the loom beams ready for the weaving department.



General view of a modern weaving shed, which contains hundreds of looms for weaving jute fabrics. A typical three-leaf sacking is in the nearest loom.



1796-7, were unsuccessful. That Company, at considerable cost, twice repeated experiments by taking up farms with the purpose of cultivating various fibres, including different species of Jute. Practically and commercially these praiseworthy efforts meriting success, up to that date encountered apparently none. However, the data then obtained were to bear fruit not many years subsequently. At the further instigation of the Home Government, however, the H.E.I.C. resumed the exportation of small quantities of Jute to both England and Dundee in 1824. The samples received here were looked at and examined, only to be set aside in warehouses, where the lots were left severely alone for some eight years.

#### EXTRACT FROM THE "DUNDEE ADVERTISER."

"The following notes relative to the early Importation of Jute to Dundee are of interest at a time when daily reference is being made to the progress effected during the 'reign' (Victoria's).

"About 1822 Mr Thomas Neish received a small consignment of Jute from London. He endeavoured to induce some spinners to try it over their machinery, but could not get them to make the attempt. It lay in the warehouse (as stated elsewhere in this paper) for a long time without buyers at any price. At length Bell & Balfour consented to take it at £11 per ton. They experimented upon it to a small extent about 1825 or 1826, but were unable to spin it into yarn, and the bulk of it was disposed of for the purpose of being made into door mats. In 1832 Mr Neish made another trial, and again in 1833 he received other parcels, and from that period that trade has continued.

"About the year 1840 the "Selma," belonging to Dundee owners, arrived from Calcutta with a cargo of Jute (and other products), being the first Jute which was ever brought from Calcutta direct. To show the bad odour of Jute in Dundee, in January 1835, the "Advertiser"

of that date says it is difficult to get good Flax yarns—*bona fide* Flax unmingled with Jute. The use of it would tend to lower the character of our manufactures very much, and it is hoped the necessity for using it will not continue long enough to ruin it altogether.”

This article was repeated the following week in the “Advertiser,” the reason adduced being that it had given so much satisfaction to those interested.

Further trials in more practical fashion, and an effort to adapt the machinery to the new fibre, resulted in Jute gradually establishing a footing. Prejudices had still, however, to be met and overcome. Certainly, not a few of the objections were rather formidable, such as radical changes in machinery, which had to be reckoned with at considerable outlay of capital; besides, the bulk of the flax machines realising probably only a fraction of their intrinsic value if sold. Manufacturers and exporters alike also entertained evidently a rooted dislike to deal in the “new fangled stuff.” More than one merchant of experience and standing stated to the writer during the first years of his apprenticeship that, using their own phraseology, “eh, laddie, yir maisters are doing an awfu’ thing in pittin’ a’ their eggs in ae basket, turning oot a’ their gude machinery to spin sic a feckless thing as Jute.” This was said in 1855. It was in this year that the great majority of spinners and manufacturers changed from Flax to Jute spinning, and from hand loom to power loom.

The imports stood in 1838 at 1,136 tons; in 1853, 15,400 tons; in 1863, 46,983 tons; in 1873, 143,150 tons; in 1883, 233,883 tons; in 1893, 173,062 tons; in 1903, 166,755 tons; in 1909-1910, 222,321 tons.

These figures put thoroughly to rout all fears and erroneous ideas regarding Jute, changing the tone adopted as to the relative esteem entertained towards Flax and Jute. This can be humorously confirmed by recalling here the stern injunctions issued to the apprentices in some offices in Dundee never to address envelopes to a “Jute Spinner” as such, even although the latter may

never have spun an ounce of Flax, but the designation to be "so-and-so," "Flax Spinner," it being considered *infra dig* to be termed the former. Assuredly, here one can apply the phrase, *tempora mutantur, nos et mutamur in illis*. The introduction of Jute, therefore, effected changes in Dundee, changes as rapid as various. Jute spinning mills multiplied, old landmarks removed, new streets opened, and kingly activity reigned all round.

The population rapidly rose from 12,480 in 1755 to 29,716 in 1811, and in 1910, 166,007.

What with perseverance and repeated discoveries of the great advantages of this fibre with the growing belief in its great future, Jute gained at last an established reputation. One difficulty after another disappeared, and spinning Jute becoming more or less practicable, the way became clear for a long period of brilliant successes. Mills and factories increased and extensions on every hand followed in quick succession, profitable returns justifying these in every way. It were, in a manner, tedious to specify even the principal improvements introduced from time to time, as in every mill, generally speaking, there was discovered a new method in practically every machine, as well as in the mode of preparing, spinning, and weaving. Thus this healthy and stimulating rivalry produced from time to time valuable improvements, greatly to the benefit of the trade, as each new idea, mode, or system became sooner or later universally adopted. Then, as year followed year, the employees in their turn tacitly coming within the influence of the law of heredity, there was intuitively created an atmosphere of imitation enveloping all and shedding unconsciously an influence more or less of practical utility to the manifest benefit of both employers and employees, aiding also, undoubtedly, towards keeping Dundee in the foremost rank of the textile trade, first gradually, then rapidly. The news of Dundee's good fortune spread to all lands, and competition soon shewed itself in several countries. What helped not a little to that development was a quiet inroad of young men to

offices, mills, and factories, and engineering establishments. The technicalities thus gleaned from these various avenues of details, plus the commercial knowledge, speedily bore results in the erecting, in the first place, of factories, the yarn required being supplied from Dundee. The building of spinning mills, as compliments thereto, rapidly followed.

Up to 1863-4 Jute trading in Continental Europe was comparatively insignificant. In France, the consumption in 1864 amounted to only about 6,176 tons; the previous year the figures were 10,324 tons, the difference arising from several causes. The export of yarn to that country from Dundee shewed a marked increase that year, thus was supplemented the lessened production in France, and explains the increase of export to that country. The year 1873 marked the beginning of an ever-increasing extension, in well-nigh every country of Europe, of spinning mills and factories, consequently the exports from Dundee shewed a serious shrinkage. The consumption of Jute for foreign Europe now reaches about 2,250,000 bales per annum.

From the foregoing it will be seen that Dundee held virtually a monopoly of the Jute industry from its *practical commencement in 1839* up to, say, 1855, when the nucleus of what has eventuated in a most formidable competition by India having started Jute spinning and weaving in that year, the consumption then amounting to 2,600 tons per annum, and which now shews the enormous quantity of 4,274,200 bales yearly, which equals per annum the striking increase to 763,250 tons. The unwisdom of this indiscriminate extension and the irony of it is well shown by some 80 per cent. of the mills having adopted short time for (at time of writing) about 15 months, the agreement only reaching that qualified support after long and tedious negotiations, receiving an accelerated impulse through the iron entering into the heart of the industry and the soul of its profits.

The Indian Factory Act recently passed restricts the hours of working from 1st July 1912, and, therefore,



A JACQUARD LOOM OF A SPECIAL TYPE FOR THE WEAVING  
OF BRUSSELS AND WILTON CARPETS.



practically takes the place of the above-named short time agreement, but there seems to be in this prolonged depression experienced by the Indian mills a compensatory nemesis rebuking an author who published in 1909 a booklet, wherein, with "Maharajic" scorn, reference is made to "harmless wails of their competitor on the Tay."

The following figures will show the enormous growth of the Indian competition:—

EXPORTS FROM CALCUTTA—Jan. 1st to Dec. 31st.

	JUTE BAGS.	JUTE CLOTH.
1911.	354,586,889 Bags.	858,381,927 Yards.
1910.	449,826,810 "	1,008,693,898 "
	Decrease, 95,257,921 "	150,311,971 "

The result of the lessened production.

The mills in Dundee alone employ when in full working about 36,000 workers. The construction of the mills is a great improvement from the works of other days, with ill-ventilated flats, and the basement of many badly lighted and dingy in the extreme, with not a few under the level of the street. The surroundings now are in every respect conducive to the health of the workers, and the machines they attend to are quite up-to-date and well protected, thereby lessening accidents almost to the veriest minimum.

The principal products here have always been Yarns, Hessian Cloth, D.W. Bagging and Tarpauling, Twilled Sacking with Sacks, Bags and Covers made therefrom. But Jute, about its earlier stages towards the goal of practical account, was found to be very easily dyed in the most delicate shades, and this led to its utility in carpeting; also it can be brought to a considerable degree of whiteness by bleaching. The price at which, in this line of production, namely, carpets could be sold gave a great impetus to the importation of the raw material, and to the exportation of Jute Twist and Yarns. One other avenue opened was in *wide-widths* of Hessian Cloth, forming the foundation of Linoleum, which kindred branch has increased with leaps and bounds, enriching manufacturers

in Scotland, England, the Continent, and the United States of America. This resulted in giving employment to many more workers. Another opening which helped the sale of Jute Cloth was its successful application to Coffee Bagging, and which from its cheapness at once displaced Flax Tow Bags. As time went on various other uses were found for Jute, with the happy result that the trade in Dundee received such an impulse from ever-increasing sources that the progress was not far short of being well-nigh marvellous.

Therefore, the clear-cut lessons deducible from the foregoing summarised historiette of the Textile Trade of Dundee are: the necessity for ceaseless vigilance, alertness, adaptations to machinery of ascertained practicality, technical knowledge, originality in designing, with a close study of the whole field relative to buying and selling; having these, and, above all, patient fortitude enshrined in glowing hope, will, in all likelihood, ensure ability to meet all competition with success. Given these armoured elements, Dundee will not only hold its position, which it barely does at present, but being thus fully equipped will meet manfully the future when the world's requirements greatly increase, as they must do, and, let us hope, once again forge ahead with energy, and by judicious extensions be able and ready to participate in the increase, and then, no doubt, it will always find a profitable demand for its Jute manufactures.

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## Spinning and Weaving.

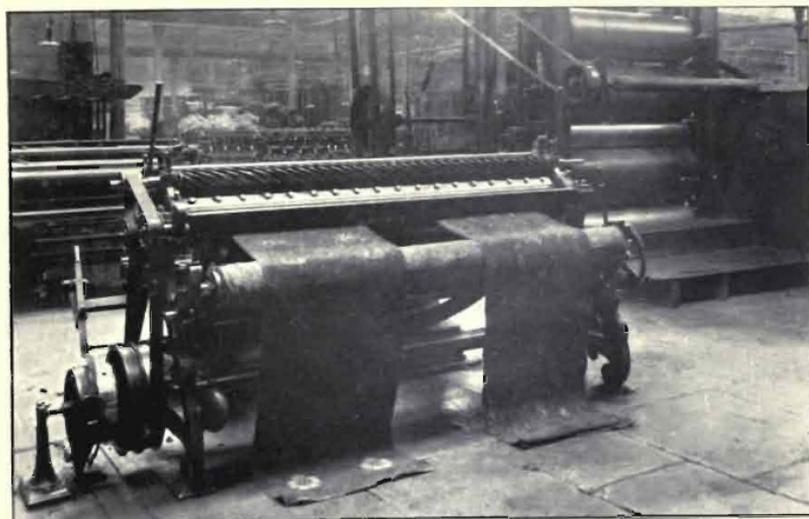
By **Thomas Woodhouse, Dundee Technical College  
and School of Art.**

THE development of the jute industry in general has been described in the foregoing article; it now remains to deal shortly with the spinning and weaving industries of the district. It is, naturally, impossible to give a detailed description of the technicalities of spinning and weaving—these particulars can be obtained from other and more suitable sources.

The evolution of these two extensive branches of the textile industry proceeded in and around Dundee on much the same lines as in those other centres which have developed into important textile districts; that is to say, one or two hand looms, with the necessary adjuncts for winding and beaming, were in general use in a large number of houses, and in a few cases a number of weavers worked together under the same roof, partly for companionship and partly for convenience. These weavers were supplied with the necessary yarns for warp and weft first from the simple distaff and spindle, and afterwards from spinning wheels—several spinners being required to keep one weaver fully employed. These conditions, with very little alteration in the method of manufacture, prevailed for generations, but the period from 1730 to 1800 witnessed a great activity throughout the kingdom, with regard not only to means of communication, but also to improvements affecting the textile industry in general. It was about the beginning of this period that attempts were made to evolve more or less automatic apparatus for preparing and spinning different kinds of textile fibres, as well as for facilitating the operation of weaving. So far as weaving is concerned, the great pioneer was, undoubtedly, John Kay, who first substituted wires for canes in weaving reeds, and then introduced the

fly shuttle and pickers—an invention which has probably done more than any other to revolutionize the weaving industry. The pre-eminence of these parts, which are employed for alternately propelling and checking the shuttle, may or may not be seriously threatened by a recent novel invention in weaving, but the very fact of their being in universal use almost from the time of their introduction to the present day, says much for their efficiency; indeed, unless radical changes in weaving take place, it is difficult to imagine any other kind of apparatus which could supplant them. It is to Kay also that we owe the mechanism for the manufacture of card clothing—a type of furnishing not much used in the jute and flax industries, but exceedingly important in the carding of woollen and cotton yarns.

The introduction of the fly shuttle and pickers to the hand loom facilitated the process of weaving to such an extent that in a short time the production of cloth was more than doubled, and as a result the hand spinners for a time found it impossible to supply the weavers' demand. A great development in any one branch of industry is invariably followed in course of time by improvements in those branches which are most closely connected with it, and this happened with respect to the sister industry—spinning. The scarcity of yarn, and therefore the threatened lack of employment for weavers, caused attention to be drawn to the possibility of obtaining yarn by mechanical methods: Lewis Paul was the first to take out a patent for such a process, and thus laid the foundation of mechanical spinning, but it was left to such industrial champions as Hargreaves, Arkwright, and Crompton to carry on the work. These inventors ultimately solved the problem of mechanical preparing and spinning so satisfactorily that an abundance of yarn for the weavers was again easily obtained. The conditions, indeed, were now reversed, and, until the introduction of the power loom, the weavers were unable to keep pace with the increased production of yarns brought about by the improved methods of preparing and spinning.



Part of a Finishing Department. The machine in the foreground is a "cropper," which cuts the projecting fibres from the face of the cloth by means of a rapidly rotating spiral knife. Two Wilton carpets are shown in the machine.



A group of five-bowl calenders. When the cloth leaves any of these machines its appearance may be that of a "flat finish," a "round thread finish," or a "glazed finish."



Although Dr. Cartwright's first patent for a power loom was lodged in 1785, and his more practicable one in 1786, several years elapsed before a satisfactory loom was on the market. In Dundee, more than three decades passed before any serious experiments were made with power looms, and it was not until the year 1836 that the way appeared clear for the introduction of a comparatively large number of such looms. In this year Messrs Baxter Brothers & Co. erected more than 200 looms, and this was the beginning in Dundee of a general development of power loom weaving. By this time, however, a few flax spinning mills had been established, and it is a significant fact that the above-mentioned firm, which was amongst the first to adopt the improved methods of manufacture, continued steadily to increase the number of power driven machines in their mills and factories until in 1867 they had more power looms employed in the manufacture of linen goods than any other firm in the world.

Flax and hemp, particularly the former, were the chief fibres which were spun into yarn and woven into cloth; the jute fibre was little used at this period—it was, in fact, at this time passing through the experimental stages. A great variety of fabrics, from the plainest cloths to elaborately figured damasks, was, however, manufactured from the above-mentioned flax and hemp yarns, and, in addition, small quantities of other vegetable fibres were used. The trade continued on these lines until the difficulties of spinning the jute fibre, and the objections to the use of the yarn and cloth made from the fibre, were overcome; then a great demand arose for jute fabrics, and all who were able to take part in the boom turned their attention to the manufacture of these cloths. The success was phenomenal, and in the course of time the manufacture of several kinds of linen fabrics was neglected or discarded for the then more remunerative jute industry. These conditions prevailed for some years, during which time the manufacture of jute fabrics was confined almost entirely to the Dundee district. The monopoly was destined, however, to be lost, for when it

became known that the fibre could be satisfactorily spun into yarn, and woven into cloth, and when the antipathy to its employment was overcome, its manufacture began to spread to other districts. Nevertheless the trade continued to grow in Dundee, old mills and factories being enlarged, and new ones built, to cope with the ever increasing demand for the new type of cloth, and it was not until several large mills and factories were erected and equipped on the banks of the Hooghly, in the vicinity of Calcutta, that Dundee's progress was eventually checked. By this time, however, the trade in Dundee had assumed huge dimensions, and it is gratifying to be able to state that ever since the above-mentioned check, the enterprise of the spinners, manufacturers, calenderers, and merchants has enabled them to obtain a fair share of the trade, and this in spite of unequal conditions of labour, and of the fact that jute fabrics are now, and have been for some time, manufactured in practically every country where weaving is practised to any great extent. A considerable number of fresh outlets and uses for the fabrics and for the yarns have naturally arisen on account of the comparative cheapness of the jute fibre, so that when from any cause the manufacture of any of the simpler fabrics has been extended to other districts or countries it has invariably been in some measure counterbalanced by the introduction of one or other of the special fabrics which are now made in large quantities. A great development in the spinning of yarns for use as cords, twine, ropes, etc., has also taken place within the last few years, hence this branch is now a very important one in many mills. In recent years also a considerable number of machines have been employed in the spinning of the finer or lighter yarns—a gratifying feature, and one which may ultimately have for its sequel a corresponding development in the weaving branch. It is due to these specialities, and to the beautiful finish which is now imparted to all types of jute goods, coupled with the inherent skill of the textile operatives in general, that the prestige of the district as an important manufacturing centre is still upheld.

Several of the above special fabrics are simple in structure, that is to say they are made with what are technically termed plain weave and simple twill weaves, whereas others are much more complicated. Brussels and Wilton carpets are perhaps the most elaborate types of textiles which are made in the city, although considerable ingenuity and taste are displayed in connection with other types of carpets and rugs.

Before the introduction of the jute fibre there was, as already mentioned, a large quantity of linen fabrics manufactured in the hand loom—sailcloth, canvas, dowlas, apron, pillow, and other household linens. The flax yarns which were used in the manufacture of these goods were prepared on machinery both of the wet spun and the dry spun types. It is to be regretted, however, that wet spinning of flax has practically died out in the district, and that the flax spinning industry as a whole is decreasing. Unless some Government help be forthcoming for the encouragement of flax culture, it appears unlikely that the wet spinning process will be resuscitated, or that dry spinning will regain its former importance. There is still a considerable trade done in canvas, duck, and similar fabrics required by the various departments of the Government, and by large shipping companies, but since 1840 the manufacture of many of the other types of linen has been left to the neighbouring districts. Dundee, however, still retains its supremacy as the great centre for jute and linen in Great Britain, and as the chief commercial textile centre of Scotland.

Although keen foreign and colonial competition has affected Dundee seriously, the city provides a very large quantity of the ordinary fabrics such as hessian, bagging, tarpauling, hop-pocketing, brattice cloth, sacking, cotton bagging, padding, hammocking, hose-piping, etc., while the introduction of linoleum as a floor covering has led to a great development in wide hessians, some of which are eight yards in width, although widths of two and four yards are much more common.

There is an enormous variety of yarns spun in the

district and then woven in the natural, bleached, or dyed states, but apart from that used at home, there are large quantities exported to other countries. The yarn is sent out, not only in the form of hanks, but also in the form of rolls, chains, and cops, so that when the material reaches its destination little more requires to be done before it is ready for the loom.

It is impossible to enumerate all the fabrics—from narrow goods, such as girthing, hose-pipe, and the like to the widest linoleum cloths—which are made in the district, but, in addition to those mentioned, there is manufactured a great variety of plain and figured fabrics, in all colours, for wall, stair, and floor covering, as well as millions of wrappers and bags of all kinds and sizes used in transporting and storing various kinds of merchandise.

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## Shipbuilding and Marine Engineering in Dundee.

By **W. S. Thompson, Lilybank Foundry.**

THE first marine engine made in Dundee was fitted into the ferry steamer "Union," built at Perth in the year 1821, for service between Dundee and Newhaven. As the description is interesting, it is given below:—

"This boat, the most unique and perhaps the most splendid ferry boat in the country, is a twin boat composed of two hulls, each 76 feet keel,  $11\frac{1}{2}$  feet beam, and  $11\frac{1}{2}$  feet asunder. They are handsomely and substantially built, and well bound together by beams fortified with iron; and the mould and execution do much credit to the taste and skill of Mr Brown (of Perth), the builder. The whole length upon deck is 92 feet and the breadth about 34. Thirty-two feet of the one end is left about two feet



Sack Printing Department. Names, trade marks, and the like are printed in one or more colours on the bags. The names displayed are in black letters.



A general view of a "sewing flat" where lengths of jute cloth are rapidly sewn into bags. Each machine is capable of sewing about 2000 bags per day.



lower than the rest of the deck, and railed in for carriages and cattle, and the doors at the middle of this space are so constructed as to serve for platform in loading and unloading. Twenty-two feet in the centre are occupied by the machinery, an engine being in each boat, and the paddle wheel acting in the canal between. The engines are of fifteen horses power each; and as these are connected with the same wheel, they act contemporaneously. As to the appearance and quality, it is enough to say they are constructed by the Messrs Carmichael, castings by Mr Straton, of the Dundee Foundry. So smoothly indeed do they work that there is hardly any tremor in the boat; and when the doors which enclose the machinery are shut there is very little noise. The paddle wheel has wooden floats, and is so divided that though each half has only eight floats, the whole acts with the same smoothness as if it had sixteen, and yet the power is not diminished. Notwithstanding the immense size of the boat, she obeys her helm very easily. There are two helms, each constructed of a rectangular iron plate four feet and a half in the horizontal direction and three feet and a half in the perpendicular. The tiller of each is almost ten feet long, and is worked by a wheel and pinion. The machinery is so constructed that either end may go foremost; and thus the boat can arrive and depart without the labour or space required for turning round. The reversing of the motion is effected by reversing the motion of the valves of the engines. These are opened and shut by an alternating rod moved by an eccentric block on the shaft of the paddle wheel. This rod acts upon a double lever fastened to the rocking shaft of the valves; when it acts on the lower end of the lever the paddle wheel moves one way, and when it acts on the upper end the wheel moves the other. The lever is made broad in the middle, with a flange round it which retains the stud on the alternating rod during the time that it is changed from the one end to the other. The rod is raised and lowered by means of a toothed sector into which a pinion works. The two pinions are on the opposite ends of a rod which passes

under the index table, below which it has a bevel wheel connected with the reversing index. By simply turning this index the boat passes in less than one minute from motion in one direction to motion in that directly opposite. The boat may be steered by either helm, and by working with helms at the same time it may be turned round in a very small compass. Indeed, though the boat appears huge and unwieldy, yet, in consequence of the impelling power being in the centre, it can be turned in a much smaller compass than a less boat with two wheels. Its motion, too, during a breeze or across a swell is much more steady, as a good deal of disagreeable rolling of a two-wheeled boat arises from the unequal hold which its wheels take of the water."

The above description is interesting in view of the fact that nearly sixty years afterwards this type of twin boat with centre wheel was tried on the English Channel service, a vessel called the "Calais-Douvres" having been built in the year 1877 by Mr Leslie of Newcastle for this purpose. Her dimensions were:—Length, 302 feet; beam, 61 feet; depth of hold, 13 feet 9 inches; and she was fitted with diagonal engines, with four cylinders, each 63 inch in diameter by 94 inch stroke, working at 28 lbs. pressure per square inch.

Messrs Carmichael also built the engine for another ferry steamer called "George IV.," and a complete description and illustration of this engine will be found in the memorial volume printed for the Meeting of the British Association held in Dundee in 1867. Messrs Carmichael's Works, Ward Foundry, founded in 1810 by Mr James Carmichael (whose statue stands in the Albert Square), were at this time located on their present site in Ward Road, but their forge was situated at Seabraes, and it was here that it is claimed the first iron paddle steamship built in Scotland was launched in 1838. They also built about this time a small iron schooner called the "Tinker." Many people at this time did not believe that an iron ship would float, and the launch created great interest. Flush riveting was not then thought of for the outside or shell

plating, and the rivets on the outside of the shell were finished with pan or bat heads.

After building these two vessels Messrs Carmichael, who had revolutionised iron manufacture by the invention of the fan blast, became absorbed in locomotive and land engine work, and gave up marine work.

In 1834 Mr Peter Borrie, Engineer (whose works, the first Tay Foundry, were situated in Trades Lane), along with Mr Thomas Adamson, Shipbuilder, took up the building of wooden steamers, and built several, one of which, the ill-fated "Forfarshire," was wrecked on the Farne Islands, and was the object of Grace Darling's heroic venture.

Mr Borrie in 1840 commenced iron shipbuilding, and built several iron paddle steamers, two of which, the "Lass o' Gowrie" and the "Princess Royal," the latter a twin-hulled vessel, were built at Broughty Ferry, there being then three shipbuilding yards there—one at about where No. 1 Douglas Terrace now stands, one at No. 13 James's Place, and one west of the Castle. These vessels were fitted with single cylinder vertical return connecting rod engines. Mr Borrie, meeting with misfortune, gave up business in 1846.

From the year 1842 until 1854 no iron ships were built in Dundee. Wood shipbuilding, however, flourished, and in 1847 five firms were engaged in this industry, viz. :— Alexander Stephen, David Calman, Thomas Adamson, John Calman & Son, and John Brown. Mr Stephen came from Aberdeen to Arbroath, and ultimately settled in Dundee. Two of his sons (Alexander and John) founded the business on the Clyde at Linthouse. The eldest son (William) carried on the business in Dundee, and, besides shipbuilding and shipowning, built and owned several whalers.

The year 1846 saw wood shipbuilding at its zenith in Dundee, and in that year Mr Alexander Stephen launched the "Eastern Monarch," a vessel of 1,840 tons, builders' measurement, one of the largest ships then in existence. From this time wooden shipbuilding gradually declined,

and composite ships, and then wholly iron vessels, began to appear. None of the firms except Alexander Stephen and John Brown (latterly Brown & Simpson) changed over to the new material and new methods, but in 1853 they were joined by Messrs Gourlay Brothers.

In 1846 Messrs Gourlay & Mudie took possession of Dundee Foundry, and laid the foundation of an industry which has been of great service in the growth of the City. It may be interesting to record that this business was founded in 1790, and acquired later by two brothers named Stirling. They made and patented a hot air engine, which was not very successful owing to trouble with the retorts; however, one engine was made to drive the works and another was installed at Chapelshade Works, but they were not a success, and had ultimately to be discarded.

In 1851 the "Correo," a wooden steamer 395 tons b.m., built by Mr John Brown and engined by Messrs Gourlay & Mudie, was the first screw vessel built in Dundee. She was fitted with diagonal geared engines of 70 h.p., with two cylinders five lbs. working pressure per square inch, jet condensing—the crank shaft being geared to the propeller shaft to bring up the latter's speed of revolution.

The style Gourlay Brothers was adopted in 1853, Mr Mudie retiring, and Mr Henry and Mr Alexander Gourlay becoming the proprietors of Dundee Foundry and starting shipbuilding at Camperdown Shipyard. Their first vessel was the screw steamer "Pavo," built for Mr Peacock for the Arbroath and Newcastle trade. She was 89 feet long (about the length of a modern steam drifter), and had engines with cylinders  $17\frac{3}{4}$  in. diameter by 18 in. stroke, working at 10 lbs. pressure.

In 1834 the Dundee, Perth and London Shipping Co. introduced paddle steamers to take the place of the sailing smacks for their trade to London. These steamers, built by Mr John Wood of Dumbarton and engined by Mr Robert Napier of Glasgow, were very successful, and greatly enhanced the reputation of the Clyde; it was not, however, until 1856 that Messrs Gourlay secured an order for the local Company, to which they built the Company's second

"London," an iron screw vessel with beam geared engines. The first steam whaler, named the "Tay," was sent out from Dundee in 1857; she was so successful that Peterhead, Dundee's rival in whale-fishing, had to follow suit and adopt steam.

The first compound engine made in Dundee was fitted into the "Dalhousie" in 1858, and this engine was also fitted with the first surface condenser made in Dundee. The tubes were of cast iron,  $1\frac{1}{2}$  inch bore,  $\frac{3}{8}$  inch thick, made tight with india rubber rings fitted in recesses in cast iron tube plates. The condenser, however, was far from being efficient and the vacuum poor, and compared unfavourably with the jet condenser as to reliability.

A paddle ferry steamer for the Tay Ferries, named the "Forfarshire," was launched in 1861, and this is believed to be the first steel vessel built in Scotland. This vessel is still in existence, and maintains the daily service between North and South Queenferry on the Forth.

In 1866 Messrs Thompson & Gall started business as Engineers and Ironfounders at Tay Foundry, near Stobs-well. This partnership was dissolved in the following year, and Mr W. B. Thompson acquired and carried on the business.

Steam pressure had risen in 1869 to 48 lbs. per square inch, and superheating began to be tried. The "Libra," built in this year by Messrs Gourlay, used steam superheated to 400 degrees. Owing to trouble with the superheater this was abandoned later as being troublesome and dangerous. Vessels now began to increase in size, and in 1873 Messrs Gourlay built the "Kenilworth" and "Abbotsford," each 345 feet long by 37 feet beam; and following them the P. and O. liners "Teheran" and "Tibet," 360 feet long by 36 feet beam, having engines with cylinders 48 in. and 84 in. in diameter by 48 in. stroke, 67 lbs. pressure. These vessels were fitted with six boilers, and as there was no crane capable of handling such weights, all the machinery had to be put into the vessels on the stocks, the ship's side being left open for the purpose.

Mr Thompson started shipbuilding in 1874 at Caledon

Shipyard, the first vessel built being a composite steam yacht for the Earl of Caledon.

Mild steel was introduced by Mr Thompson in 1881, two vessels being built to Lloyds' first scantlings in steel, these scantlings were found to be too light, and were afterwards amended.

Messrs Pearce Brothers, Lilybank Foundry, who up to 1880 had been employed on land engines and textile machinery, began the manufacture of marine engines, and in 1882 opened Craigie Shipyard. They were unfortunate, however, and became so heavily involved that both shipyard and foundry were sold in 1889 to Messrs W. B. Thompson & Co., Ltd., who had acquired Mr Thompson's business in 1886. Messrs W. B. Thompson & Co., Ltd., went into liquidation in 1896, and the business was acquired and reconstructed under the name of the Caledon Shipbuilding and Engineering Co., Ltd.

Messrs J. & H. Whyte & Cooper began business as marine and general engineers at Britannia Engine Works in East Dock Street in 1882; this partnership was dissolved in 1897—Messrs Whyte & Mair taking over Tay Foundry from the Caledon Company and Messrs Cooper & Greig retaining the original premises. Besides having done a large amount of land and marine work, the latter firm have done considerable experimental work, and it is largely due to Mr Cooper's initiative that the atmospheric condenser has been adopted and found so suitable for many of the mills in the City.

Messrs Whyte & Mair carried on business for a few years, but were not successful. Messrs McFarlane & Machan, who started business in 1892 at Dock Street Engine Works, carried on business successfully for nine years, but were forced to liquidate through the failure of a Liverpool shipping firm.

In 1900 there were therefore left engaged in these industries Messrs Gourlay Brothers & Co., Ltd., Shipbuilders and Engineers; Messrs the Caledon Shipbuilding and Engineering Co., Ltd., Shipbuilders and Engineers; the Dundee Shipbuilders' Co., Ltd., successors to Alex.

Stephen & Sons, Shipbuilders, in 1895, succeeded by the Dundee Shipbuilding Co., Ltd., Shipbuilders, in 1906; and Messrs Cooper & Greig, Engineers.

The output of these firms for the last ten years is given below, and reached a maximum in 1908 with 22,100 i.h.p. and 27,100 tons gross tonnage, valued roughly at £677,500. Unfortunately, Messrs Gourlay Brothers & Co., Ltd., in 1908 sustained serious business losses; they were forced to suspend payment, and the works were closed. This was a serious blow not only to the industry, but to the City, where the outlets for male labour are not too plentiful.

#### TOTAL OUTPUT FROM ALL DUNDEE YARDS.

Year.	I.H.P.	Gross Tonnage.
1900	17,430	21,212
1901	20,762	18,396
1902	29,084	22,266
1903	19,730	15,247
1904	11,456	7,582
1905	22,599	21,328
1906	31,313	25,546
1907	26,295	16,972
*1908	27,100	22,100
1909	8,549	7,912
1910	7,585	5,952

\* Gourlay Brothers shut down.

Some of the largest and most notable examples of vessels built at the port in recent years are as under:—

Ship's Name.	Length.		Breadth.		Depth.		Gross Tnge.	Nett Tnge.
	Ft.	Ins.	Feet.	Ins.	Feet.	Ins.		
"Queensmore "	360	0	45	9	30	7	3791	2488
"Marwarri "	445	0	50	0	33	0	5658	3622
"Bengali "	445	0	50	0	33	0	5664	3619
"Londres "	292	0	45	0	12	0	2670	1650
"Caledonian "	426	4½	50	0	31	6	4990	...
"Californian "	447	6	53	6	34	8	6223	4038
"Laufranc "	418	0	52	0	30	0	6274	3654

The capital invested in these two industries is estimated at £70,000, and gives employment to about 2,100 men.

The movement during the last fifteen years has been towards specialisation, and the engineering firms who used to manufacture pumps, cranes, winches, windlasses, steering gear, and other auxiliaries find that they cannot now make these at a profit, and are therefore abandoning these branches.

The tendency in engine design is towards higher revolution and reduction of weight, the prejudice against fast running having been dispelled by high speed forced lubrication steam engines and the internal combustion engine, also by better lubrication, and the adoption of white metal for all bearings. Steel boiler plates can now be obtained 25 feet long, 11 feet 6 inches wide, and 2 inches thick. Steel has also almost entirely displaced wrought iron for shafting and reciprocating parts, good clean forged wrought iron being extremely difficult to get.

The cast iron box condenser is being rapidly displaced by circular or pear-shaped types, with wrought steel shells, thus relieving the engine frame of expansion stresses and eliminating what was generally a weakness in design. There has been a tendency to return to superheating, but although the defects in the superheater have been largely overcome, the internal lubrication of the engine still seems to present difficulties.

Working pressures generally remain about 180 lbs. per square inch, and there does not appear to be any great desire, except in large units, to increase the pressure or to adopt quadruple engines owing to extra first cost, multiplicity of parts, and extra length necessary in the vessel for this type. The inclination rather appears to be in the direction of the internal combustion engine of the Diesel type, if this can be made reliable for continuous running and handling.

In shipbuilding steel has entirely displaced iron, and plates of almost any size and thickness are obtainable. Cast steel, now being much more uniform in quality and reliability, is much used. Improved and more powerful

tools are noticeable, such as hydraulic joggling, bending, punching, shearing, and rivetting, pneumatic caulking and drilling and electric drilling, and wood working machinery. Methods are considerably improved and more latitude in design is apparent, largely due to revision and extension of Lloyds' and other Classification Societies' rules to new designs and methods of construction.

By the provision of improved facilities and equipment it is believed that the shipbuilding industry of Dundee can be greatly extended. The superior situation of the port, with its magnificent waterway, specially lends itself to development along such lines.

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## Mechanical Engineering.

By **Angus R. Fulton, B.Sc., A.M. Inst. C.E.**

THAT Dundee does not rank higher in engineering circles is somewhat a matter of surprise, though there are reasons which may account for it. During its earlier industrial progress the sites available for public works were somewhat restricted. Only a narrow strip of ground lay between the river front and the steeply sloping surface to the north. Works were certainly built on the rising ground, but the cost of haulage to and from the docks and railway termini has proved a serious item in the balance sheet of those firms, unless engaged as in the heyday of the jute trade, in a business where the profits were ample and the competition limited.

Unfortunately these are not the normal conditions prevailing in the engineering trade, and certainly not in Dundee, where, unassisted by the proximity of either coal or iron ore, the local makers have an arduous struggle to hold their own with more favoured centres. Hence progress has been relatively slow.

But while this was true with regard to the works long established, and which are, with few exceptions, cut off from direct railway connection or sea communication, the same cannot be said of the present state of affairs. Owing to developments at the harbour, ground is now available for sites especially suited for engineering works. Open to the river, by which supplies of raw material can be readily obtained from home and foreign ports, and communicating directly by sidings with the two principal railways of Scotland, an ideal situation has been created. When we add to this that an abundant demand exists for female labour, owing to the peculiar nature of what still ranks as Dundee's staple industry, it seems that the conditions are such as to tempt families of good working class to settle in the city, and so provide that plentiful supply of labour which is so necessary for the commercial success of engineering or other enterprises. That Dundee will sooner or later enjoy the prosperity resulting from such a development is not difficult to foresee; that it may be sooner depends considerably on the energy and determination of its leaders.

Though Dundee is not entitled either by the number or magnitude of its establishments to rank as one of the chief centres of engineering in this country, nevertheless the local engineer can say with equal pride and truth that professionally he is an inhabitant of "no mean city." Its contributions to engineering progress have been both varied and valuable; the products of the skill and industry of its artisans are world spread, and bear the hall mark of excellence; its workshops are extensive and efficient, well organised and modern.

To the city must be attributed that important advance in the perfecting of the steam engine for marine work effected by the reversing gear, and the great saving in time and money involved in the substitution of the fan blast or blowing machine for heating or melting iron for the bellows previously in vogue. The invention and construction of the Stirling Air Engine, too, must always be associated with the period which James Stirling spent in

Dundee, and the locality at least must be credited with the invention of the reaping machine by the Rev. Patrick Bell.

But the Handbook issued forty-five years ago in connection with the previous and only other meeting of the British Association which Dundee has had the honour of housing, contained this and much more interesting historical matter. It is, therefore, more proper to touch on the changes which have taken place since then, and the present position of the trade.

Of the twelve principal firms mentioned then, six still maintain their position, and five of them their name. Amongst those which have ceased to exist the principal was Gourlay Bros. & Co., originally the Dundee Foundry Co., established as far back as 1790, when engineering, as we know it, was only in its earliest beginning, and Scotland was only waking up to the possibilities that lay before it.

This firm will be remembered for its connection with Stirling, and for its long record of good work extending over a century. That it should have been allowed to go under in the stress of present day competition is a matter of widespread regret.

Along with it will be missed the name of Thomson Bros. & Co., Douglas Foundry, whose identity has been swallowed up in that of Urquhart, Lindsay & Co., Blackness Foundry.

#### GENERAL ENGINEERING.

Of the firms which still exist precedence must be given to that of James Carmichael & Co., Ward Foundry. It is one of the oldest engineering establishments on the east coast of Scotland, having descended from father to son for over one hundred years. It was started in a small way in 1810 by two brothers; the inventive powers of the one and the engineering skill of the other soon making success assured. Their improved plan of reversing gear for

**James  
Carmichael  
& Co.,  
Ward Foundry.**

marine engines was applied to practice in 1821, and in 1829 their fan blast for the melting and heating of metals formed at once a substantial contribution to science and an immense boon to the trade.

At that time, too, the enterprise of the firm was directed to railway work, and two of the first four locomotives which supplanted the original rope haulage of the Dundee and Newtyle Railway, and which were the first of their kind in Scotland, were made by them.

As if to give further proof of their versatility a venture was made in the earliest days of iron vessels to build this class of ship, and the "Queen," "Caledonian," and "Tinker" were constructed at Seabraes, then on the river front, but now separated from it by the Caledonian and North British Railway yards. Partly owing to prejudice, which had not then been overcome, the venture proved unprofitable and was abandoned. At his birth centenary in 1876, a statue erected in Albert Square to the memory of the founder, James Carmichael, was unveiled. Carried on by their sons, and latterly by their grandsons, the business has extended most successfully. Boiler work of all descriptions is undertaken, a specialty being those of the Lancashire type. Forgings of the heaviest class are made, and mill and factory engines up to 4000—5000 horse-power, designed and constructed in Ward Foundry, bear witness not only in Dundee and Scotland but throughout the jute mills of India by the excellency of workmanship and efficiency of working to the high class nature of their productions.

This firm being of comparatively recent **Cooper & Greig**. origin has shown all the enterprise and energy of youth. They are makers of reciprocating engines of various types and of the largest size. In addition to ordinary surface and jet condensers they make a feature of evaporating condensers, the senior partner, Mr Cooper, being the first to introduce their use into land practice. The list of inventions by this gentleman, and worked by this firm, is very extensive, including

a steam turbine for use with high pressures, and another to utilise the exhaust steam discharge from reciprocating engines, a superheater, and a thermo-circulator for equalising the temperature of marine boilers.

All classes of boilers are constructed with such accessories as hydraulic stokers and exhaust steam feed water heaters.

The triple hydraulic engine and the great gearing and chains used for moving the three large caisson dock gates for the new Admiralty Docks at Malta were also designed and constructed by this firm.

**Caledon Shipbuilding and Engineering Co.** Messrs Pearce Brothers, Lilybank Foundry, a well-known firm forty-five years ago, has given place to the Caledon Shipbuilding and Engineering Co., but this company is dealt with under the heading of Marine Engineering.

#### TEXTILE MACHINERY.

As befitting its position as centre of the jute industry, Dundee ranks as one of the principal centres for the supplying of all machinery necessary for this and kindred industries. In this branch four firms have existed over half-a-century.

**James F. Low & Co., Ltd., Monifieth Foundry.** This firm, although only floated into a Private Limited Company early in 1902, dates back to about the year 1811. They are machine makers, iron and brass founders, and are well known all over the world for the reputation which they have gained for making textile machinery, and also for their iron castings.

They manufacture all kinds of preparing and spinning machinery for flax, hemp, jute, and tow, and when working under normal conditions employ about 500 workmen.

During recent years their whole works have been rebuilt, and equipped with the most up-to-date tools for the special purposes of their trade.

**Urquhart,  
Lindsay & Co.,  
Blackness  
Foundry.** This company was started in 1863, at a time when the jute trade was developing with extraordinary rapidity, and soon took a leading place in supplying the demand for textile machinery required in the winding, weaving, and finishing departments of this and the linen industries. That position has been well maintained, and the firm still remains a principal maker of that class of machinery, dealing largely not only with Calcutta but with all European countries. Converted into a Limited Liability Company in 1897, the success of the company has continued. Some of the finest and most efficient triple expansion engines now running in Calcutta have been constructed at Blackness Foundry. Shafting and heavy rope and belt pulleys up to a weight of 70 tons have also been a specialty of these works.

During the last twelve years the distinguishing feature of this business has been the department which was then inaugurated of wheel cutting for the trade. So successful has this department been that some years ago new shops were specially built to accommodate it, and filled with the very finest machinery for the cutting of gears, most of the machines being designed and constructed in the workshops of the company. A visit to these shops will certainly repay the visitor, who will be made welcome. We believe we are correct in saying that contracts in machine cut gears are here undertaken which cannot be equalled by any other firm in the trade. In normal times 700 to 800 are employed at these works.

**Robertson &  
Orchar, Ltd.,  
Wallace  
Foundry.** This foundry was established in 1856 by the late Provost Robertson and the late Provost Orchar. Originally their energies were principally confined to the designing, building, and fitting with machinery the jute works which began to be established in Dundee about that time. Later on, after the local demand had become somewhat exhausted, they extended their business to continental countries, and when jute mills

began to be erected in Calcutta, they were responsible for the design and equipment of a large number of these.

Of late years they have made a speciality of sewing machines for all classes of jute and canvas goods. They also became connected on business lines with the principal firm in the linoleum trade, designing and manufacturing the most of the machinery required by that firm, not only for their works in Britain, but also for their other establishments in France, Germany, and the United States. A new shop, 120 feet long and 50 feet wide, fitted with an electric overhead travelling crane has this year been erected to meet the demands of this branch. Gas engines and electric motors supply the motive power in these works.

The founder of this firm in 1842 was the **Charles Parker, Sons & Co., Victoria Foundry,** late Mr Charles Parker of Darlington, who, as Chief Magistrate of the city, was taking a keen interest in the prospective visit of the British Association to Dundee in 1867, when he died some little time before it took

place. Originally located at Ladybank Works, near the centre of the town, the firm is now situated in the north end at Victoria Foundry, where direct railway connection is obtainable. During its early existence the bulk of its productions was machinery for flax and hemp yarns, receiving medals at the Exhibitions at London in 1851 and 1862, and at Paris in 1855 and 1867. When jute was introduced into this country the production of machinery for its manufacture was added to the other branches, and now the firm are large makers of jute, flax, and hemp preparing, weaving, and finishing machinery, having an extensive connection wherever the manufacture of these fibres is carried on. The "Victoria" loom, invented by the founder, for the weaving of heavy Navy canvas, is said to be the only loom in the market capable of making "mathematically correct" cloth, and, as constructed now, presents very few modifications on the original design.

This firm came into existence twenty years ago, principally for the manufacture of the Laing's Patent Sewing Machine—an invention by a Dundee working mechanic, Mr James Laing, which revolutionised the sack-sewing industry of the world. It remains in 1912, with some minor inventions added, as the only machine used to produce the millions of overhead hand stitch sewn bags required to supply the world's wants. In addition to these machines, the output of the works includes all classes of bag making machines, yarn testers, water-proofing and other machinery for the treatment of cloth, rubber machinery, and special machinery for the manufacture of confectionery. Some five years ago a department was added to carry out electrical power and light installations, and recently an automobile branch was instituted, both of which are proving highly successful.

#### CONFECTIONERY MACHINERY.

As far back as 1830 witnessed the beginning of this business, then under the firm name of Sutherland & Murdoch. It was not, however, till the late eighties, when it was formed into a Limited Liability Company, that it secured that prominence which it now commands. Ten years ago the works were removed from Dundee to Monifieth—a change which has been markedly beneficial to the fortunes of the company. Its leading feature is the manufacture of all classes of machines used in the confectionery and preserve trades. These include a new caramel compound cutting machine, lozenge cutters, creaming pans, and vacuum pans for sugar boiling, hydraulic presses for fruit preserving, and sugar cane mills, with all necessary engines and boilers complete. Besides this, the firm manufactures gun-metal steam fittings of all descriptions, and also metal fittings to meet all the requirements of the sanitary engineering trade. In normal times their employees number 140.

**Low & Duff,  
Ltd.,  
Albert Works,  
Monifieth.**

## STONE-WORKING MACHINERY.

Mr George Anderson, already a crane maker of some repute, started the stone-working machinery industry of this company at Arbroath early in the eighties, and in 1897 it had so increased that he moved to Carnoustie and formed a company. In 1905, owing to the rapid expansion of business, the company was refloatated with increased capital. Two years later this company acquired the business of Grice's Gas Engine Co., Ltd., of Birmingham, and now the two firms working as one, employ from 350 to 400 men. The firm ranks as the premier and largest makers of stone and marble working machinery in Great Britain, and possibly throughout the world. They are the patentees of those successful circular saws which cut stone by means of diamonds inset round the periphery of the blade, and which they have supplied to the trade all over the world, but principally in the United States and Canada. They have recently put down for the contractors a huge plant for working the stone and marble and for erecting the Victoria Memorial in Calcutta.

As crane makers, without having the largest output, they rank high, supplying harbour and dock cranes of various types and capacities, and also equipping many quarries.

## GAS ENGINES.

This gas engine business was transferred from Birmingham in 1907—the class of engine manufactured being the horizontal type, of horse powers varying from 3 to 150, with and without suction producer plant. Large piston areas per unit of power is the policy adhered to, on the grounds of general efficiency and of addition to the life of the engine. The joint works are situated alongside the Dundee and Arbroath Joint Railway, and occupy fifteen acres. The foundry is fed directly from the railway by means of a 20-ton electric overhead travelling

crane, about 30 tons of metal being passed through daily. Adjacent is a small steel foundry where special castings are made. The main turning, fitting, and erecting shops, occupying seven parallel bays, are served by electric travelling cranes. Three gas engines, worked by suction plants on the double generator system, enabling one plant to be cleaned while the other is in operation, ensure continuous night and day running when necessary. From them also is derived the power for electric lighting and for the current supplied to the welding plant, by which the diamonds are electrically sealed into steel sockets for the saws.

#### BRASS FOUNDERS.

**Hunter, Doig & Palmer,**  
**Ratray Street**  
**Works.**

Started originally in 1865 as mill furnishers by Hunter & Graham, this firm has been continued by the assumption of young, active men as partners, and has now become wholly a manufacturing business, dealing principally in gun metal steam fittings, and also doing a large export trade in machine brasses. In average times eighty men are employed here.

**David Boswell,**  
**Ltd., Tay**  
**Brass Works.**

Established over thirty years ago under the name of M'Naughton & Boswell, it was continued as David Boswell, Ltd., and still trades as such though the sole proprietors now are A. Alexander & Son. Establishing a connection with marine engineers, this firm makes a speciality of engineers' and shipbuilders' fittings of all descriptions, and are included on the Admiralty list. A large business is also done in casting from customers' patterns in various alloys. The requisite machine tools are of the most up-to-date order, and the works are electrically lighted and driven. Over forty men are usually employed.

## Electrical Engineering in Dundee.

By Wm. C. Keay.

THE high place which Dundee takes in Electrical Engineering is not sufficiently well known to the citizens outside of the immediate circles concerned. Those who come directly within the sphere of this scientific industry are indeed well aware of its relative importance, but a feeling of modesty on the part of our leading engineers has, I think, been largely responsible for the lack of general knowledge as to its extensive range and character. From the historical point of view, in the development of this applied science, Dundee takes a high, and in some respects a unique place. Many distinguished men, whose names are now known over the world, are so closely associated with Dundee in this respect as to be inseparable, while the researches of several, though perhaps chiefly pursued in other centres of activity, should not be altogether detached from the city of their birth and education. One could say much here, but in the prescribed limits of this short article much of general and historical interest must remain unsaid. To-day our electrical industry is an example of progressive development, and credit must be given to the pioneers who have initiated and established such a potent factor in the industrial life of our historic city.

As early as 1834 James Bowman Lindsay wrote as follows:—

“Houses and towns will in a short time be lighted by electricity instead of gas, and heated by it instead of coals, and machinery will be wrought by it instead of steam.”

In 1835 Bowman Lindsay lit his study with electric light, and between the years 1853 and 1859 his now famous experiments in wireless telegraphy were conducted. An account of James Bowman Lindsay's life and work is

given on another page of this volume. These dates may be said to mark the beginning of the electrical epoch in Dundee, and with him, in his later experiments, must be associated the name of Mr George Lowdon, who assisted him, and who was for many years practically the only maker of electrical apparatus in the city. A long period followed of patient and fruitful scientific research and investigation of which little, however, but passing notice was taken, except by a few interested citizens. The industry proper may be said to begin in the year 1876. In this year the first dynamos in Scotland were brought by Mr Lowdon to light the works in building the first Tay Bridge. From 1876 to 1879 small installations were fitted up for Gourlay Brothers; Carmichael's, Ward Foundry; Don Bros., Buist & Co., Ward Mills; and Bullionfield Paper Works. From Dundee there were many dynamos with lamps fitted in other cities, Stobcross Docks, Glasgow; Blaikie's Works, Edinburgh, and numerous other examples could be cited. In these early years Dundee may be said to have been the centre for electric lighting in Scotland. The first mansion house in Scotland in which electric light was used was Balruddery House in 1879. Since this date Dundee has kept abreast of modern science in the development of electric lighting, power, transmission, etc. To-day there are from 300 to 350 men employed in this growing industry.

In the year 1894 the opening of the Central Electric Station at Dudhope Crescent Road was celebrated. The demand for current rose rapidly as the use of electricity became known. Though extensions were periodically made, it was soon seen that the requirements for tramway and industrial purposes would exceed the possible economical supply at this station. In the year 1907 the original scheme for the new Electric Station at Stannergate was propounded, and in February 1910 the scheme was realised. The new station was auspiciously opened by one of Dundee's famous sons, Dr. Ewing, C.B., F.R.S., M.I.C.E., etc. Full particulars of the modern equipment of this station are given on page 175 of this Handbook.

The facilities for electric driving in the mills and factories have been greatly increased by this progressive policy. Developments in this direction have also been furthered by the excellent examples of textile driving shown in the new Technical College of Dundee. The equipment for this College has been specially considered and installed according to the recommendations of experienced textile engineers. This plant fulfils as nearly as possible all educational requirements, and also illustrates how, in many cases, the electric driving of textile machinery may be of industrial and commercial advantage. There are over a dozen motors of varying powers, and the current used is both D.C. and A.C. The direct current is at 400 volts, and the alternating current 3 phase, 50 cycles. The spinning department is driven by two large D.C. motors. These are fixed overhead, and are of the "variable speed" type, in order to illustrate the effects of varying speeds on the spinning fibre. In the weaving department a motor drive for each machine has been adopted. Alternating current motors have been selected for the looms owing to the absolute immunity from sparking and fire risks of the A.C. machine. This type of machine also overcomes easily the "speeding up" difficulties of the D.C. motor, as the shuttle demands for its effective throw a very quick start. The equipment at the Technical College altogether affords an interesting object lesson in textile driving.

Special mention should also be made of the University College Peter's Electrical Laboratory. Professor Wm. Peddie, D.Sc., etc., deserves special credit for the care he and his colleagues have taken with the equipment, on modern lines, of this Laboratory. The plant has been recently amplified, and a brief summary of the more recent machines will be of interest here:—

(a) *Direct Current Motor*—

12·2 h.p., 400 volts (shunt wound), direct coupled to

(b) *Direct Current Generator*—

7.5 k.w., 18 amps, 400 volts, 1,520 r.p.m.  
(compound wound).

(c) *Induction Motor*—

5 h.p., 12 amps, 250 volts, 50 cycles, 1,420  
r.p.m., 3 phase; squirrel cage.

(d) *Induction Motor*—

5 h.p., 10.25 amps., 250 volts, 50 cycles, 1,450  
r.p.m., 2 phase.

(e) *Alternator*—

250 volts, 1000/1500 r.p.m., 3 phase, 50/75  
periods per sec., 34.6 amps. per phase,  
rotary field. Connected by flexible  
coupling to

(f) *Shunt Wound Motor*

400 volts, 22/25 b.h.p., 480/1500 r.p.m.

(g) *Rotary Converter*—

400 volts, 15 amps., 1,500 r.p.m., motor side.

250 volts, 13.8/16.3 amps. per phase, 3 phase,  
50 cycles per sec., 1,500 r.p.m. alternator  
side.

The switchboards and connections are arranged as follows:—

The D.C. motor (a) is controlled by double-pole switch and fuses, starter and shunt-regulator, and the D.C. generator (b) by D.P. switch and fuses and shunt regulator, the above being mounted on one switchboard.

The second switchboard is designed for the control of the motor-alternator set (f), and the induction motors (c) and (d). The motor of the alternator set is equipped with an interlocking shunt regulator and starter, and D.P. switch and fuses. The rotary field of the alternator (e) is connected to a shunt breaker through same D.P. switch. The three-phase induction motor (c) is connected to three-pole switch and fuses, and slip rings to a three-phase

starter. The two-phase induction motor (*d*) is connected direct to a starting compensator, and D.P. switch and fuses. Both machines are controlled by a four-pole switch with connections from alternator (*e*). Three poles of the four-pole switch are connected to the three-pole switch for three-phase induction motor (*c*), and the remaining pole to one pole of the D.P. switch for the two-phase motor, the other pole of this switch being connected to the middle pole of the three-pole switch.

The third switchboard is equipped with switches, etc., for the rotary converter, viz., one D.P. switch and fuses, starter, and shunt regulator. The mains are taken direct from the Corporation meters to the various switchboards.

Perhaps the most complete example of mill and factory electric-driving in Dundee is to be seen at Hillbank Linen Works. Details of this plant will be of interest to manufacturers and engineers alike, and I also append a few figures from the official test, as the question of steam consumption relative to output is of more than academic interest to an industrial community. The turbo-generator is of 1000 kilowatt capacity, and was erected to drive the spinning mill and weaving shed, and also a proposed extension of the former. Both spinning and weaving departments were previously driven by steam engines. The mill absorbed about 1000 horse power (indicated) by a pair of horizontal compound tandem engines. The shed absorbed about 250 i.h.p. from a M'Naughted beam engine. The plant consists of:—

(1) A Zoelly turbine running at 3,000 r.p.m. connected by a flexible coupling to a three-phase, 1,250 k.w. alternator of 50 periodicity, with rotating field magnets and star-connected stator winding, the exciter being carried on a prolongation of the alternator shaft.

(2) A condensing plant, consisting of a surface condenser having 2,500 square feet of surface, placed immediately below the turbine; a pair of Edward's air pumps 13 inches diameter by 8 inches stroke actuated by a two-throw overhead crank shaft running at 155 r.p.m., and a Rees Roturbo circulating pump running at 725 r.p.m.

The air and circulating pumps are driven by a 35 h.p. three-phase motor, the first through cut steel gearing, the second by a prolongation of the motor shaft.

(3) A switchboard with eleven panels and the necessary instruments.

(4) The following motors with controllers:—Four 210 b.h.p., with wound rotors and slip rings to run at 485 revs. per minute, with current at 440 volts, each having two bearings and a flexible coupling to couple direct to line shafts in the mill; four similar motors with three bearings and rope drums; three motors of 40 b.h.p. to run at 355 revs. per minute and drive shaft by belts; one 75 k.w. transformer to reduce the voltage from 440 to 105 for lighting.

(5) All the necessary cabling.

Two tests were made while the turbine was driving the machinery in the mill and shed. Steam was supplied from three Lancashire boilers with safety valves loaded to 160 lbs. per square inch, supplemented by downtake superheaters which raised the temperature of the steam to between 500° and 600° Fah. The steam consumption, taking the mean of the two trials, was 15.9 lbs. per k.w. hour, or 11.85 lbs. per e.h.p. delivered to the mill circuits. This e.h.p. is equivalent to the b.h.p. delivered from the spur wheel or rope fly wheel of a steam engine, and not to the i.h.p. developed in the cylinders. To compare the steam consumption of the turbo-generator and a steam engine it is necessary to know the relation between the i.h.p. and the b.h.p. of the latter. As regards steam consumption per b.h.p. hour the turbine is more economical than any but exceptionally economical mill engines, and probably as economical as the best. Before the b.h.p. can be utilised, however, it has to be transmitted from the switchboard or the driving wheel to the line shafts in the mill by cables and motors in the one case, and by ropes or gearing, usually ropes, in the other, and the losses in these two modes of transmission must be considered before an accurate comparison can be reached. The tests taken lead to the conclusion that as

regards *steam*, and therefore coal consumption, there is little to choose between a turbine with a motor drive and an engine with a rope drive for loads of about 1,500 horse-power. Upkeep, space, and first cost all affect the economy of a power plant. With a turbine drive the space occupied is much less, and the cost of oil and stores is very small, whereas for a 1,500 h.p. engine this item may amount to about £150 a year.

Dundee's activity in electrical work has by no means been confined to the city boundaries, and large contracts have been secured by local firms all over the country in the face of much competition. It may come as a surprise to many to know that Blackpool, Ayr, Lancaster, Southend, and many other towns owe their electric tramway systems to Dundee's enterprise. The largest contract of its kind in Scotland was only just recently completed by a Dundee firm, viz., at Shieldhall Outfall Works, Glasgow. This contract comprised the mechanical power, the electrical installation, the oxidizer plant, and the workshops' equipment for the whole of the works. The mechanical power contract alone included the manufacture, delivery, labour in erection, setting to work, and maintenance for a certain period, of the steam boilers, mechanical stokers, superheaters, economisers, steam and water piping, feed pumps, feed tanks, high-speed triple-expansion surface-condensing forced-lubrication engines, and direct driven dynamos; similar engines connected direct to centrifugal water pumps, with all necessary accessories, platforms, and iron work. The pumping plant had to deal with the low-level sewage of Glasgow main drainage and raise it through a height of 26 feet; the other plant being used in connection with the supplying of power for the several processes involved in the treatment and purification of the sewage, lighting purposes, etc. An idea of the capacity of this plant may be realised by the fact that it is capable of dealing with 32,000,000 gallons of sewage per day, and that the length of the cabling alone used on the electrical contract amounted to 25,000 yards, or about 14 miles.

Dundee has also secured a large number of water turbine installations throughout Scotland, and indeed in this respect it may claim to be the headquarters for the development of water power in the north. Since the advent of the metal-filament lamp, a large number of oil engines and dynamos have been installed in mansion houses throughout the country. This method of illumination has proved its efficiency and convenience as unequalled where supplies from a power station are unavailable.

There is no reason why Dundee should not have a still greater future before it in electrical science and industry. It will be for the good of its citizens if this interesting department of human activity is encouraged and fostered, and our young men educated to take their place in the electrical field.

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## Printing and Publishing in Dundee.

By **David T. Sandeman, F.J.I.** (formerly  
of "**Glasgow Herald**").

WITH the long and notable history of the Printing and Publishing Trade in Dundee some incidents of great interest are associated. When, in the early part of the sixteenth century, the printing press was made use of by the Provost and other citizens to diffuse the doctrines of the Reformation, measures for the apprehension of the printer—John Scott by name—were taken on the part of the Church dignitaries. Scott managed to escape, but his prosecution and the troubles that soon after ensued in connection with the English invasion led to the temporary decline of the art. During the succeeding hundred years

very few publications, except religious essays and maps, were issued from the press of Dundee. Attempts at revival were made in 1703, when the Presbytery offered to Mr David James the modest sum of 24s. to enable him to "sett up the art," and again in 1750 when Messrs Henry Galbraith & Coy. established an office entirely unaided. The latter effort was to some extent successful, while the former proved a comparative failure—an early commentary on the more modern endeavours to subsidise industries.

#### FIRST FRUITS OF THE ART.

The earliest books of any distinction were printed and published by the Galbraith firm towards the end of the eighteenth century. They included, it is significant to notice, Ostervald's Bible in folio, and another volume of similar size containing the theological works of Isaac Ambrose. The Bible embraced "numerous engravings and notes taken from the most eminent commentators." Both works, now extremely rare, are characterised by accuracy, clearness, and equality in depth of colour, testifying to the fact that the head of the staff was a man of culture, high professional skill, and imbued with considerable artistic taste. Then followed "A New Edition of the Heroick Actions of the Renown'd Sir William Wallace, General and Governor of Scotland," by William Hamilton of Gilbertfield, to which is annexed "The Life of Robert Bruce, King of Scots," by John Harvey, M.A. All this book is in verse, and reveals a high degree of poetical talent. Hamilton, who was a descendant of Hamilton of Gilbertfield, Ayrshire, formed a close intimacy with Allan Ramsay, who informs him in one of the "Seven Familiar Epistles" that he is indebted to certain of his lyrics for poetic inspiration and stimulus. Burns, in his "Epistle to William Simpson," names Ramsay, Gilbertfield (Hamilton), and Ferguson as those in whose company he would desire "to speel the braes of fame." The Galbraiths seem, like many of their later successors in the publishing line in Dundee and elsewhere, to have migrated to Edinburgh, as subsequent volumes with their imprint appear to have been published

in the Capital. The list of other early books published in Dundee by the Messrs Chalmers and Messrs Colville is too extensive for quotation here, but it may be mentioned that full particulars are contained in a Manuscript which has been compiled with commendable care by Mr T. Y. Miller, one of the Registrars of the City and who for many years was connected with the "Dundee Courier." That document is now in the safe custody of Dr. Millar, the City Librarian, and must be highly useful for reference purposes.

#### EARLIEST DUNDEE DIRECTORIES.

To the enterprise of the firms of Colville and Chalmers is due the earliest efforts to supply the City with Directories. In 1783 the Messrs Colville issued the "Dundee Register of Merchants and Trades," a little volume of some 70 pages. This was the first Directory. The intention was to issue it annually, but the scheme fell through from lack of support, and not till 1809 did the Colvilles venture on a publication of the same kind. Another severe hiatus occurred, and it was 1818 before the third Directory appeared from the same firm. Another publication, "Dundee Delineated," appeared from the Colville press in 1822. But no further attempt in a similar direction was made until 1829, when the publication of a Directory fell into the hands of Mr James Chalmers, the Dundee bookseller, to whom the country is indebted for the first suggestion of the adhesive postage stamp, now so familiar and generally useful. Mr Chalmers continued to publish other Directories on his own account until 1845, the year when the issue of a Directory was taken over by the staff of the Post Office. It was printed for several years by various firms. In 1864 the printing was undertaken by Messrs J. P. Mathew & Co.; with them it has continued up to the present time.

#### BIRTH AND PROGRESS OF NEWSPAPERS.

To the firm of Messrs Henry Galbraith & Coy. the City owes its first newspaper. This was brought out in 1755 under the title of "The Dundee Weekly Intelligencer," but

notwithstanding the laudable efforts thus made to "contribute to the enlightenment of the people," the paper had a small circulation, and as the sinews of journalistic warfare in the shape of advertisements were only of a meagre nature, the paper did not live long. A more successful attempt at newspaper literature took place in the first year of the nineteenth century, the "Dundee Advertiser" being first issued on the 16th January 1801. This was followed by the "Dundee Courier" in September 1816, by the "Dundee Warder" in February 1841, by the "Weekly News" in May 1855, by the "Dundee Times" (one of the first of penny papers) in 1855, by the "People's Journal" in 1858, by the "Evening News" in 1876, by the "Evening Telegraph" in 1877, by the "Evening Post" in 1900, and by several other kindred publications, which will be referred to in due course.

#### THE "DUNDEE ADVERTISER" AND JOHN LENG & Co., LTD.

As already stated, the natal day of this newspaper was January 16th, 1801. It bore the title of "Dundee Weekly Advertiser and Angus-shire Intelligencer." The sheet was a puny one of four pages, with four short columns in each page, while the price ran to sixpence. Its owner was Dr. James Stewart, an ardent Radical reformer, his object being to "establish a newspaper in which the Liberal sentiments of the people could be freely expressed." At first the "Advertiser" was printed by the Messrs Colville and other private firms; but, in 1805, when Dr. Stewart sold the paper to Messrs Saunders, Writers, the latter fitted up an office of their own in Peter's Court, Seagate, where the printing was carried on for a few years. In 1808 a removal was made to New Inn Entry, the site of the premises being now occupied by the warehouses of Messrs James Keiller & Sons. Another change took place in 1838 to an old tenement in Argyle Close, Overgate, and there, amidst many disadvantages, the work of producing the gradually increasing newspaper was conducted for

upwards of twenty years. By 1859, however, new premises became a necessity, and a site being obtained in Bank Street, there was erected on it a comparatively small office, which formed the nucleus of the present palatial buildings.

The changes in the titles, size, and price of the paper have been as numerous as those connected with the offices. Beginning with the somewhat imposing title already mentioned, this was altered within a year to the "Dundee and Perth Weekly Advertiser." Then "Cupar," the county town of Fife, was introduced; then "Angus-shire" again took a place; and so the changes were rung until 1861, when, as a penny daily, the "Dundee Advertiser" took the name by which it has ever since been called. The price was raised in 1812 from the original one of sixpence to sixpence-halfpenny. By 1815, owing to an increase of the Stamp Duty, the price went up to sevenpence. With the fall of the Stamp Duty in 1836, the cost of the paper went down to fourpence-halfpenny, only to be raised again in 1843 by one halfpenny. But the abolition of the Stamp and of the Paper Duty enabled the proprietors in 1861 to follow the example set all over the country by bringing out the "Dundee Advertiser" as a daily at the price of one penny. In the course of these various alterations of price the size of the paper has sprung up from four to ten or twelve pages, with seven or eight long columns in each. It is claimed by the proprietors that the "Advertiser" has consistently advocated an advanced and robust Liberalism.

Many distinguished journalists have since 1801 filled the editorial chair. The first was the Rev. James Roger, to whom "those in peril on the sea" are mainly indebted for the erection of the great beacon on the Forfarshire coast known as the Bell Rock Lighthouse. Next came Mr James Saunders, who took a prominent part in disputes between Dundee Town Council and Guildry, being instrumental in obtaining the adoption of a new "sett" of the municipal Constitution. He was succeeded by Mr Robert Stephen Rintoul, afterwards so conspicuously associated with "The Spectator." As an enthusiastic

advocate of the Reform Bill, Mr Rintoul invented the well-known phrase, "The Bill, the whole Bill, and nothing but the Bill." Mr James Galletley, who followed, is chiefly remembered by his action on the Reform Bill defeat of bringing out the "Advertiser" with broad black mourning borders. The succeeding editors were Mr Peter Brown, Mr Francis W. Baxter, and Mr Lake Gloag. Next came the chief under whom the paper attained its greatest prosperity—Sir John Leng. Under his editorship, which lasted fully half-a-century, the "Advertiser" developed in a very remarkable manner. The change to a daily took place, the new premises were erected, other publications, including the "People's Journal," with separate editions for Forfarshire and neighbouring counties, and the "People's Friend" were added, and lithographic and other departments started by the firm. In the later years of his life, when Parliamentary duties absorbed so much of his time, Sir John devolved many of his journalistic tasks on younger men. Sir Carlaw Martin became editor, and on his appointment as Director of the Art Museum in Edinburgh, the chair was taken by the present editor—Mr Alexander Urquhart.

Reference has been made to the "People's Journal" and to the "People's Friend," but these, along with the "Advertiser," by no means exhaust the publications which issue from the office of John Leng & Co. They have a joint interest in the publication of the "Evening Telegraph," bring out "My Weekly," and handbooks which form a People's Library of upwards of a hundred works. Their machinery and printing appliances of all kinds are thoroughly up-to-date, and have enabled them to publish many books of note, including "Dundee: its Ancient and Historic Buildings," by the late Mr A. C. Lamb; and "Roll of Eminent Burgesses of Dundee—1513-1886," by Dr. Millar.

THE "DUNDEE COURIER" AND D. C. THOMSON & CO., LTD.

The career of the "Dundee Courier" is quite as varied and interesting as that of the "Dundee Advertiser."

Friday, September 20th, 1816, was the date of its first publication. Started as the organ of the Conservative party, and with the long title of "Dundee Weekly Courier and Forfarshire Agricultural and Commercial Advertiser," it was only a small sheet, though its price ran up to no less than sevenpence a copy. The title was, after a year, curtailed to that of "Dundee Courier," but before long other alterations took place until amalgamation first with the "Argus" and secondly with the "Warder." Ultimately the title of "Dundee Courier and Argus" was permanently adopted. Side by side with these changes the price of the paper ranged from sevenpence to fourpence-halfpenny, and to a penny—the publication being then three times a week. This price was maintained when the paper became a daily in 1861, but in 1866 its present price of one halfpenny was decided upon, the "Dundee Courier" thus being the first and oldest halfpenny morning paper in Great Britain.

The "Courier" has also had many proprietors, many editors, and many printing offices. First of all it was issued from premises of an old and undesirable kind in a narrow entry called Key's Close, leading from the Nethergate to Fish Street, a locality which has been entirely remodelled by the construction of Whitehall Street. Removals took place to Reform Street, to New Inn Entry, to Lindsay Street, and afterwards to the present sumptuous buildings in Albert Square. Messrs Colville & Son appear to have been the earliest proprietors and printers of the "Courier," but its prosperity and usefulness as a public organ may be said to date from 1823, when the proprietorship was acquired by Mr David Hill, formerly connected with the "Montrose Chronicle." Mr Hill proved to be a journalist of great ability and enterprise. He at once assumed the editorship which had before been in the capable hands of Dr. George Buist and Mr Samuel Horsley, continuing to carry it on till joined in 1849 by Mr Charles Alexander, whose long and honourable connection with the "Courier" as editor and proprietor is still remembered with much admiration. It was

during his time that the amalgamations already referred to occurred, one of the most important of them being the absorption of the "Warder," a paper which originated during the time of religious agitation preceding the Disruption of 1843, and which was carried on with so much vigour by Mr Robert Park under the motto, "Righteousness exalteth a nation, but sin is a reproach to any people." Mr Park also brought out in 1855 the "Dundee Weekly News," but on the amalgamation with Mr Alexander's firm, who owned the "Dundee Weekly Telegraph," the title was changed to the "Weekly News and Telegraph."

Mr William Thomson, who had for a quarter-of-a-century been giving financial support, first to Messrs Park, Sinclair & Co., publishers and proprietors of the "Daily Argus" and "Weekly News," and after the absorption of that firm by Messrs Charles Alexander & Co. to the latter firm, became in 1886 sole proprietor of the "Courier" business, and along with members of his family carried it to a height of great prosperity, adding to the papers already referred to the "Weekly Welcome" in 1896, the "Red Letter" in 1899, the "Saturday Post" in 1904, and the "Red Rose Magazine" in 1908. Another paper, the "Evening Post," was also produced, and this was amalgamated in 1905 with the "Evening Telegraph," under the title of the "Evening Telegraph and Post," now the only evening paper issued in Dundee. To supply all these publications with pictures and the other up-to-date requirements of modern newspapers, the firm—now known as D. C. Thomson & Co., Ltd.—made large additions to their plant of all descriptions. They have also established a printing office in Glasgow, where some of their various papers and other publications are printed and published. Also they are now erecting a large printing office in Manchester to produce the English circulation of their publications. Some idea of the development of the firm may be gained from the fact that, whilst their total weekly output a quarter-of-a-century ago was under one hundred thousand copies, it is now over two millions. Amongst the books

printed by them is a catalogue of over 800 pages of the Central Lending Library of Dundee.

Regarding the editors of the "Dundee Courier," allusion has already been made to Dr. Buist, Mr Horsley, Mr Hill, and Mr Alexander, but several other prominent local men of literary ability—including Dr. Barty of Bendochy, Mr William Thoms, and Mr William Hay—contributed at one time or another to its leading columns. The present editor is Mr John Mitchell, J.P., a journalist of such distinguished position that he was last year elected as President of the Institute, and in that capacity conducted most successfully in Dundee the annual Conference of the Institute, which was attended by from four to five hundred delegates belonging not only to all parts of the United Kingdom, but also to our colonies.

#### DUNDEE PERIODICAL BIBLIOGRAPHY.

Besides the newspapers and other periodicals already enumerated, many more have come and gone. A list of nearly two hundred of these was compiled by the late Mr A. C. Lamb, the earliest being the "Dundee Magazine: or a History of the Present Times of 1775." A writer in "Scottish Notes and Queries" professed to have discovered that another magazine was published in Dundee as far back as 1757, but the name of the printer was not disclosed, and as the publication contained no local news, the inference seems to be that the magazine might have been produced in London or elsewhere, and that the name of the town was filled in for as many copies as some local bookseller thought he could dispose of. Several of the periodicals were of a religious nature, such as "Civic Sermons to the People," issued in 1792; "The Christian Reporter," 1829; "The John Knox," 1840; "The Messenger of the Churches," 1860; "The Dundee Pulpit and Religious Record," 1872; "The Soul Winner," 1884; and "Pray and Trust," 1891. Journals of wit and humour also find a place in the list. The earliest was "The Piper o' Dundee," which came into existence in 1875, and only survived after four monthly copies had been published. It was revived in 1886, under the editorship of Mr George

Scrymgeour, who still writes every day in the "Evening Telegraph" under the *nom de plume* of "Here and There." This paper, taking its title from an old Dundee official whose duty was to warn the inhabitants to keep within doors at night and to rouse them in the morning, lived for a good number of years, its portrait gallery proving a popular feature. The oldest journal of this kind still to the fore is "The Wizard of the North," the originator, proprietor, and editor being Mr James Russell, familiarly known as "The Doctor." Besides cartoons, conical sketches, and art and dramatic notices, the paper contains an attractive column on "What the folks are saying in Dundee."

#### GENERAL PRINTERS IN DUNDEE.

Besides John Leng & Co. and D. C. Thomson & Co. in connection with the "Advertiser" and "Courier" offices, there are about twenty firms of printers in Dundee. Gone now are the Galbraiths, Colvilles, and Chalmers's of early days. Gone, too, is Mr James Duff, who was for long the oldest printer not only in Dundee, but in Scotland, and whose name and fame must always be honourably associated with the industry. But the places of these worthies are well occupied by such firms as J. P. Mathew & Co., William Kidd & Sons, Burns & Harris, Valentine & Sons, David Winter & Son, Paul & Matthew, John Durham & Co., John M'Corquodale, and A. B. Duncan & Co. The introduction of the linotype machine has much reduced the employment of compositors in Dundee as elsewhere, more especially in newspaper offices. Still there are about 250 men and boys employed in the printing trade. The work they carry on is of a journalistic and miscellaneous kind, but does not include many books of note. All the same, Messrs Kidd have to their credit various volumes associated with the history of Dundee, whilst Messrs Mathew have recently published "Lochee, Past and Present," and Mr M'Corquodale is responsible for a memorial volume of good merit—"George Dutch Davidson"; while Messrs Winter are responsible for the present Handbook. The publications of the Thomsons and Lengs have already been alluded to.

## Preserves, Confectionery, and Biscuit Manufacture.

By Bailie William Forwell, J.P.

WHILE Spinning and Weaving constitute the staple trade of our City, there are other industries of very great importance, not the least of which are those forming the subject of the present short paper.

**PRESERVES.**—Over a hundred years ago, when the standard of living was very much plainer than now, preserve manufacturing was started in a very small way in Dundee. Since then the trade has advanced with great rapidity. Marmalade, which forms the backbone of this business locally, was first introduced in 1797 as an article of diet. It proved a most welcome addition to table dainties, and to such magnitude has the trade grown that the very name is as intimately linked with the City as that of jute. Dundee marmalades are extensively distributed, and along with other preserves which have constantly been added to the choice offered the public, they occupy a leading place in the esteem of those calling for such dainties. To give some idea of the immense business done in Marmalade it might be mentioned that the annual output of one firm alone would fill a sufficient number of one pound pots packed closely together to reach from Dundee to London, or if the pots were put one upon the other they would make a column a yard in thickness and over 25,000 feet high. The leading firm engaged in the industry is that of Messrs James Keiller & Sons, Ltd., which not only has large works in the City, but the necessities of whose business call for a large London factory at Silvertown, as well as another in Germany—the latter brought into existence to get over tariff walls. Other firms doing a large business of this kind are Lindsay & Low Ltd., Ogilvie & Co., and Dundee & Arbroath Preserve Manufacturing Co. Large preserve

manufactories dealing with local fruit—strawberries, raspberries, etc.—also exist in the near neighbourhood, at Coupar Angus, Newtyle, and Blairgowrie where the berries are grown.

CONFECTIONERY has during recent years also formed a not unimportant branch of Dundee's trade since it was first introduced some 20 years ago. Dundee chocolates and sweetmeats are nearly as popular throughout the United Kingdom as marmalade, as evidence of which it might be mentioned that one of the local firms was entrusted with a special order for the King and Queen while on their recent trip to India on s.s. "Medina." The principal firms engaged in this industry are Messrs Keiller, Lindsay & Low, and James Couttie & Sons.

The local trade in confectionery, chocolate, and preserves is put at not less than £600,000 annually, and employment is found in the several branches for over a thousand workers.

BISCUIT Manufacture was not a Dundee industry prior to 1870, up to which time the City was almost entirely dependent upon Glasgow, Edinburgh, and other centres for its supply of machine-made fancy biscuits. At this time, however, the first biscuit factory north of the Forth was founded here, and, curiously enough, by a Free Church minister (Rev. Wm. Forwell) who had been engaged in the industry in his early pre-college days in Glasgow. His venture was most successful. A fairly extensive business is now carried on by three firms—Messrs A. G. Kidd & Sons, Ltd., Lindsay & Low Ltd., and James Couttie & Sons. These firms turn out goods which in variety, quality, and finish equal any in the country, their volume of business approximating over £60,000 annually, and their works employing a large number of men and women.

Locally the baking trade assumes very considerable dimensions, but apart from firms which specialise in seasonable delicacies—such as Scotch shortbread, cakes, and gingerbread—this is not so different from that obtaining in other Scotch cities as to justify detailed reference.

## Fishing, Trawling, and Whaling.

By *Ex-Bailie William High, J.P.*

THE Port of Dundee is pleasantly situated on the north bank of the Tay, about 8 miles from its mouth; it is the third seaport in Scotland, and one of the safest and most convenient harbours in the country.

From mediæval times it has been a fishing centre, and in modern days, because of its convenience for shipment by rail and water, it is surprising that it has not taken a larger place as a centre of distribution.

Prior to 1902, supplies were landed at Craig Harbour, near to the Tay Ferries, but at this date, after considerable controversy, the whole of the trade was transferred to the new Market and Dock built by the Harbour Trust at Carolina Port. Since then the development has not been so satisfactory as had been hoped. The trade at first did not take kindly to the change, and it is only recently that a better feeling has prevailed.

The Dock itself is yet incomplete. When finished, it will have 2,700 lineal feet of quay space, 6,700 yards of depôt, and 8 acres of water area. There is also a large extent of vacant ground in the neighbourhood available for occupation, on moderate terms, as stores, curing yards, etc. Railway sidings connect the Dock with both Caledonian and North British systems. A hydraulic coaling hoist, at which vessels of all sizes and draughts can be expeditiously dealt with, adjoins the Dock on the east, while in close proximity to the west are the premises of the Ice and Cold Storage Co., where 25 tons of ice are manufactured daily. There is also ample dry dock accommodation available for repairs.

During the past year trawlers and liners landed a total of 84,947 boxes of fish and 2,780 score of cod, equal in all to 3,800 tons. This was supplemented by an additional 200 tons of fresh and 320 tons of cured fish by rail, making a total supply for the year of 4,320 tons.

It is a matter of regret that Dundee does not at present get a share of the East Coast herring fishing in June, July, and August. The old method of herring fishing by sailing boats has passed away, and the steam and motor drifter are steadily taking their place. The natural result will be that herring fishing must, to a large extent, be confined to those ports having a sufficient depth of water to admit drifters at all states of the tide.

On the east coast, harbours of this description are not numerous; indeed, between Aberdeen and Shields, Dundee Harbour is the only one with this qualification, and there therefore seems no good reason why this should not become an important centre for the summer fishing. The facilities available are second to none in Great Britain. At the period mentioned, the Eastern Wharf is practically idle. It is nearly a mile long, and adjoining it are sheds having a total floor space of about 8 acres. These are all concreted, and in every respect well adapted for the handling of herring in an economical and expeditious manner, and in all sorts of weather. Salt, boxes, and barrels could all be landed at the point required, and the herrings could be shipped from the wharf, or placed on rail at the sheds, without any cost in cartage. A fleet of drifters would be required to start, but, if these were introduced, Dundee might become, both for buyer and seller, one of the most important centres of the summer fishing industry.

Drifters from Aberdeen do not usually fish further south than the Bell Rock, and those from Lowestoft and Yarmouth seldom further north than Cromer Knoll, the result being that between these two points the ground has never been properly covered.

Trawling has never become a large industry at the Port, although the conveniences are such as could enable it to be successfully prosecuted. To secure the attendance of the larger buyers, upon whom the financial success of the fishing principally depends, it would be necessary to have dependable supplies in large quantity, and this would only be possible were a large fleet introduced—from 40 to 50

trawlers for a start. So far, Dundee capital has not seen fit to embark upon this trade on a large scale—in which way only could the trade be developed.

In Seal and Whale fishing, Dundee has long occupied a pre-eminent position, but of late years, owing to the uncertain nature of the results from the point of view of profits, the industry has been much restricted.

The oils obtained in this Arctic fishing were at one time much in demand for lighting purposes, but with the introduction and extended use of new and improved illuminants—first coal-gas and later electricity—and the enormous development in the use of mineral oils for this and related purposes, the demand was much lessened. To prepare the jute fibre for manufacturing purposes, however, it has to be subjected to the action of fish oils, and this provides one of the main markets for the products of the whale fishings.

While in 1867 there were engaged in the prosecution of the seal and whale fishery 12 auxiliary screw steamers, all full rigged, and, with their equipment absorbing a capital estimated at about £200,000, these have been reduced to a total of 8 in all, three of which are small. The ships are all wooden, strongly built and fortified, both inside and out, to withstand the ice pressure to which they are likely to be subjected.

The success of the whale fishing during recent years, owing to the scarcity of whales in the region hitherto visited—Davis Straits—caused, it is believed, by their resorting for safety to more inaccessible waters, has been so limited as greatly to discourage the venture, and during the current season only two ships have gone forth to try their fortune. The present fleet consists of the *Active*, *Balaena*, *Diana*, *Arthur William* (ketch), *Morning*, *Queen Bess*, *Scotia*, and *St. Hilda*.

Dundee has not, so far, entered into competition with Norwegian capital in the prosecution of whale fishing in the Shetlands or South Africa, this industry being of an entirely different type from that carried on from the port, and with a smaller and less valuable species of fish.

It is doubtful whether the industry, indeed, will ever recover its former prosperous condition. The grip which it took on the mind of the nation, because of its association with adventure and romance, was always greater than its relative commercial importance; the world's confines are so steadily shrinking, because of modern scientific advance, that it cannot now secure the same hold on the mind of youth as was formerly the case.

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## Banking in Relation to Local Conditions.

By W. G. Leggat, Agent, Bank of Scotland.

ALL the Scottish banks are represented in Dundee. With the principal offices in the centre, and numerous branch offices conveniently situated throughout the city, liberal provision exists for the banking requirements of the community.

As the title indicates, it does not come within the scope and purpose of this short article to treat of the history and system of Scottish banking. Enough to say that the conspicuous success which has attended the business of Scottish banking in the past is the best tribute to the soundness of the principles which have guided its operations. Combined with the character, perseverance, business qualities, and enterprise of its people it may be justly claimed that to its banking system Scotland is indebted for the great development of its natural resources and the expansion of its trade and industry. Dundee has shared in that expansion largely on account of its connection with the jute trade. Between sixty and seventy years ago this industry was little beyond the experimental stage. While, perhaps, the expectations created by its rapid development in the early years have not been realised, still, it has become a large and important industry, and forms the staple trade of the city. The mills and factories in the United Kingdom outside Dundee and district are comparatively few in number.

It is difficult to form an estimate of the aggregate amount of capital invested in the local trade as repre-

sented by buildings, plant, machinery, general equipment, stocks raw and manufactured, but it is believed that the capital so invested will amount to fully £10,000,000. In the course of a season as many as sixty steamers will arrive in the port with jute cargoes from Calcutta and Chittagong. There are between fifty and sixty works engaged in spinning and weaving, employing, it is estimated, 33,000 to 35,000 hands. The money value of raw material imported annually for consumption by the local mills, calculated on the market prices which have ruled within recent years, will not be far short of £4,000,000.

A trade of such volume cannot be successfully conducted without extensive financial operations. This leads us to speak of the useful part which the banking institutions of the city play in the matter of finance. Let us employ an illustrative example. The capital account of a spinner or manufacturer may run into substantial figures. A large proportion of it will necessarily be represented by buildings, machinery, and plant, and the balance will probably consist of stocks of raw material, manufactured goods, and trading debts due to the firm. The assets, other than the block or property account, we speak of for the purposes of accounting as liquid assets, but for trading purposes a certain proportion of these, probably the major proportion, will necessarily be more or less of the nature of fixed capital, which remains circulating in the business. In such a manufactory there may exist machinery capacity for dealing in the course of a single season with raw material costing on the aggregate twice the amount or more of capital employed in the business. In ordinary circumstances the manufacturer will not buy all his jute at once, but if he is to trade successfully he must be placed in a position so to act if the market conditions are favourable. The value of the free assets employed in his business, plus, it may be, accumulated means invested outside, in conjunction with character and business capacity, will justify his banker in providing the necessary credit, or temporary additional working capital required to undertake these commitments, and thus

enable him to finance his trading operations with ease. A successful year's trading to the spinner or manufacturer depends largely upon the way in which he buys his jute—that is to say, the average level of prices at which he is able to secure his supplies. Within recent years speculation has entered in a greater degree than ever before, both at home and abroad, into the markets for raw material. Much foresight, experience, and often not a little good fortune are therefore required to carry through these operations successfully. Current prices, along with individual circumstances relative to stocks on hand and contracts for delivery of the manufactured article, will be the guiding factors in determining how and when to buy. Under certain conditions the manufacturer may find it more advantageous to buy a proportion of his jute on spot, but the bulk of it is bought through local brokers for shipment on draft or "cash on arrival" terms. With the exception of the primary transaction in which the baler settles with the Bengal native growers in rupee money, the jute is paid for by Bills of Exchange, usually drawn at three months' sight by the shippers. In quite a number of cases these bills are drawn direct upon the buyers for payment against delivery of the accompanying bills of lading, invoices, and marine insurance policies. But as a general rule, the bills, with relative shipping documents, are drawn upon the London office of the Scottish bank with which the manufacturer or merchant keeps his local account, the documents being deliverable on acceptance of the draft. These bills are converted into cash on the other side by being sold, at the ruling rate of exchange, to one or other of the Indian banks, who forward them with the shipping documents to their offices or correspondents in London. On arrival of each mail the drafts are presented for acceptance to the London offices of the Scottish banks. The local banks are advised without delay of the arrival of the drafts, and immediately take instructions from their respective customers as to acceptance or payment under rebate. If the customer has unemployed funds he may secure a fair return on his money by electing

to pay a number of the drafts under rebate. Except in the case of drafts for account of merchants doing a "cash on arrival" business, the London offices are instructed to accept the bulk of the drafts, or in other words, engage to pay them at maturity. The holders of the draft, on obtaining the bank's acceptance or payment under rebate, surrender the shipping documents, which are then forwarded to the local offices of the banks, where they are held pending the arrival of the steamers. By arrangement with his banker the customer may get up the documents so that he may operate delivery and store the jute, or pass on the documents to his buyer for cash. In many cases the jute is stored in independent warehouses in name of the banks, as security to them for present or future advances. Transactions of the nature described run into huge figures in the course of a season.

It will thus be seen what an important and indispensable function the local banks fulfil, not only in the smooth conduct of the multifarious transactions themselves, but also by interposing their name or credit for account of their numerous customers, and providing them with the temporary liquid capital required until the raw material has been manufactured and sold. Not only do the local banks play an important part in the financial operations by which the jute supply is bought and paid for, but they are also a valuable medium by which payment is effected of manufactured goods sold locally through merchants or brokers. The settlement, which is practically on a cash basis, takes place weekly on Tuesdays. The principal settlement is on the first Tuesday of each month. An approximate computation of the money value of cheques passed through the banks for the purpose of settlement (1) on the ordinary weekly adjustment of accounts, and (2) on the principal settlement on the first Tuesday of each month, may be put at £100,000 and £170,000 respectively. Aggregating these figures for the year at, say, £6,000,000, we get an idea of the extent and importance of the staple industry of the city, and of the vital necessity of its healthy maintenance and prudent expansion in order that the numerous other local trades

depending upon it may be vigorously and profitably conducted.

The flax trade of Dundee and district is also an important, although not an expanding industry. In the city it is in few but strong hands. The drafts against shipments from Russia are drawn, as a rule, upon the buyers direct, the connection of the banks being confined more or less to the retiral of the drafts when due.

In regard to other trades or professions in the city, there is nothing in the dealings of the banks with them distinguishable from the practices and customs in vogue in other parts of the country.

In concluding this paper we would revert to what was said in the opening sentences as to the part the Scottish banks have played in fostering and developing the trade of the country generally. The secret of their success in that direction has been the deposit system, which is in effect the foundation of their business. By means of their network of branches throughout the country, they gather up the savings of the people and the temporary unemployed balances of those engaged in business, and by prudent lending make these available for trade. Within the past two or three decades many fresh fields for investment have opened up, and in consequence the Scottish banks, who in earlier times might be said to have been almost the sole custodiers of the people's savings, have had to face considerable competition for deposit money. In this respect Dundee has been no exception to other large centres. On the contrary, its progressive Municipality, its ably managed Trust Companies, and vigorous Saving Bank have attracted much of the money which formerly found its way into the hands of the banks. Still, these institutions continue to get a liberal share of the increasing wealth of the city and district, and it may be confidently expected that in the future as in the past, the Scottish banks will continue to use with prudence the funds entrusted to them in building up and extending that great system of credit upon which the success of commercial and industrial enterprise depends.

## Marine Insurance.

By R. Kinnison and D. S. Nicoll.

THE origin of this branch of insurance is lost in obscurity, but it is believed to have existed some 700 years B.C., during the period of Rhodian prosperity, as at that time there were extensive commercial dealings between Italy and Mediterranean ports, and the Rhodian laws, which were generally respected by Levant merchants, are supposed to have applied in a great measure to marine matters.

So far as the United Kingdom is concerned, the first record we have of a Court of Control was the Act of Parliament of 1601. We have no documentary evidence before us to prove when the first transaction in marine insurance took place in Dundee, but we know that in the development of commercial interests during the last seventy years, the city has been afforded every facility in trade requirements so far as marine insurance is concerned.

At one time the contract of marine insurance was a subsidiary consideration in trade contracts, but nowadays it is very often the item which decides whether some venture will be entered into or not.

Dundee merchants have now every facility for carrying through sale contracts with their buyers abroad, from the fact that stamped policies for attaching to shipping documents can be obtained within half-an-hour of receipt of instructions, and if the terms of sale contracts provide for cash in exchange for documents, payment can be made by bankers on date of issue. It can easily be understood, therefore, that Dundee enjoys full benefits, as the majority of leading marine insurance companies are represented by agents, who not only hold power of attorney to issue policies, but are also authorised to examine and settle claims. On the other hand, if consignees abroad prefer claims to be paid at destination, this can also be arranged at the foreign agencies, thus enabling merchants to get clear of any further responsibilities or worry relating to "c.i.f." contracts after the goods have been shipped.

## **Life, Fire, and Accident Insurance.**

**By Councillor R. M. Noble.**

DUNDEE is also well served in life, fire, and accident insurance, every British company of importance having established branches in the city. With the exception of the year 1906, when the great "whisky fire" took place, involving a loss of £450,000, Dundee has been remarkably immune from disastrous fires. This is in a great measure due to the efficient Fire Brigade, with its modern and up-to-date equipment, and the splendid water supply, both undertakings being owned by the City Corporation. This has in a great measure tended to the lowering of rates, and many of the more hazardous risks are fitted with very efficient sprinkler installations.

### **SICKNESS, INVALIDITY, AND UNEMPLOYMENT.**

The new conditions arising from the great legislative measure just at the time of writing coming into operation is of special interest in the case of Dundee. Owing to the enormous preponderance of female labour (not hitherto, in the case of two-thirds of its number, associated with any union or friendly society), special preparation is necessary with a view to the evolution of machinery for carrying through the work, as well as in educating those whom it is intended to benefit to the requirements of the measure. It is now believed, that while the Insurance Act throws a not inconsiderable tax on such a low paid textile industry as that of jute, the greater efficiency of the workers, arising from the benefits conferred, will assist in increasing production, and thus reducing the burden. Whether this will be so or not, time will tell. Meantime a door of hope is undoubtedly opened to many overburdened by the pressure of harsh economic conditions.

## Distilling and Brewing.

By John Henderson Stewart.

"THERE is nothing half so sweet in life as a great big thirst!" So wrote a genial and thirsty soul on an historic occasion. From time to time poets in wavering melodies have charged the air with praises of Scotland's "Whisky," and it has been said that the Scotsman's capacity in the consumption of the "wine" of his native country shows his strength to its best advantage. Time was when the flowing bowl was wooed with a profuseness and regularity unknown in our more temperate age. Yet it is calculated that at the present time the number of labels issued annually on bottles of Scotch whisky, if put end to end, would stretch all the way round the world!

The seaport of Dundee, by reason of its geographical position at the gateway of the Highlands, is particularly well suited as a centre for the distribution of the produce of the Scottish Highlands to the various markets of the world, and an extensive and yearly increasing business is being done in the blending and casing of Scotch whisky.

The art of DISTILLING dates back many centuries before the Christian era, probably as far as 2000 B.C., when it was practised in China, India, and Egypt, the grain used being chiefly rice. Aristotle in his "Meteorology" (lib. II., ch. ii.) specially comments upon it. Distilleries in this country date from the reign of Henry VIII., Scotch whisky being held in great repute by the English in the time of the Tudors. Whisky as now known is not of the same character as the "usquebaugh" of the 17th and 18th centuries, which was a mixture of plain spirit flavoured with nutmeg and other spices.

The three types of whisky—namely, Scotch, Irish, and American—are sharply differentiated from each other. The first-named possesses a typical dry, clean flavour. Irish whisky is round and sweet. American whisky is

mainly made from rye; it is much higher in flavour and heavier than either Scotch or Irish, and because of this, and also on account of the method of distillation common in the States it requires a longer time to mature.

Broadly speaking distilling consists in transforming the starch in the barley or other grain employed into sugar, the saccharine or starchy matter being then converted into alcohol. On the class of wood employed in which to store whisky in bond until maturity a great deal depends, the best results being got from sherry casks which have been freshly emptied.

To what is the world-wide popularity of Scotch whisky attributable? Unquestionably it is due in a great measure to the character of the soil in the land of its origin, the water used in the process of manufacture absorbing a peculiarly soft and peaty aroma as it runs through the heather-clad moors in the Highlands.

Because of Excise restrictions statistics are not available as to the quantity or values of the whiskies dealt with in Dundee, but the number and magnitude of the firms engaged in the industry—distilling at various large centres in the Highlands, blending, bottling, and casing at their free and bonded stores in the city, and shipping in enormous quantities to all the large centres of population at home as well as to the colonies and abroad—places Dundee in the front rank as a distributing centre of the trade—giving it an equal association with this liquid item of modern commerce as that which it possesses with jute and marmalade.

BREWING, although carried on in Dundee, is not an industry typical to Scotland, the hops and other cereals employed being grown to the best advantage in the fertile plains of the South. Beer can boast a remarkable antiquity. The ancient Egyptians had a liquor made from grain which they called *hek*; while 4,000 years ago a temperance cult seems to have sprung up in the land of the Pharaohs, and an agitation for the suppression of beershops was set on foot. Heroditus mentions the "wine made from barley" which the Egyptians used.

Before the introduction of hops into England from Flanders in the 16th century, "ale" was the name exclusively applied in this country to the fermented liquor obtained chiefly from malt, the term "beer" being gradually introduced to describe liquor brewed with an infusion of hops. This distinction does not apply at the present time, except in so far as the term "ale" is not applied to black beers such as stout, nor to "lager" beer. The term "lager" originated in Germany on account of the liquor made there being laid up in a lager or store-house.

The preparation of beer on anything approaching to a manufacturing scale appears, until about the 12th or 13th century, to have been, in Britain, carried on chiefly in the monasteries with very primitive apparatus. The brewers of London, it is interesting to recall, combined to form an association in the reign of Henry IV., and were granted a Charter in 1445, so it is evident that brewing as a special industry must have developed with some rapidity. After the Reformation the ranks of the trade brewers were swelled by numbers of monks from the expropriated monasteries. Up to the 18th century the professional brewers brewed for the masses—the wealthier classes preparing their own beer. At this time, however, it became gradually apparent to the latter that they could have as good a beer from a brewery, owing to the improved methods in operation there. Hence the speedy disappearance of private brewing. In Dundee there is a considerable quantity of beer brewed, but it is almost entirely consumed locally, and very little is shipped. Still, a considerable number of people are given employment in the industry.

But, as I have said, it is whisky that may proudly lay claim to be Scotland's national beverage, and in the meeting of demands for it Dundee takes an outstanding place as a centre of distribution.

## Dundee as a Shopping Centre.

By Annie S. Maxwell.

IT is only perhaps after a prolonged sojourn in some remote, unpopulated spot, situated "at the back o' beyont," that one appreciates shops at their true value. We, in Dundee, I am afraid, accept our shopping privileges as we accept much else, as a matter of course, rarely stopping to consider the amenities which put us, in this respect, in line with London and other large centres of the world's commerce.

Thanks to our geographical position, we can receive supplies by sea, as well as by rail, so that even a railway strike need not leave us in the hungry isolation which is the unhappy portion of certain cities. As regards merchandise of all kinds, Dundee can hold its own with any place in the kingdom. Its prices are not higher than those current elsewhere, and, in many instances, they are less, while, in proportion to its size, it has as great a variety and choice of goods as is to be found outside of the Metropolis.

There is little fear that Dundee housewives will follow the example set recently in France, and go on strike against the shops. Provisions of all kinds are plentiful and good, and they are sold, moreover, at a fair market price, nor is there in Dundee one rate for one class and a second for another class—a detestable custom prevalent, not only on the Continent, but in some parts of England and Scotland as well.

We have not yet reached the point of having stores which, like the great Whiteley's, or the "Wertheim" in Berlin, undertake to provide everything, from the proverbial needle to an anchor. Dundee is, meanwhile, quite content with its excellent butchers, bakers, grocers, fishmongers, etc., and when we leave the realm of provisions and come to that known technically, I believe, as "soft goods," we find a condition of things which makes us more than ever satisfied with ourselves and our city.

Every woman loves shopping—most of all shopping of what may be called a personal kind. The calm delights of purchasing a juicy steak, or a pound of freshly ground coffee, pale before the more alluring joys associated with the acquisition of a summer gown or a new drawing-room carpet. And the big drapery and furnishing establishments of Dundee fairly charm the money from the pockets of its women-folk. Up-to-date? Of course they are. How could they be other than marked by good style and modernity, while the heads of departments, by constant visits to London and the Continent, keep themselves and their customers in touch with all that is best and newest. Whatever may once have been, the reproach of being "old-fashioned" can no longer be used against Dundee. I don't say that we just fling ourselves at the head of a new fashion. One might not, for instance, the day after Bond Street has decreed in favour of crinolines, see half-a-dozen of these garments in the Nethergate; but let Dundee approve a mode, and it will not hesitate to adopt it. "Canny" we may be, but we do not lag behind.

To return, however, to the drapery stores. Little wonder that shopping is such a pleasure to us in Dundee. For one thing there is the note of personal interest necessarily absent in cities of a larger growth. The shopkeepers and assistants know their customers, or most of them,—know their tastes and wishes and study to consider and suit them. No high-handed, indifferent methods here, but pleasant ready service, indicative of a real desire to help and accommodate the purchaser.

Such is the key-note all through such stores. Enterprising and progressive they are to a degree, and, following on the lines of American stores, they provide for the convenience of their customers, luncheon and tea-rooms, rest and dressing-rooms, reading and writing-rooms, telephone service, post-box, safety elevators, accommodation counter—everything, in fact, that can make shopping pleasant, easy, and attractive.

That bi-annual London attraction, "The Sales," has, of course, its counterpart in Dundee, as it must have wherever womenkind abound. You remember the story

of the ship-wrecked company cast on a desert island, and how one day, after months of danger and privation, the cry arose: "A sail! a sail!" As one woman the feminine passengers rushed to the spot whence the cry came. Great and deep was their disappointment when they found that it was only a ship approaching to their rescue, and not a sale of the kind so dear to the heart of woman.

An explanation given lately of the mania for sales was that a "bargain" is, perhaps, the nearest approach which men and woman can feel, in this harsh business-world, to the delightful sensation of getting something for nothing. It is human nature to revel in that sensation, and as David Harum says—"There's as much human natur' in some folk as there is in others—if not more." So Dundee has its sales and enjoys them, and the sales, in their turn, are a success when conducted on the fair honest lines which alone ensure this.

Shopping hours are much the same in Dundee as they are in other large cities. The Wednesday half-holiday has become very general, although certain firms still prefer to close early on Saturday. The afternoon hours are, as a rule, the busiest, and the wise woman will, in preference, do her shopping in the early morning when she gets such time and attention as is impossible for assistants to bestow in the rush and bustle that comes later.

An easy and luxurious method of conducting one's shopping now-a-days is by telephone. All the leading shops in the city are on the telephone, and some of the larger establishments have an arrangement whereby a customer can be switched on to any special department with which she wishes to deal.

Shopping by post is another institution of modern times, and one which contains great possibilities for development in Dundee and elsewhere. By this means hundreds and hundreds of people living beyond the reach of shops can have the same advantages which city-dwellers enjoy. From the daily advertisements in the newspapers, or by means of the catalogues issued now-a-days in such profusion, they learn of the goods which the shops have to offer. In regard to drapery goods, most of the Dundee

stores follow the lead of London, and send parcels "on approbation"—a system which is much appreciated by customers, and only sometimes, for their credit be it said, taken undue advantage of. One regrets to have to admit even a "sometimes," but, unfortunately, it exists, and it is impossible to condemn too highly the unscrupulousness and dishonesty of women who will wear for a special occasion a hat or a garment sent on approval, and then return it on the plea that it "doesn't suit."

One feature of the mail-order trade suggests itself as worthy of development and that is the specialising of a certain article, so that it comes in time to be identified with the name either of the maker or of the place of its manufacture. For instance, one inevitably associates Nottingham with lace and Sheffield with cutlery, and, to quote an illustration specially apposite to this subject, it is significant that in France marmalade is known almost everywhere as "le Dundee." So much for the way in which the reputation of our city is "preserved" abroad; better still, from the point of view of individual profit, when the name of the seller is identified with the product he wishes to put upon the market. "You English have a queer language," said a Frenchman once to a friend of mine. "I cannot understand it at all. Here you have a word that you spell 'm-u-s-t-a-r-d.' And how do you pronounce it? Colman!"

Such is the name a big firm has been able to build up for itself; but what it has done, another, in a smaller way, can do also. It is not necessary for this to run a large and expensive establishment. There are men, and women too, who are doing a splendid business by selling some special article, and who do it all from one small shop, or, in some cases, without a shop at all.

Specialise, specialise, specialise—that is the first thing, and the next is to make your specialty known to the public. Which brings us to a far-reaching and very wide aspect of business life, wider far than can be dealt with here. Commercial interests and how to advance them—that is a big subject, and, as the ready Rudyard puts it, another story from mine.

## Trades Organisations.

By Robert Stirton, J.P., Ex-President Dundee

### Trades Council.

TRADES organisations have been an important factor in the development of Dundee from a remote period. As early as the beginning of the 16th century we find the craftsmen associated in corporations for mutual benefit. Then, generally speaking, a man was both master and workman; he could not become the former unless he was a competent workman who had served a regular apprenticeship and was of good character.

In virtue of the burghal rights which they held as freemen, they were associated in the government of the town and became identified with its interests. The number of trades so associated would not then exceed twenty. To-day they number about fifty, composed exclusively of workmen and workwomen. The masters need no longer to be personally proficient at the trade in which they are engaged. The modern trades union is a product of last century, and many of the older ones commenced as local unions, each seeking to improve its own position without much regard to the welfare, or even the rights, of kindred associations. This style of fighting by companies has now largely been departed from; with one or two exceptions, unions are national or international in their character and scope, keeping in close touch with their fellow-workers in other centres. Many of them are in a high state of efficiency, and besides close attention given to their own immediate trade interests, most of them are affiliated with, and send delegates to, the Dundee and District Trades and Labour Council, which was formed over twenty-five years ago, its avowed objects being that it stands for the advancement and protection of the rights of labour and the wellbeing of the working classes generally. It closely follows all proceedings in our Local Boards and Law Courts, and endeavours to secure labour representation in Parliament and on Local Boards, and co-operates with similar associations throughout the country.

This organisation has been singularly successful in serving the ends for which it was instituted, it has formed an ever-ready vehicle for conveying and expressing the essence of working-class opinion on matters of public importance affecting the general interests of the community, and is ever ready to bear a hand in all forward movements—industrial, social, civic, and political.

First in alphabetical order of the unions forming the battalions of the labour army come the Bakers, organised to a man, numbering about 500, as a branch of the National Federal Union of Bakers and Confectioners. This trade, the proper conduct of which is of vital importance to the community, has been so systematised both as to conditions and wages, that perfect smoothness in working, satisfactory to the men, the masters, and the public is the result. The Blacksmiths, one of the most fundamental trades of any civilised community, are also a national society fully organised, having a membership of nearly two hundred. There are two branches of Boilermakers, capably and efficiently organised.

The Amalgamated Society of Engineers has five branches in the city, with a membership on the roll of over 900. As a society it has had an existence in the town for over sixty years, and has several members who have been on the roll for over fifty years. The mottoes under which it advances are Maintenance of Rights, Performance of Duties, and Realisation of Aspirations. Nobly and successfully does it endeavour to carry out all three. The scale of benefits is generous and well arranged, comprising almost every contingency in a workman's life, and though the contributions are a somewhat heavy item of expenditure every fortnight, the necessity tends to the formation of methodical habits, which are of immense importance and of great value to the individual member, and he performs his part, confident from his experience in the past that every obligation which his society has taken on will be fulfilled.

The Carpenters and Joiners form a strong and effective working union. A lately effected amalgamation of the

two societies known as the Carpenters and Joiners (Associated) and the Joiners (Amalgamated) now form one society, with three branches and an aggregate membership of 500.

Ironmoulders are one of the oldest trades unions in the country, having been in existence for over a hundred years, and are as successfully organised as their lengthened experience would lead one to expect.

The Painters are a live body of men who have to fight against very adverse circumstances, but by dint of hard and effective work succeed in maintaining a good position in the labour world.

The United Patternmakers Association Dundee Branch was opened thirty-eight years ago, and has a present membership of 110, and its benefits are trade, sick and funeral, superannuation, tool insurance, and accident benefit.

Operative Plasterers have a membership of about 75, and are very zealous and enthusiastic members of their union.

The Plumbers are the pioneers of the eight hour movement in the city. They have a membership of about 220, comprising every competent plumber in the city. Their standing and position in the labour community is an object lesson in the value of thorough organisation on the part of both workmen and employers.

In addition to all those societies already mentioned there are many others, such as the Postmen's Federation, the Typographical Society, which embraces every working member of the craft, Shipwrights, Shop Assistants, Railwaymen, Tramwaymen, etc.; all of which societies, in addition to the trade benefits catered for, carry on successful friendly society work, much the same in scope and efficiency as do the Engineers.

In addition to those specialised trades which are national or international in their scope, there are the Bleachfield Workers, Calender Workers, Jute and Flax Workers, and Mill and Factory Operatives' Union, mainly local. The Calender Workers have now close on a thousand members.

Their working conditions hitherto have left not a little to be desired, but by diligent organisation and persistent effort they have quietly set themselves to the task of the improvement of their position as workers.

The Mill and Factory Operatives' Union and the Jute and Flax Workers' Union look after the interests of the general factory worker, but unfortunately have hitherto been unable to reach more than half of those employed. The work of organising is exceedingly difficult, owing to the diversity of conditions of employment and rates of pay obtaining amongst the different grades of workers, the lack of discipline, and the tendency to hasty and irresponsible action by the unorganised section of them, and the grudging and ill-disguised aversion of the employers to recognise the representatives of the unions.

This condition of things is likely soon to change for the better—forced by the logic of circumstances and recent events. The necessity for organisation representing the interests of the workers as against the influences which tend to keep them down to the economic level of a bare subsistence is being more and more generally recognised. There is a Time Spirit abroad, working in and through most trade organisations, which seeks not merely to secure advantages for their own particular branch of industry, but which takes cognisance of the claims of others, and realises that the condition of the lowest and meanest paid worker is the concern of all, and the real standard and measure of our civilisation.

This feeling of solidarity is likely to become more intense as time goes on, and, if wisely guided, is more likely to lead to the use of political means of securing and retaining desired conditions than the more costly weapon of the strike. The objects which the workers have set their hearts on are increased leisure, giving greater opportunity for culture, and the leading of a freer, fuller life. And in their trade organisations they think they possess the best and speediest means of attaining their desires. In trusting them they are trusting themselves, for the unions are just what the members choose to make them.

May their work be so successful that when next the British Association visits Dundee there will be no need for special lectures to working men, as the working man in that hoped for day of fuller opportunities will be able to attend and to appreciate the ordinary work of the Association.

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## Dundee as a Centre of Investment.

By C. H. Marshall, S.S.C.

MODERN investment of capital is principally of two kinds: one, the use which a man makes of capital in carrying on and developing of industries, by himself or under his supervision, and from which he himself derives the whole net return; the other, the investment made by individuals in shares or debentures of, or by way of loan to, limited companies, which are either trading or investment associations, in the actual administration of which the great majority of the investors have no active part. In many cities of the United Kingdom the largest of manufactories have been transformed into joint stock companies, the stock of which is held by investors in many cases scattered all over the kingdom and abroad. Dundee is an exception; almost the whole of the capital engaged in its chief industries of flax and jute spinning and weaving being held privately. Few outside investors are interested in these trades. Possibly, the speculative nature of the industries arising from the violent fluctuation in the price of raw material, with consequent varying financial results, does not offer a sufficiently steady income-producing investment to invite outside capital. Whatever the reason, Dundee mills and factories are practically all privately owned.

As a rule, the industries of a locality are affected to a large extent by the economic conditions existing around it. The proximity of raw material and the natural advantages of situation often account for the class of industries which develop to the greatest extent in a locality, and which offer investment for capital. From its geographical position, it is surprising that capital in Dundee has not been largely invested in shipbuilding and engineering. For the employment of capital in these industries the city has advantages; the principal being a broad river, and proximity to vast coalfields in the neighbouring county of Fife. The city is removed, no doubt, from the iron and steel centre, but these natural advantages, with the lower rates of wages ruling, compensate largely for this drawback. The investment of capital in this direction in Dundee, notwithstanding these natural advantages, does not exist to the extent one would anticipate, though the Tay has a long and honourable history in shipbuilding, and many fine vessels are built on its shores. Still, this industry is limited, the city not having hitherto taken advantage of its natural resources as a shipbuilding centre. Investors have apparently looked more to the disadvantages than the natural advantages. Dundee investors have in this respect differed from those of Glasgow, the centre of shipbuilding in Scotland, which, with only the natural advantage of proximity to the coal and iron area, has the great disadvantage of being situated on a narrow and comparatively shallow river. Yet the genius and enterprise of the west have overcome these obstacles and permitted of the largest ships in the world being built and navigated upon the Clyde.

Capital in Dundee is principally invested in textile manufactures. The city can be associated authoritatively with the textile trade for centuries. Hector Boece or Boethius, the historian (born about 1465), a native of the town, in his "History and Cronikles of Scotland," says, "Dundee, the town quhair we wer born; quhair mony virtewus and lauborius pepill ar in, making of claith." The industry of spinning, commenced no doubt by thrifty

housewives on spinning wheels, was gradually taken up by the male population. The hand-loom, in process of time, gave place to steam driven machinery, which greatly widened the field for textile manufacture. The marketing of textile fabrics being already largely centred in Dundee, it was natural, when machinery opened a wide field for manufacturers, that they should extend their investments with the expansion of trade in the industry which the inhabitants of the city were acquainted with, and which for long had provided employment in the city. The manufacture of flax was, until the decline of sailing ships, the staple industry, although for a time the manufacture of cotton goods and sewing threads was introduced. These latter flourished for a little and then decayed.

About 1830 it was ascertained that Indian jute fibre could be cheaply treated and made into yarn and cloth on machinery adapted from that already in use in the flax industry. A growing demand for jute manufactures naturally brought with it continued increase of investment of capital in the textile trade. Many uses were found for the products of the fibre and the jute manufactures of Dundee found markets in every country in the world. Investment in jute industries in Dundee has for some years been seriously checked by mills having been erected in Calcutta. There, on account of the raw material being at hand, and a plentiful supply of cheap labour being available, large quantities of jute goods are manufactured on favourable terms, consequently Calcutta has become the great centre of manufacture. India has, however, provided a profitable outlet for British surplus capital. In Calcutta there are about forty companies which run altogether about 35,000 looms. Only three of these companies (but these amongst the largest) have been financed from Dundee. The nominal amount of the shares, debentures, and temporary loans of these three companies in February 1912 was, as will be seen from the appended statement, £1,394,844, and the market price of their ordinary shares showed at that date an appreciation of, approximately, an average over the three of 27 per cent.

In addition to the employment of capital in the staple industry, and in financial enterprise, there are very considerable sums invested in other industries in Dundee; for example, in the manufacture of marmalade, jams, and confections, brewing, whisky blending, whaling, shipping, and trawling. A linoleum work, built a few years ago, is likely now to add to the successful enterprises of the community.

The Post Office Savings Department, as also the Dundee Savings Bank, with its deposits of £2,335,878. 13s. 10d., fall, of necessity, to be mentioned as they help in the daily financial life of the community and nation by means of their purchase of Government stocks and other investments.

The total Land Valuation of the city for 1911-1912 (including £55,602 of railways) was £978,323 10s. 0d.

The direction of the investment of capital in local industries has been dealt with generally. So far as regards the staple industry, it is impossible to particularise by means of figures, although it is believed that the total amount invested approximates to something like £10,000,000. Many of the largest and what are believed to be the most successful concerns engaged in the staple trade are, as has been stated, either private partnerships or private limited companies which do not issue balance sheets, access to which would be essential in order to discuss the financial result of employment of capital in local industries. This impediment, however, does not exist in the case of those investment companies which have their headquarters in the city, and figures regarding them, and the reasons which have led to their inception, it is believed, will be of interest. The success of these companies is worth attention, and the people of Dundee have reason to be proud of the investment companies which were conceived by the foresight and the business capacity of some of their leading citizens.

It is somewhat difficult to give, apart from funds handled by local investment companies, reliable statistics as to the amount of Dundee money invested abroad.

Competent authorities estimate this amount in the neighbourhood of seventeen millions sterling, but this is believed to be conservative, some placing it as high as thirty millions; and when it is remembered that the total British loans invested abroad are estimated to amount to over three thousand eight hundred millions, the estimate of local foreign investments seems well founded. The following information as to locally managed companies may be not uninteresting to the general reader.

The investment companies which have their headquarters at Dundee are:—

The First, Second, and Third Scottish American Trust Companies, incorporated in 1879;

The Western & Hawaiian Investment Co., incorporated in 1883;

The Alliance Trust Co., Ltd., incorporated in 1888;

The Northern American Trust Co., incorporated in 1896; and

The British Canadian Trust Co., incorporated in 1910.

The total capital, consisting of shares, stocks, debentures, and loans, invested in these companies, at par, amounts to £7,161,437. The market value of the investments in these companies in February 1912 amounted to £9,521,592, an appreciation on the par value of no less than £2,360,155. From the appended statement it will be observed that the appreciation has, in almost every case, taken place in ordinary stock. This is no cause for surprise, considering the dividends which have been paid upon the ordinary shares of the companies. During the past five years the average dividend on the ordinary shares of the Alliance Trust Co., Ltd., has been 13 per cent; the Northern American Trust Co., 11 per cent.; and the First, Second, and Third Scottish American Trust Companies fully  $8\frac{3}{8}$  per cent.,  $8\frac{1}{2}$  per cent., and  $7\frac{3}{4}$  per cent. respectively.

In comparatively recent years cautious investors associated a high rate of interest with a corresponding risk of capital. A study of modern economic conditions has removed this suspicion; and in forming these companies as a means of investment of surplus British capital,

their founders anticipated the change of opinion in the investing public, and kept themselves in line with the times, thereby demonstrating their foresight.

A brief survey of the alteration in economic conditions, so far as regards the investment of capital in foreign enterprises, may not be out of place in an article of this kind. The development of railways, of iron and steel manufactures, of electricity, and the innumerable industries to which iron, steel, and electricity have given birth, are all of comparatively recent date. Means of transport also, and particularly means of communication, have been improved to such a degree that New York is now as near to London, through the laying of the Atlantic cable, as London was formerly to Dundee. To cross the Atlantic is now a matter of days. To pass to the place of investment, and to secure by ocular demonstration that the land, railway, tramway, or electric work, for which British capital is asked, is in existence, can be accomplished in the period which was formerly devoted to a holiday at home, but which now provides in the same period more interesting recreation combined with business. The electric cable provides, by the assistance of accredited agents, the means of ascertaining the development of work abroad and the probable prospect of gain. Then, a sense of security has been established by the meeting of the obligations of the borrower to the creditor. The opportunity of investing surplus capital at a high rate of interest, combined with security of the investment, has naturally attracted capital to the American Continent, and in North America it is believed the principal investments of the Dundee companies have been made. Surplus capital will always be attracted in the direction of the highest rate of interest, combined with security, for no one will employ capital at a low rate of interest, if, with equal security, a high rate can be obtained. The highest interest will always be obtained in a young country which is engaged in the development of commercial enterprises. The North American Continent (the United States in the lesser, and Canada in the greater degree) are both young

countries. A country like our own which has for long years been developed and enjoyed commercial prosperity does not offer the same opportunities for the profitable investment of capital which a naturally rich country in the course of development will give. In a country like ours, increase of capital makes its employment at a high rate of interest difficult. Competition in the various industries the country is engaged in naturally limits the profits of capital in home industries. Again, abundance of capital restricts borrowing. Extension of the number of borrowers is productive of increase of interest. Confirmation of this is seen in its simplest form by a perusal of the Bank of England weekly statement. If there is an excessive purchase of gold—*i.e.*, excessive borrowing by foreign states—the bank rate is increased. A new country in the course of development may be rich in natural resources, but weak in the supply of the precious metal. It must materialise its natural wealth into gold. But the gold must be borrowed, and borrowed upon the interest which the country can afford to pay, and at which lenders will lend. If a high rate of profits is being made from the product of its natural resources, the country can afford to and will pay a high rate of interest for the money it must borrow for the exploitation of these resources.

The North American Continent has been for years past, and will no doubt, for many years to come, be engaged in the development of its natural resources, for which it will require to borrow at a high rate of interest.

Although the companies dealing in American investments which have been mentioned in this article have all had unqualified success, this has not always been the experience of Dundee investors in America. An unfortunate Oregonian Railway is called to memory with regret, while Land and Cattle Companies have met with varying degrees of success. Those cattle companies still in existence are gradually bringing their operations to a close.

In conclusion, the hope is expressed that the investment of capital in the staple industry of Dundee will for long

be continued on a profitable basis; that the city will not continue to depend so much as it has done upon one industry; that the enterprise of its citizens which has been demonstrated in the employment of capital abroad in enterprises embarked on there, will be more centred in the future in endeavours to exploit new and important industries in the city, which will add to the employment, the welfare, and the happiness of the people of Dundee, and raise it to a higher level as an industrial centre.

*Statement showing Nominal and Market Values.*

*February 1912.*

(a) DUNDEE INVESTMENT COMPANIES.

	Nominal Value.	Market Value.	Decrease.	Increase.
<b>1. FIRST SCOTTISH AMERICAN TRUST CO., LTD.</b>				
Ordinary Stock ...	£ 300,000	£ 625,500	...	£ 325,500
4% Debenture Stock ...	250,000	250,125	..	125
Temporary Loans ...	48,000	48,000	...	...
<b>2. SECOND SCOTTISH AMERICAN TRUST CO., LTD.</b>				
Ordinary Stock ...	400,000	836,000	...	436,000
4% Debenture Stock ...	350,000	348,250	1,750	...
Temporary Loans ...	47,655	47,655	...	...
<b>3. THIRD SCOTTISH AMERICAN TRUST CO., LTD.</b>				
Ordinary Stock ...	400,000	714,500	...	314,500
4% Debenture Stock ...	350,000	347,700	2,300	...
Temporary Loans ...	33,700	33,700	...	...
<b>4. WESTERN &amp; HAWAIIAN INVESTMENT CO., LTD.</b>				
20,000 4½% Pref. Shares, £4 each ... ..	80,000	80,700	...	700
20,000 Ord. Shares, £1 each ... ..	20,000	59,830	...	39,830
Debentures and Temporary Loans ...	124,157	124,157	...	...
<i>Note.—The Capital of this Company is in process of being increased and re-arranged.</i>				
Carried forward ...	2,403,512	3,516,117	4,050	1,116,655

	Nominal Value. £	Market Value. £	Decrease. £	Increase. £
Brought forward ...	2,403,512	3,516,117	1,050	1,116,655
5. THE ALLIANCE TRUST CO., LTD.				
4½% Cum. Preference Stock ...	700,000	721,600	...	21,600
4% Cum. Preference Stock ...	200,000	194,700	5,300	...
Ordinary Stock ...	300,000	987,000	...	687,000
Debentures and Tem- porary Loans ...	1,180,905	1,180,905	...	...
6. NORTHERN AMERICAN TRUST CO., LTD.				
4% Preference Stock ...	600,000	572,000	28,000	...
Ordinary Stock ...	400,000	1,032,000	...	632,000
3½% Debenture Stock ...	750,000	662,500	87,500	...
Terminable Debentures	250,000	250,000	...	...
Temporary Loans ...	84,000	84,000	...	...
7. BRITISH CANADIAN TRUST Co., LTD.				
20,000 4½% Pref. Shares of £5 each, fully paid	100,000	97,250	2,750	...
20,000 Ord. Shares of £5 each, fully paid ...	100,000	130,500	...	30,500
Debentures and Tem- porary Loans ...	93,020	93,020	...	...
TOTAL ...	7,161,437	9,521,592	127,600	2,487,755

## (b) DUNDEE-CALCUTTA JUTE COMPANIES.

	Nominal Value.	Market Value.	Decrease.	Increase.
I. THE SAMNUGGUR JUTE FACTORY CO., LTD.				
3,000 5% Cum. Pref. Shares of £10 each ...	£ 50,000	£ 49,375	£ 625	£ ...
20,000 Ordinary Shares of £10 each ...	200,000	266,000	...	66,000
Debentures and Tem- porary Loans ...	90,073	90,073	...	...
Carried forward ...	340,073	405,448	625	66,000

	Nominal Value. £	Market Value. £	Decrease. £	Increase. £
Brought forward ...	340,073	405,448	625	66,000
2. TITAGHUR JUTE FACTORY Co., LTD.				
15,000 5% Cum. Pref. Shares of £10 each ...	150,000	148,125	1,875	...
30,000 Ordinary Shares of £10 each ...	300,000	399,000	...	99,000
Debentures and Tem- porary Loans ...	194,667	194,667	...	...
3. THE VICTORIA JUTE Co., LTD.				
15,000 5% Pref. Shares, £10 each ...	150,000	146,250	3,750	...
20,000 Ordinary Shares, £10 each ..	200,000	224,000	...	24,000
Temporary Loans ...	60,104	60,104	...	...
TOTAL ...	1,394,844	1,577,594	6,250	189,000

	Nominal Value. £	Market Value. £	Decrease. £	Increase. £
INVESTMENT COMPANIES ...	7,161,437	9,521,592	127,600	2,487,755
CALCUTTA JUTE COMPANIES	1,394,844	1,577,594	6,250	189,000
TOTAL ...	8,556,281	11,099,186	133,850	2,676,755

## The Progress and Development of the Harbour of Dundee.

By J. Hannay Thompson, M.Sc., M. Inst. C.E., F.R.S.E.,  
General Manager and Engineer.

THE Harbour of Dundee is situated on the north bank of the estuary of the River Tay, about ten miles from the North Sea, and is controlled by the Trustees of the Harbour of Dundee, whose jurisdiction extends from the North Sea for a distance of 12 miles from Buddonness to the westward to an imaginary line drawn from Invergowrie to Balmerino. The estuary of the River Tay within the jurisdiction of the Dundee Harbour Trustees covers an area of 25 square miles. Owing to the configuration of the coast, it forms an excellent Harbour, being protected from the north-east and south-east gales by the Gaa and Abertay Sandbanks at the entrance to the river, which form natural breakwaters, and vessels can lie at anchor in the roads in perfect safety during the heaviest gales from any direction. The depth of water is sufficient to allow vessels of any draft to anchor at all states of the tide. The width of the navigation channel at the Bar is 1,600 feet, with a depth of water at high-water ordinary spring tides of 40 feet.

The Port of Dundee has been an important one since the fifteenth century, and from authentic records it is evident that it was well known for many centuries previous to that date. It is one of the very few natural Harbours on the east coast of Scotland and England, and this fact doubtless led to the establishment of settlements near Dundee in the early days, and from remains found during the last 100 years at the Stannergate, consisting of urns of unburnt clay, stone coffins with human remains, etc., this seems to have been the case. Perhaps the most valuable of these archaeological finds was the disclosure of the large shell bed or "Kitchen Midden," which was exposed during excavations carried out between the river and the railway in 1878.

It can be shewn by records within historic times that the locality was regularly used as a Harbour of refuge. Wyntoun states that the ships of Malcolm Canmore, when that monarch was pursuing Macbeth, entered the Tay to support his soldiers about 1040, and although no records of commerce exist regarding this period, it is certain that a river which was navigable for ships of war would afford equal facilities for those engaged in commercial enterprise. The earliest charter to the Burgh of Dundee, viz., that given by William the Lion in the latter half of the twelfth century, and confirmed by Robert the Bruce, granted a free Harbour to the Burgesses, thus implying that a Harbour had been in existence before his time.

The first reference in documents to the existence of an actual shipping Harbour is found in connection with the Abbey of Coupar Angus. Dundee was the port at which all merchandise arriving in Scotland for the use of the Abbey was received, and on April 11th, 1225, Alexander II. granted a license for a vessel to the Abbot of Coupar: "To export wool and other merchandise to Flanders, under the charge of Robert of Pert and Friar Gilbert, Faber." Numerous entries in the Exchequer Rolls in the 13th century prove that at that time Dundee was used as a Harbour of imports.

Though it is difficult to form an adequate idea of the extent of the trade at the port at this early time, the accounts of the Customs levied on exports furnish some data by which to form an estimate. In the accounts of the Customs for the year 1326-1327, the earliest documents of the kind extant relating to Dundee, we find that there were 18 ships sailing from Dundee, which carried 68 lasts, 3 sacks, 9 stones of wool, 4,203 woolfels, 7 lasts, 19 daces, and 3 hides. The Customs levied amounted to £240. 4s. 8d. Included in the imports for this year were various super tunics of grey cloth, and of coloured materials, several pieces of dyed fabrics for the King's use, and confections and pepper for the Royal Household. Payment to Faskyn, merchant of Bruges, for various colours imported to Dundee, and purchased

for painting the King's Chambers in the Castle of Berwick, shews that Dundee was preferred to Berwick as a trading port by the merchants on the Continent.

From this time records can be followed regularly. Thus, in 1329, 23 ships sailed, the Customs being £267. 4s. 6d.; in 1331, 28 ships sailed, the Customs being £303. 2s. 8d.; in 1362, 28 ships sailed, the Customs being £906.13s. 6d.; in 1372, 11 ships sailed, the Customs being £1050. 14s. 1d.; in 1383, 12 ships sailed, the Customs being £902.

In the early part of the fifteenth century, Flemings had been settled in different parts of Scotland in small colonies to teach the natives the art of weaving, and the result was that cloth became an export, and this was, doubtless, the commencement of the spinning and weaving trades at Dundee.

It is difficult to say when the first built Harbours came into existence, but the reference in Robert the Bruce's Charter of 1329 to a "free Harbour" existing in the time of Alexander III. shews that works of some kind had been erected in the thirteenth century. In 1447, it was proposed that the Harbour should be repaired, and James II. gave letters patent, ordaining that money should be lifted for the purpose from vessels frequenting the port. A charter to that effect, ordering also the enlargement of the Harbour, and sanctioning the impost, was granted by the King in 1458. This impost was afterwards known as "havin' silver," and was levied for centuries.

A severe storm occurred in the winter of 1600, and had damaged the Harbour so seriously that an application was made to James VI. for assistance. The King granted a letter under the Privy Seal to uplift a "towst" for three years from all ships using the Harbour, in order that the necessary repairs could be effected. This "towst" was renewed in 1607 for five years, and again in 1612 for a further period of 19 years.

An important charter granted in 1641 by Charles I. confirmed the gifts made by his predecessor and defined the powers of the Town Council, as then constituted, with reference to loading and unloading ships on both sides of

the Tay, and granted a new imposition to enable them to erect sufficient buoys and signals to mark the approach to the Harbour. No documentary evidence is available as to the extent of the Harbour at that period, but if Dr. Gumble, the biographer of General Monk, may be credited, he says that when Dundee was captured there were 60 ships of all sizes taken in the Harbour. Assuming this to be correct, the shipping accommodation must have been extensive.

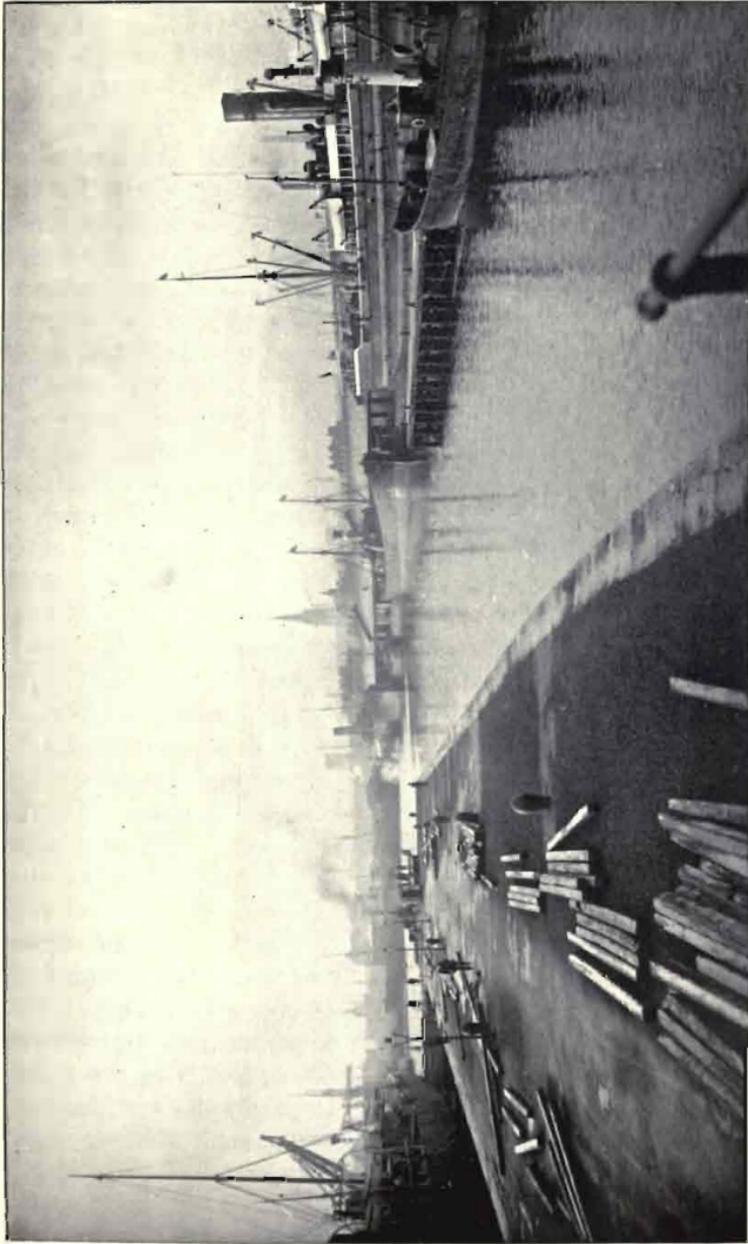
In 1658 the Harbour was again seriously injured during a violent storm, which, following on the devastation committed in 1651 by General Monk and his army, reduced the town and impoverished its inhabitants. The Town Council in 1675 reconstructed a great portion of the Harbour works. Towards the end of the eighteenth century, piers and moles were constructed by the celebrated engineer, Smeaton, and, trade increasing, a considerable revenue was derived from the dues on goods and vessels.

Up to 1815 the Harbour belonged to the town, and its affairs were administered by the Town Council (which was, of course, then differently constituted from that presently existing), under various Royal Charters, but in July of that year an Act of Parliament was obtained, placing the Harbour for a period of 21 years in the hands of a Commission, who were given powers to levy rates, borrow money, and carry out Harbour improvements according to plans prepared by the famous engineer, Thomas Telford.

Prior to the construction of the new works authorised by this Act, the Harbour consisted merely of a small Tidal Basin, protected from storms by breakwaters, probably built of rough rubble stones, and with a landing wharf built of wood.

Behind the north wall covering the ground, now known as the Greenmarket, was a Scouring Basin, into the walls of which were fitted sluices, and these being opened at low tide the enclosed water rushed out, scouring a certain amount of sand and silt from the Haven.

In October 1815 the construction of the new works was begun. The Graving Dock was opened on the 24th



VICTORIA DOCK (INCLUDING GRAYING DOCK), DUNDEE HARBOUR.



December 1823, and was one of the finest in the Kingdom at that time, capable of receiving the largest vessels. The length of the Dock is 250 feet and the width of the entrance 39 feet.

The King William Fourth Dock was opened on the 24th November 1825. The water area was  $6\frac{1}{4}$  acres and the length of quays 2,515 feet, and it was provided with a lockway 160 feet long.

The cost of these works amounted to about £90,000. As a result of the policy initiated by the Act of 1815, the prosperity of the Harbour rapidly advanced. The tonnage of ships entering the port had increased from 70,000 tons in 1815 to 165,000 tons in 1829, while for the same period the revenue had grown from £1,700 to £11,000. Prior to 1815, the greatest quantity of flax and hemp imported in one year had been 3,000 tons, while in 1829 about 18,000 tons were brought into port. Shipbuilding had also become a flourishing industry, and slipways were laid down on the reclaimed ground east of the new works.

In 1830 an Act was passed permanently vesting the Docks in the "Trustees of the Harbour of Dundee," the Harbour Trustees paying to the Town Council the sum of £27,500 as purchase money for their whole rights in the Harbour and Docks. Earl Grey Dock, having an area of 5 acres, was opened in November 1834, and, thereafter, the works were gradually extended to the east. The Marine Parade, a sea-wall extending eastwards from the east roundhead of the West Tidal Harbour, the Patent Slip, the East Tidal Harbour (now Camperdown Dock and Victoria Dock), a shallow Basin, with rough protection walls, were in existence in 1848.

But as time went on and trade increased it became necessary that further facilities should be provided.

The average draught of the larger vessels frequenting the Harbour had, in 1855, increased to from  $14\frac{1}{2}$  feet to 17 feet, and, as on a neap tide there was only  $14\frac{1}{2}$  feet on the cill of Earl Grey Dock, they were obliged to load or discharge a large part of their cargo in lighters, at great additional cost and inconvenience.

This fact, together with the commencement of the importation of jute from Calcutta, necessitated the further extension of the Harbour. The manufacture of flax and hemp goods was the principal industry in the city, and the introduction of the manufacture of jute very largely increased the prosperity both of the city and of the Harbour, these trades being then, as now, the staple trades of the city, upon which the prosperity of the whole of the inhabitants is very largely dependent, there being, however, many other thriving industries in the town.

The Constitution of the Harbour Trust remained practically the same from 1815 till 1869, when the membership was increased from 21 to 32, the additions being representatives from the Chamber of Commerce, Shipowners, Harbour Ratepayers, and Municipal Electors. By a Consolidation Act, which came into operation in August 1911, the Constitution has undergone further change. The old basis of representation between the trading, shipping, and public interests has been retained, but there has been a reduction of the number of representatives formerly given to the Guildry and Trades Incorporations, in respect that the functions previously exercised by these bodies are now largely discharged by others, which have been given increased representation. Dundee Harbour Trust is now composed as follows:— 1 representative from the Admiralty, 8 from the Town Council, 2 from the Guildry and Trade Incorporations, 4 from the County Council of Forfar, 6 from the Chamber of Commerce, 4 from the Shipowners, 6 from the Harbour Ratepayers, and 2 from the Municipal Electors, making a total of 33.

The Harbour property now covers an area of 190 acres, the whole of which has been reclaimed from the river, with the exception of about five acres, and the length of the river frontage owned by the Harbour Trustees is two miles. The land upon which the North British and Caledonian Railway Stations are built, and the East Station of the Dundee and Arbroath Joint Railway, the Goods Yard Sidings of the North British Railway, the

Esplanade, the greater portion of the Gas Works, and the Cattle Market, have all been reclaimed from the river, as well as the whole of the land south of Yeaman Shore, Exchange Street, and the Seagate.

There are four closed Docks at Dundee Harbour, and three Tidal Docks, of a total water area of about 38 acres. There are also two Deep Water Wharves, having a total length of 2,800 feet. An interesting feature at the Docks is the Royal Arch, situated between King William and Earl Grey Docks, which was erected to commemorate the visit of Her Majesty Queen Victoria in 1843. Camperdown Dock was opened in 1865, and cost £100,000, and Victoria Dock, which, together with the Graving Dock, cost £145,000, was opened in 1876. The Deep Water Wharves have been built at various times since 1882 as the trade of the port rendered this necessary. These Wharves were originally constructed of timber, but they are gradually being reconstructed in ferro-concrete, and about 1,000 feet of the Wharves have now been completed in this material. The Docks are used for the coasting and Continental trade. The large liners and vessels in the East India and other foreign trades, are accommodated at the Deep Water Wharves on the river front. These Wharves have a length of 2,800 feet and a depth of water of 35 feet at high water.

A Fish Dock and Market has been provided for the Trawling industry, with sufficient depth of water for vessels to enter at any state of the tide.

There are two Graving Docks, one 500 feet long, and a Slipway for the repair of vessels. The smaller Graving Dock, which is 250 feet long, is at present leased to the Admiralty for the purpose of repairing the Submarine vessels which are now stationed at the port. The Docks and Wharves are well provided with shed and warehouse accommodation, having a total area of nearly 12 acres, and this is being increased as found necessary.

There are 10 miles of Railways on the Dock property, and the total length of quayage is  $3\frac{1}{2}$  miles.

The Docks and Wharves are well provided with

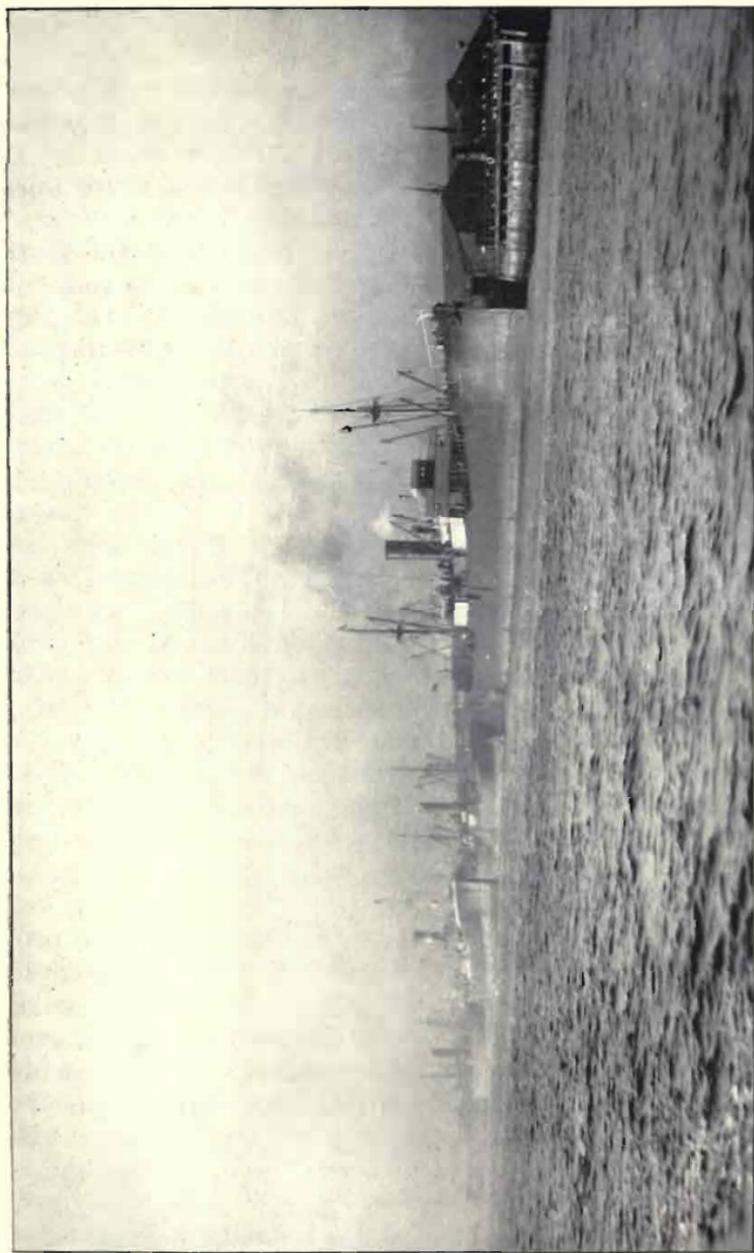
Hydraulic and Steam Appliances for the handling of goods, and a large 20-ton Hydraulic Coal Hoist.

The Harbour Trustees are the Lighting and Buoying and Pilotage Authorities for the Port, the river being well-equipped with Lighthouses and Automatic Low-pressure Acetylene Gas-lighted Buoys, the latter burning from 8 to 12 months without renewal.

Many thriving industries are situated on the Harbour property, principal of which are Shipbuilding and Timber Yards, Confectionery and Preserve Works, Oil Works, Cold Storage, a Tannery, Canvas and Waterproofing Works. The Corporation Electric Power Station is also situated on Harbour ground.

Owing to depth of channel on the spacious river, there are excellent facilities at Dundee Harbour for building ships up to 600 feet in length and over, while vessels up to 460 feet long can be launched, engined, and boilered at the port.

The Harbour Trustees own and work the passenger and vehicular Ferry service between Dundee and Newport on the south side of the river. This service was previously controlled by the Justices of the Peace and Commissioners of Supply for the Counties of Forfar and Fife under Acts of the Scottish Parliament, dated 1617 and 1686. In 1815 the Ferry was worked by 25 sailing boats, licensed by Lord Douglas, who had, by his title, a right to the passage of the water of Tay at Dundee, commonly called the Ferryboat Duty at Dundee, and who, for this privilege, received dues. The Ferries subsequently passed into the hands of the Caledonian Railway Coy., who attempted to obtain Parliamentary sanction to work them as part of their system. The Harbour Trust successfully opposed this in Parliament, afterwards purchasing the rights and plant for a slump sum of £20,000. Immediately after the Ferries came into the hands of the Trustees they set about making improvements, and a policy of regular service was introduced and other changes effected, which were largely instrumental in Newport and other places on the south banks of the river finding favour as residential districts.



EASTERN WHARF, DUNDEE HARBOUR.



The Capital Expenditure on the Dock property has been £1,270,000, and the present debt is £348,000.

During the past 36 years the Harbour Debt has been reduced by nearly £250,000, notwithstanding the fact that the Trustees have spent £490,000 on new works for improvements and the remodelling of the Harbour during this period, upwards of £250,000 of which has been spent within the last 20 years.

The Annual Revenue of the Harbour is, approximately, £80,000, and the Annual Expenditure about £74,000.

The Registered Tonnage of Vessels entering the Harbour is about 800,000 tons.

There are 40 acres of vacant land on the Harbour property, having a river frontage and railway connections, well situated for shipbuilding and other industrial purposes.

The Trustees are at present considering schemes for large extensions of the deep water berthage on the river frontage and increased shed accommodation for vessels bringing jute from Calcutta.

During recent years a great change has taken place in the size of the vessels engaged in this trade.

In former years, the importation of jute was spread over the whole year, when no difficulty was experienced in dealing with it, but, owing to the above-mentioned change of circumstances, the whole of the jute arriving at the port has now to be dealt with in the course of from five to six months.

Vessels over 500 feet long, and bringing from 8,000 to 10,000 tons of jute, have arrived at the port, and, owing to many of these vessels arriving about the same time with such large cargoes, it has been found that, notwithstanding the very extensive accommodation which exists at the Harbour, nevertheless congestion sometimes takes place.

## STATEMENT SHEWING PRINCIPAL IMPORTS AND EXPORTS AT DUNDEE HARBOUR.

## IMPORTS.

Year.	Flax. Tons.	Hemp. Tons.	Jute. Tons.	Codilla. Tons.	Coal. Tons.	Timber. Loads.	Esparto Tons.	Grass. Tons.	Sugar. Tons.	Flour. Tons.	Grain. Tons.
1875 ...	25,722	979	121,042	7,288	153,303	45,180	...	...	...	4,858	2,365
1886 ...	19,650	1,021	142,305	5,241	122,148	41,758	4,114	...	...	3,410	5,752
1896 ...	22,518	2,370	251,862	6,333	83,638	51,651	4,512	...	...	7,285	8,475
1906 ...	11,755	2,464	231,489	4,946	40,366	55,228	4,483	16,411	...	11,987	8,036
1912 ...	17,270	3,932	224,384	5,319	32,049	42,560	4,713	15,583	...	13,091	6,591

## EXPORTS.

Year.	Linen and Jute Manufactures. Tons.	Bags and Sacks. Tons.	Yarns. Tons.	Grains. Tons.
1875	48,515	24,000	6,759	3,519
1886	60,956	18,205	18,276	4,652
1896	96,597	16,673	25,068	5,357
1906	67,252	20,240	36,997	8,859
1912	67,185	25,215	41,842	9,420

## Agriculture : Dundee District.

By James Cameron, Agricultural Editor,  
"Glasgow Herald."

IN the agricultural sense the Dundee district is usually held to have its northern limits along the sunny side of the Sidlaws in the counties of Forfar and Perth and its southern about Leuchars and Kilmany in Fife. On the northern side of the Tay estuary, Inchtute is generally regarded as the western boundary and Barry or Carnoustie as the eastern. In Fife the coastal range may be said to extend from Tayport to Balmerino. The areas now referred to have Dundee as their main centre for marketing purposes. Agriculturally, the Dundee district presents very great variations in soil and climate. Geologically, the district is mainly a gift from the Lower Old Red Sandstone and Devonian formations, but the breaks in the systems and the surface coatings from drifted materials are the important matters in the farming sense.

The volcanic outcrops to the north and north-east of Dundee have undoubtedly added greatly to the fertility of neighbouring areas. Further to the north-east breaks of "rotten" sandstone have given an "eating" character to the soil, while adjoining pavement beds are surfacely in union with relatively cold till. Sections of a peaty nature and poor clay subsoils are found near the Sidlaws. To the west of Dundee the red soil of Longforan is noted for its fertility and early harvests, while the upper slopes of that district and of Fowlis contains some of the best cropping land in Scotland. Again, although the Carse of Gowrie is an old lake bottom, the popular non-agricultural belief that it is all composed of clay has to be modified. Towards the eastern section, sand is more or less mixed with the clay, and the most "mortary" parts are where there is a commingling of the finer washings from the Old Red Sandstone with the water-borne clay. To the east of Dundee the nature of the soil is exceptionally good for general farming purposes once there is a departure from the sandy

and gravelly coastal fringe. Breaks of whin and trap give a blended character to the surface. In parts, as in Panlathy, the soil is somewhat stiff, but on the whole it may be said that there is only a sufficiency of "bone" or firmness for tillage purposes.

The section of Fife now classed as in the Dundee district presents peculiar inequalities. Sand dunes and beds of gravel are in touch with excellent sections of loam, strips of clays, and some moss. In the Leuchars district areas of the finest farming soil in the county are very near a stretch of the poorest moorland. A mere study of the ordinary geological map is consequently of little practical value to the student who attempts to read the agricultural foundations from afar.

From the mid fifties of the past century down to the late seventies the Dundee district, in common with other parts of the country, had great agricultural prosperity. Prices for all kinds of farm produce were so good that when depression began to be felt about 1880 one of the shrewdest of agricultural authorities declared that the growing of wheat in Scotland at 30s. per quarter was a "dream." In the prosperous times beef and mutton were from 15 to 25 per cent. higher in price than the average of the past ten years, while wages were about 30 per cent. lower and hours of labour slightly longer. Regular agriculturists competed keenly for vacant holdings, and a proportion of those who had been successful in manufacturing and general mercantile pursuits were to a considerable extent responsible for raising rents to "sporting figures." Many of those who entered farms towards the close of the sixties at nineteen years' leases lost considerably before they acquired their freedom. That was specially the case with those who took secondary or worse land. To the credit of the majority of proprietors it falls to be said that they either offered tenants breaks in contracts or made fair reductions in rents while times were on the downgrade. By 1890 the great majority of holdings had been subjected to readjustment in rents, and by 1895 it could be said that practically all farms within the district had

been valued in accordance with the altered conditions in agriculture. In the case of loamy soils, or "black lands" as they are termed in the locality, the average reduction was fully 30 per cent., while on clays and soils of an allied character the fall in rent was from 40 to 50 per cent.—the most stubborn clays having a beating down to the extent of 50 to 60 per cent.

Although the first Agricultural Holdings Act and succeeding enactments have given tenants increased liberty, and in some respects practical freedom in cropping and disposal of produce, it cannot be said that the farming methods of the past twenty-five or more years have shown a violent departure from the use and wont of the more prosperous times. The typical Carse of Gowrie eight course, with one section in fallow, four in grain, one in beans, one in turnips, and one in hay, is still honoured where the conditions are suitable. On loamy soils of the best class near the city the majority prefer a seven course of cropping, with two years' grass or one year's pasture after hay. In that course winter wheat follows late potatoes. Some restrict the potato section to a certain extent by devoting part of that green crop area to cabbages, tares, and mashley. In this way the risks incidental to the growing of such a speculative crop as potatoes are reduced, and additional food is secured for the live stock. Owners of dairy herds naturally take this line of cropping. The "sharp six" rotation of cropping which is still favoured to some degree in East Forfarshire is not much practised in the Dundee district. In that rotation there are three sections of grain, two of green crops, and one of hay. Outlying localities with secondary or late soil are usually farmed in a five or six course, with one green crop composed mainly of turnips. The standard straw crop is oats, and if the land is fit to carry a good sole of grass for three years it is allowed to do so. Live stock are the principal concerns on lands so farmed. A proportion of natural grasses is now generally sown down on those soils with the ryegrasses and clovers; but as hay is never of front rank value on such lands, the best farmers cut only

as much of its section as is required for home use. The natural grasses help to carry the pasture fairly well through the second and third years when ryegrass tends to fail.

The quality of the produce grown on the red soil of Longforgan, the upper slopes of that locality, the Fowls quarter, the volcanic section to the north and east of Dundee, and on a very fair proportion of the land to the north-east and east is remarkably high. A like note applies to a moderate section of the land in North Fife, and more particularly to areas in the Leuchars district. Hay grown on a section of the Longforgan red soil has always taken leading rank in Dundee market, while the potatoes from the same soil have often competed very closely against the "Dunbars." Owing to the high condition in which most of the soil in the Dundee neighbourhood is kept, the barley is generally more suitable for distilling and porter-making than for the brewing of beer. Oats thrash out well as a rule, and reach excellent weight per bushel on the firmer soils, while most of them are very fair in colour. As for wheat, that taken after fallow in the Carse practically always leads, but in some seasons wonderfully good samples are secured on black land after potatoes. Turnips and Swedes from the loamy soils of some firmness and depth have always a greater feeding value than those from the very light, the mossy, and the clayey areas. On the clay, however, growth is more prolonged during the fall of the year than on any other varieties of soil. As cattle-feeding and dairying are such prominent industries in the Dundee neighbourhood, and as "turniping" of sheep is more or less practised further out, the growing of the important root crops has received special attention in recent years. The best methods of working the soil, most suitable manures, most profitable varieties, most effective systems of drilling, singling, and other points have been studied in a thoroughgoing manner, and the result is a considerably greater tonnage per acre than was grown during the "good times." Much of the improvement is due to the competitions fostered by the Farmers' Clubs.

In the days of George, Lord Kinnaird, who was a man of advanced ideas in regard to the cultivation of the soil, it was thought by the more ardent that steam ploughing and grubbing would do much for all fairly level areas of some depth and strength; but partly owing to the difficulty of timing operations or of working in perfect season, and partly owing to a steady fall in prices, steam power lost what it had gained in the fields, and horse haulage was more securely established than ever. Traction engines for shifting coal, potatoes, manure, and other bulky materials have come fairly into use in the district, however, during the last fifteen or more years, and in this way tear and wear in horse flesh have been reduced. In the immediate neighbourhood of Dundee, but more especially on the northern side, a heavy amount of carting still falls to be overtaken owing to the local conditions. From twenty-five to thirty-five years ago, when the burgh occupied a smaller area than it now does, its cow-sheds had generally an average of 900 to 1000 milking animals. At the present time the city, with its extended area, has from 1400 to 1500 head of milk cattle. All the stock is kept on the non-breeding system. Most of the cows—principally Irish shorthorn crosses—are bought when newly calved, and they are kept on a forcing dietary of farm foods, distillers' grains, and meals until they pass out to the fat market, which usually happens at the end of ten months. Many years ago some authorities predicted that urban dairying could not last long owing to the steady loss on fat cows, increased expenses in rent and labour, and stricter sanitary regulations, but the end is not yet. Cropping of the land in the vicinity of the city is very largely regulated by dairying on the spot and by cowfeeders' demands. In early summer the young grass on the closely cropped farms is roused or sold to the burgh dairymen at so much per square pole. Later in the season the East Carse and neighbouring areas are drawn upon for green beans and mashley; soft turnips, Swedes, and straw follow, all those materials or sample loads being disposed of at so much per ton under the auctioneer's hammer. Carting has to be

done by the grower of the crops. This entails a large amount of horse work. But the severest strain on horses and tackle consists in the carting of manure from the cowsheds to the farms. In practice the city district holder of land can never refuse to come to fairly liberal terms with his burgh customers. Generally speaking, the manure from the cowfeeders' premises is unduly expensive by the time it is laid on the fields, but it is necessary to secure it in order to preserve the working combination. The fertility of the soil has to be upheld in any case by a return of manure. Spring labour is of course saved by the standard practice of carting the bulky manure to the stubble section which is to be prepared for the next season's green crops. Frosty weather affords an excellent opportunity for such carting, as the manure can then be at once piled and spread on the fields.

Although a section of North Fife is closely in touch with Dundee in a sense, and finds the large burgh to be all-important for disposal of such commodities as fat stock, grain, and milk, the estuary forms a practical barrier against the close-cropping and produce selling which are the working principles on certain areas along the northern side of the water. Still, only a moderate proportion of the land between Tayport and Balmerino is fit to be subjected to the crop-and-sell rule, as strength and depth of soil are the exception. Ordinary courses of cropping are therefore pursued, and, apart from dairying, the feeding of cattle and sheep is most successfully practised. From what has been stated in connection with the cropping of farms within a short distance of Dundee on the northern side of the estuary, it will be understood that summer grazing of cattle cannot always fall into the working arrangements. But winter feeding takes a fair position, and by this means use is made of surplus fodder and roots, while cartages of bulky manure from city or railway siding are averted to large extent.

Generally high rents and special courses of cropping for local requirements have been against the breeding of high-class animals of pure blood, but the older race of agricul-

tourists in Dundee district can recall the time when some excellent shorthorn cattle were bred by the Arklay family at Ethiebeaton. At Naughton in North Fife, Miss Morrison Duncan (now Mrs Anstruther Duncan) had an excellent Aberdeen-Angus herd, which was dispersed in 1896. The herd contained very fine representatives of the Erica, Lady Ida, Pride of Aberdeen, Elena, Ruth of Tillyfour, Fyvie Flower, and Drumin Lucy families. At the sale Mr Andrew Mackenzie repurchased for Dalmore the fifteen years' old Maydew of Montbletton, the last heifer calf of Lady Ida, and with Maydew he took her heifer calf Make Haste. The late Colonel Smith Grant acquired at the same time the noted stock bull Edric for 240 guineas.

At Powrie, near the northern boundary of Dundee, the late Mr Thomas Smith owned a large and famous herd of Aberdeen-Angus cattle for many years. His Witches of Endor, Marys, Rubys, Naomies, and Prides, his Monarch, Rover, Wilfred, and Norfolk bulls, were his joy and solace. Admirers of black cattle from all parts of the world visited Powrie. The herd was sold in the autumn of 1902, shortly after Mr Smith's death. For a long term of years Powrie had further been noted for its Leicester sheep, but the flock was disposed of in 1885.

Severe carting work is a practical handicap on the breeding of draught horses around the city, but a vigorously conducted Society for the breeding of superior Clydesdales is associated with the Dundee and Carse of Gowrie districts. Incidental reference has been made to farmers' organisations. The Arbroath Analytical Association and Farmers' Club and the Carse and Dundee District Farmers' Club have done excellent work during the last quarter-of-a-century. They have been of immense service to buyers of artificial manures and feeding stuffs; they have stimulated and improved crop-growing; and they have formed effective bases for discussing questions of importance to farmers within their bounds.

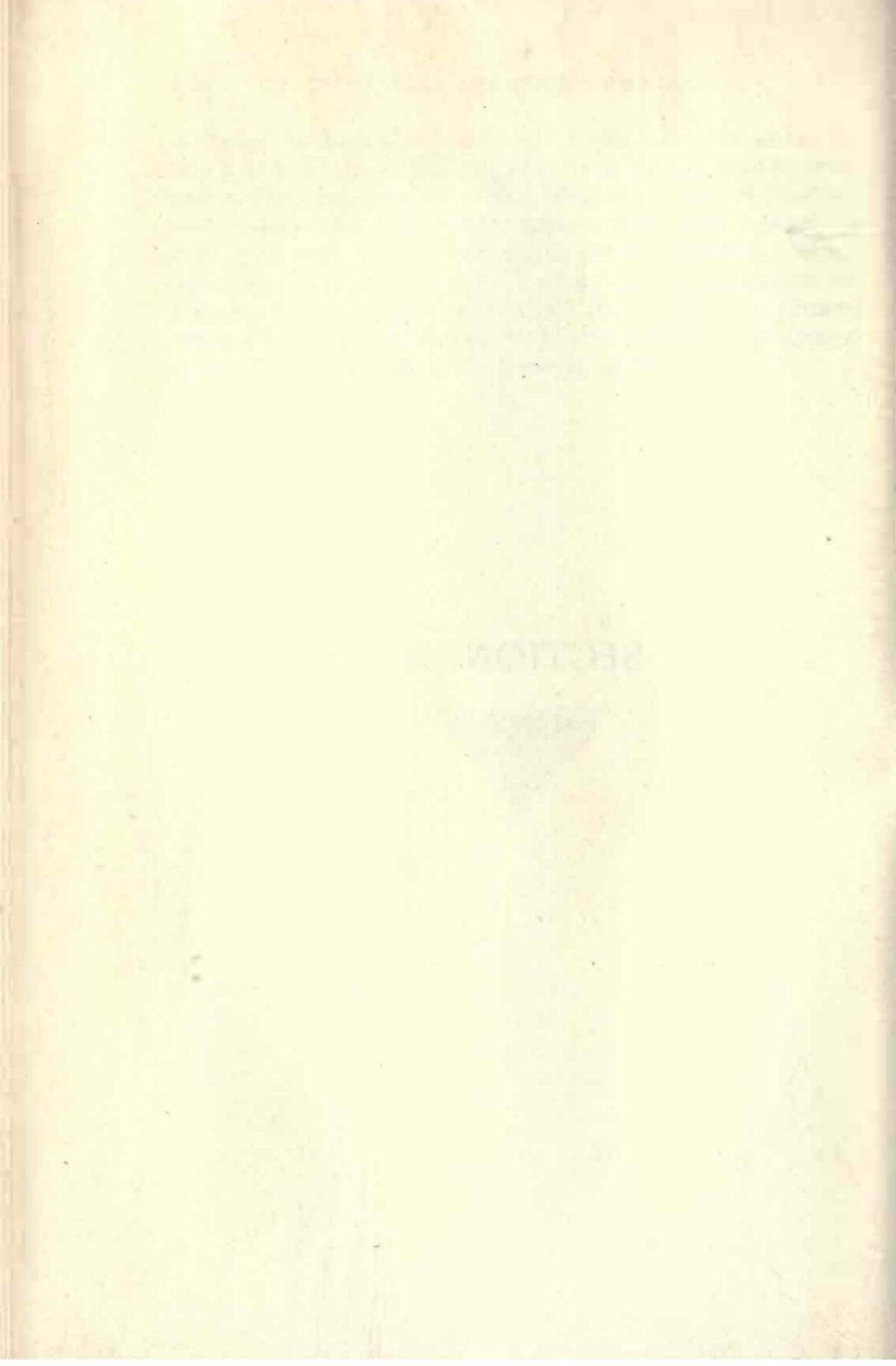
Dundee is provided with excellent fat stock markets and slaughter-houses. Until electric tramways came into force its hay market was generally accounted to be the best in

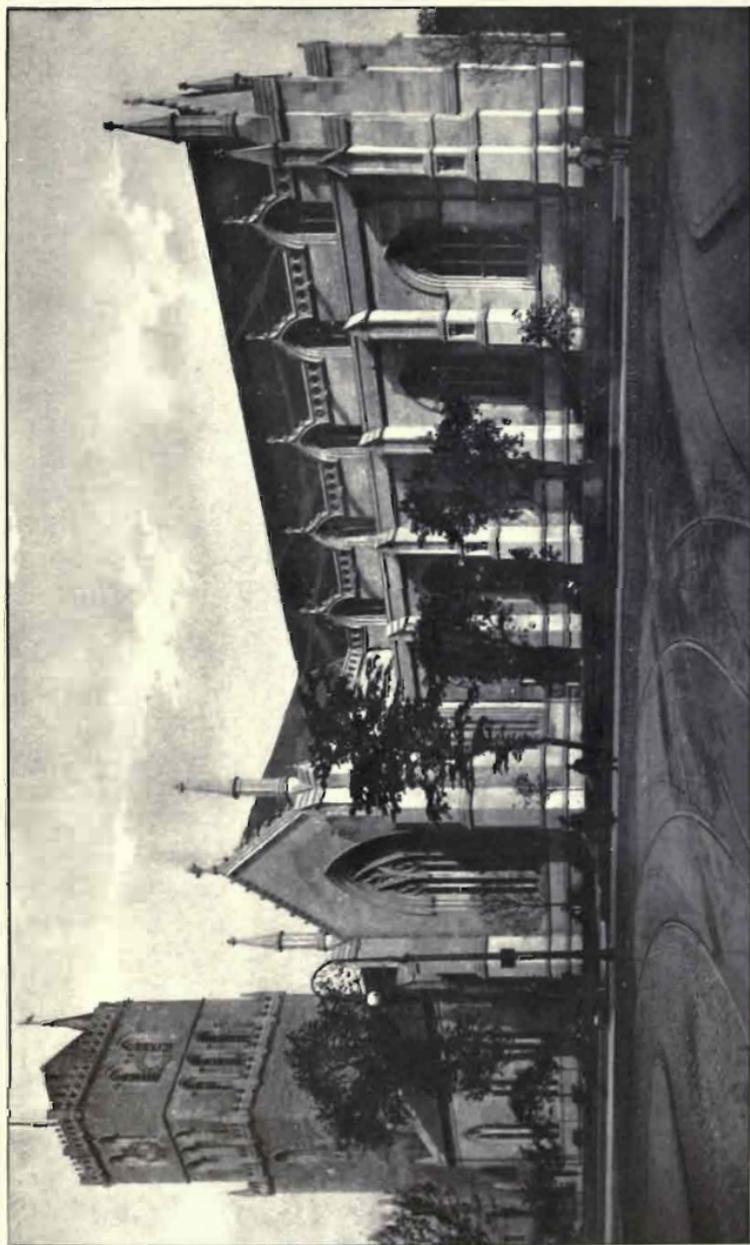
Scotland for first-class quality. It was a natural outlet for much of the top quality produce from the Carse of Gowrie, and it drew supplies from East Fife, the Carse of Stirling, and occasionally from Easter Ross. The market is still a very good one, but its overturn is much restricted. Meeting in the open for disposal of grain has an attraction for Dundee district agriculturists, but the recent and present stances have been classed as awkward and slightly dangerous on account of tramway and general traffic.



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## SECTION II.





CITY CHURCHES (SHOWING OLD STEEPLE)

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1900

## Ecclesiastical Architecture in Dundee.

By P. H. Thoms, F.R.I.B.A.

A VIEW of our city from the river or from Fife gives evidence that the ecclesiastical necessities of the community are amply provided for, although the towers and spires of churches are perhaps overshadowed in importance by the tall chimneys of the numerous mills and factories. On examination we are compelled to admit, however, that our Church buildings do not possess the architectural interest which may be found in many cities of less importance, both in our own land and on the Continent.

Our sole remaining heritage from mediæval times is the Tower of St. Mary, better known as the "Auld Steeple," and in it we have a monument of which any city might be proud. It is undoubtedly the boldest and most striking tower of its kind in Scotland. It forms an important and picturesque feature in any view of the city, and holds a cherished place in the heart of every Dundonian at home or abroad. We are impressed, in spite of the richness of ornament, by its strength, resembling that of the grim Keep Towers of the period by its soundness and honesty of construction, by its typical Scottishness. The warm grey tone of its well-hewn stonework, the broad, plain surfaces, the deep reveals of the windows, and the simple and massive details of mouldings and tracery, all combine to this effect of vigour and boldness.

The history of the building is most intimately bound up with the history of the city, and is of the most intense interest. A very brief account is all that lies within the scope of this paper.

The Church of St. Mary was founded in the end of the twelfth century, and a Church with Western Tower was built and completed, except for the North Transept, by

1350. It must not be supposed, however, that this building attained the proportions, or assumed the shape of that which later occupied the site. No vestige of this Church remains, nor is there any evidence as to its size and appearance, with the exception of the lower part of the Western Tower.

It is on record that the Church and Tower were destroyed by the English invaders in 1385. Probably a ruined portion of the original Tower was left by the invading soldiers after they had destroyed the Belfry, and carried off the bells. It is quite certain from the architectural style, and plainly to be read in the construction of the interior, that the lower portion of the Tower is a survival from a previous building.

Before this date—1385—the Church was under the care of the Abbey of Lindores, in Fife, and its endowments were administered by the Abbot and Chapter. No attempt seems to have been made to rebuild the Church for a considerable time after its demolition by the English invaders. Probably there were no funds available for the purpose, as the Abbey of Lindores must have suffered by the impoverishment following the invasion by the English troops, who overran the whole country at this time. We can well imagine how the sight of the desolate ruins saddened the hearts of the burgesses of Dundee. They made repeated applications to Lindores that the buildings might be placed in the charge of the Town Council, and about fifty years later an agreement was entered into granting their application on certain terms. A Kirkmaster was appointed in whose charge the buildings and accessories were placed. This office still survives, although at the present day the duties do not appear to be onerous. Funds for rebuilding the ruined Church were collected by contributions, by utilising certain fines levied in the Burgh Courts, and by other methods.

First of all, the North Transept, which does not seem to have existed previous to the catastrophe, was erected and the remainder of the Church rebuilt and fitted up. It was then one of the largest and most important parish churches

in Scotland, and there seems to have been a very keen interest and pride taken in the work by the burgesses of that day.

About 1480 the Town Council, having completed the restoration of the Church, directed its attention to the ruined Tower, and resolved to rebuild it on a nobler scale than before, but to retain such relics of its predecessor as had been left by 'oure auld enemyes of England.' The Norman style of architecture had, in the meantime, given way, through several intermediate stages, to the late Gothic or Perpendicular, and the problem confronting those builders of four centuries ago—to superimpose upon the beautiful Norman doorway a building of a different style, and yet in complete harmony with it—has been, I am sure all will agree, most admirably solved.

The lower portion of the Tower, with the doorway, is the only part of date previous to 1480 now remaining to us, and it is to be regretted that Sir G. Gilbert Scott, in his restoration of 1872, made such a free translation of the details.

The corbels existing at the level of the capitals of the four corner pillars in the interior indicate that the ceiling of the original lower storey was much lower than the present vaulting. The presumption is, that the object of removing this ceiling was to make room for the fine late Gothic window in the west wall above the doorway. On the capitals of the corner pillars referred to were placed clusters of smaller shafts, from which springs the vaulting of the loftier roof.

The last stones on the top of the Tower were probably placed in position about 1492, and then the work seems to have come to a standstill, probably owing to lack of funds. At this period the nation was completely impoverished, by reason of the constant wars with England, which culminated in the fatal field of Flodden.

There should be no doubt whatever that the intention of the original builders was to finish the Tower by the erection of flying buttresses meeting above to form an open or "crown" termination, as in the Tower of St. Giles

Cathedral, Edinburgh. I have carefully measured and drawn out the whole of the upper portion of the Tower, and the formation of the angle stones at the top of the structure, together with the huge stones in the centre of the north and south walls, extending some feet below the level of the present Cape House, clearly indicate that their function was to serve as bases for the corner- and mid-pinnacles for the flying buttresses of the crown. The positions of the mid-bases on east and west walls are now occupied respectively by a fireplace and an "aumbry" or press in the Cape House, and it is natural to presume that the base stones were removed in order to provide those conveniences.

Another feature which confirms the theory that a crown termination was intended is the very close resemblance, almost amounting to identity in form and detail, between the upper balustrade of this Tower and that of St. Giles, Edinburgh, where similar stones can be seen performing the constructional functions for which those in the Old Steeple were intended. It is a tradition that the architect of the Dundee Tower of St. Mary's and the Tower of St. Giles, Edinburgh, was Sir William Bishington of Ardrross, Fife, and this may account for the similarity.

However, it seems quite certain that the crown termination, though several stones were actually hewn for its construction, as will be afterwards shown, was never erected, and that the building remained at a standstill until about 1548. In this year the English, under Admiral Wyndham, bombarded Dundee and took possession of the town, treating the inhabitants with great cruelty, and setting fire to their houses. The Admiral garrisoned the Tower, erected cannon thereon, built up the lights of the west window, and made it a strong place for controlling and keeping in subjection the inhabitants.

The Cape House, which to this day forms the termination of the Tower, was built at this time by (or at least for the use and shelter of) the English soldiers, and a careful examination of its masonry will reveal the fact that several moulded and hewn stones, intended, in all

probability, for the crown termination, were built into the walls, which themselves are much thinner, and much less soundly and honestly put together than the walls below. In addition, there is to be seen a fragment of a tombstone, bearing the initials "K. H.," built into the western wall, indicating that the builders of the Cape House took the first stones that came to hand for their purpose.

The Cape House and the fortified west window which the English had made were afterwards used for defensive purposes, and in 1644, when Montrose made his descent upon Dundee, instructions were given to John Milne, the King's Master Mason, to build "two roundis" on the top of the Staircase Turret, which had previously terminated at the top of the storey containing the triple windows. The purpose of this was to make access to the top of the Tower more direct and continuous.

Much damage was done to the Tower and Church both in 1548 and at this time. Six years later the Tower was once more the scene of strife, when the brutal General Monck perpetrated the atrocities which have made his name execrated in Dundee.

Four churches had gradually developed from the original cruciform structure in connection with the Tower. They were called St. Mary's, or the East Church; St. Paul's, or the South Church; St. John's, or the Cross Church; and St. Clement's, or the West Church. St. Clement's was so badly damaged that it had to be entirely rebuilt in 1789. Then, in 1841, they were almost totally destroyed by fire, and were thereafter rebuilt as three churches, in the form in which we have them to-day, St. John's being transferred to a new site in Tay Street.

On the morning of the fire, January 1841, which fell on a Sabbath, an uncle of mine, then aged about three weeks, was waiting, gorgeously arrayed in the family christening robe, to be conveyed to St. John's for baptism, when the nurse entered and said: "Ye needna tak' the bairn tae the kirk the day. It's a' in a lowe."

This completes the record of the building of St. Mary's Tower and the City Churches to the present date, except

that in 1872 the Tower was somewhat drastically restored, under the direction of Sir G. Gilbert Scott.

The Town Council is to be congratulated on the careful manner in which the recent restoration of the stonework of the Churches has been carried out, and on the improvement in amenity which has resulted from the removal of the former high railings, and the laying out of the precincts with paved paths and terraced lawns.

Before we leave the consideration of St. Mary's Tower, a brief description of its salient features is necessary. The Tower is about 40 feet square over the walls of the lower storeys, which are 8 feet thick. Above the first parapet the walls are 5 feet thick. It rises to a height of nearly 160 feet. The western doorway consists of two round-headed openings comprised within an elliptical arch, which in its turn is enclosed by a square moulding. The jambs and central pillar are moulded with alternate rounds and hollows, and the capitals, which have a continuous abacus, the arch mould, and the elliptical label, are all enriched with foliated carving. In the spandril over the central shaft is a circular panel enclosing a carving representing the Virgin and Child; and below, on a shield, are the arms of the diocese of Brechin.

A lofty traceried window of six lights, having the large central mullion, so common in Scottish Gothic, rises above the doorway. The tracery is late Gothic, well proportioned and pleasing. The Tower is vaulted above this window, and an interesting feature is the irregularity in which the corner shafts supporting the vaulting are fitted into position. This irregularity, together with the small clusters of shafts which rise above the capitals of the main shafts, suggests that considerable changes were effected at a later date on the original work, as I have already indicated.

A round-headed window, completely filled with tracery, occupies the next stage, and above that there is a two-light pointed window. Then comes the beautiful enriched parapet, pierced with quatrefoils and having crocketed pinnacles, which divides the Tower into two main stages. The upper stage of the Tower is crossed about halfway up

by a string-course. Below this string-course there are triple-pointed and cusped openings on each side, except the north, where, the space being curtailed by the Staircase, there are only two openings. The portion above the string-course has two similar openings on three sides, and one on the north side.

The walls are surmounted by an elaborate pierced parapet, having the quatrefoil, as in the lower parapet, for its motive. The huge bases of the pinnacles for the crown termination occur at each angle, and in the centre of each side, corbelled boldly out from the walls.

At the north-east angle of the Tower, the Staircase Turret projects. It is circular as to the interior, and the outside of the wall forms part of an irregular octagon. The upper parapet returns round the turret, which is finished with a steep conical roof of stone.

The project of removing the Cape House and erecting a crown on the Tower has engaged the attention of the authorities on several occasions.

Records prove the existence of quite a number of monastic buildings, churches, and chapels, in Dundee during the Middle Ages, but no vestige of any of these remains, although fragments of Gothic jambs and window tracery have been unearthed, from time to time, in various localities.

Not until the seventeenth century was nearing its close did the Renaissance style become the usual mode of architectural expression in Scotland, and our first important ecclesiastical edifice in this style is St. Andrew's Parish Church, at the foot of King Street, which was erected in 1772, from the design of Samuel Bell. In several publications the design has been erroneously ascribed to the elder Adam. This Church occupies a commanding site, set well back from the street, from which it is separated by a graveyard, bisected by a broad pathway ending in a flight of steps. It is a plain rectangular building, with a Tower and Spire at the west end. The South Front is well proportioned, and its principal features are the two three-light windows in the Italian

manner, the centre light being arched, and the sidelights flanked by Ionic pilasters, and surmounted by architrave, frieze, and cornice. Over the solid between those windows is an oval panel, and on each side of this panel is a bold carved festoon, somewhat crude in design and workmanship. The eaves cornice is small, though effective, having tiny modillions at short intervals. Very finely carved vases ornament the putt stones and apex of the gables.

The first stage of the Tower above the Church roof is slightly set back at the corners, which are occupied by vases of refined design. It consists of large clock dials, with bold surrounding moulding. Above this stage the Tower becomes octagonal in shape, and the corners used to be decorated by vases slightly smaller than those below. I have been informed that one of those vases was brought to the ground in fragments by an ingenious slater, who hitched a rope over it to sling his hanging scaffold. The other three were *removed* to restore the symmetry of the Tower! The octagonal stage contains narrow, round-headed openings in each face, and is covered by a bold rounded intake, out of which rises the slim, graceful spire, pierced at intervals by small round openings, and finished by a well-designed copper weather vane representing a dragon.

The interior of the Church is bald and uninteresting. The Nine Trades and the Three Trades cannot be congratulated on the alleged stained glass with which they filled the three-light windows flanking the pulpit. It is of poor design, and the drawing of the figures is very faulty.

This Church is quite a good expression of the Renaissance taste of the period. The details of the stonework particularly are charming and refined.

St. Peter's Church, Perth Road, is a building of similar character, but it is bald and crude, lacking the importance and interesting detail possessed by St. Andrew's.

We now come to the consideration of the modern Church buildings of the city, from which, though their

name is legion, we can only pick out a very few as of real architectural interest.

St. Paul's Cathedral Church, Castle Hill, the stronghold of the Episcopalians, is our foremost example. It was built in 1853 from the designs of Sir G. Gilbert Scott, and is a cruciform structure with a lofty spire. It is unfortunately somewhat jostled by neighbouring buildings of uninteresting character, and while the fine spire takes an important place from many points of view, the remainder of the Church can hardly be seen.

The Church consists of West Tower, Nave, and Aisles, Transepts and Chancel, with apsidal termination, and is in the style of the Middle, or Decorated period of Gothic architecture. The roof is an open timber one, except over the Chancel, where it is vaulted in stone. The lower storey of the Tower is also stone-vaulted. The Tower is bold and massive, with the Staircase Turret projecting at the north-west corner. The Main Entrance in the Tower is a lofty pointed arch, richly moulded. Above it there is a traceried window, which lights the West Gallery occupying the space over the Entrance. Two rich parapets, supported on corbels, traverse the upper part of the Tower, and the bold gargoyles are specially noteworthy. The spire is broached, with massive pinnacles rising from the broaches.

The interior of the Church is impressive and noble in proportion. The nave arcade is lofty, and the pillars and arches are particularly graceful and satisfying, the mouldings being of very refined design, and the carved work unobtrusive. One has the feeling that the chancel is scarcely large enough, and that the woodwork therein is not quite worthy of its position.

St. Mary's Roman Catholic Church, Lochee, by Hansom, built in 1865, is, though unpretentious, a very delightful work in a somewhat unconventional type of late Gothic. One of its most interesting features is the quality of its masonry, the stones being very small, giving to the surfaces a charming and truly Gothic texture. The Church consists of a long nave with aisles, and a chancel which is

carried up in the form of an octagon, with a high pitched slated roof, and very deep buttresses, enclosing high traceried windows. The long lines of the low nave and aisles, with many small clerestory and aisle windows, terminating in the low chancel tower, produce a peculiarly picturesque effect. The interior is constructed of brick, terra-cotta, and stone of various colours, and the small scale repeating ornament and details show remarkable ingenuity and fertility of design. A very noteworthy feature is the scientific and constructive manner in which the walls are corbelled and inclined to meet the thrust of the roofs, with deep splays on the outer surfaces. Provision seems to have been made for the erection of a tower at the end of the nave.

In the Hilltown district we have St. Salvador's Church, a fine example of the art of the late G. F. Bodley, who died quite recently, and who occupied probably the premier place among the Church architects of his day. It consists of nave with narrow aisles, chancel, and Lady Chapel. The nave was built in 1869, and the chancel and Lady Chapel in 1874. The exterior, though quiet and unassuming, is dignified and beautifully proportioned. In style it is based on the late work of the Middle period of Gothic. Owing to the restricted dimensions of the site, it has been found necessary to project the buttresses of the nave into the aisle, and the effect of the plain walls of the aisle, with the buttresses rising above the roof, is unusual, but distinctly pleasing.

The interior, in its woodwork particularly, is of late Gothic character, and it is remarkable how successfully the architect has infused the spirit of harmony and unity into the whole work. In every detail one sees the touch of the master hand. The nave arcade is simple, the pillars being splayed, and the arch mouldings dying down on the splays, without capitals. The chancel is spacious, and has no east window, the east wall being occupied by a rich tabernacled reredos and altar. On the north wall of the chancel is a projecting stone aumbry of interesting design.

The roof is of timber and plaster. The windows of the chancel contain some very good stained glass, particularly the Bishop Forbes window.

This Church is a very successful example of the application of colour and gilding to stone- and wood-work. The original colour decorations remain in the Lady Chapel, and throughout the remainder of the building the original decorations in water paint have been very carefully reproduced in flat oil paint.

We are fortunate in having such a beautifully complete Church in our city. It is worthy of very careful examination by all interested in architecture.

In the period from 1850 to 1880 a very large number of Presbyterian Churches were erected, and while many of these are somewhat ornate as to the outside, the interiors are of that distressing Victorian type, containing many galleries, iron pillars, much pine wood, and shiny varnish.

St. Paul's U.F., Nethergate; St. John's U.F., St. Mark's and M'Cheyne Memorial, in the Perth Road, are all spired Churches, in a type of Gothic which shows French influence. Of these, St. John's U.F., by our late townsman, Mr. James Hutton, is probably the most interesting. It has a good open situation, and the spire is slim and graceful.

St. Enoch's Church, Nethergate, has square towers flanking the gable over the Entrance. It is set back from the street, but the major portion of the forecourt is occupied by shops, which detract from the appearance of the building.

The Catholic Apostolic Church, Constitution Road, is a large plain building, in the Middle Gothic style, having nave, aisles, and octagonal-ended chancel. The detail, though severe, is scholarly, and the interior is lofty and impressive.

Panmure Street Congregational Church occupies a good site facing the Albert Institute. It is a low building, with small slated towers flanking the main gable, and groups picturesquely with its surroundings.

The Episcopal Church of St. John the Baptist, Albert Street, designed by the late Rev. Mr. Sugden, while probably one of the least pretentious church buildings in the city, is interesting on account of the quality and colour of its stonework. The chancel has recently been adorned with rather elaborate carved oak choir stalls, wall panelling, and reredos, the designs for which were inspired by the beautiful and well-known woodwork in King's College Chapel, Aberdeen.

In most of our recent Church buildings, particularly those devoted to the Presbyterian form of worship, the utilitarian spirit of the age is plainly evident. In nearly every case an attempt has been made to obtain a richer effect externally than the available funds justified, with the result that one misses in the interiors that devotional feeling which is so impressive in, for example, St. Salvador's.

Of recent Churches the most important are St. Thomas's, Lochee Road; St. Patrick's Roman Catholic, Arthurstone Terrace; Baxter Park U.F., Wishart Memorial, King Street; and Clepington U.F.

The appearance of the Gilfillan Memorial Church, Whitehall Crescent, designed by the late Malcolm Stark, of Glasgow, does not indicate its ecclesiastical character. It is, however, a well-proportioned building in the Renaissance style, with interesting details. The high buildings on either side somewhat detract from its effect.

Now that the suburb of Downfield is included within the boundaries of our city, I am pleased to be able to conclude this brief notice by mentioning its very charming little Episcopal Church, the only modern building in our neighbourhood which displays any of the characteristics of our national type of Gothic. The walls are rough casted, and the roof is covered with heavy stone slates of beautiful colour.

The architectural enrichments are sparingly used, and the broad plain surfaces, the crow-stepped gables, the simple mouldings, and the rough paved pathways give an admirably native air to the building.

## Public Buildings.

By James Thomson, City Architect.

HAVING regard to its antiquity and commercial importance, Dundee cannot be said to be rich in its possession of buildings having any outstanding architectural merit.

### THE TOWN HOUSE,

situated on High Street, and occupying the site of St. Clement's Church, is probably the most interesting of the public buildings. Designed by William Adam, popularly called the elder Adam, and erected in 1734, it occupies a fairly prominent position in the main street of the city. The building, as originally designed, was estimated to cost £2,852, and the architect's fee for this work is believed to have been thirteen guineas. As completed, the whole cost of the building with furnishings did not exceed £4,000, including architect's fees. The building stands a few feet in advance of the line of the adjoining buildings, and the front portion of the ground-floor is an open piazza (called "The Pillars") with shops in the rear.

The first and principal floor contains the Council Chamber and the Guild Hall, two lofty rooms with characteristic chimney-pieces and door-heads. These rooms have also some fine stained glass windows, the older ones in the Guild Hall being specially fine and more in keeping with the building than those inserted at a more recent date. The other smaller apartments on this floor are now used as store-rooms for preserving the public records.

The upper and basement floors contain barrel-vaulted rooms which were used as prison cells up till 1836.

The circular stair at the rear is built round a hollow newel, which formed the only means of light and ventila-

tion to the condemned cell, a loathsome dungeon in the basement.

A clock tower and spire surmount the building, the spire rising to a height of 140 feet from the pavement. The clock, marked 1735, is one of four dials and three bells, to which were added seventy years later four smaller bells to chime the quarters.

Unfortunately a very inferior quality of stone was used, and it decayed to such an extent that the whole front had to be faced with Roman cement and painted.

#### THE ALBERT INSTITUTE

occupies a site which was formerly public meadows, marshy in its nature, and the buildings were necessarily founded on piles. The buildings were erected in three sections, the first being designed by Sir Gilbert Scott, and opened in 1867. This portion was first used for the meetings of the British Association, which visited Dundee that year.

In 1869 the Free Library was opened to the public, and so greatly was it taken advantage of that, after only four years, it was found necessary to extend the buildings. This addition, which provided accommodation for a museum and art gallery, was designed and carried out by Mr. M'Kenzie, a Dundee architect, and opened in 1873.

Another and larger extension of the Institute was made in 1887, and was designed and carried out by Mr. William Alexander, City Architect. This large wing to the east was opened in 1889 in honour of the jubilee of the Queen, and called in her honour the "Victoria Galleries."

Six large galleries were thus added, four being entirely devoted to the display of pictures.

The western section is still used as a lending department of the public libraries on the ground-floor, the Albert Hall over same being used as a reference library and lecture hall. The Albert Hall, a part of the original building, has, through the generosity of Sir William Ogilvy Dalglish, Bart., been quite recently improved by the introduction of stained glass windows and handsome electroliers.

## THE HIGH SCHOOL.

On the rising ground at the top of Reform Street, and facing southwards towards the High Street, stands the High School occupying a very prominent position close to the Albert Institute buildings.

Designed by John Angus, Edinburgh, and erected in 1833 at a cost of £10,000, it is one of the most outstanding architectural compositions in Dundee.

In the centre of the façade is a fine Grecian portico of six columns standing on a stylobate of steps, supported on either side by wings forming a dignified frontage of fine proportions.

## THE ROYAL EXCHANGE.

This building occupies a site fronting Albert Square, and, together with the other public buildings in the Square, forms a part of what would seem to be a fairly good example of Town Planning of over half a century ago. Like the Albert Institute, the Royal Exchange building is erected on marshy ground, and difficulty was encountered in forming the foundation, so much so, that the tower which forms the main feature of the Exchange, and was to have been finished with a crown, was never completed. The building was designed by David Bryce, Edinburgh, and was completed in 1856 at a cost of about £12,000. The first floor is taken up principally by a large hall, used as a reading-room, while the rest of the building is occupied as offices for merchants in the jute and flax industry.

## THE COURT HOUSE.

This building was erected from designs by William Scott, City Architect, Dundee, and faces a large open square near the centre of the city. It is conveniently situated in respect of its proximity to the Central Police Station on the east, and the Prison Buildings on the north.

In grouping, the Court House strongly resembles the

High School, having a long frontage, with central block, connected to lesser ones by screen walls pierced by gateways, giving access to the Prison and Police Buildings in the rear. The front is treated with pilasters of the Tuscan order, and in the centre of the main block is a pedimented portico of four columns, reached by a flight of steps. The Prison Buildings in the rear were erected in 1836 to take the place of the cells in the Town House.

#### THE ROYAL INFIRMARY.

One of the most commanding situations in the city is that occupied by the Royal Infirmary Buildings, standing as they do on the slope of the Dundee Law and overlooking the River Tay.

The original main buildings were erected to designs by Messrs. Coe & Goodwin, London, and many additions of importance have been made, notably the Caird and the Maternity Hospitals, both provided through the generosity of James K. Caird, Esq., LL.D., Dundee.

Another addition made during recent years was a Nurses' Home, the gift of Sir William Ogilvy Dalgleish, Bart., and two years ago the out-patients' department was extended and modernised.

The institution is exceedingly well placed for its purpose, being within easy distance of the centre of the city, and occupying a site which, for openness and healthiness, would be difficult to equal in any city.

#### THE CUSTOM HOUSE.

Conveniently situated at the Docks, this building occupies a prominent position, facing Dock Street. It was the joint design of Mr. Leslie, Harbour Engineer, and Mr. Taylor, Architect, of Glasgow, and was erected in 1843.

In the centre of the façade, and over a rusticated basement, is a boldly projected tetrastyle portico, with Ionic columns running through two floors, surmounted by a

pediment enclosing the Royal Arms. The windows on either side are carefully grouped, with the centre ones marked by richer treatment, and the elevation with a strong crowning cornice forms a simple and pleasing composition.

This building furnishes accommodation for the Customs and Excise, while the east wing is occupied by the Harbour Trustees, and contains board room and offices for Engineer, Clerk, and Treasurer.

It is built entirely of local stone, and took the place of the old Custom House which stood in the Greenmarket and was only recently taken down to make way for central improvements.

#### THE MORGAN HOSPITAL

was founded and endowed through the beneficence of Mr. John Morgan, an Indian merchant, who was a native of the city. Designed by Messrs. Peddie & Kinnear, Edinburgh, it was erected in 1861 at a cost of £15,000.

Standing on a triangular piece of ground between Forfar and Pitkerro Roads, in the north-east of the city, the site of this building is a happily chosen one for a public school. The position is airy and open, and the grounds are more than usually extensive for such a building.

In its earliest years boys were boarded and educated, there being provision for 100 boys, and the work was conducted according to the original scheme for twenty years. In 1889 it was acquired by the School Board, and opened as a day school known as the "Morgan Academy."

Extensive alterations were made at that time, chief among these being the roofing in and flooring of the quadrangle which now forms a commodious assembly hall. The building is two storeys in height, the central feature being a massive tower, flanked by wings.

## The Auld Howff; or, Cemetery of Dundee. Monuments and Inscriptions.

By A. H. Millar, LL.D., Chief Librarian.

To the meditative mind of the romantic tourist who happens to visit Dundee, the quaint old graveyard called the Howff will offer material for reflection. The very name has a species of poetic suggestiveness. The good old Scots word "Howff" means a favourite meeting-place, and though that name was not applied to the cemetery as a burying-ground, it has a peculiar appropriateness. For three hundred years it was the principal graveyard of Dundee, and within its sacred precincts there lie the remains, as their tombstones tell us, of "godlie and honest" men, and "chaste and verteuous" women, of civic rulers and humble craftsmen who were the makers of Dundee, and the conservers of her political and religious liberty. Long before this place became a cemetery it had interesting historical associations. The ground was the orchard of the Franciscan Monastery, which was founded by the beneficent Devorgilla, mother of King John Balliol, and foundress of Balliol College, Oxford. You may wonder why a Princess of the Royal Blood and the mother of a Scottish King selected Dundee as the burgh to be honoured by her munificence. It is too long a story to tell completely, though a passing reference may be made to it. William the Lion granted the burgh of Dundee to his brother David, Earl of Huntingdon, about 1192. When the Earl died in 1219, he was succeeded by his only son, John le Scot, who died without issue in 1237. The property of the Earl was then divided amongst the daughters of Earl David. Margaret, the eldest, was married to Alan, Lord of Galloway, in the parish Kirk of

Dundee, which her father, the Earl, had founded, and, as a large portion of the burgh had fallen to her share, including the mansion known as Huntingdon Hall, it is very probable that Devorgilla was born in Dundee; hence her design to further Christianise her birthplace by founding the Franciscan Monastery. It is interesting to learn that, through the partition of the burgh after John le Scot's death, all the daughters of Earl David held property in Dundee, and there are deeds extant showing the possessions of Isabella de Brus, Ada de Hastings, and Devorgilla de Balliol, in the burgh. The succession to the Scottish Throne was contested by the descendants of these Dundee ladies of the olden time.

The Franciscan Monastery continued to flourish for about three centuries till the Reformation, but was overthrown about 1560. Seven years after that date Mary Queen of Scots and Henry Darnley visited Dundee, and it was then pointed out to her that the graveyard of Dundee at St. Clement's Kirk (on the site where the Town House now stands) was in the centre of the burgh, and was therefore dangerous to the health of the inhabitants. Accordingly, by Letter of Gift, dated 1567, the Queen handed over "the orchard of the Grey Cordelier Friars" to the town to be used as a burying-place in all time coming. It is strange to notice that the reason assigned for selecting this spot as a graveyard was that it was "without the town wall." The place is now in the very centre of the modern city of Dundee. Interments soon began in the new ground, and the oldest monument now extant is dated 1577.

For two hundred years after the date of this gift the orchard was used as the meeting-place of the different crafts of Dundee, and this is how it came to be known as "the Howff." There was a kind of sentimentalism even in the business meetings of these honest old craftsmen long ago which we look for in vain nowadays. The leading members of the various trades selected certain parts of the orchard for their lairs, and the meetings of the craftsmen were usually held beside the graves of departed

members of the trade, as if the presence of the voiceless dead gave a seriousness to the business in hand. Thus the Bakers, who are well represented in our town, met for two centuries beside the grave of David Tendall, who died in 1591, after a long career of usefulness, thus perpetuating his memory, and calling him to witness from his tomb how faithfully they were administering the trust he had committed to them. When the Trades Hall was built in 1778, there was no longer any necessity for these open-air meetings, and the Howff was abandoned as a meeting-place for the Trades, though the old colloquial name has adhered to it. It continued to be used as a burying-place until 1858, when it was closed save to a few existing lair-holders. The last interment was that of George Duncan, M.P. for Dundee, who died in 1878.

It is possible to study the changes in monumental designs for three hundred years by examining the tombstones in the Howff. Here will be found characteristic examples of sixteenth century inscriptions in linear raised Gothic characters, with peculiar emblems introduced. On many of these there are heraldic bearings of Scottish families, now extinct. Indeed, for the student of heraldry there is no other graveyard in Scotland so rich in armorial blazons of families whose arms are not to be found in any published works on Scottish heraldry. There are also examples of the richly decorated monuments of the seventeenth century, and characteristic types of eighteenth and nineteenth century tombstones. These serve to illustrate the alterations in monumental taste since 1577. The mural monuments, though now in a dilapidated condition, have been of great beauty and elegance of design.

It may be mentioned as an instance of the rampant Vandalism and utilitarian Philistinism of our day that, in 1892, it was seriously proposed to a Committee of the Dundee Police Commissioners that the whole of the west wall of the Howff, with all its historic monuments, should be demolished; that a portion of the graveyard containing about three hundred lairs should be violently annexed; and that a modern street, with causeway blocks to suit

Post Office requirements, should be made over the dust of some of the noblest heroes whose names are recorded in the annals of Dundee. Within the space thus proposed to be desecrated there lie the bones of several Bailies who fell fighting in defence of the town, at the siege in 1651. There also reposes the sacred dust of Provost Fletcher, who boldly withstood the repeated attempts of James VII. to wrest civic power from the people. The Wedderburns of Blackness, the Guthries of Guthrie, the Forresters of Millhill, the Duncans of Lundie, the Kinlochs of Kinloch, the Goldmans of St. Fort, and many others well known in history, would have all been included in the scheme of sacrilegious spoliation. Fortunately this act of Vandalism was prevented.

The following are some of the notable tombstones, with quaint inscriptions:—

No. 195.—At the West Wall near the second recess, Tombstone of William Newton, litster (dyer), 1608.

The memorial of the rightivs is in the remembrance of the Lord continvally, and sall not taist of the second deith; but the memorial of the vikit sal rot, and pass away and decay.

Ve leir fra Abraham oor father of old,  
To honor the burial ve soold be bold.

No. 15.—T. S. probably Simson, date *circa* 1600.

Mensis Marcii die 6  
Man, tak hed to me,  
Hov thov sal be,  
Quhan thov art dead;

Drye as a trei,  
Vermes sal eat ye;  
Thy great boote  
Sal be like lead.

Ye tyme hath bene,  
In my yooth grene,  
That I vas clene  
Of bodie as ye ar;

But for my eyen  
 Nov tvo holes bene ;  
 Of me is sene  
 Bvt benes bare.

No. 71.—Flat stone, Alexander Gray and Elspet Smythe,  
 1613, Arms of Gray and Smythe.

Ve pas from deith to lyf.  
 As gras ve pas  
 From that ve vas,  
 Ve hope againe  
 Vith Christ to raigene.

No. 101.—Tombstone of Walteir Cooper, tailyour, 1628.

Kynd Comarads, heir Coopar's corps is layd,  
 Walter by name, a Tailyour to his trade ;  
 Both kynd, and treu, and stut, and honest hartit,  
 Condol with me that he so soon departit ;  
 For I avow, he never weyld a sheir  
 Had better pairts nor he that's borid heir.

No. 19.—On the North side of the gate, Andrew  
 Mureson and Margaret Ramsay, his wife, 1629.

Stay, trav'ler, notice who entomb'd heir lyes  
 On that was verteous, chast, and very wyse,  
 Good to the poor, still liv'd a godly lyfe,  
 Both first and last, since she becam a wyfe.  
 To quarell Death for her change wer but vain,  
 For Death spares nather godly nor prophane ;  
 To say she's chang'd twer but a foolish storie,  
 If not to live eternalie in Glorie.

No. 68.—Robert Mureson, 1637.

Avay, vaine vorld ! thov ocean of annoyes,  
 And com, sveit heaven, vith thy æternal joyes.

No. 262.—Heir lysis ane godlie and honest man, James  
 Wat, flesher, Burges in Dondie, who lived in the holie  
 band of matrimonie with Agnes Theane 38 yeiris, and did  
 buir to him 8 childring. He departit this lyif the 26 of  
 Sep. 1641, his age 62.

Come, quirists al, and sing with me,  
 Hale lu ja. Hale lu je.

No. 264.—Sarcophagus stone with full-length effigies of John Baxter, baker, and Helen Seyton, his wife, 1609, with arms of Baxter and Seyton, marshalled.

Ve live to die, and deiis to live for ever.

No. 17.—Flat stone with full length effigies of Johr. Kynneir and Eupham Gray, 1627. This tomb has evidently been erected by the husband in his lifetime, spaces having been left for the date of his death, which are still blank.

Heir lysis tvo godlie aigit personis to wit Johne Kynneir merchand and Eupham Gray his spous, quha deceissit as folowis—to wit, the said Eupham Gray deceissit the first day of March 1627, of the aige of 59, and ye said Johne Kynneir deceissit ye [       ] day of [       ] of ye aige of [       ].

10. Recess, West Wall.—On the coping of the wall are richly decorated panels showing arms and initials, the legend on the cornice being—"In monvmentvm sepultrvrae familiae Mvdeorvm erexit Jacobvs Mvdevs anno 1602." Fragments built into the wall are from the tombstones of Sir Thomas Mudie, Provost of Dundee, 1651, and James Wedderburn. At the end of the wall the inscription reads:—"So sal the Lord bliss the in all thy proceedinges."

No. 117.—Sarcophagus monument to Dr. David Kinloch of Aberbothrie, 1617. The translation of the Latin inscription, now partly defaced, is as follows:—"The monument of sepulture of a man of the greatest honour, Magister David Kinloch, of great learning, and adorned through life with many illustrious virtues; a most skilful Physician to the Kings of Great Britain and France, by whose letters and seals the nobility of his family and descent is amply testified and proved. He died in the Year of human salvation 1617, and of his age, 58."

Dr. Kinloch was Physician to James VI., and while confined in one of the prisons of the Inquisition in Spain, he cured the Grand Inquisitor of a dangerous disease, and

was set free with many tokens of gratitude. He was recognised as one of the foremost Latinists of his time, and several of his poems were published in the *Delitiae Poetarum Scotorum*. On one of the sloping sides of the tomb there have been numerous coats of arms, many of which are now defaced. Dr. Kinloch's own arms still remain, and there are ribbons with the names of Ramsay, Lindsay, Scrymgeour, and Stewart. On the same slab an inscription formerly stood in memory of Sir James Kinloch, Nevay, who garrisoned Dundee for Prince Charles Edward in 1745, and whose estates were forfeited.

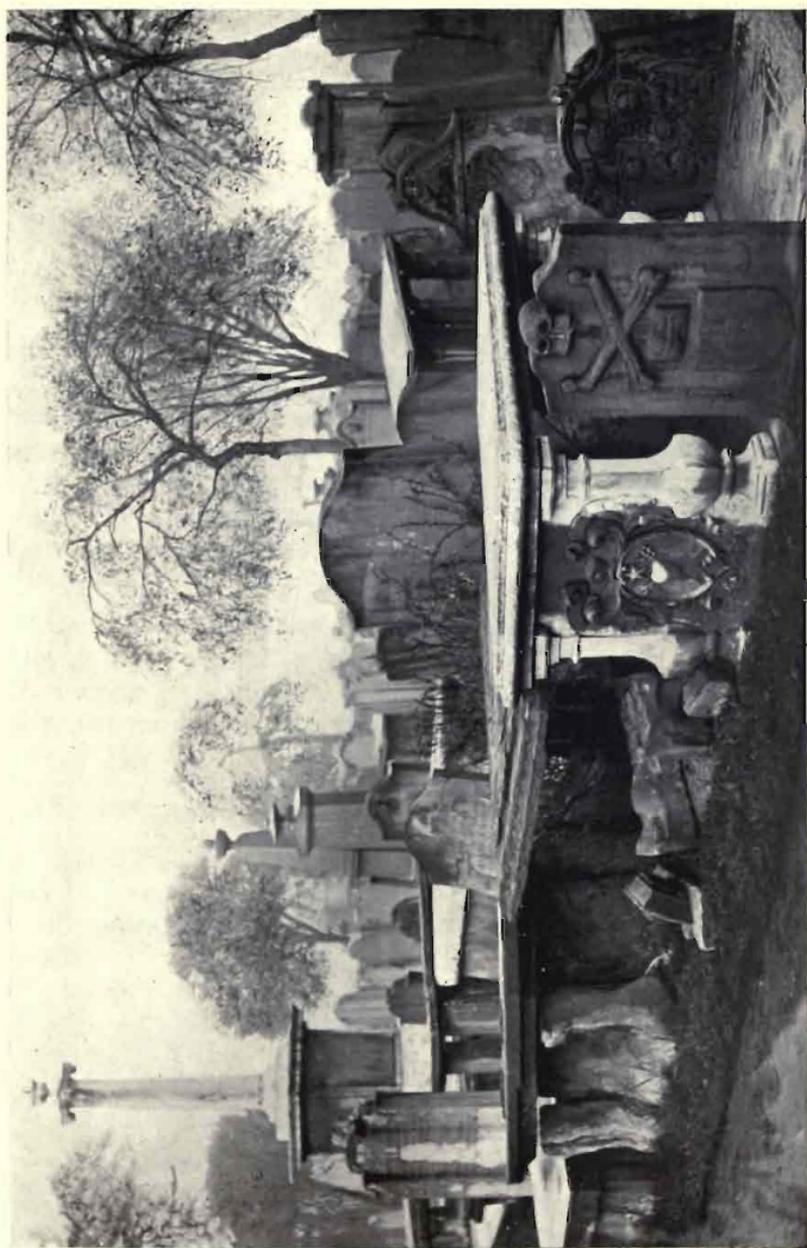
15. Recess, West Wall.—The large monument near the north end of the wall is that of the Duncans of Lundie, ancestors of the Earls of Camperdown. It is much decayed, but has been a splendid monument. It was erected in 1718 by Alexander Duncan of Lundie, in memory of his father, Alex. Duncan of Lundie, 1696, his mother, Ann Drummond, daughter of John Drummond of Megginch, 1695, and their five children.

No. 188.—The cope-stone of a sarcophagus bears a Latin inscription, of which this is the translation:—  
“David Lindsay placed this in remembrance of his wife Christian Rutherford, adorned by piety and virtue, and accomplished in Greek, Latin, and French literature. She died 9th November, 1603, aged 40 years.”

No. 271.—Robert Pattillo, skinner, and his wife Margaret Spens, 1648. Arms of Patillo and Spens, marshalled.

The man is blest that careful is  
The needy to consider;  
For in the season perilous  
The Lord will him deliver.  
The Lord will make him safe and sound,  
And hapie in the land;  
And he will not deliver him  
Into his enemies' hand.

No. 270.—Covering stone of a sarcophagus erected by Thomas Vichtane in memory of his wife, 1645. Figures



VIEW IN HOWFF BURIAL GROUND.



symbolical of Morning and Evening of Life, and Life and Death.

When dayes and yeires ar all by gone  
Then most we compt with God alone.

No. 600.—Table stone with fielded panels, initials G. M. and M. K. with marshalled arms.

Remember man as thou goes by,  
As thou art now so ons was I.  
As I am now so shal thou be,  
Remember, man, that thou must die.

No. 156.—Elegant sarcophagus monument erected to Andrew Archibald, lithotomist, now much out of repair. It formerly bore a long and curious Latin inscription referring to his surgical operations. The date is September 1662, and his age is given as 67. After the inscription an ingenious quatrain is added, in which the word "Mors" is spelled four times, reading downwards.

**M**ors solet innu**M**eris morbis corru**M**pere vita**M**  
**O**mnia mors rostr**O** devorat usque su**O**  
**R**ex princeps sapiens se**R**vus stultus mise**R** æge**R**  
**S**is quicunque velis pulvi**S** et umbra Summu**S**.

No. 526.—Monument erected to James Chalmers, bookseller, Dundee, originator of the adhesive postage stamp.

Nos. 941-970.—Burial-place of the Tendals, bakers in Dundee for over 100 years, 1591-1600-1694. The tombstone of John Tendal, 1565-1591, has the following verse:—

Lat nane be sure  
Lang to indure  
His lyfe in yird a hour,  
But Deid mon cum  
And maw him down  
As in ye field a flowre.

Nos. 612-613.—Tombstone of John Roche, brabner (weaver) and Eupham Pye, with their children. There

are fourteen skulls representing the parents and their offspring.

Nos. 723, etc.—Burial-place of the Wedderburn family, including the Wedderburns of Croft, of Pearsie, of Easter Powrie, and of Ballindean. The principal monument is the upright column, erected in memory of Lady Margaret, daughter of David, Lord Ogilvy, and sister to David, Earl of Airlie. She was the mother of Sir David Wedderburn, Bart. On the west side of the pedestal there is a beautiful marble tablet by Schumacher, the tutor of the celebrated Nollekens the sculptor.

## Ancient Trades and Incorporations.

By Joseph Wilkie, Clerk to the Guildry.

THE ancient Trade Incorporations of Dundee still existent are:—

### THE GUILDRY.

The Bakers (originally "Baxters")	} The "Nine Incorporated Trades of Dundee."
The Shoemakers (originally "Cordiners")	
The Glovers (originally "Skinners")	
The Tailors . . . . .	
The Bonnetmakers . . . . .	
The Fleshers . . . . .	
The Hammermen . . . . .	
The Weavers (originally "Brabners" or "Websters") . . . . .	} The "Three United Trades of Dundee."
The Dyers . . . . .	
The Masons . . . . .	
The Wrights . . . . .	}
The Slaters . . . . .	

The Fraternity of Maltmen.

The burgesses of Dundee were at a very early period in Scottish history endowed with valuable privileges of self-government and exclusive trading within the Burgh. These privileges were confirmed and enlarged by successive sovereigns, notably by King William the Lion in the twelfth century, and by Alexander III. and David II. in the fourteenth century. The other royal burghs in Scotland were similarly favoured by the Crown, with the view, no doubt, of fostering commerce and the handicrafts,

which in those early days must have been in a very poor and struggling condition in Scotland; but probably also with a politic eye to the expediency of establishing powerful communities of townsmen who might be relied upon to assist the Crown in its frequent disputes with the turbulent feudal barons.

In working out their privileges and for the proper regulation of their communities, the burgesses in Dundee, as in other royal burghs, seem to have gradually resolved themselves into fraternities or combinations, each having for its object the regulation and protection of the particular handicraft or calling of its members. The formation of these distinctive bodies of the burgesses took place with the approval and assistance of the magistrates, and the authority which they exercised within the burgh was supported by the law and usage of the country. Strict dividing lines were observed between burgesses engaged in commerce and burgesses engaged in the handicrafts, the former being known as "Merchant Burgesses" or "The Guildry," and the latter as the "Trades" or "Crafts."

There is no record of any formal charter in favour of the Dundee Guildry or Trades until near the end of the fifteenth century; but it is tolerably certain that they must have existed and been recognised as authoritative bodies in the burgh for, at least, two centuries before. The earliest formal constitution of the Guildry, of which there is any record, is contained in an agreement or contract called a "Merchandis Letter," entered into between the Town Council of the Burgh and the Merchant Burgesses in the year 1515, whereby the merchants bound themselves to raise money by a tax on merchandise for the support of the "Holy Blood Altar" in the South Aisle of the Parish Church; and, on the other hand, the Town Council bound themselves to recognise the merchants as a Guild, with power to choose "ane Deane of Gild; ye whilk Deane of Gild sall have power of collectorschip of ye halie bluid siluer, and wther duties of ye halie bluid; and till exerce, hant, and vse ye office and awthoritee perteing to ye

Deane of Gild, according to ye statutes of ye Gild and ye burrow-lawes." The "Merchandis Letter" was ratified and confirmed by a charter dated 17th July 1526 granted by King James V.

The Guildry had power to make laws regulating the commerce of the burgh ; it had the first offer of all goods brought into the burgh for sale ; and no ship could be chartered unless in the presence of the Dean of Guild, or sail without his permission. Obedience to the regulations of the Guildry and the decrees of the Dean of Guild was rigorously enforced by fine and imprisonment. Before the representative of the burgh attended Parliament a meeting of the Guildry was called to give its instructions ; the magistrates could not impose local taxes without its advice and consent ; and its permission was also required before the Town Council could grant charters or "Seals of Cause," as they were called, to the Trades.

Mercantile law-suits and questions relating to property within the burgh were disposed of in the Guild Court, presided over by the Dean of Guild, who had all the powers of a judge at common law. The jurisdiction of this Court was repeatedly recognised by Parliament, and continues to the present day, but is now limited to cases relating to the erection of new buildings, or the demolition or alteration of old buildings, the prevention of encroachments by individuals upon the property of their neighbours, or on the public streets, and similar matters.

"Seals of Cause" were granted by the magistrates to most of the "Trades" or "Crafts" at about the same time as the royal charter was granted to the Guildry ; the earliest extant being that of the Bonnetmakers, dated 31st July 1496. Some of the Trades are supposed to have been possessed of early charters which have been lost. Each Trade was a distinct Incorporation, complete in itself, with power to choose its own Deacon, "Boxmaster" (Treasurer), and other office-bearers, and had the sole power of admitting new members. No one was allowed to execute work within the burgh unless he was a member of the particular trade to which the work pertained. An entrant to a Trade

had to serve a regular apprenticeship, and to prove before admission that he was "apt and fit" for his craft, usually by working an "essay piece" to the satisfaction of essay masters appointed by the members. Each craftsman had to confine himself to the exercise of his own particular craft, and was not eligible for admission to any other "Trade," nor, of course, to the Guildry, whose membership was confined exclusively to merchants. The Deacons of the various Trades held courts for the purpose of administering justice in matters relating to their crafts. Lawsuits between the craftsmen and their journeymen and apprentices were raised before the Deacon, whose power and privileges in his own Trade were somewhat similar to those exercised by the Dean of Guild in the Guildry. The Deacons' Court, however, appears to have fallen into desuetude in the early part of the seventeenth century.

In the exercise of their various rights and privileges, the Guildry and the Trades frequently came into collision, and arbitration and litigation were occasionally resorted to. In these disputes the various Trades made common cause against the Guildry. This led to a movement for closer union amongst the Trades, which, after various schemes had been tried, culminated in nine of the Trades forming themselves, previous to 1573, into a confederation or united body called the "Nine Incorporated Trades of Dundee." Each of the individual Trades forming this confederation retained its own corporate capacity, and continued to elect its own office-bearers and manage its own affairs as formerly. The "Three United Trades" is a similar combination of the Mason, Wright, and Slater Trades.

The Guildry and Trades continued to exercise their privileges of exclusive trading within the burgh until the year 1846, when, by "The Burgh Trading Act" of that year, all such privileges in burghs or elsewhere in Scotland were abolished. Dundee had extended by this time far beyond the ancient burgh boundaries, and the burgesses' privileges, which had originally been necessary to preserve the infant trade of the burgh from extinction, had become

merely useless and vexatious restrictions on the trade of a large and prosperous town.

Although no longer possessed of their ancient trading privileges, the Guildry and Trades have preserved their original constitutions, and continue to exist as prosperous and popular institutions in the city. They elect representatives to the Dundee Harbour Board, the Dundee Royal Lunatic Asylum Board, the Directorate of the High School, the Morgan Trust, and similar bodies. The office of Dean of Guild and the Convenerships of the Trades are highly prized by the citizens, and carry with them seats at most of the public boards in the city. By the "Royal Burghs (Scotland) Act 1833" the Dean of Guild was recognised as an *ex officio* member of the Town Council, and in the comparatively recent Town Councils Act of 1900 the Dean's seat at the Town Council is continued. The funds of the Guildry and Trades are now principally devoted to the support of decayed members and their widows and families.

## Scientific and Literary Institutions.

By John Paul.

LOOKING back over the Dundee records, one institution, from the success it achieved and the results which followed, stands naturally at the head of its scientific and literary history.

### THE WATT INSTITUTION

was founded in 1824, in honour of James Watt, the celebrated engineer, and was intended for "the instruction of young tradesmen in the useful branches of arts and sciences." The first session opened appropriately on 19th January 1825, the anniversary of the birth of James Watt, by a gathering in Willison Church. A membership of 460 and two lecturers was a good beginning, and for the first twenty years the Watt Institution was popular, and imported valuable education at small cost. The Directors were fortunate in their choice of Lecturers. One of them, James Bowman Lindsay, appointed in 1829, has attained world-wide renown as a pioneer in Electricity and Wireless Telegraphy. For the efficient carrying on of the classes, books, apparatus, and specimens were a necessity, and suitable premises were in demand. One of the halls of the Public Seminaries (now High School) was secured for a museum, and on 1st January 1838 the first exhibition of curios, natural and mechanical, was opened. A subscription was started for the erection of suitable buildings, and a site was secured in Constitution Road. Class-rooms and a lecture hall provided at a cost of £2200 were opened in November 1839, and for many years much good work was done. Unfortunately, about 1847, there was a falling away, and by 1852 the classes were at a standstill. It is interesting to note that in 1840 the Watt Library

contained 1694 volumes. The Eastern Bank held a bond on the property, and the managers announced their intention of selling the books and specimens in liquidation of the debt. A number of leading citizens, headed by Sir David Baxter, approached the Bank managers, and the restricted sum of £350 was named for the movables. This sum was at once subscribed, and the Watt Library and Museum were transferred to a hall in Lindsay Street, where they remained till 1867. The public were admitted to the Museum for a nominal sum, and the Library was carried on by subscription. Weekly lectures on literary and scientific subjects were arranged, the Rev. George Gilfillan and Sheriff Campbell Smith contributing, and the Watt Institution became once more a living power in the community. The Free Libraries Act was adopted in Dundee in 1866, and on the erection of the Albert Institute building in 1867, the Directors of the Watt Institution arranged to hand over their Library and Museum to the Free Library Committee. This was done, and on 10th June 1868 the Watt Institution ceased to exist. It was a worthy forerunner of the Albert Institute, and its books and specimens were a valuable nucleus for our present Free Library and Museum.

#### Y.M.C.A.

The Watt Institution buildings in Constitution Road were acquired by the Directors of the Young Men's Christian Association in 1871, and being only seven years in existence at the time, they brought all the ardour of youth to bear on the problems before them. In addition to the religious aspect which naturally was predominant, the Directors at once started evening classes in Mechanics, Mathematics, Steam, and Chemistry. During the first session 90 students were enrolled. Other subjects were added in subsequent sessions, and for seventeen years the Y.M.C.A. was the acknowledged centre for technical training. The number of students for the session 1886-7 was 617. Every evening had its special subjects, and every

room its class. Though the Technical Institute became a rival in 1888, the number attending the Y.M.C.A. was well maintained, and by the close of the century both Institutions were filled to overflowing. In 1902 the Education Department urged that the classes in both Institutions should be united under one management, and the Y.M.C.A. Directors handed over the control to the Technical Institute Committee. Thus for thirty-one years the Y.M.C.A. carried on successfully the scientific and literary education of working-men. The personality and enthusiasm of teachers like Robert Chalmers and Frank W. Young, D.Sc., could not fail to inspire young men and popularise scientific studies.

#### THE TECHNICAL INSTITUTE.

During his lifetime Sir David Baxter manifested a keen interest in the practical work done by the Watt Institution, and at his death in 1872 he left £20,000 for the founding of a Mechanics Institution. His Trustees carried out his wishes in 1888, when the Technical Institute in Small's Wynd was opened. At that time the commodious building, now an integral part of University College, was considered ample for the needs of the city, but so great became the demand for instruction in Science and Art by the beginning of the century, that the Directors found the accommodation at the Technical Institute and Y.M.C.A. quite inadequate. Government came to the rescue in 1906 and offered pound for pound raised locally for new premises. The result was the extensive new Technical College in Bell Street, erected and equipped at a cost of £75,000. Sir William Ogilvy Dalgleish, Bart., in opening the Institute, 3rd March 1911, thus summarised technical education in Dundee:—"My story began in 1871 with one teacher of 4 subjects and 90 pupils, and it closed in 1911 with 49 teachers, teaching 20 subjects, divided into 80 classes and about 1300 students."

## INSTITUTE OF ENGINEERS.

The Dundee Institute of Engineers was formed in 1884, and they incorporated the Society of Experimental Engineers in 1909. This vigorous Society has excursions to places of mechanical interest during summer, and lectures, &c., during winter. A special feature has been the encouragement given to younger members who write essays and pursue original research.

## EARLY LITERARY SOCIETIES.

The weavers and craftsmen of the first half of last century had a natural aptitude for debate, and could express their ideas in fluent language by tongue or pen. Newspapers then were few, small, and expensive, and manuscript magazines were laboriously prepared and circulated to the members of the various societies. During the forties of last century no fewer than ten such magazines were in circulation monthly. The names indicate to some extent the special characteristic of each society.

*Diagnostic Literary Society's Magazine; Dundee Natural History Magazine; Dundee Literary Repository; Dundee Literary Institute Magazine; Magnum Bonum Literary Society Magazine; Lochee Literary Casket; Lochee Literary Budget; Dundee Literary and Scientific Institute Magazine; Dundee Natural History and Literary Magazine; Lawson's Magazine of Natural History.*

These neatly written M.S. magazines exhibit an amount of enthusiasm highly commendable. Thomas Lamb of Lamb's Hotel was beloved by the enthusiasts of his day, and his premises in Murraygate was the meeting-place of many of these early Societies. "The Halls of Lamb in Reform Street continued to be a literary centre during the lifetime of A. C. Lamb, the son of Thomas. He was a diligent collector of "Old Dundee" memorials, and his magnificent collection was in 1901 gifted to the

Free Library Committee by Edward Cox of Cardean. Many of the unique M.S. magazines are among the treasures.

#### NATURALIST SOCIETIES.

In 1828 William Gardiner, botanist and poet, was the moving spirit of a society, "The Gleaners of Nature," and up till 1835 his M.S. magazine circulated among the members.

The Dundee Naturalist Association was started in 1847, George Lawson, the first President, became afterwards Professor of Natural History in Nova Scotia. William M. Ogilvie, the Secretary, did yeoman service in his day as a Naturalist, Town Councillor, and Magistrate. In Lamb's rooms the members met for some years.

On 22nd January 1874 the Dundee Naturalist Society was formed, Bailie Ogilvie being first President. The Society's record of Lectures, Exhibitions, and Excursions from its inauguration to the present day is most creditable, and the impetus given to the study of Natural Science has carried intelligence to a higher level, and stimulated and enriched the community.

The Dundee Working Men's Field Club was instituted 28th April 1885, being then an offshoot of Clepington Parish Church Guild. Excursions for the study of Nature have been a special feature, and the explanatory remarks on the specimens gleaned have proved highly instructive.

#### GEOGRAPHICAL SOCIETY.

The Royal Scottish Geographical Society was founded in 1884, and Dundee is one of the four centres where the annual course of Lectures have been delivered. Nearly all the leading and best known explorers, British and Foreign, have thus been brought to the city.

#### LOCHEE LITERARY ASSOCIATION.

This organisation began in a humble way in 1875, and step by step grew in influence, moulding and shaping the life of Lochee. Peter Anderson was first President and

for many years Secretary. Dr. A. B. Connel gave active assistance and donated over 200 volumes to their library. In 1883 they entered their present premises in High Street. For a series of years excellent courses of popular lectures were arranged and many celebrities were thus brought to Lochee.

#### DUNDEE PARLIAMENT.

Budding politicians drift naturally into the local Parliament where they find scope for their argumentative and oratorical gifts. This useful debating society was instituted in 1877 and is a valuable training ground for public life.

#### ARMITSTEAD LECTURES.

In 1873 Lord Armitstead of Castlehill, at the close of his first term as M.P. for Dundee, placed £5,000 in the hands of Trustees for the founding of a Working Men's Club. The original intention proving a qualified success, the Trustees instituted popular lectures instead, at a popular price. The first course was opened in 1882, and have been continued yearly since. Distinguished people who would not otherwise have been heard in Dundee have lectured to large audiences.

#### PHOTOGRAPHIC ASSOCIATION.

The first Photographic Exhibition held in Dundee was opened in March 1854; since then local photographers have kept abreast of the times. In 1880 they formed the Dundee and East of Scotland Photographic Association, under the Presidency of J. C. Cox, Lochee. Many international exhibitions and two Scottish Photographic Salons have been promoted by this body. For many years the monthly meetings were held in Lamb's Hotel, but of late they have taken place in University College. The Scottish Photographic Federation (now comprising nearly 50 societies in Scotland) was founded in 1903 at a

meeting in Dundee, and a Scottish monthly Journal, *The Camera*, is published in the city. The photographic survey of Dundee was undertaken some years ago, and is now nearing completion, several thousands of pictures having been taken and preserved.

#### BURNS SOCIETY.

The centenary of the death of Robert Burns saw the inauguration of the Burns' Society. A Recreation Club, led by John Ramage, handed over their rooms and assets in Nethergate, and the first conversazione was held in the Art Galleries, 23rd July 1896. Dr. A. H. Millar was first President, and Robert Fulton, Secretary. The chief aim of the Society has been the study of Scottish literature before and after Burns. Able local lecturers and talented musicians and dramatists have kept up a high standard.

#### CHURCH AGENCIES.

Most of the churches have literary guilds which are practically public institutions. Some of them, like the Literary Societies of Wallacetown and Ward Chapel, were supported by all denominations, and arranged courses of lectures for the inhabitants. Men of ability like C. C. Maxwell, Frank Henderson, M.P., and James A. Rollo, were the leaders, and most of our public men found their tongue at such societies. Of specialised study the Castle Street Chapel Shakespeare Society is a good example. Of late years, Church guilds have suffered in consequence of the healthy crave for technical education.

#### ALBERT INSTITUTE LECTURES.

The Free Library Committee acted wisely in arranging courses of popular lectures, and their success since their initiation in 1906 proves their utility. With the Victoria Art Galleries and Branch Libraries at their command, the

natural evolution would be for the Natural History, Fine Art and Literary Institutions in the city to work in conjunction with, and under the wing of the Free Library Committee. Courses of Lectures could then be arranged in different parts of the city in keeping with the aims and objects of the central Institution.

## Charles Lyell and Forfarshire Geology.

By Sir Archibald Geikie, K.C.B., D.C.L., Pres. R.S.

THE first Meeting of the British Association at Dundee in 1867 was remarkable for the large company of geologists who attended it. Not only were they numerous, but they included one or two of the veteran chiefs whose recollections went back to what has been called the "heroic age" of geology, and who had themselves played a notable part in laying the foundation-stones of the science. Murchison, still active alike in mind and body, with his erect figure and voluminous neck-cloth, was a conspicuous feature on the platform of Section C. Lyell flitted about among the different Sections, full of interest in every fresh discovery, and eager to hear the details of it from the lips of the discoverer himself. Egerton and Enniskillen were there to see the latest additions to the store of fossil fishes from the Old Red Sandstone. Pengelly came with his annual racy account of the excavations at Kent's Cavern. Charles Martins, of Montpellier, told how he had found traces of former glaciers in the Pyrenees. A gathering which included also such men as Andrew C. Ramsay, Thomas Oldham, James Nicol, Robert Harkness, Charles W. Peach, and other well-known names was one worthy to be held in lasting remembrance.

Of all this brilliant assemblage the figure that the present Meeting of the Association in Dundee more especially brings to mind is that of Sir Charles Lyell. Not only a Scot, but also a Forfarshire laird and proud of his native soil, he was drawn to the Meeting in 1867 not only by his keen interest in the progress of science, but by loyalty to his county, and his desire that the gathering in Dundee should be successful. He never forgot how much he owed to the geological features of Forfarshire for their influence in stimulating his early efforts to study the history of the Earth by personal observations in the field.

A copy of Bakewell's "Geology" which, when a lad, he had found in his father's library, had given him the first inkling into this science. When, at the age of nineteen, he travelled from his College at Oxford by coach to Scotland, he was already observing the characters and succession of the rocks that were passed on the journey. As he crossed the Sidlaw Hills from Dundee to Kinnordy his new-found zeal gave him a fresh interest in the scenery.

While at Oxford his geological proclivities were decisively stimulated by the genial lectures and enjoyable excursions of the enthusiastic Buckland. He now determined to take geology as his special field of scientific activity. The Geological Society, which had come into existence a dozen of years before, was then in the first flush of its youthful ardour, with Buckland as one of its most energetic and inspiring members. The young Oxford student was introduced into that lively company by his sympathetic Professor, and in 1819, when only 22 years of age, he was elected a Fellow. We may infer with what eagerness he entered into the work and spirit of the Society from the fact that in the course of only four years he was chosen to be one of the Secretaries.

When he returned to Scotland, longing, doubtless, to turn to account the geological knowledge and methods of observation which he had now acquired, he found his native district to be full of interest and variety. That part of the county had as yet only been superficially examined by men of science, and thus lay temptingly open to the first competent observer who would patiently study its details. Had Lyell then settled on his paternal estate he would probably have devoted himself to this study. But it was well, not only for the cause of geology, but for that of science at large, that he was led into a wider field. Nevertheless, his visits to his home after leaving the University and before he launched upon his brilliant career left their mark on the history of Scottish geology.

It is interesting to recall that Lyell in these early days recognised the anticlinal arch of the Sidlaw Hills and the

great synclinal trough of the Mearns, and thus for the first time saw the true geological structure of Forfarshire. The striking section which he gave of that structure in his "Elements of Geology" held its place in all the successive editions of that work, and thus became one of the classic illustrations of its subject. In one of these youthful excursions around his home he came upon a remarkable dyke of igneous rock which has a particular interest, since it formed the theme of his first published scientific paper. His essay appeared in the year 1825 as the forerunner of the many memoirs and volumes with which he was yet to enrich geological literature. Not only the older rocks, however, but the younger superficial accumulations attracted his notice, and became the subject of his investigations. The digging-up of marl on the site of a former lake upon his father's property at Kinnordy, and the discovery of some antlers in that deposit, were incidents eminently suited to awaken his interest, giving him an opportunity to compare recent fresh-water deposits with those of earlier geological periods. His observations formed the subject of another paper in which he struck the keynote of his geological philosophy,—that the past can best be interpreted by a detailed study of the present.

After the appearance of these early essays on problems suggested at his Forfarshire home, the scenes of Lyell's scientific activity lay far from his native place, and extended over wide tracts both in the Old and the New World. For a dozen of years, travelling all over Europe for the purpose of enlarging his knowledge of geological facts and strengthening his grasp of the great principles of the science and his power of expounding and illustrating them, he made no additions to Forfarshire geology. When, however, in the year 1840, Louis Agassiz startled the geologists of Britain by boldly proclaiming that their country had once been swathed in snow and ice, and that traces of this Arctic condition remained fresh and unmistakable to the present day, Lyell, ever ready to receive new truths and to expound them to the world, entered the arena wherein the Swiss naturalist was meeting with

strong opposition, especially from some of the older geologists. From his native county of Forfarshire he brought forward new evidence to confirm part at least of Agassiz' contention. Among the hills overlooking Glen Clova he had found two lakes, each nestling in a picturesque rock-girt corrie and hemmed in on front with conspicuous mounds of earth and stones that ponded back the water. He described these mounds as true glacier-moraines formed of the detritus that the ice had carried forward from the encircling crags behind. Important in the history of the progress of geology as one of the earliest contributions to the now voluminous literature of glaciation, the paper in which Lyell described these examples of former glaciers has a special interest to Scottish geologists, as it was the first of the long series of memoirs and books which have so fully revealed the successive stages of the Ice Age in Scotland. The evidence which attracted Lyell's notice and was described by him, though obvious to a trained eye, was much less imposing than much which has since been discovered. That Lyell should have recognised its true character and boldly proclaimed his belief, at a time when such ideas were not yet favourably regarded by the general body of British geologists, is a proof of his power of observation and of that courage on behalf of what he believed to be truth which he so bravely displayed to the end of his life.

No geologist of his day realised more clearly than Lyell the necessity of visiting and comparing in different countries the various kinds of geological evidence from which the principles of the science are deduced. In his pursuit of this self-imposed task he from the very beginning travelled into one region after another all over Europe. Each succeeding season found him at work, either investigating some district in his own country, or abroad among the rocks and in company with the geologists of some tract in which he was interested. In these journeys, after his marriage, he had the inestimable advantage of the companionship and assistance of his accomplished wife. He twice visited North America, and

travelled over a wide extent of Canada and the Eastern States, keeping his eyes open not only on the geology, but on the habits and social problems of the communities through which he passed.

His scientific aim in all these numerous peregrinations was not so much to make original observations as to see for himself the work of others on their own ground and, where possible, under their guidance, and thus to be able to judge from personal inspection of the character and value of that work and the validity of the conclusions that might have been based upon it. His trained observing faculty, however, could not fail now and then to enable him to detect errors of observation and to note the importance of evidence that had previously been missed. He united the powers of a keen critic, and of a philosophical and eloquent historian, and he devoted these powers with unwearied zeal to the furtherance of the science which all through his life had the first place in his regard. The appearance of each fresh edition of his "Principles" and "Elements" was looked forward to with keen anticipation by his contemporaries, who knew that they would find in them a masterly discussion of the advances made by each section of geology and a balanced judgment respecting the more important problems still awaiting solution.

It is hardly possible to overestimate the debt which the science in this country owes to the writings of Charles Lyell. He found the subject in a state of anarchy, amidst which the Plutonists and Neptunists waged an angry warfare with each other. He left it with the Neptunists not only routed from the field, but extinct and almost forgotten, and the victorious Plutonists almost everywhere following his lead as the great prophet of the Uniformitarian School. Towards this great advance many other able and enthusiastic fellow-workers powerfully contributed. Yet they would have been the first to acclaim him as their redoubted and inspiring leader. The reaction which has since set in against what has been regarded as the too exclusive

Uniformitarianism of Lyell can in no way diminish our recognition of the splendour of his achievement and the world-wide influence which he has had in placing geology on a firm basis as an observational science.

In his school days, and still more during his college career at Oxford, Lyell distinguished himself by his taste for literature and his pronounced literary faculty. In those years he wrote verses both in English and Latin. One of his compositions at school was a mock-heroic poem in Latin on a fight between the land-rats and the water-rats. In one of his college vacations he made a trip to the Isle of Staffa, and on his return to Oxford sent to his father four Spenserian stanzas, giving his enthusiastic impressions of that wonderful piece of rock-scenery. When he began to write on scientific themes his literary power showed itself from the first, whether the subject was a plain straightforward account of his own observations embodied in a paper read before the Geological Society or a brilliant article in the "Quarterly Review" on the labours of some other scientific man. When in later years he issued his classic volumes on the "Principles" and "Elements" of geology, they were hailed with universal approbation for their literary charm, not less than for their scientific value. By the grace of his style he undoubtedly attracted a much wider circle of readers and made the aims of his favourite science more generally appreciated than any other writer of his time.

In his private life Lyell was a singularly attractive personality. His stately courtesy of the old school was combined with a kindly and unassuming manner that made one half-forget for the moment that he was one of the most noted men of his day. His talk, full of information, ranged easily over both science and literature, often with flashes of humour and reminiscences of incidents that he had met with in his travels. His brother-geologists felt the inspiring enthusiasm of his eagerness for fresh knowledge and his keen interest in every new discovery. The readiness and geniality with which he welcomed and encouraged the entry of younger men into the scientific

field is a treasured memory in the hearts of those who experienced it. I well remember the occasion on which I first made his acquaintance. It was at the first Meeting of the British Association at Aberdeen in the year 1859, where, when little more than a lad, I read my first paper in Section C. I was one day sitting on one of the back benches in that Section-room, listening to the papers and discussions, but more especially gazing with much interest on the magnates of geology who were mustered on the platform, none of whom I knew personally, though I was familiar enough with their names and their writings. I remember to have specially watched the movements of Sir Charles Lyell and the attentive way in which he was regarding the proceedings. Being short-sighted, he would from time to time screen his eyes, screwing them to get a better view of the speaker or the diagrams. By and by he rose from his seat and spoke to one of the Secretaries sitting at the green table on the platform, who pointed to the part of the room where I was sitting. Cautiously stepping down to the floor and peering around into the audience in front of him, he advanced in my direction, and, to my surprise and delight, sat down beside me and began at once to ask many friendly questions about my work and to give me words of encouragement in my career. It was a proud moment in one's life to be in this way welcomed into the ranks of science by one of the great masters to whom from a distance one had looked up with mingled awe and admiration. The kindly sympathy which the illustrious author of the "Principles of Geology" showed to younger men bound them to him by ties of affection that heightened their regard for his genius and their gratitude to him for the instruction and stimulus which they owed to his writings.

## George Don.

By G. Claridge Druce, Hon. M.A. Oxon., F.L.S.

AMONG the celebrated botanists connected with this romantic and beautiful county of Forfar two names stand out prominently from the rest, the one, Robert Brown, who, with great natural ability and having many advantages, made for himself a foremost position in the Botanical world, as an exceptionally able systematist; the other, George Don, belonging to a widely different type, was primarily a nature lover, endowed with great physical powers of endurance, who pursued an unwearied and diligent research at the floristic botany of his native county, and indeed took toll of the Botanical treasures of a large area of Scotland, so that his discoveries of new plants are probably larger and more important than those made by any other British botanist. Yet such is the irony of fate that he always lived in penury, and his latter days were made more bitter from the clutches of malignant disease, and his end was rendered more terrible to his sturdy, independent spirit, by absolute poverty, and the knowledge that those near and dear to him were dependent upon promiscuous charity for their daily bread. Thus it was by a bitter and stormy passage he entered into his rest. Even then malignant fate pursued him, not content with all that it had done to bear down his spirit by painful disease, to crush his independence by starvation, society still held in reserve a more cruel weapon; his character for common honesty was impeached, so that for some years, if not for two generations, his name became a byword, and his records stigmatised as "one of George Don's reputed discoveries." If the mills of God grind slowly, yet eventually time, the great healer of sorrow and prover of truth, has given a more correct judgment than that which arose

in 1820 from the cold judgment of easy-chair professors; and few Englishmen and no Scotsman to-day would venture to assert that Don was not an honest and truthful botanist; moreover, considering the period in which he lived, and the opportunities which he possessed, no one among us but would admit that his field work was exceptional in quantity and quality, and that we are justified in claiming for him a foremost place among field naturalists, and at the same time in recognising his special gift in observing the minute differences in plants, which is the true test of floristic specialisation.

The details of the early years of George Don are misty and indistinct. Even as regards his mother's Christian name and his birthplace there are two versions—the one given by his son to Dr. Neill (*Memoir*, p. 279), that his father was born at Dundee, and that his mother's name was Jane Fairweather, would at first sight appear to be authentic, but on examination breaks down; since, when George Don the elder died, his son was only a lad, and these details were supplied by him to Dr. Neill thirty-five years after, and when challenged on one or two points, Don the younger says: "All the information I have given does not rest on my authority; it was derived from Mr. James Don, my father's cousin in London, who probably may have been wrongly informed." The second version is that given by my friend, Mr. John Knox of Forfar, whose articles in *The Scottish Naturalist* (1883-4) first drew attention to the injustice which had been done to George Don, and were the chief means by which his reputation has been vindicated. He says that George Don was born on the Farm of Ireland, which is on the west flank of the famous hill fort of Catterthun, in the parish of Menmuir, in Forfarshire, and that he was christened on 11th Oct. 1764, his parents being Alexander Don (1717-1813), and Isobel [? Jane] Fairweather. Alexander was afterwards a cutler at Dundee, and in 1771 or 1772 removed from Beechall, Menmuir, to Little Causeway, Forfar, where he worked as a shoemaker, as was not unusual then among small farmers, and he was also fond of Horticulture as a recreation.

To support Mr. Knox's statement may be cited (*Mem.*, p. 235) that George Don speaks of having seen "a peregrine falcon in the possession of the Laird of Balnamoon's grandfather, and of his servants hunting with it about 1771." Balnamoon is in the parish of Menmuir, and in 1771 Don would be seven years of age. Knox says that Don was educated at Forfar, receiving an ordinary elementary education, and that as a boy he was keen on natural history. I have made a somewhat exhaustive examination of the various dates given by Don himself as to the dates at which he collected certain plants, and feel convinced that, after leaving school, he was first sent to his cousin, R. Miller, who was gardener at Dupplin about 1779, when Don would be fifteen years of age. To support this is the fact that (*Mem.*, p. 168), under *Herb. Brit.*, n. 145, he says, "I first discovered this moss [*Anodon Donianus*] in the Den of Dupplin in Nov. or Dec. 1779, being then in fruit." At Dupplin, too, he found either then, or subsequently, *Geranium phaeum* (p. 160), *Pilularia* (p. 177), *Scirpus setaceus* (p. 168), *S. pauciflorus* (p. 167), *Habenaria viridis* (p. 164), *Doronicum Pardalianches* (p. 167), *Phegopteris Dryopteris*, and *Polystichum aculeatum*, besides several Mosses and Lichens. Moreover, he says (Pref. to *Herb. Brit.*) that he "first began his Botanical excursions in the Highlands in 1779."

Probably from Dupplin Don went to Dunblane to learn Clock-making, but we have no certain evidence as to the exact date; even under *Scolopendrium* (*Herb. Brit.*, 143) he only says that it came from a well at Dunblane.

Knox (p. 56) says that when he was at Dunblane he made a *Hortus siccus*, of which no trace is extant. In 1782 he gathered *Valeriana pyrenaica* (p. 157) at Blair Adam, in Kinross; and in 1784 he was on Ben Lawers and gathered *Poa glauca* (p. 196), which would not be in evidence before June. We next hear of him in Worcestershire at the garden of Hewen Hall, the seat of Lord Plymouth, whence he records *Ranunculus parviflorus* in 1784 (p. 149), *Saponaria* (p. 175), *Arenaria*

*tenuifolia* (p. 167), *Geranium columbinum* (p. 160), *Stellaria aquatica* (p. 180), *Potentilla procumbens* (p. 146), *P. verna* (p. 163), *Lamium Galeobdolon* (p. 159), *Lycopus europaeus* (p. 146), and *Phyllitis Scolopendrium* (p. 143); also in *Herb. Blake* there are specimens of *Trifolium fragiferum*, *Linaria vulgaris*, var. *peloria*, *Brachypodium pinnatum*, and *Carex axillaris*, as well as an example which is almost certainly of his collecting, *Cerastium tomentosum* from a wood near Redditch. From Worcestershire he also records *Galium spurium* (p. 161), a new alien to the British flora. About this period he was at Broadsworth (p. 258), 5 miles from Doncaster, for six months, and here he found several species, including *Teesdalia nudicaulis* (p. 173), *Cerastium arvense* (p. 180), *Galium Mollugo* (p. 162), and *Campanula glomerata* (p. 162); and in a letter to Winch (p. 258) he refers to *Ophrys apifera*, *O. muscifera*, *Spiranthes spiralis*, *Orchis ustulata*, and *O. pyramidalis*, as growing in that district. There are also specimens in *Herb. Blake* from this place of *Rhamnus catharticus*, *Daphne Mezereum*, *Bupleurum rotundifolium*, with Don's name on the sheet, and one of *Staphylea pinnata* without the name, but apparently of the same collector.

He visited Bristol in 1785, where he found (*Herb. Blake*) *Apinella glauca* and *Carex humilis*; in 1786, in April, he was in Dundee and found *Potentilla opaca*, and was in London (p. 280) either, as his son says, "following his trade of a clockmaker," or as Dr. Neill more probably suggests, occupied in a nursery garden. In 1787 he was in Bristol again, for there is, in *Herb. Blake*, a specimen of *Phleum paniculatum*, gathered by him in that year. This was probably only a flying visit, for there are also specimens of *Panicum sanguinale* (*Herb. Blake*) from Surrey in 1787; and from Boxhill, where he gathered *Bucus sempervirens* (*Herb. Blake*) in the same year. He also found *Polypogon monspeliense* on the Essex shore (*Herb. Blake*), and speaks of *Matricaria Chamomilla* (p. 164) "as being a common weed in nurseries and gardens near London, particularly on the Surrey side;" he refers to having seen

*Lythrum Salicaria* (p. 172) near London, and under *Potentilla opaca* (p. 172) says, "The *P. opaca* of English authors appears to be the *P. verna*, at least such was the case with the plant cultivated in Mr. Curtis' garden at Lambeth Marsh;" he also says that he has "seen *Campanula Rapunculus* by the sides of hedges near Millbank, but it appears hardly indigenous;" and in his *Herbarium* (and *Herb. Blake*) there is a specimen of *Briza maxima* (p. 186) from Newington Butts—of course only as an escape from cultivation; while under *Alopecurus pratensis* (p. 199) he says, "When I was in London about 1786 I saw a patch about 20 yards square of this grass cultivated by Mr. Curtis." However he may have been employed in London, he differed from most of his countrymen (the majority of whom are not botanists) and failed to make both ends meet, so that his father had to remit him the means to return to Scotland. Either on his homeward journey or on one of his previous wanderings he passed Oxford, for he says of *Senecio squalidus* (p. 168) that he saw it "in the neighbourhood of that classic city the habitat given in *Eng. Bot.*" Sibthorp (*Fl. Ox.*, Pref.) in 1794 only alludes to it as *Senecio species*.

It appears probable that, on his return to Scotland, he went as a journeyman to Glasgow, where, it is said, he worked at his trade five days in the week, devoting the remainder to his botanical excursions. In 1788 he records *Carex filiformis* (p. 150), *Poa alpina*, *Anthemis tinctoria*, and *Hypnum cordifolium* from his native county.

In 1789 he is said (p. 58) to have married Caroline Clementina Oliphant Stewart, whose acquaintance he had first made when at Dupplin, she being related to the Oliphants of Gask. His son George says that he was married before he went to Glasgow, if so the date would be 1789 or 1790; at any rate, in 1789, he visited Ben Lomond, where he found *Carex saxatilis*; and *Bartsia alpina* (p. 154) on Maelgyrdy; *Polygonatum verticillatum* (p. 258) in the Den of Rechip, Perth; as well as *Silene nutans* in Forfarshire. But in 1790 he was in Forfar, for he gives

that date as that of his discovery of *Caltha radicans*; in 1791 he found *Eriophorum alpinum* at Forfar; and in 1792 introduced *Stratiotes* to Forfarshire. During his residence in the western metropolis, he made the acquaintance of John Mackay in 1791 (p. 266), or 1793 (p. 23), and records *Festuca sylvatica* in 1790; and *Scirpus maritimus* from Dumbarton; *Lythrum Salicaria* and *Lycopus* from near Paisley; *Raphanus maritimus* in November 1793 at Greenock; and *Carum verticillatum* from the opposite shore. He also added a new alien to the British flora, *Agrostis verticillata* (*Herb. Blake*). Evidently he went backwards and forwards between Glasgow and Forfar, but I suspect that he went to live at Forfar in 1793, for under *Poa glauca* (p. 196) he says, "He has cultivated it at Forfar since 1793;" and that about this time he discovered a grass now known as *Deschampsia setacea* (p. 193). In that year he was on Ben Lawers, where he saw the long-legged Plover, and discovered *Arenaria sulcata* (p. 128) in the company of his friend John Mackay, as well as a new species of grass. It seems to rank under the genus *Elymus*. He gave it the trivial name *Alpinus*, but of this variety he could only find two plants (p. 24). This is the grass now known as *Agropyron Donianum*.

In 1794 he visited Skye, where he gathered *Eriocaulon* (p. 147), *Arabis petraea* (p. 155), *Brassica campestris* (p. 147), *Alchemilla argentea*, *Schoenus nigricans* (p. 152), *Scirpus rufus*, *Rynchospora alba* (p. 152), *Carex pauciflora* (p. 155), *Sagina maritima* (p. 170), *Sparganium affine* (p. 131), and other plants; he also climbed Ben Nevis, where he gathered *Poa flexuosa*, *Sagina alpina*, *Carex saxatilis* (p. 176), *Hieracium eximium*, &c., and then found *Stellaria scapigera* to the east of Loch Nevis. Ben Lawers was again visited, where he discovered *Juncus castaneus* and *J. bulbosus*, and probably *J. biglumis*.

In 1795 he worked the Clova hills, discovering *Juncus tenuis*; on Little Culrannoch *Lychnis alpina*; and in the lowlands of Angus gathered *Grimmia Doniana* and *Vogelia paniculata*. In 1796, on the hill of Turin, he

found *Crepis pulchra*, which is now extinct, and was probably only of casual origin.

After 1797 there is no difficulty in tracing Don's career. In that year, with the small sum of money which he and his wife had saved, he purchased of Mr. Charles Gray of Carse an acre of land, called the Dovehillock, on a ninety-nine years' lease, and at a yearly rent of five shillings, on the condition that two dwelling-houses should be built thereon. This piece of ground sloped to the west towards what at one time had been Forfar Loch. He lived in his house which he built in a very penurious and frugal manner, selling vegetables to such of the Forfar people as chose to send for them. He made a large artificial pond, which he stocked with aquatic plants and fish, leaving room for a broad border in which the native plants were arranged according to the Linnean system, and grown in their appropriate soils. He also frequently explored the Highlands, and sent his plants to patrons such as Brodie of Brodie, the Bishop of Carlisle, Mrs. Dawson Turner, the Countess of Aylesford,\* Mr. Blake,\* afterwards of Danesfield, Herts, and others. On these expeditions he occasionally absented himself for a week at a time; his plaid, and a bag of oatmeal, or bread and cheese, sufficed him for shelter and sustenance (*Memoir*, p. 61).

In 1801 Don explored Lochnagar, and added that most striking and rare species, *Lactuca alpina*, and the rare grass, *Alopecurus alpinus*, to the British flora, the latter being new to science. By Loch Lee he found a variety of *Arabis hirsuta*, which was at first mistaken for *A. ciliata*.

In 1802 Don went northward over the Cairngorms, where he added *Carex vaginata* to the British list; to Banff, where he added *Campanula persicifolia* to the British flora from Cullen.

In 1802, owing to the influence of Brodie of Brodie and others, he was, after a somewhat curious delay, appointed

\* The plants of these two are in the writer's possession, the first was given to him by Miss C. E. Palmer, a grand-niece of Lady Aylesford, and the second was acquired by purchase.

to succeed the talented Mr. J. Mackay\* as principal gardener of the Royal Botanic Gardens, Edinburgh; and to "Scotia's darling seat" he removed in December of that year, leaving his garden at Forfar in the care of his father. Don's salary was £40 a year. While in Edinburgh he made the friendship of Dr. Patrick Neill, whose firm became the printers of his principal work, *The Herbarium Britannicum*, of which the first two fascicles appeared in 1804; Nos. III. and IV. in 1805; Nos. V. and VI. in 1806 (about which date Don left Edinburgh for Forfar); VII. and VIII. in 1810; and No. IX. in 1812 or 1813. From the Preface to this work we may obtain some idea of Don's Scottish explorations. In the Preface he says, "Since he first began his Botanical explorations in 1779, he has repeatedly ranged over the fine mountains of Angus-shire which surrounds the great district of Clova, where no one on a similar pursuit has ever preceded him. He has also searched the vast range of mountains which stretch about 60 miles through the district of Knoydart, in Inverness-shire, a region which has never before been examined by a botanical eye. He is the only botanist, too, who has explored the lofty mountains of Cairngorm, and the great hills of that neighbourhood."

In 1803 Don, for his discoveries, was made an associate of the Linnean Society, and during his residence at Edinburgh, attended the medical lectures with the view of obtaining a medical degree. He made many expeditions round Edinburgh, added many plants to the local flora, and found about 100 herbaceous plants and 200 cryptogamia in the King's Park, which had not been enumerated in Mr. Yalden's Catalogue (p. 64).

Among his gatherings at Edinburgh may be mentioned *Vicia lutea*, and *Astragalus danicus* at North Queensferry; in 1804 *Chaerophyllum aureum*, near Corstorphine.

On the Pentlands he added *Galium uliginosum* to the Scottish flora and gathered *Arena fatua*.

\* Mackay died on the 14th April. Don was not appointed till 12th December.

At Pettycur he found *Arenaria tenuifolia*.

In and about the "grey metropolis of the north" he found *Poa humilis*, *Bromus secalinus*, *Stellaria palustris*, *Draba muralis*, *Stratiotes*, *Mentha gentilis* (Herb. Blake), *Radicula sylvestris*, *Vicia lathyroides*, *Senecio viscosus*, *Scirpus fluitans*, *Arenaria verna*, *Festuca rigida*, &c., and *Galium cinereum*, near Slateford.

At Arniston he noticed the naturalised *Galanthus* and *Pulmonaria officinalis*.

Near Gullane and Leith he found *Artemisia maritima*, *Atriplex littoralis*, *Beta maritima*, *Apium repens*, *Asparagus altilis*, *Potamogeton densus*, *Glyceria distans*, and *Lepturus filiformis*.

He gathered the American *Solidago lanceolata* at Haddington; *Symphytum tuberosum* at Belton Bar; and *Glyceria maritima* at Burntisland.

Don did not long remain in Edinburgh; he had little knowledge of stove plants (p. 65), and it must be confessed that he did not shine in that department of horticulture, but the stipend was manifestly insufficient to keep a large family in a city in anything like comfort, and Don loved an untrammelled life. Hence arose a want of cordiality between himself and the Professor, so that he once more went back to Forfar and his old occupations, but dabbled in surgery (p. 67), at which he might have been successful, had not his wandering habits been a stumbling-block. These rambles became more prolonged and frequent, so that his business gradually fell away, and his circumstances became more straitened.

So many of his specimens are undated that no accurate account of these expeditions can possibly be made, but we can cull some facts from the dates which he gives. The high ground of Clova and Lochnagar were certainly visited in 1807, and on his way were obtained the alpine *Carex rariflora*, *Cochlearia alpina*, and the grass, *Avena alpina*, all new to science. In the same year he found *Equisetum variegatum*, new to Britain, on the sands of Barrie, and also records *Arenaria fastigiata* (which has never been confirmed), but says he found it in Clova several years

previously. He also gathered *Hieracium cerinthoides* from the Head of Clova, but the plant is *H. anglicum*, var. *cerinthiforme* (Bachh.), *H. calenduliflorum* (Herb. Br. Mus.), and *H. globosum* from Lochnagar.

In 1808 he found, near Forfar, a grass new to Scotland, *Deyeuxia neglecta*, though now destroyed by drainage, and *Phleum Michellii* "on the highest hills of Clova," but this has never been confirmed. It was probably in this year that he found *Deschampsia alpina* on Lochnagar, where it still grows, and about this date he records an unconfirmed species, *Ranunculus alpestris*, "about 2 or 3 rocks on the mountains of Clova." In 1809 he records *Potentilla tridentata* from the hill of Werron in Angus, gathered on 3rd April; but this again has not yet been refound.

In 1810 he gathered *Chaerophyllum aromaticum*, and visited Ben Lawers, where he found a variety of *Eriophorum vaginatum*, which Smith thought was *capitatum*, and also an alpine state of *E. angustifolium*, which he erroneously believed to be *E. gracile*, but he also added *Carex atrofusca* to the British flora, a plant which remained undetected on that much worked hill until 1892. In a marsh near Forfar he also found the alien *Iris xiphioides* naturalised.

About this time he became so impoverished that, in 1812, he had to make an arrangement with his creditors, a chilling blow to his sturdy and independent spirit. He was also in the clutches of malignant disease; notwithstanding, he made in 1812 a long excursion up the Clova Hills to Deeside, whence he ascended Ben Macdhui and the Cairngorms. On the way to Glen Dole he added that most interesting alpine, *Oxytropis campestris*, to the British flora; gathered *Salix lanata* (p. 290) on the Clova mountains, *Hieracium crocatum* in the river bed near Mar Lodge; *Ranunculus nivalis*, an alpine form of *R. acris*, also near Mar Lodge; and *Juncooides arcuatum*, that local alpine from Ben Macdhui; and in the same year found *Hierochloa borealis* (*Savastana odorata*) in Glen Kelly—a grand gathering as the climax of his labours. In 1813 his father Alexander, who had been living with him, died at the age

of ninety-six,\* and in that year was published (as an *Appendix B.* to the *General View of the Agriculture of the County of Angus, or Forfarshire, by the Rev. James Kenrick, Edinburgh, 1813*) *An Account of the Native Plants in the County of Forfar, and the Animals to be found there*, which, although clumsily arranged by Don, gives an immense amount of knowledge of the Natural History of his native county. It contains many new British species. Don had also, in 1807, published (*Trans. Highland Soc. of Scotl., vii., 194, 1807*) *Observations on Some of the Indigenous Grasses of Britain which seem deserving of Culture for Pasture or Hay*, for which he was awarded a piece of Plate, value 15 guineas; and in 1811 he read a paper *On the Varieties of Pinus sylvestris, or Scots Fir* (*Mem. Cal. Hort. Soc., i., 1814*), in which he describes four varieties of that tree.

In the early part of 1813, probably his last fasciculus was issued, and we find that he came home from one of his expeditions in the autumn of 1813 labouring under a severe cold, which being neglected grew gradually worse. A suppurating sore throat ensued, and under conditions of poverty so extreme that he and his family had to depend upon the charity of neighbours, he lingered in excruciating agony for six weeks and died on the 15th January 1814 (p. 78).

Although during his life Don lived apart from his fellows, with whom he had not much in common, yet his worth and integrity were recognised by them, so that when they buried him, the whole town turned out to witness it, or to follow his body to the kirkyard. The references to his death in the local papers bore testimony to his worth, as did the contemporary evidence of Dr. Neill and others; but later on, as I have said, his *bona-fides* was questioned, and certainly in the forties, fifties, and sixties a botanical student at Edinburgh heard little in his favour. Doubtless Professor Arnott's (of Glasgow) attitude had a great deal to do with this; the two men were as the

\* Late W. G. Don of Dumbreck (*Glasgow Herald*, 14th Sept., 1816).

poles asunder. That Arnott was possessed by a bitter animus and not merely by a scientific desire for the certainty of newly discovered facts is evident from his own words. Under *Caltha radicans* (no longer a reputed discovery), he says: "Is only known, and in our opinion has never been known except as a garden variety" (*Br. Fl. Ed.*, vi. p. 11). Under *Stellaria scapigera*: "We now believe [it] to exist nowhere in a wild state. . . . Don cultivated it extensively in his garden at Forfar" (*Br. Fl. Ed.*, vii. p. 70). His statement under *Lychnis alpina* is more calumnious still: "We have strong reasons for thinking that the plant was sown there (Culrannoch) about sixty years ago" (*Br. Fl. Ed.*, vi. p. 61), which was about the date when Don recorded it. *Hypericum barbatum*: "We do not believe that this species was found wild in Scotland" (*l.c.*, p. 81); respecting this there is a specimen of a form of *Glechoma hederacea* in *Herb. Blake*, on which Don writes: "By the side of a hedge, about 1 mile east of where I discovered *Hypericum barbatum*." *Juncus tenuis*: "We have specimens from Don's garden at Forfar, but we much doubt if the roots were found in Clova" (*l.c.*, p. 451). "*Hierochloe borealis*: found only by Don, notwithstanding that Glen Kellar or Cally has been minutely searched; the specimens we have seen from Don appeared to have been cultivated." These extracts will suffice to show the evidence of mistrust which inspired Arnott of Don's *bona-fides*, and led him to slander a poor man who was dead.

Enough of this painful side. I had hoped, from a chronological investigation of Don's plants, that it might have been possible to infer whether these unverified records had been made in the later years of his life under failing mental conditions, but such is not the case. It does, however, appear that the majority of these were made after his return from Edinburgh, when his garden at Forfar was crowded with exotic plants and had become untidy, so that immature plants from the hills might easily have been confused with exotics already in his garden; I can

offer no other explanation in the case of *Ranunculus alpestris* and *Potentilla tridentata*, unless, indeed, these plants with others still await rediscovery.

I have, therefore, briefly sketched the life of Don and glanced at his Botanical discoveries, for a full list of which see *Memoir*, pp. 126-141, but to which may be added *Glyceria plicata*, which he distinguished from *G. fluitans*. We may also notice that, in addition to the new British plants already mentioned in those pages, he found, on one of his ascents of Ben Lawers, *Myosotis pyrenaica*; in the Clova Valley, *Rosa Doniana*; by the Esk, *Carex aquatilis*; he ascended the high peak of Cairntoul, and the massive Ben a Bourd; he explored the coast of the Moray Firth, the neighbourhood of Gordon Castle, the fir woods of salubrious Grantown, the seacoast of Aberdeen and Kincardine, and the shores of Lochs Leven, Laggan, Katrine, and the Gareloch of Loch Long.

Nor was his own county (rich as it is in natural beauty) neglected. In his description of its Natural History, already alluded to, he enumerates 300 species of the larger and rarer plants, most of which he says he cultivated in his garden. He gives about 100 species of Mosses and Liverworts, over 100 species of Lichens, and upwards of 100 species of Algæ. A large and valuable list of the Fauna is also included. Besides the plants already alluded to in Forfar, he added to science the *Lamium*, which he appropriately called *intermedium*; the Willow from Baldovan Wood, *Salix Doniana*; and as new plants to Scotland, *Potamogeton zosterifolius*, in Rescobie Loch; *Juncus balticus*, from the sands of Barrie; and near Montrose, *Carex divisa*, *Scirpus Tabernaemontani*, and *Chaerophyllum aureum*, recently discovered at Callander. As I have said,\* the list of Don's discoveries is by no means exhausted, since but little allusion has been made to the numerous species of Hawkweeds which he found; nor have I more than glanced at his

\* Address on Unveiling the Monument to George Don at Forfar in Sept. 1910.

keen discrimination of varieties and forms, much as I should have liked to mention this in some detail, because it shows his power of acute perception, and testifies to his great critical ability, winning for him a high place among British Field Botanists. His notes show that a plant to him was not only a name but a living organism. He had but an elementary education, he was of lowly birth, and without influential connections, poverty was his daily companion, and must have severely limited his range of reading, a deprivation especially detrimental to a botanist; but he had one book, although his poverty made even this difficult to examine as freely as he desired—the Book of Nature, which he studied with a minute scrutiny, so that it gave up secrets to him which had not been revealed even to the holders of professorial chairs. From his earliest days he had dipped into this volume as he wandered over moor and fell; as a journeyman, he stinted himself of rest and leisure in order to explore its pages; in his late years he pursued the search until his physical powers gave way.

We may quote from the introduction to his paper on "The Indigenous Grasses," which appears to have been written when at Edinburgh; he says: "In the early period of his life, and as far back as his recollection can reach, he felt an irresistible and almost instinctive attachment to the delightful objects of the vegetable kingdom. This ardent desire for attaining knowledge increased with his years. No motives of interest or even the stimulus of emulation, but an invincible propensity to botanical study, induced him to abandon in a great measure the more ordinary paths of industry, and devote himself chiefly to his more favourite pursuit. Even now, however agreeable in some respects the situation which he occupies may be to his wishes, it is by no means lucrative. . . . At his outset in life, he formed the arduous, although to him pleasing, resolution of visiting every corner of his native country, in search of its vegetable productions; and for twenty-five years past he has been in the practice of making several botanical excursions every year, particularly in the alpine districts of the Highlands, where he

has spent many days and even nights with pleasure among the lofty cliffs, far from any human habitation, animated by the attainment, or by the hope of botanical discoveries."

For this special work of exploring the mountainous districts of Scotland, Don was physically well fitted; he brought to the quest a strong and active frame; tall and vigorous, he could march 30 miles in twelve hours without breaking fast. His needs were of the simplest; therefore there is no doubt that, in his lengthy pilgrimages and laborious ascents, he visited places which even yet have not been re-examined by botanists of sufficient knowledge to be able to recognise all the various plants which Don has enumerated. He had in a very special degree those absolute essentials for the field naturalist—quick perception, accurate discrimination, unflagging zeal, patient industry, a retentive memory, and above all, that innate touch of genius, which gives to its possessor a rich dowry in compensation for the drawbacks with which it is not unusually accompanied.

He may be classed, and in no inferior position, with Hugh Miller the geologist, as a worthy investigator of Natural Science; each was equally devoted to one ideal, pursued through many years with conspicuous ability and unfaltering tenacity. Nor is it invidious to add that he occupies even a higher plane than those two Nature lovers, Robert Dick the Baker-Botanist and Geologist of Thurso, and Thomas Edwards the Naturalist of Bauff, already immortalised by Smiles.

A contemporary of Robert Burns, he possessed the same qualities of independence of character and keenness of intellect in a marked degree, and, like the poet, perhaps suffered by their over-development; yet while criticising we can only mildly censure the hypertrophy of qualities growing scarcer in these comparatively tamer times.

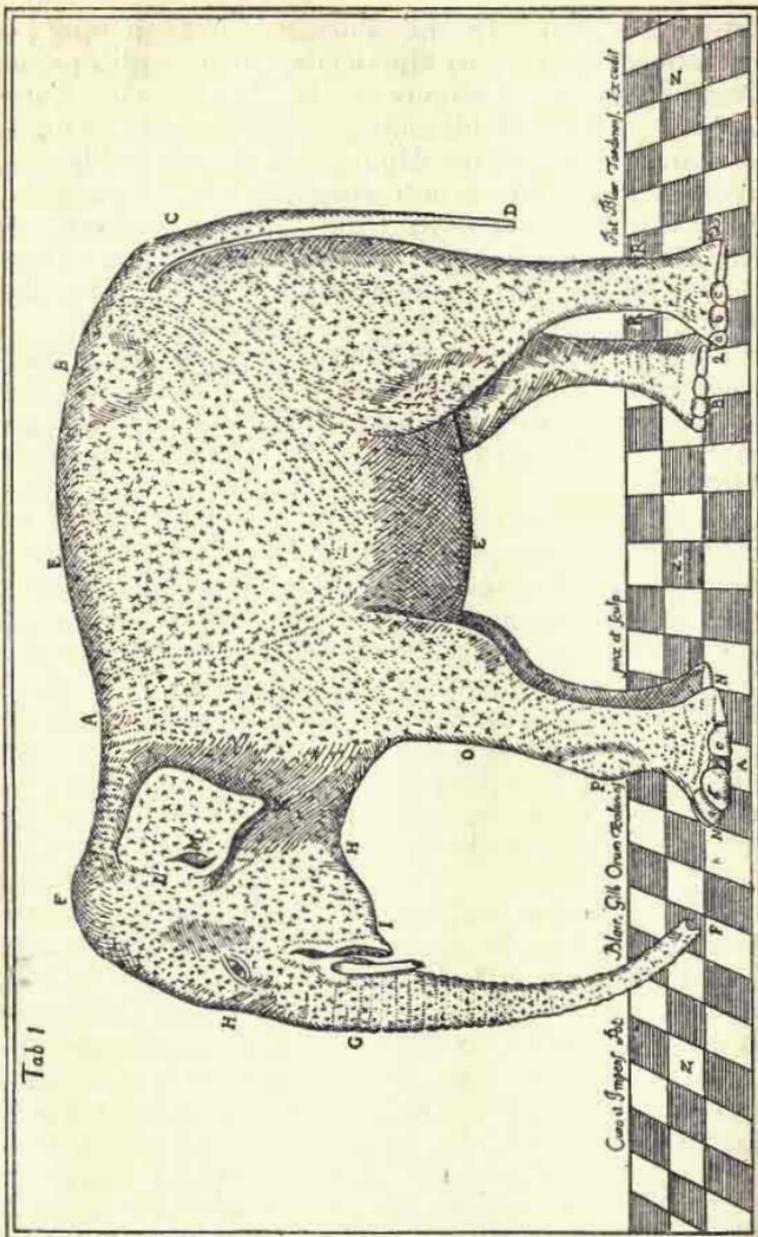
As Walter Scott made known the beauties of Caledonia stern and wild, and popularised with a wizard's power its varied and romantic history, so Don in his narrower sphere laid open to the botanist of succeeding times the rich moun-

tain flora, which is so freely bestowed, yet often so skilfully concealed, among the corries and crags of the higher hills, and thus has created in the minds of us, who follow the same pursuits, a sense of gratitude and a keen admiration for his toilsome, exacting, and unremunerated labours. To those whose only standard of success is opulence his life will be pronounced a failure; to those who love ease and luxury his career will be looked upon as insanely miserable; yet I question if the wealthiest millionaire ever derived as much satisfaction from the accumulation of his riches as Don experienced in finding a new species, or if the most self-indulgent individual ever obtained so exquisite a pleasure as Don enjoyed in those high alpine journeys, where, in the pure air, among the tumbled fragments of the hills, with the sense of unutterable calm, only broken by the soft sounds of distant streamlets' fall, or the plaintive notes of the Curlew and Golden Plover, he held his communing with Nature. There he learned the secrets of self-respect and independence, traits of character now apt to be disregarded, but which through generations have been the pride of Scotland. That Don's reputation has been vindicated, and that he no longer rests under a nameless grave, is a fact which will give pleasure not only to the botanist, but to all who admire an honest and sincere life. A plain obelisk, of blue Aberdeen granite, now stands in Forfar churchyard, with the following inscription:—

“To the memory of George Don, botanist, native of Forfarshire, who, after a residence of more than twenty years in Forfar, died at the Doo Hillock there, Jan. 15, 1814. Don was a man of genius, who, with few educational advantages, raised himself to a high place in the ranks of the botanists of his day. He established a Botanic Garden in Forfar, which contained a most extensive collection of British plants. He was Superintendent from 1802 to 1806 of the Edinburgh Royal Botanic Gardens. For his services to British botany he was elected an Associate of the Linnean Society. In 1813 he published an account of the native plants of the

County of Forfar. In the course of many journeys of explorations made in the Highlands, under hardships and privations, he added largely to the then existing knowledge of the flora of his native country; and so long as there are Students of the Alpine flora of Britain his name will be held in affectionate remembrance. Five plants perpetuate his name. A rose (*Rosa Doniana*); a willow (*Salix Doniana*); a grass (*Agropyron Donianum*); and two mosses (*Grimmia Doniana* and *Seligeria Doniana*).

“This monument was erected by public subscriptions through the efforts of the Forfar Field Club: John Knox, schoolmaster, Forfar; and also of George Claridge Druce, M.A. Oxon., F.L.S., by whom it was unveiled, 8th Sept. 1910.”



REDUCED FAC-SIMILE OF PLATE IN "OSTEOGRAPHIA ELEPHANTINA."

## Patrick Blair, M.D., F.R.S., Anatomist and Botanist.

By A. P. Stevenson.

IN the "Philosophical Transactions of the Royal Society of London," vol. xxvi., for 1710-12, a paper appears, extending over a hundred and eleven quarto pages, which, in addition to general zoological interest, possesses a local value not generally known. Entitled "Osteographia Elephantina," it gives a description with an anatomical dissection of an elephant, which died on the road between Broughty-Ferry and Dundee on 27th April 1706.

The writer of the Memoir, "Patrick Blair, Surgeon-Apothecary," communicated his matter to Sir Hans Sloane, and by him it was transmitted to the Royal Society, read and printed in its Transactions, of which the author was shortly afterwards elected a Fellow.

The paper was accompanied by four large folded copper-plates (one of which is reproduced on a smaller scale herewith), which were engraved in Dundee, and probably were the earliest work of the kind done here—at least, they are considerably antecedent to those plates which Mr. A. C. Lamb claimed as the earliest engraved in this city. Blair's explanation of the plates being engraved in Dundee is characteristic. "They might have been finer done in London, but since I had the original by me, whereby I was able, from time to time, to correct in the engraving what errors happened in the drawing, I rather chose to have them done in Dundee."

It so happened that this elephant was the first to be dissected in Great Britain, and notwithstanding the disadvantages under which Blair worked, and of which he gives a very quaint and amusing account, the accuracy

and value of the paper has been recognised by experts. Not long ago, Professor Boas, of Copenhagen, one of the greatest authorities, asserted that Blair's observations were most accurate and reliable. Some details in the life of this Dundee doctor of 200 years ago may draw more attention to the man and his work.

The date of his birth is not known; it was probably about 1666. His family was an old Dundee one, and the "Dr. Patrick Blair" who, according to Dr. A. H. Millar's "Roll of Eminent Burgesses of Dundee" (page 134), was "made a Burgess and Brother of the Guild of Dundee, for his meritorious services to the Commonweal" (3rd March 1625), was very probably one of his forbears. Apart from Blair's own letters and writings, the earliest public notice of him appears in an advertisement in *The Edinburgh Gazette*, for 29th September 1701, where, designating himself "Surgeon-Apothecary, Dundee," he intimates that he has ready for the press a work which, upon suitable encouragement, would shortly be published. He gives the title in full: "*Manuductio ad Anatomium*; or, A plain and easy method of dissecting, preparing, or preserving all parts of the body of man either for public demonstration, or the satisfaction of private curiosity." In the books he published in later years there are references to medical and surgical cases with which he was concerned in the Low Countries in 1695-97, and as some of these deal with fighting and duelling, one may conclude he formed part of that army which "swore heavily in Flanders."

Settled again in Dundee, as we have seen, he seems to have secured a responsible position; and it was through his friendship with Provost Yeaman, that he had his opportunity with the elephant—the Provost being gifted with the *cadaver* by the keepers of the animal, to whom he gave a certificate that it had come to its death in a natural way, and through no fault of its custodians. Blair was always a keen naturalist, and in the Sloane collection in the British Museum a large number of letters are preserved, written by him from Dundee to Sir Hans

Sloane and James Petiver, in which his "earnest desire to improve a close pursuit of the Natural History" is very evident. The letters date from 1706 to 1714 and are full of interest—Blair revealing himself as a most likeable personality. On 26th July 1708 he tells Petiver that the death of the "huge" animal, "whereof the monuments are preserved with us," was "a great motive for me to engage several honourable and learned gentlemen in the neighbourhood, with the physicians and surgeons in this place, to erect a Public Hall at their own private charges, to use all means for improvement of the Natural History, to make a collection of curiosities, wherever they have come a good length, and to establish a Physik Garden, whereof I am overseer."\*

On 29th May 1712 Blair was made an M.D. of Aberdeen, "on the recommendation of the Bishop of Aberdeen and several eminent physicians in Angus," as the official record has it, and in the following year (1713) he left Dundee for London to see his correspondents Sloane and Petiver, whom he had never met personally. His visit must have been a memorable event to Dr. Blair, and on his return journey to Dundee, a long and gossipy letter to his "kind landlord and special friend" Petiver, dated Birmingham, 9th October 1713, gives particulars of his visits to Oxford, Litchfield, and elsewhere, and the famous botanists and medical men with whom he foregathered on his homeward route. Sadder days lay in store for the doctor. He was to see England and London again under very different conditions. His next meeting with his friend Petiver was in—Newgate prison! The Jacobite rising of 1715 was the unfortunate event which made a turning-point in Blair's life. "The honourable and learned gentlemen in the neighbourhood," who built the "Hall of Rarities,"

\* This "Hall of Rarities," as Blair calls it, contained the skeleton and the stuffed skin of the elephant. Hall and elephant and specimens have long since disappeared, although Small, in his "Account of Dundee" (1792), speaks of the skeleton as having been "recently in existence." A writer in the *Dundee Advertiser*, in 1825, said "he had heard" that some proverbially thrifty townsman had got the bones ground down to make a top dressing for his fields in Strathmore.

and founded the "Society for Natural Improvements of Dundee," were all strong adherents to the Stuart cause, as indeed at that time most of the townsmen of importance generally were—so much so indeed that, when Argyll reached Dundee after Sherriffmuir, he had to appoint new magistrates and a town-clerk in place of the officials who had deemed it wise to leave the neighbourhood. Blair's brother and nephew were active, and their names are among those exempted from the Acts of Indemnity of 1715 and 1745. Dr. Blair, however, maintained that he "was in no respect accessory to the late troubles, but happening to reside near the parts where the rebellion broke out, the gentry forced him to accompany the army as a medical attendant." He was amongst the army which, under Mackintosh of Borlum, entered England, and ultimately surrendered at Preston, the same day the indecisive battle of Sherriffmuir was fought—13th November 1715. Dr. Blair was one of the melancholy company who were marched over the Midland counties and lodged in Newgate. Here his friends Sloane and Petiver did their best for him, and after his trial and sentence to death, succeeded in obtaining a pardon for him. This, however, came at the very last moment, and his friend Petiver, writing to Sloane, gives a somewhat dramatic account of it. On the evening of the day before the execution Petiver came to see him. "The Doctor," he wrote, "sat pretty quietly till the clock struck *nine*, and then he got up and walked about the room; at *ten* he quickened his pace; and at *twelve*, no reprieve coming, he cried out, 'By my troth, this is carrying the jest too far!'" The reprieve, however, came soon after, and in due time the official pardon followed. Dr. Blair did not return to Dundee, but endeavoured to secure a practice in London. He resumed his connection with the Royal Society, and a "Discourse on the Sexes of Plants," read before the Society, formed the basis of his best known work, "Botanick Essays," published in 1720. In April of that year the "struggle for existence" was so acute, that he "was nearly ruined," as he wrote Sloane, and had

to retire to a "country place," where he might live more quietly and find a better livelihood. This he found at Boston, in Lincolshire, and here he remained till his death in 1728. He still kept up his relations with his London friends, but the chief correspondent of his later years was John Martyn, the son of a Hamburgh merchant with whom he had botanised in London, and to whom his heart had gone out with the love of a father to a son. This "amiable youth," as Dr. Blair calls him, in after years became Professor of Botany at Cambridge, and always insisted that Dr. Blair was "his preceptor in Botany, and the most intimate friend of his early years." All the MSS. of Dr. Blair's last work passed through John Martyn's hands, and the proofs were read and corrected by him. Most of Blair's correspondence with Martyn is preserved in the Banksian collection in the British Museum.

In addition to many papers printed in the "Philosophical Transactions of the Royal Society," Dr. Blair published the following works:—

"Osteographia Elephantina, 1713." A reprint of the Royal Society paper, with the four original plates, dedicated to Dr. John Arbuthnot. A copy of this work is in the "Old Dundee" Collection of the Free Library.

"Miscellaneous Observations in Physic, Anatomy, Surgery, and Botanicks, 1718." This contains much interesting local matter, and bits of personal history, with a drawing of a Perthshire plant, which Dr. Blair also found in Wales.

"Botanick Essays, 1720." This is the most outstanding of Dr. Blair's books, and was the first to give in English a reasoned and convincing proof on the question of sex in plants, the Doctor demonstrating his case by experiments. He also discusses the Structure of Plants, and the Methods of Classification, indicating a strong preference for the Aberdonian Morison's system, as against that of Ray. The Nourishment of Plants and the Circulation of the Sap in all seasons are also treated with great fulness. The book contains four plates, and is dedicated to Sir Isaac Newton,

the President, and to the Council and Fellows of the Royal Society, and his friend, Sir Hans Sloane, the President and the Fellows of the Royal College of Physicians, London. The book bears, under date 22nd October 1719, the "Imprimatur, Is. Newton, P.R.S."

"Pharmaco-Botanologia; or, An Alphabetical and Classical Dissertation on all the *British* Indigenous and Garden Plants of the New London Dispensatory, 1723-28." This work was issued in Decads at irregular intervals—the seventh and last division published synchronising with Dr. Blair's death—and only reached the letter H of his alphabetical arrangement. It is full of varied and curious matter relating to the virtues and uses—medicinal and otherwise—of the plants discussed, and contains many allusions to local plants and their habitats, besides notes relating to the author's life in Dundee and the places of his youth and "wander years." The work is practically an English version of the Latin lectures given by Dr. Blair in connection with the "Physik Garden" of Dundee, of which he was "overseer," and which he used in the training of his "'prentices," his personal interest in whose welfare and progress is one of the many pleasant features in his letters to the London apothecary Petiver already referred to.

## William Gardiner, Botanist.

By A. P. Stevenson.

WILLIAM GARDINER, the author of the "Flora of Forfarshire" and other botanical works, was born at the West Port, Dundee, on 13th July 1808, not 1809, as generally stated. ("The foundation stone of the Bell Rock Lighthouse was laid 10th July 1808, three days before my birth."—Gardiner MS. in Lamb. Collection.) His parents were in very humble circumstances, and at a very early age the boy was apprenticed to an umbrella-maker in Dundee. He was entirely self-educated, as his school years had to be cut short that he might aid the family exchequer. A disposition he evinced towards natural history was fostered and encouraged by his father and uncle, who, especially the latter (Douglas Gardiner), were keen botanists, and friends of George Don of Forfar, with whom they often "herborized."

Gardiner's little spare time, and all his early Sunday mornings, were devoted to his favourite studies. He was a keen observer of all living things. His early note-books and manuscript magazines still in existence, and in the possession of the Dundee Free Library, give ample evidence of this, and indicate a surprisingly wide acquaintance with both scientific and general literature. He was "neat-fingered," as his mounted specimens show; made wonderful sketches, and wrote really good verse.

In his notes he records his "finds" of rare flowers and insects at spots in and around Dundee, which now have lost their former life and glory and are bald in stone and lime.

Through the kindness of a sympathetic employer later on—when a journeyman never getting much beyond ten shillings of a weekly wage—he was able to go botanising

outside the immediate neighbourhood of Dundee. In Loudon's "Magazine of Natural History" for 1832, he records the results from a natural history point of view of a "Walk along the Coast of Forfarshire."

In 1838 a proposal made by him to the Botanical Society of Edinburgh, "to collect 2500 specimens in the Perthshire Highlands for a sum of five guineas," was accepted, and with this undertaking his career as a collector of British plants was begun. For some years he kept to his umbrella-making, doing his botanical work during the summer months; but in 1844 he devoted himself entirely "to collecting and distributing our native plants, and hoped by this means to be instrumental in forwarding the cause of Flora, and at the same time gratifying my own fondness for the pursuit."

He supplied extensive and well-prepared collections of plants to subscribers and others all over the United Kingdom, and correspondents abroad were pleased to have his assistance also. Articles by him, dealing with botany and entomology in particular, appeared in Loudon's "Magazine of Natural History," Rennie's "Field Naturalist," Newman's "Phytologist," and other journals of natural history; and papers contributed by him were printed in the "Proceedings of the Botanical Society of Edinburgh," which Society elected him an Associate in 1838. At the time of his death he was referred to in the "Annual Report of the Linnean Society" as being "well known to the members," having been an Associate from 1849. His publications were as follows:—

"A Flora of Ten Miles Around Dundee" (1840?).

This production the writer has never seen, his attention was drawn to it by the late Sir Joseph D. Hooker, who quoted the title from the library list at Kew Gardens, and of which Sir Joseph wrote later on:—"The Dundee Flora is a myth. All I can find is a 12mo sheet, blank on one side, addressed to the Editor of the 'Journal of Botany' (Sir W. Jackson Hooker), on the other in small print is a list of the Natural Orders, genera, and species, in tabular form . . . which W. G. has personally seen up to this date.

The little sheet is evidently only a prospectus of a work that never appeared." This may be so; the odd thing is, that in the "Northern Warder" review of the "Flora of Forfarshire," the book is said to be by the author of a "Flora of Ten Miles Round Dundee." Perhaps some Dundee collector may be able to throw light on this matter.

"Botanical Rambles in Braemar in 1844, with an Appendix on Forfarshire Botany, 1845."

This was primarily intended for his patrons to indicate the nature of the districts where the plants he supplied were collected.

"Twenty Lessons on British Mosses." First Series, 1846. Second Series, 1849.

In these little books dried specimens of the mosses described were mounted at the commencement of each article.

Of the first series four editions were published. The last edition, on which Gardiner was engaged at the time of his death, was completed and issued by the late Bailie Ogilvie, Lochee, and his sister, for the benefit of Gardiner's orphan boy.

"The Flora of Forfarshire, 1849."

This was Gardiner's principal work, and with the exception of Don's list of the "Native Plants in the County of Forfar," published in the Appendix to Headrick's "Agriculture of Angus or Forfarshire" (1813), is the only published Flora of the county.

The aspect of the county has changed very considerably in the sixty years since its publication, but the surprising thing is, as the late Robert Smith, B.Sc.—whose early death was such a serious loss to Scottish and to Forfarshire botany—pointed out, the stations indicated by Gardiner, still remain in many cases actual habitats of the plants referred to by him.

Gardiner had planned a volume on the Zoology of Forfarshire, but it was never executed. In the later years of his life he fell into poor health, and ultimately he was in such indigent circumstances that an appeal had to be

made to the many botanists with whom he had been in communication for assistance.

The response was very cordial, and the list of contributors published showed how extensive had been his correspondence with the best known workers in the field of British Botany. It was hoped he would soon resume his labours, but in his low physical condition he succumbed to an attack of typhus fever, 21st June 1852.

At the sale of his effects, which had to be realised for the benefit of his orphan boy, his collections of plants were purchased by Professor C. C. Babington of Cambridge. Gardiner was buried in the old Howff burying ground, but no stone marks his place of rest.

Public opinion at the time of his death favoured an effort to place a memorial of the humble botanist over his grave; but the pressing needs of his only son took rightful precedence in the subscriptions which had to be asked and obtained from those who thus indicated their respect for the work and memory of William Gardiner.

## Patrick Matthew of Gourdiehill, Naturalist.

By W. T. Calman, D.Sc.

THE name of Patrick Matthew is mentioned by most historians of the Evolution theory as one of those who anticipated Darwin and Wallace in enunciating the principle of Natural Selection. Matthew's views were published in 1831 in an appendix to a work on "Naval Timber and Arboriculture," and his claim to priority was fully admitted by Darwin. Apart, however, from the references in the "Historical Sketch" prefixed to the later editions of the "Origin of Species" and in Darwin's "Life and Letters," little seems to be generally known about him, and it is perhaps not always recognised how complete the anticipation really was. Last year Professor Walther May, of Karlsruhe, published in the "Zoologische Annalen" (vol. iv. pp. 280-295) an elaborate essay on "Darwin und Patrick Matthew," in which full justice is done to Matthew's work and some biographical details are given. The article is accompanied by a portrait which is reproduced here by permission of the publishers.

By the courtesy of Professor May, I have been put into communication with Miss Euphemia Matthew, of Newburgh, who has kindly supplied me with much interesting information relating to her father, supplementing and, in some points, correcting the particulars given by Professor May.\*

Patrick Matthew was born on 20th October 1790 at Rome, a farm held by his father, John Matthew, on the banks of the Tay, near Scone Palace. His mother, Agnes Duncan, was related, though in what degree is not known,

\* I am also indebted, for information used in the preparation of this notice, to Mr. Francis Darwin, Mr. A. P. Stevenson of Dundee, and Mr. Thomas Bell of Balbeggie.

to the family of Admiral Duncan, the famous ancestor of the present Earl of Camperdown.\* He was educated at Perth Academy and at Edinburgh University, but his stay at the latter cannot have been of long duration, for, on his father's death, he undertook, at the age of seventeen, the management of the estate of Gourdiehill, near Errol. This estate he inherited from the Duncan family, in whose possession it had been for more than 300 years. One of his first employments there was the planting of an extensive orchard which, I believe, still exists. In 1817 he married his cousin, Christian Nicol, whose mother, Euphemia, was a sister of Agnes Duncan. Matthew travelled a good deal on the Continent at various times. He was in France in 1815 when the news of Napoleon's return from Elba caused him hurriedly to leave the country. In 1840 he travelled in the north of Spain, and later he lived for some time in Hamburg and in Holstein, where he purchased an estate which he frequently visited in later years. He died at Gourdiehill on 8th June 1874 (his wife had died in 1857), and was buried in Errol Churchyard.

Matthew was a frequent contributor to the local press, especially the *Dundee Advertiser*, as well as to the *Gardeners' Chronicle*, *Mark Lane Express*, and other periodicals, writing chiefly on political and agricultural matters. He was an early and active supporter of the Chartist movement and of the agitation for the repeal of the Corn Laws. It is of interest on the present occasion to record that he attended the last meeting of the British Association in Dundee in 1867, and read a paper (not published in the annual "Report") on "Capital and Labour" before the section of Economic Science. When the scheme for bridging the Tay at Dundee was being considered, Matthew advocated what he deemed a preferable route, crossing the Tay above Newburgh and bringing the various villages on the

\* The family tradition alluded to by Professor May, according to which the Matthews are descended from a sister of Robert Bruce, is declared by Miss Matthew to be quite without foundation.

Carse in touch with the railway, and so promoting their development. He strongly protested against the inadequacy of the proposed structure, holding that it was quite unfit to resist the gales that occasionally sweep down the valley of the Tay, and these apprehensions were tragically justified a few years after his death. In his last years Matthew gave much attention to the question of exhaustion of the soil, holding that "high farming and the application of foreign and artificial manures are fast increasing the sterility of our land."

In addition to the work on "Naval Timber" already alluded to, Matthew published in 1839 a book entitled "Emigration Fields," and, in 1864, a political pamphlet on "Schleswig-Holstein." It is on the title-page of the last-named that he describes himself as "solver of the problem of species" (see Darwin's letter to Hooker, "Life and Letters," vol. iii. p. 41).

Matthew's chief claim to remembrance rests, however, on his "Naval Timber," and it is interesting to notice, as Professor May points out, that the conception of Natural Selection is not so entirely foreign to the subject of the book as might at first sight be supposed. Matthew's main theme is naval supremacy, and the means of maintaining it. Writing at a time when the Napoleonic wars were a recent memory, he has much to say on the ennobling influence of war, and on the struggle for existence between nations. On the other hand, his experience as an agriculturist had given him a very clear idea of the importance of artificial selection (p. 106, *et seq.*). The conjecture may be hazarded that Matthew, like Darwin and Wallace, had read Malthus's "Principles of Population." His reference on p. 247 to "population-preventive checks" would seem to suggest this. At all events in 1831, with the misery of the "hungry forties" already in sight, the problems of over-population were forcing themselves on the attention of all men.

Matthew's views on Evolution are given, in somewhat haphazard order it must be confessed, in various passages of the appendix. He considers it not unphilosophic to

hold "that living things, which are proved to have a circumstance-suiting power—a very slight change of circumstances by culture inducing a corresponding change of character—may have gradually accommodated themselves to the variations of the elements containing them, and, without new creation, have presented the diverging changeable phenomena of past and present organised existence" (p. 382). His own explanation of this "circumstance-suiting power" is given in the following passages.\* —

"There is a law universal in nature tending to render every reproductive being the best possibly suited to its condition that its kind, or that organised matter, is susceptible of, which appears intended to model the physical and mental or instinctive powers to their highest perfection and to continue them so. This law sustains the lion in his strength, the hare in her swiftness, and the fox in his wiles. As Nature, in all her modifications of life, has a power of increase far beyond what is needed to supply the place of what falls by Time's decay, those individuals who possess not the requisite strength, swiftness, hardihood, or cunning, fall prematurely without reproducing—either a prey to their natural devourers, or sinking under disease, generally induced by want of nourishment—their place being occupied by the more perfect of their own kind, who are pressing on the means of subsistence" (pp. 364-365).

"The self-regulating adaptive disposition of organised life may, in part, be traced to the extreme fecundity of Nature, who, as before stated, has, in all the varieties of her offspring, a prolific power much beyond (in many cases a thousandfold) what is necessary to fill up the vacancies caused by senile decay. As the field of existence is limited and preoccupied, it is only the hardier, more robust, better-suited-to-circumstance individuals who are able to struggle forward to maturity, these inhabiting only the situations to which they have superior adaptation and

\* Some slight changes have been made in the punctuation of these passages.

greater power of occupancy than any other kind; the weaker, less circumstance-suited, being prematurely destroyed. This principle is in constant action; it regulates the colour, the figure, the capacities, and instincts; those individuals of each species whose colour and covering are best suited to concealment or protection from enemies, or defence from vicissitude and inclemencies of climate, whose figure is best accommodated to health, strength, defence, and support; whose capacities and instincts can best regulate the physical energies to self-advantage according to circumstances—in such immense waste of primary and youthful life, *those* only come forward to maturity from the strict ordeal by which Nature tests their adaptation to her standard of perfection and fitness to continue their kind by reproduction" (pp. 384-385).

This "law" is described as "operating upon the slight but continued natural disposition to sport in the progeny," and "in concert with the tendency which the progeny have to take the more particular qualities of the parents," giving rise to species (p. 385).

On the publication of the "Origin of Species," Matthew wrote to the *Gardeners' Chronicle* (7th April 1860, pp. 312-313), claiming priority for his discovery of Natural Selection, and giving long extracts from his book. A fortnight later a letter from Darwin appeared in the same periodical (pp. 362-363), in which he said, "I freely acknowledge that Mr. Matthew has anticipated by many years the explanation which I have offered of the origin of species under the name of natural selection." A further letter from Matthew appeared a few weeks later (p. 433). As Darwin wrote to Lyell at the time ("Life and Letters," vol. ii. p. 301), it was "a complete but not developed anticipation." Professor May points out that, while Wells and Prichard both preceded Matthew in recognising the action of Natural Selection, they only discussed its application to the races of mankind.\* Matthew, on the other hand, brings

\* See, however, Prof. Poulton's interesting essay on Prichard ("A Remarkable Anticipation of Modern Views on Evolution," *Science Progress*, New Series, Vol. I, No. 3, April 1897; reprinted in *Essays on Evolution*, Oxford, 1908).

it forward as one of the factors in a general theory of evolution.

By the kindness of Miss Euphemia Matthew I have been permitted to see three of Darwin's letters to her father. As they have not hitherto been published, it has been thought worth while to give them here in full. The years in which they were probably written have been kindly added by Mr. Francis Darwin.

DOWN, BROMLEY,  
KENT, S.E., *June 13th* [1862].

DEAR SIR,—I presume that I have the pleasure of addressing the Author of the work on Naval Architecture [*sic*] and the first enunciator of the theory of Natural Selection. Few things would give me greater pleasure than to see you; but my health is feeble, and I have at present a son ill and can receive no one here, nor leave home at present.

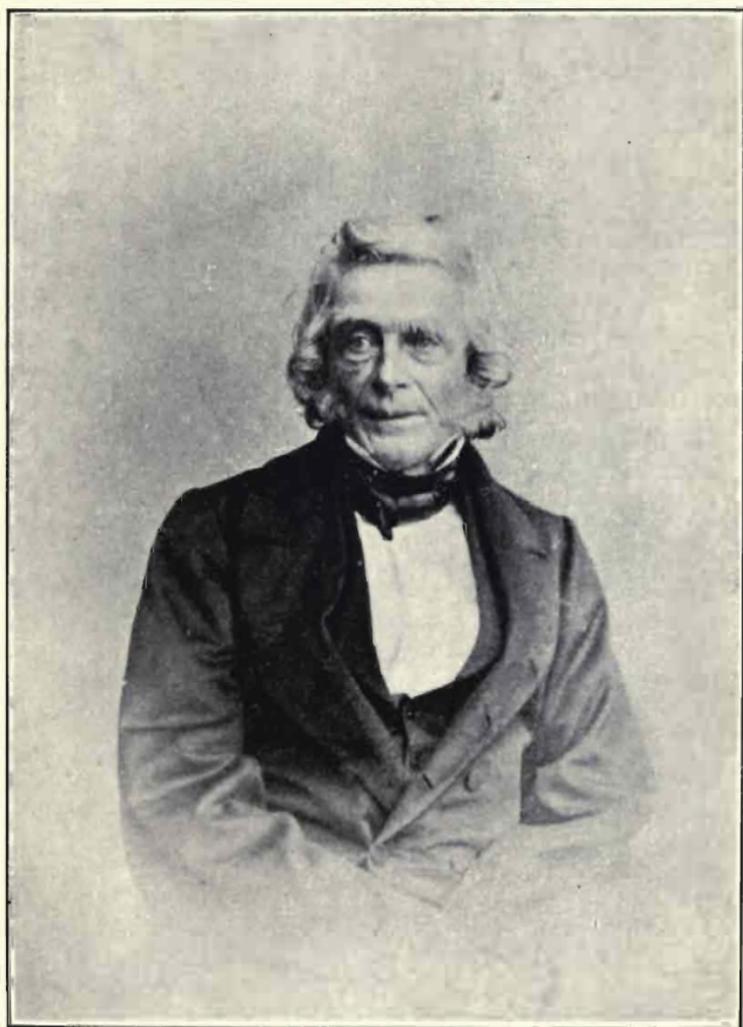
I wish to come up to London as soon as I can; if, therefore, you are going to stay for more than a week, would you be so kind as to let me hear, and if able to come up to London, I would endeavour to arrange an interview with you, which [would] afford me high satisfaction.—With much respect, I remain, dear sir, yours very faithfully,  
CH. DARWIN.

DOWN, BROMLEY,  
KENT, S.E., *Nov. 21* [1863?].

DEAR SIR,—Mr. Darwin begs me to thank you warmly for your letter, which has interested him very much. I am sorry to say that he is so unwell as not to be able to write himself.

With regard to Natural Selection, he says that he is not staggered by your striking remarks. He is more faithful to your own original child than you are yourself. He says you will understand what he means by the following metaphor.

Fragments of rock fallen from a lofty precipice assume



PATRICK MATTHEW.



an infinitude of shapes—these shapes being due to the nature of the rock, the law of gravity, &c.—by merely selecting the well-shaped stones and rejecting the ill-shaped an architect (called Nat. Selection) could make many and various noble buildings.

Mr. Darwin is much obliged to you for sending him your photograph. He wishes he could send you as good a one of himself. The enclosed was a good likeness taken by his eldest son, but the impression is faint.

You express yourself kindly interested about his family. We have five sons and two daughters, of these two only are grown up. Mr. Darwin was very ill two months ago and his recovery is very slow, so that I am afraid it will be long before he can attend to any scientific subject.—

Dear sir, yours truly,

E. DARWIN.

DOWN, BECKENHAM,  
KENT, S.E., *March 15th* [1871].

DEAR SIR,—I thank you for your kind letter. You show no signs of your fourscore years in your letter or in the newspaper article, which seem written with your pristine vigour. My health keeps very indifferent and every exertion fatigues me, so that I doubt whether I shall be good for much more. Your parable of the Damascus Woman is quite new to me and very striking.

I sincerely wish you a happy meeting with your son. I have many letters to write, so pray excuse my brevity, and believe me, with respect, yours faithfully,

CH. DARWIN.

## Robert Brown and Other Botanists.

By Lieut.-Colonel Sir David Prain, F.R.S.,  
Director of the Royal Gardens, Kew.

ROBERT BROWN, second son of the Rev. James Brown, M.A., by his wife Helen, daughter of the Rev. Robert Taylor, was born at Montrose, where his father was Episcopalian minister, on 21st December 1773. From the Montrose Academy he went, as a Ramsay bursar, in 1787 to Marischal College, Aberdeen, and two years later, when his father left Montrose for Edinburgh, Brown entered the University there. Here he studied for several years, with the object of entering the medical profession, but did not take a University degree. While a student he worked at Botany, and his work was so highly regarded by Dr. Walker, then Professor of Natural History, that, in 1791, Brown was induced to communicate his earliest paper to the local Natural History Society. Shortly after the enrolment of the Fifeshire Regiment of Fencibles, Brown was given, in 1795, the double commission of Ensign and Assistant-Surgeon in the corps which he accompanied to the north of Ireland. Here he served until sent to England on recruiting service in 1798. During this deputation he passed some months of that year and the next in London, where he was made, in 1798, an Associate of the Linnean Society, and continued his botanical studies in the house of Sir Joseph Banks. Returning to regimental duty in 1799 he served in Ireland till December 1800, when, on the recommendation of Banks, he was appointed Naturalist to an expedition about to be dispatched under Captain Flinders to survey the Australian coasts. Resigning his commission, Brown sailed with this expedition from Portsmouth about the middle of 1801, and was absent from England for over four

years, while the southern portion of Tasmania and the southern, eastern, and northern shores of Australia were being explored. On his return Brown landed at Liverpool in October 1805, with large Australian collections, and on reaching London was appointed Librarian to the Linnean Society. In 1810, the year in which the first and only volume of his *Prodromus Floræ Novæ Hollandiæ* appeared, Brown became, on the death of Dr. Dryander, also Librarian to Banks. In 1811 he was elected a Fellow of the Royal Society.

In 1820 Sir Joseph Banks died and bequeathed to Brown for his life the use and enjoyment of his library and his collections. In 1822 Brown resigned the Librarianship of the Linnean Society and became a Fellow; in 1823 he was appointed a member of the Linnean Council. In 1827, with Brown's assent, and in conformity with a provision in the testament of their original owner, the Library and Herbarium of Banks were incorporated in the British Museum, while Brown was appointed the Keeper of its botanical collections. This office Brown held till he died.

In 1828 Brown was nominated a vice-president of the Linnean Society; in 1832 he received the degree of D.C.L. from the University of Oxford; in 1833 he was elected a Foreign Associate of the French Academy. At the instigation of Humboldt, King Frederick William IV. conferred on Brown the Royal Prussian Order "Pour le Merite," and on the recommendation of Sir Robert Peel he was awarded a civil list pension of £200 in recognition of his services to science. In 1839 the Royal Society awarded Brown a Copley medal, the highest honour it can bestow; and in 1849 he consented to serve as President of the Linnean Society. This position he filled until 1853, when, owing to his advanced age, he resigned the chair. Five years later, on 10th June 1858, Brown died in his eighty-fifth year, in the house in Soho Square which had been bequeathed to him by Banks nearly forty years earlier, and had been the scene of his own labours for sixty years.

The paper which Brown communicated to the Edin-

burgh Natural History Society, when only a lad of eighteen, was a critical list of additions to Lightfoot's *Flora Scotica*. Though never published, its merits were fully appreciated, and its facts, with Brown's assent, were utilised by Withering. In Ireland as in Scotland he not only botanised but studied his specimens critically, and it was a visit to Withering at Edgbaston, when he was on recruiting service in England in 1798, which led to his introducing himself to Dryander. The impression which Brown's knowledge and thoroughness made on Dryander led in turn to the recommendation of Brown by Banks as naturalist to the New Holland expedition.

In the course of that expedition, as Sir Joseph Hooker points out, Brown "states that he collected nearly 4000 species (3900) in Australia, and that the additions, not collected by himself, amounted to only 300 more, whence it follows that the amazing number of 4200 species of plants belonging to all orders, cryptogamous and phanerogamous, at least three-fourths, which were new to science, were collected (with the exception of 300), accurately described, and accompanied by such observations as appear in the published volume of the *Prodromus* by one unaided botanist, and this between the very end of 1801, when he landed in Australia, and 1810, by which time one-half of the manuscript had been actually seen through the press." As Hooker truly adds, "This is a feat unexampled in the history of botanical science."

How this was possible Hooker also explains. In addition to his natural genius Brown was gifted with a singularly retentive memory, a powerful physique, and extraordinary powers of application. Whether collecting under a tropical sun or penned within the cabin of a storm-tossed sloop, his tireless industry was unaffected. His plants were therefore in great measure described as he collected them in the field, and his descriptions were fully written out on board. On his return to England, all that had to be done was to arrange the manuscript for the press.

But, as Von Martius has remarked, Brown was as

distinguished among aphoretic students as he was among peripatetic ones; he was as great in the closet as in the field, and his later work was as pre-eminent in its quality and as astonishing in its extent as that of his earlier period.

Space forbids an enumeration here of all Brown's contributions to natural knowledge or an assessment of all that botanical science owes to his labours. For this and for a picture of his unique personality we must turn to the Eulogium written by Von Martius when Brown died, and to that delivered nearly thirty years later by Hooker. If Alexander von Humboldt, with happy inspiration, was the first to describe Brown, then still in the plenitude of his powers, as *botanicorum facile princeps*, the verdict which the phrase implies was fully accepted both by Von Martius when writing of his ripe old age, and by Hooker when speaking with all the knowledge accumulated in the course of a whole succeeding generation. The greatest botanist of his age, estimable and admirable alike as a master of his science and as a man, Brown is surely one of those whom Augustus must feel pardonably proud to count among her sons.

ALEXANDER GIBSON, who was born at Laurencekirk in the Mearns on 24th October 1800, after studying at the University of Edinburgh, and becoming a Licentiate of the Edinburgh College of Surgeons in 1819, was appointed in January 1825 an Assistant Surgeon in the service of the Hon. East India Company. During the first few years of his service he was attached to the Indian Navy, but in 1836 he was appointed to the Vaccination Department, the operations of which he conducted in the Deccan and Kandeish. Much devoted to botanical studies, and especially to the application of botanical knowledge to pharmacology and agriculture, the opportunities afforded him for field work during the continued touring which his new post entailed were fully utilised, and in 1838 the Government of Bombay, recognising the value of his special knowledge, appointed him Superintendent of

their Botanic Garden at Dapuri. Here he did much useful work in the introduction and acclimatisation of exotic species important from the pharmacological and the arboricultural points of view. In 1847 Gibson was selected by Government to fill the important post of Conservator of Forests in the Bombay Presidency, and during the next fourteen years he rendered the greatest service to the administration in this capacity. Besides submitting official reports, themselves documents of considerable scientific value, published during this period, Gibson in 1855 edited Hone's *Journals*, and in collaboration with Mr. N. A. Dalzell, prepared for publication the well-known "Bombay Flora" issued in 1861. This work, characterised by great care and sound judgment, was indispensable to the resident in Western India interested in botanical subjects until Sir J. D. Hooker's "Flora of British India" was available for use. Gibson, who retired from the service of Government in 1860, with a public recognition of his "unremitting zeal in the discharge of his office," died at Bombay on 16th January 1867.

JAMES LINDSAY STEWART, son of James Stewart, was born at Dalladies, in the parish of Fettercairn, Kincardineshire, on 13th December 1831. He studied medicine in Glasgow and Edinburgh, and after graduating in the latter University, was appointed to the Bengal Medical Service on 4th August 1855. As an Assistant Surgeon he was present at the siege and capture of Delhi, receiving a war medal with clasp, and was later attached to the expedition which, in 1858, under the command of Sir Sydney Cotton, penetrated the Yusufzai country. During this expedition Stewart was able to make a valuable botanical collection, illustrating the vegetation of a hitherto unexplored tract. In 1860-61 he was appointed to officiate as Superintendent of the Botanic Garden at Saharanpur, and of the Government tea plantations in the North-West Provinces. While at Saharanpur, and subsequently, while Civil Surgeon of Bijnaur in Rohilkhand, he continued his botanical studies, and became familiar

with the forest vegetation in the plains and in the section of the north-west Himalaya between the Kali and the Jumna rivers. Such was his reputation that when, in 1864, the work of the Indian forest service in the various provinces was being co-ordinated, Stewart was invited to take charge of the forests in the Panjab. On his return to the province in which his first years of service had been passed, Stewart devoted much of his time to the botanical exploration of the Panjab Himalaya, Kashmir, the nearer parts of Tibet, and of the extensive Rakhs or brushwood tracts of the western Panjab and the adjoining province of Sindh. So thorough and so excellent was Stewart's work as an explorer, and so highly regarded were the papers published by him in scientific journals, and the valuable reports submitted by him to Government as Conservator of Forests, that he was induced to prepare a work entitled "Panjab Plants," dealing with the trees, shrubs, and herbs of economic value growing in the Panjab, which was published at Lahore in 1869. When this work appeared Stewart, who had meanwhile been promoted to the rank of Surgeon, on 4th August 1867, proceeded to England on furlough for two years, and the opportunity thus offered was taken of entrusting to him the arduous task of preparing a Forest Flora of the North-West and Central Provinces, where he had served between 1860 and 1864, and with the vegetation of which he was almost as familiar as he was with that of the Panjab. Stewart accordingly devoted a large part of his furlough, from 1869 to 1871, to this task, and would no doubt have completed it had not his health unfortunately given way. He did not return to India until October 1872, but the illness which had compelled the abandonment of his Flora, which was continued and completed by his friend and official chief, the late Sir D. Brandis, was a progressive one, and Stewart died of paralysis at Dalhousie, shortly after his return to the East, on 5th July 1873.

## Famous Men and Women of Forfarshire.

By David T. Sandeman, F.J.I.

THE number of famous Men and Women belonging to Dundee and other parts of Forfarshire is simply legion. A goodly-sized book could be filled with their names alone, so that here a judicious selection must be made. Amongst them are Statesmen and other Politicians of eminence, Judges and Lawyers of all ranks, Scientists and Scholars of great distinction, Officers holding high command in the Army and Navy, Ministers of every denomination, Doctors of Medicine, Historians, Poets, and Novelists, Journalists, Artists, Merchants, and Manufacturers, Shipbuilders, Philanthropists, and other Worthies to whom the whole county is indebted for works of enterprise and deeds of benevolence and mercy which have graced and dignified its history.

### THE SCOTTISH PATRIOT.

Apart from the numerous Royal personages who have visited Forfarshire, more particularly Dundee, from the days of Malcolm Canmore, in the eleventh century, down, through the Stewart Kings, the James's and the Charles's, to those of Queen Victoria and Queen Alexandra, the foremost place in this "bead-roll" of fame seems to belong of right to Sir William Wallace. If not actually born in Dundee—and on this point tradition varies between Elderslie and this city, on the banks of the Tay—Wallace's earliest days are associated with Dundee. It was here, according to Blind Harry, that he obtained his education, and it was here that he struck the first blow for Scottish independence, by resenting the overbearing tyranny of Selbie, the son of the English Governor of Dundee, and

slaying this presumptuous youth in the Market Place. From that sword stroke, delivered in the heat of indignant passion, dates Wallace's long struggle for the liberty of Scotland. There is, however, a later connection of the patriot with Dundee. After receiving in 1298 the appointment of Governor of Scotland, one of Wallace's first acts was connected with that city. He granted to Alexander Skirmeshur, or Scrymgeour, the lands of Dudhope, the Upper Field of Dundee, and the King's portion of the West Field of this Burgh, together with the office of Hereditary Constable of Dundee. This interesting document, which is the oldest original Charter relating to Dundee known to exist, is preserved in the General Register House, Edinburgh.

## MEN OF SCIENCE AND OF INVENTION.

### SIR CHARLES LYELL.

As this volume is being compiled for the British Association, the next place in the roll of fame must be devoted to Men of Science. And in the van of these stands Sir Charles Lyell, who attended the meeting in Dundee of 1867, and who then—along with the President, the Duke of Buccleuch, and his distinguished Colleagues, Sir Roderick Impey Murchison and Sir William Armstrong—was admitted a Burgess of the city. As a special article dealing with Sir Charles appears in this volume from the pen of Sir Archibald Geikie, it is only necessary to say here that he was born at Kinnordy, near Kirriemuir, "when chill November's surly blasts" were ushering in the severe winter of 1797, that he returned there after establishing a wide reputation, that he was regarded with the highest admiration by all his neighbours, that he ultimately died at London in 1875, full of years and honours, and was laid to rest in Westminster Abbey as "the most important geologist in the world."

## SIR JAMES IVORY.

This famous native of Dundee, described by Lord Brougham as "the greatest mathematician the world had seen since the time of Sir Isaac Newton," was born thirty years before Sir Charles Lyell. He began life as a flax-spinner, but failing in that, devoted attention to his favourite study, and after obtaining the degree of M.A. became a teacher in Dundee Academy. Mathematics, however, were so little esteemed in those days—at least in certain quarters—that the short-sighted Chief Magistrate, after attending the annual examination of pupils, gravely proposed "to put Jamie Ivory awa', as they had a gude enough teacher of the A B C already." But Ivory's talents being fully appreciated elsewhere, he was appointed Mathematical Professor of Sandhurst Military College, Fellow of the Royal Societies of London and Edinburgh, Corresponding Member of the Scientific Societies of Paris and Göttingen, and a Knight of the Order of Hanover. Physical astronomy is indebted to him for more than one important discovery, whilst for a time he supported alone the mathematical reputation of Great Britain. His scientific library, including the works of Descartes and other notable mathematicians, is the property of the Dundee Free Library. His death took place at London in 1842.

## THE FORFAR BOTANIST.

Turning to a genius in another branch of science; the name and career of George Don have a never-failing charm not only for his townsmen of Forfar but for botanists all over the world. What lover of plants has not heard of the "Dovehillock Garden," or revelled in Don's charming description of its beauties? So numerous and so valuable were Don's researches and discoveries, that he was in 1803 elected an Associate of the Linnean Society of London. He was also called on for articles by the leading botanical journals, and the Edinburgh Botanic Garden Society elected him as their Curator. But

ultimately he settled down in his beloved "Doo-hillock," which became a centre of attraction for botanists from all parts of the Empire. His closing years were unfortunately embittered by monetary troubles. The knowledge which he was the first to publish in its fullness, though the source of theories which gave deserved fame to many distinguished botanists, and untold pleasure to thousands of humbler followers of the science, brought little grist to Don's mill of material wealth. His inherent passion for botanical research failed to keep the wolf of poverty from his door, and when he passed away he left little behind him but his imperishable works. As James Ross sung:—

"Bid sylvan songsters that in shades sojourn  
Begin his elegy with plaintive tone.  
Bid Spring, the flowery-mantled maiden, mourn,  
For many a vernal debt is due to Don."

A special article on George Don is included in this volume.

#### THE DUNDEE POET BOTANIST.

William Gardiner, who was born in Dundee some five years before Don's death, carried on with much the same detail and ability the task of classifying the botanical treasures of Forfarshire. Whilst labouring away as an umbrella-maker, he spent his mornings and nights in search of wild-flowers in such resorts as the Den of Mains, Harecraigs, Baldovan Woods, and Wills' Braes. During holidays his botanical rambles were extended to Deerhill Woods, Auchmithie, Redhead, and the Sidlaws—those hills of which Robert Ford, also a Forfarshire man, afterwards wrote in the Glasgow Ballad Club poems:—

"But aye my heart gaes dunt for dunt,  
Whaurever I may be,  
If ane but name the Sidlaws,  
The hills of hame, to me."

Gardiner's wages in those days of ten shillings a week did not permit him to follow out, unaided, his project of

collecting Alpine plants on Ben Lawers or Lochnagar; but thanks to the generosity of the Botanical Society of Edinburgh, he was enabled to make excursions into the Perthshire Highlands, and thus to increase our knowledge of the vegetable kingdom. There are, in fact, few British botanists whose collections have not been enriched by some of the rarities gathered by Mr. Gardiner. His literary gifts were of no mean order, as witness his small but charming work entitled "Twenty Lessons on British Mosses," and his more ambitious treatise on "The Flora of Forfarshire," giving an account of the localities of all the various plants found in the county, interspersed with graphic descriptions of the places in which the rarer plants are to be found. Mr. Gardiner was a poet as well as a collector of and writer on botanical treasures. But with all his talents he died, like Don of Forfar, a poor man. His one chance of obtaining a competency came when an appointment was placed at his disposal by that distinguished botanist, Sir William Hooker, but having an aged mother to support, Gardiner declined the offer. Several interesting examples of Gardiner's botanical and literary works are in the Dundee Central Museum.

Another botanist of considerable reputation, Robert Brown, was born in Montrose in 1773 and died in 1858. A special article in which his presidency of the Linnean Society is mentioned appears in this volume.

#### PARENT OF WIRELESS TELEGRAPHY.

At a time when the system of Wireless Telegraphy is assuming enormous dimensions, not only as a means of communication over thousands of miles, but as a saviour of life at sea, through its unfailing method of summoning assistance to vessels in distress, great interest attaches to the parent of this development of science—James Bowman Lindsay. Born at Carmyllie, and beginning life as a weaver, Lindsay devoted himself early in life to studies of mathematical and physical sciences, these leading him to secure a situation as teacher in Dundee Prison. For

many years he laboured there six hours every day, imparting to prisoners a knowledge of the elements of the English language and of arithmetic. But this drudgery, so far from quenching his thirst for learning of a higher kind, seemed only to inflame it. He mastered astronomy, became a linguist, dived into electricity, was one of the first to exhibit "a constant electric light," originated the idea of a submarine cable to America, and led the way to wireless telegraphy. As early as 1859 he established electrical communication without wires across the Tay at Glencarse, where the river is about half a mile broad, and followed this up a year later by telegraphing across the Tay below the Earn. At the British Association meeting in Aberdeen of 1859 he read a paper explaining his wireless theory. Lord Rosse presided over the section at which the paper was read, and the originality of Bowman Lindsay's views drew forth special commendation from his Lordship, the Astronomer-Royal, and Professor Faraday, who, connected closely with Dundee, was one of the earliest, as well as the greatest, of all telegraphic experts. Mr. Lindsay's fame also attracted the attention of the Government of the day; and in 1858 he was granted, in recognition of his learning and attainments, an annual pension of £100. This well-deserved bounty enabled him to resign his appointment as teacher at Dundee Prison, and to devote his talents more exclusively to literary and scientific pursuits. He succumbed in 1862 to a severe illness, and was buried in the Western Cemetery, his funeral being attended by the Magistrates and Town Council of Dundee. In 1901 a monument to his memory was by public subscription erected over his grave. How little did Mr. Lindsay, or even those who subscribed for the monument, imagine that the time would come so soon when, from the humble experiments on the River Tay would spring a system which is linking up mighty liners on the ocean, and is about to encircle the whole of the British Empire.

## THE BROUGHTY-FERRY ASTRONOMER.

Though Thomas Dick, well known as the "Christian Philosopher," was born in Dundee in 1774, it was not until 1827 that he took up his residence at Broughty-Ferry, and carried on those astronomical labours which gave him such a wide reputation. He had commenced them at an early age, his star-gazing propensities earning for him the title of being eccentric. His father on one occasion thus sorrowfully unburdened his mind to a friend: "I dinna ken what to do wi' that laddie Tam, for he cares for nathing but books and glasses. I saw him the other day lying on the green trying to turn the steeple o' the kirk upside down wi' his telescope." But his supposed eccentricities took such a practical form, that he was able to write works on astronomy which appealed to a very large circle of readers, and proved to many a valuable means towards a wider education. Several of his works were translated into foreign languages, and brought him honours from a large number of Universities, including the degree of LL.D. from America. Dr. Dick was one of the earliest of Christian Scientists, and became a preacher of the Gospel as well as a preacher of Astronomy. Like, however, the scientists of Forfar and Dundee, the rewards that came to Dr. Dick for his labours were comparatively small, and he was left at the age of eighty without the means of a comfortable subsistence. It is far from creditable to the Government of the period that the pension ultimately given to Dr. Dick did not amount to more than £50 a year.

## POSTAL REFORMER.

Another inventor who belongs to Dundee was James Chalmers, an early postal reformer, and amongst the first to suggest the employment of adhesive stamps on letters. The Government offered a premium of £200 for the best kind of postage stamp. Mr. Chalmers naturally was among the candidates, but although his plan was adopted, the premium never was awarded to any one. In the opinion of many, however, including Mr. Joseph Hume, the reward

should have gone to the Dundee man. As a kind of solatium Mr. Chalmers was, in 1846, presented with a testimonial from his fellow townsmen, the value of it being quite equal to the premium of which he was unjustly deprived.

#### ENGINEERING EXPERT.

Mention must also be made of Professor Ewing, an old Dundee High School boy who has had a brilliant scientific career. Trained as an engineer, he went to Japan as Professor of Mechanical Engineering at the Imperial University in Tokio, returning to Dundee in 1883 to take up the first Professorship of Engineering in University College. Seven years later he went to fill a similar post at Cambridge.

#### OTHER SCHOLARS.

Professor James Walker, the present occupant of the Chair of Chemistry in Edinburgh University, is another old Dundee High School boy, and so is Mr. Frank Young, H.M. Science Inspector of Schools. Professor Jebb, the eminent Greek scholar, was born at Invergowrie, close to Dundee; and Dr. Patrick Blair, the distinguished botanist, is gladly claimed as a son of the city; whilst another notable botanist who has died recently, Mr. G. R. M. Murray, F.R.S., was born in Arbroath.

#### DUNDEE UNIVERSITY COLLEGE.

Dr. John Yule Mackay, though a native of Fifeshire, has been Principal of University College, Dundee, since 1897; whilst some of his colleagues, Professors Steggall, D'Arcy Thompson, Patrick Geddes, D. M'Ewan, and A. M. Stalker, also not natives of Dundee, have been long and honourably associated with the city. In connection with this College, special reference ought to be made to its first Principal, Dr. Peterson, who now holds the position of Principal of the McGill University, Montreal; and to its former Professor of Chemistry, Dr. Carnelly, who afterwards went to Aberdeen, and whose career of great promise was cut short by his untimely death.

## MEN OF AFFAIRS.

Amongst the many Statesmen and other Politicians connected with Forfarshire, the names of the heads of the houses of Dalhousie and Panmure stand prominently forward.

## FOX MAULE.

The greatest of them all was the Right Hon. Fox Maule. As eleventh Earl of Dalhousie and son of William Maule, Lord Panmure, he united the two branches and did so in a very brilliant way. His first official post after he had been elected M.P. for Perthshire was that of Under-Secretary for the Home Department. This, however, was only preliminary to his appointment as Secretary for War, an office which he held from 1846 to 1852, and again from 1855 to 1858—dates covering those critical periods of the Crimean War, the Chinese Campaign, and the Indian Mutiny. For his eminent services to the country in this capacity he received many honours from the Crown, and was also enrolled as a Burgess of Dundee.

## ABOLISHER OF WINDOW TAX.

Lord Camperdown, grandson of the famous Admiral Duncan, to whom attention will presently be drawn, represented his native county of Forfarshire for several years in Parliament, and whilst there was instrumental in obtaining the repeal of the obnoxious Window Tax. Before going to the House of Commons, he sat as one of the members of Dundee Harbour Board, doing service which is commemorated along with the feats of his grandfather in the name of the "Camperdown Dock."

## OTHER M.P.'S.

Lord Armitstead, a munificent benefactor to University College and the principal charitable institutions of Dundee, and founder of the Armitstead Lectures; Sir Henry Campbell-Bannerman; Lord Lochee, of Gowrie;

and Lord Congleton, all served with distinction in Parliament. The same may be said of Sir John Ogilvy, Sir John Leng, W. E. Baxter, George Dempster of Dunnichen, an early owner of Skibo, George Duncan, George Kinloch, James Yeaman, Frank Henderson, and G. M. Barnes, most of whom belonged to Dundee. Another native of the city was Sir William Allan, M.P., of Belleville boiler fame, and of no mean reputation as a poet.

#### GREAT FINANCIAL REFORMER.

AN even more eminent Member of Parliament connected with the county was Joseph Hume, the great advocate of financial and political reform. Mr. Hume was born at Montrose in 1777, and adopted medicine as a profession, going into the service of the East India Company. But he soon abandoned doctoring for politics, and embarked on that career which earned for him so much fame.

#### SERVING BRITISH INTERESTS ABROAD.

Distinguished in another field of political influence is Sir William Wallace, a native of Arbroath. For nearly a quarter of a century Sir William has been occupied with British interests in Nigeria, concluding treaties between potentates there, and generally advancing the cause of this country in that far distant region.

Still another son of Aberbrothick, who has accomplished labours of a similar kind, is Lord Inchcape, better known as Sir James Lyle Mackay. He has done yeoman service for the State not only in India and China, but also at home; one of his most recent works here being concerned with Lord Jersey's Committee to inquire into the relations between the Board of Trade and the Local Government Board. Only this year he has been appointed Chairman of an important Royal Commission to consider the trade relations between our country and our colonies—"Empire Trade."

## THE HERO OF CAMPERDOWN.

Reference has already been made to Admiral Duncan, and to the fact that his memorable naval victory of 1797 is embedded for ever in the history of Dundee by means of the "Camperdown Dock." His portrait may be seen in the Art Gallery, and though the humble house in which he was born has been swept away, his name and fame continue to be cherished as warmly as ever. For the benefit of those who inspect the portrait of the gallant Admiral, the following inscription on it is quoted:—

"The Right Hon. Viscount Duncan, Commander of the British Fleet in the North Seas, in the glorious engagement with the Dutch near Camperdown, on the 11th of October 1747, when the enemy were completely defeated, with the loss of nine ships of the line, among whom were those of the Admiral and Vice-Admiral. This portrait was placed here at the request of a general meeting of the noblemen and gentlemen of Angus, who were justly proud that their county had given birth to so distinguished an officer. And as a further testimony of their satisfaction, they at the same time resolved that a piece of plate, of 200 guineas value, should be presented to him by the county in memory of that great and important victory."

## JOHN GRAHAME OF CLAVERHOUSE.

Among the natives of Forfarshire who held high command in the British Army, reference must be made to John Grahame, most widely known on the one hand as "Bloody Claverhouse," and on the other as "Bonnie Dundee." Whether he was the devil incarnate which legend and Lord Macaulay have painted him, or the humanitarian described by other historians—the man who habitually shrank from inflicting capital or other penalties on the Covenanters—is still, and probably will remain, a matter of dispute. The most recent research on the subject carried out by Michael Barrington, and embodied in a sumptuous volume, goes to show that Claverhouse had

at all events brains as well as courage and other qualifications that go towards the making of a great soldier. It was not a desire for amusement or adventure, but a love for his profession that led the future hero of Killiecrankie to learn war under Turenne and the Prince of Orange. No one had a higher opinion of his proficiency than Turenne himself, and the Duke of Wellington also testified to his abilities as a military administrator. Whatever the other trait in his character may have been, the story of his noble deeds and gallant death, as told by Mr. Barrington, seems to stamp Claverhouse as a true patriot whose connection with Forfarshire and the Castle of Dundee ought to be kept in remembrance.

#### A FAVOURITE OF WELLINGTON'S.

Sir William Chalmers, who served with distinction under Wellington in Spain, and also at Waterloo, was the son of a former Town Clerk of Dundee. Two of his deeds of bravery are deserving of special notice. When the Duke wanted a dispatch carried from one wing of his army to another during the Peninsular War, the French troops dividing the two, he selected Chalmers for the delicate and hazardous duty. Nor was this confidence misplaced, for though the Dundee hero had to run the gauntlet of the French sentinels, and fell from his horse which was killed, he escaped from his pursuers, and delivering his message in time, saved the situation. Again, at Waterloo, he was entrusted by Wellington with the command of a regiment, all the officers of which had been killed or wounded. But Chalmers, who seemed to live a charmed life, shared in the toils and honours of the victory without so much as a scar. After the peace of 1815, Sir William, knighted for his valour, retired from the army and settled down in his native town, where his tall, military-looking figure was long familiar to his fellow citizens.

#### SOUTH AFRICAN WAR HEROES.

The last war for the supremacy in South Africa robbed Forfarshire of many of her brave sons, including the heroic

Earl of Airlie, who had served with distinction in Egypt before he fell on the veldt of Africa. The Hon. Claude Bowes Lyon, a scion of the house of Glamis, also shone in the front during the same war, and the late Colonel George Gordon, a native of Forfar, earned worthy laurels by the part he took in the defence of Umsitstand during the South African Campaign of 1877.

#### JUDGES AND OTHER LAWYERS.

If it seems a long cry from soldiers to lawyers, the transition in this roll of honour is an easy one, seeing that so many of our learned Judges, Sheriffs, and other legal luminaries have been and still are associated with Forfarshire.

Sir George Mackenzie, born in the Overgate of Dundee about 1636, became a Judge of the Court of Session in 1674, and afterwards served as Lord Advocate to Charles the Second. He had great literary gifts, and is remembered as the founder of the Advocates' Library in Edinburgh. An extensive holder of land, he erected among other mansions Belmont Castle, so long occupied by the late Sir Henry Campbell-Bannerman. He was also proprietor of Bannatyne Castle, where, in its reconstructed form, so much noble work is being carried on for poor working women and girls.

Lord Ivory, whose early rise at the bar was due to the foresight of Francis Jeffrey, and who afterwards obtained such renown as a Judge in the Court of Session, came of humble Dundee parents, and learned his lessons in Dundee Academy. Lord Craighill belonged to Forfar, and so did the family of the witty and erudite Lord Neaves.

Sheriff Logan, renowned alike for his pawky humour and his ability as an advocate, was Sheriff of Forfarshire from 1854 till his death in 1862, when the procurators of Dundee, to show their admiration of his services, erected a marble bust of him in the Court buildings. Sheriff Thoms, whose jurisdiction over Orkney and Shetland carried with

it the title of "Admiral," which he used to air with much pride, was the son of one of the many excellent Provosts which Dundee has been fortunate enough to possess as rulers. Sheriff Fyfe, of Glasgow, highly popular, author of "Who's Who in Dickens," as well as of several law-books, and who is mainly responsible for the recent admirable Sheriff Courts Act, also belongs to Dundee. Sheriff Campbell Smith only lately retired from the position he so long occupied in Dundee, and his place is now occupied by Sheriff Neish.

Several lawyers have shone in the Chief Civic Chair of the City, among them being Lord Provost Urquhart, now occupying, with great acceptance to the community, a second term of office, and earning a high reputation as a peacemaker in strike troubles. His Lordship, it may not be generally known, is a poet as well as a lawyer.

Mr. William Hay, who held the Provostship when the British Association last visited Dundee in 1867, also belonged to the learned profession. Mr. Hay resigned in 1867, when he was appointed to the Town Clerkship, vacated by the death of Mr. Christopher Kerr, for long one of the ablest members of the Faculty in the City. On Mr. Hay's retirement in 1893, Sir Thomas Thornton became Town Clerk, and carried on the work with much activity and talent till his death in 1903, when the present Town Clerk, Mr. W. H. Blyth Martin took his place. The lawyer who for several years held with such distinction the important position of Town Clerk of Glasgow, Mr. Myles, belonged to Forfar. A veteran lawyer, Mr. Robert Smith, is just now at the head of the Faculty in Dundee, which has only recently been deprived by death of one of its best known members, Mr. George Ogilvy.

## MEN OF THE CHURCH.

Forfarshire — especially Dundee — has long been marked by a goodly array of divines belonging to all denominations.

## PRESBYTERIANS.

Principal Tulloch, so long the talented head of St. Andrews United College, was once minister of St. Paul's Church, Dundee; whilst Principal Stewart, the present chief of the St. Andrews College of St. Mary, and last year's Moderator of the Church of Scotland Assembly, officiated some time in the Church of the Mains. Professor Knight of St. Andrews was connected with St. Enoch's Church, Dundee. Professor Denney, one of the most distinguished teachers in the Free Church College, occupied for years the pulpit of a Broughty-Ferry Church. Dr. Donald M'Leod, a relative of the famous Dr. Norman M'Leod, and who has recently passed away after a long and notable ministerial career at St. Columba, London, was at one time in charge of St. Mark's Church, Dundee. The "saintly" M'Cheyne, Professor Islay Burns, who succeeded him at St. Peter's Church, Dr. Whyte, Principal of New College, Edinburgh, the celebrated Dr. Thomas Guthrie, Dr. Grant, Dr. Wylie, the author of the "History of Protestantism," are amongst the other divines who have either been born in Forfarshire, or been connected in the course of their lives with one or other of the Presbyterian Churches of the county.

## CONGREGATIONALISTS AND OTHERS.

One of the earliest hymn-books published in Scotland was from the pen of the Rev. John Glas, at one time parish minister of Tealing, in Forfarshire, and who, after being deposed in 1728 for adopting independent views, founded the Congregationalist sect known as "The Glasites" in Dundee and Scotland, and through his son-in-law, as the Sandemanians in England. Mr. Glas was a man of great ability, and though his admirable collection of

hymns, published under the title of "Christian Songs," is now little known, it is still used by the Glasites at their fellowship meetings. Though not a hymn-writer, the Rev. George Gilfillan, who did most of his life's work in Dundee, originally as a Presbyterian, was the author of "The Bards of the Bible," and of a large number of kindred works. For these and for his great accomplishments as a preacher and public speaker, as well as for his kindness of disposition and his generous treatment of budding *littérateurs*, Mr. Gilfillan earned the respect and admiration of his fellow-citizens. A Memorial Church has been built to commemorate his name and fame. Dr. David Russell, also a voluminous author of religious books, and who laboured in Dundee for nearly forty years; the Rev. David Macrae, another able writer and preacher; and Dr. K. C. Anderson, the present minister of Ward Chapel, are amongst the remaining distinguished Congregationalists of whom Dundee can boast.

#### OTHER CHURCHES.

Many notable Bishops of the Episcopal Church of Scotland have been connected with Forfarshire, including the learned Bishop Forbes of Brechin, the present Bishop Robberds, who fills that diocese, and Bishop Guthrie, of Dunkeld—one of the numerous Guthries whose names figure so largely in the history of the county, as may be inferred from the popular rhyme:—

"Guthrie of Guthrie and Guthrie of Gagie,  
Guthrie of Taybank and Guthrie of Craigie."

The Roman Catholic Church also has had many devoted clergymen in Dundee, the most notable of them all being Father Stephen Keenan, who during his long and laborious career, idolised by his own people, cleared off large debts on the mission buildings, and built a new place of worship. He left nearly all his means to found an orphanage for female children connected with the Roman Catholics in Dundee.

## MEN AND WOMEN OF LITERATURE AND ART.

The authors, more especially the poets, of Forfarshire are, to quote Milton's famous lines:—

“Thick as autumnal leaves that strow the brooks  
In Vallombrösa.”

Some bold spirits, led by Mr. Alan Reid, the able compiler of “The Bards of the Angus and the Mearns,” have been daring enough to trace a connection between Robert Burns and the Mearns, founded partly on the popular belief that the national poet once paid a visit to Fetteresso, and that when challenged by the proprietor for fishing without leave in the river there, exclaimed:—

“Your fish are scarce, your water's sma',  
There's my rod, and Rob's awa'!”

But no verification of the incident seems to be forthcoming. What can be relied upon is that Burns's grandfather, Robert Burness, sprang from the Mearns, and that his father, William Burness, removed from there in his nineteenth year, first to Edinburgh and afterwards to Ayrshire. If Forfarshire, however, cannot lay claim to this poet of the very first class, it has plenty other distinguished men in every department of literature.

## ROBERT NICOLL.

Without going so far back as John Barbour, who, in the fourteenth century, wrote that famous epic, “The Bruce,” to the Wedderburns, whose “Guidly and Godly Ballads” played such an important part in the Reformation; or even to Sir George Mackenzie of Dundee, who towards the end of the seventeenth century gave so many indications of poetic gifts, it will suffice to begin with Robert Nicoll, the Dundee bookseller, who published his first volume of poems in 1835, and who was then acclaimed by Ebenezer Elliot, the Corn Law rhymer, as “Scotland's Second Burns.” But he had a short if gifted career, dying of con-

sumption in his twenty-fourth year. Many of the lyrics he wrote, like "Bonnie Bessie Lee," still survive, as do some of his humorous pieces like "Minister Tam":—

"But his work noo is endit—our Tammie has grown  
To a kirk wi' a steeple—a black silken gown—  
Sic a change frae our laddie wha barefooted cam',  
Wi' his wig white wi' pouter, is Minister Tam!"

#### AUTHOR OF "THE MITHERLESS BAIRN."

Another Dundee poet who has also been compared to Burns is William Thom, the author of those pathetic lyrics, "The Mitherless Bairn" and "The Blind Boy's Pranks," and of a volume of verses, "Rhymes and Recollections," which were the means of getting him an invitation to London and introductions to Lady Blessington, Douglas Jerrold, the Howitts, and other literary celebrities. But he, too, came to an untimely end. A weaver by trade, he never overcame the privations and hardships of his early life, and though he hoped on returning to Dundee, "like a bird that flutters round her forsaken nest, to spend his latter days in comparative peace and quiet," this was not realised, and he died soon afterwards in very abject circumstances. Still a third poet, characterised by a similar ability to express feeling and pathos in verse, is Alexander Smart, a pressman in the *Dundee Courier* office during the days before steam was applied to printing. Smart was a contributor to a volume of well-known Scottish verse called "Whistlebinkie," and his "Songs of Labour" were highly spoken of by Lord Jeffrey. In much the same category may be placed James Gow, the Dundee weaver poet; Robert Mudie, also a weaver poet of Dundee; and Robert Leighton of Dundee, author of "The Whittle."

#### THOMAS HOOD.

Thomas Hood spent some years of his early life in Dundee, and it was there that he made his first plunge into literature, manifesting in contributions to the *Dundee*

*Advertiser* the dawning of that genius which afterwards burst forth in "The Bridge of Sighs" and "The Song of the Shirt." All the circumstances connected with Hood's residence in Dundee, and of his subsequent return on a visit to relatives, have been admirably narrated lately by Mr. Walter Jerrold, a grandson of the great Douglas Jerrold. In Hood's "Memorials," published after his death, a rhyming description of Dundee is published, not always in the best taste, but very smart—as, for example, the following skit on the economic habits of the people:—

“Beneath a theatre or chapel they'll pop  
 A sale room, a warehouse, or mean little shop,  
 Whose windows—or rather no windows at all—  
 Are more like so many holes in the wall.  
 And four churches together, with only one steeple,  
 Is an emblem quite apt of the thrift of the people.”

#### SHELLEY'S WIFE.

The first famous woman whose connection with Forfarshire falls to be mentioned is Mary Wollstonecroft Godwin, the wife of Percy Bysshe Shelley. Her friendship with the Baxter families of Dundee, and her romantic elopement with the poet, have recently been described by Dr. Millar, the City Librarian and one of the editors of this volume, but without trespassing unduly on the remarkable details he has unearthed, it may be stated that the gifted authoress of that weird novel, "Frankenstein," came to Dundee in July 1813, and resided with Mr. W. T. Baxter—a relative of the late Sir David Baxter and of the present Sir George W. Baxter—until March 1814, when she returned to London. Her elopement with Shelley took place in July of the same year. This event naturally shocked the Baxters, as the poet's first wife was still alive, and served to break off to some extent the active correspondence between them and Mary Godwin, but it revived again on her marriage to Shelley on the death of Harriet Westbrook. Christina Baxter, one of W. T. Baxter's daughters, always claimed that she was Mary's favourite friend.

"Frankenstein" was begun in the Baxter's house at Broughty-Ferry Road, though it was not completed till long afterwards.

#### BROWNING'S MOTHER.

This reference to the interesting connection of one great poet with Dundee opens the way for the narration of another incident which relates Robert Browning very closely to the city. Towards the end of the eighteenth century, the proprietors of the Sugar House in the Seagate brought from Amsterdam as their manager, Mr. Wiedeman. He took up his duties in 1782, and was married soon after to Sarah Revel, whose previous history cannot be traced. To them were born in Dundee one son and one daughter, Sarah. When the boy grew up he went to sea and rose to the rank of a skipper. Sarah remained with her parents until first the one and then the other died. The skipper, who had by this time retired, then took his sister to live at Clapham, and it was there that she met and married the father of Robert Browning, thus becoming the mother of one of the most subtle and intellectual of modern poets.

#### "THRUMS."

Those members of the British Association who visit Kirriemuir during their stay in Dundee will find that, though the birthplace of J. M. Barrie has here and there been a good deal modernised, the Auld Licht Manse is very little changed, and that much remains to remind one of the scenes described in "A Window in Thrums," "Auld Licht Idylls," and "The Little Minister." They will also derive much pleasure from a "crack" with some of the natives of "Thrums," who, though naturally very proud of the fame to which their townsman has risen, are still critical enough to declare that "Gin Jimmie Barrie had come to us, we cud ha'e tell't him far better stories than ony he has." But as Dr. Alexander Whyte, himself a Kirriemuir man, says:—

"All of us in the town know the characters Mr. Barrie

describes, and had taken them and their eccentricities just as a complete part of our life, scarcely worth notice. But when a man of genius put them into print, that made all the difference. Some of the working men were deeply read in literature and philosophy. Mr. Barrie has thoroughly grasped the characters of the little community with all their humour and pathos. 'Thurms' is a true picture of my native place."

#### "THE WIZARD OF THE NORTH."

Besides paying several visits to Forfarshire, Sir Walter Scott conferred distinction on the county, first by selecting Arbroath as the "Fairport" of his delightful novel, "The Antiquary," and secondly, by sketching a Forfarshire "laird" as one of its principal characters. During one of his tours in the county, Sir Walter enjoyed the hospitality of the Earl of Strathmore at Glamis Castle, and drank from the old family silver cup, "The Lion of Glamis." It was from this same cup that the famous novelist took his idea of "The Bear of Bradwardine," mentioned in "Waverley."

#### LADY AGITATORS AND OTHERS.

A Dundee lady, Mrs. Alcock, earned notoriety as the heroine of as "guid a gangin law plea" as those referred to by Sir Walter Scott in "Redgauntlet." From one legal action she went on to so many others that her maiden name of Mary Ritchie became only too well known in the Court of Session. As a rule she was successful, but not before she had changed her lawyers as often as did "Peter Peebles," immortalised by Scott. She was singular in another respect, for she drew up a Marriage Contract long before she got a husband. After deserting Mr. Alcock and bringing a suit against him, she joined the Mormons, and became an ardent disciple of Prophet Joseph Smith.

Fanny Wright, who was known through her marriage with a Frenchman as Madame D'Aursmont, was born

in Dundee. There she distinguished herself as an author of no mean pretension, but on emigrating to America she made herself notorious as an agitator against the Slave trade and in favour of women's rights.

Another lady whose fame was of quite a different kind was Lola Montez, brought up in Montrose. For long she reigned all powerful in Liberia, through the ascendancy she gained in the middle of last century over Louis I., who created her Countess of Landsfield and allowed her £5000 a year.

But apart from these are other ladies connected with Forfarshire with reputations of a more wholesome and valuable kind—such as Elizabeth Soutar, a blind poetess; Mrs. Agnes Lyon, authoress of the noted song, "Neil Gow's Farewell to Whisky"; Clementina Stirling Graham, authoress of "Mystifications"; Dorothea Ogilvy, who wrote "Scotland is calling you, swallows come home"; and "Deas Cromarty," who, in addition to collaborating with her husband, Rev. Dr. Watson, in several works of note, has written many books of her own, and is a frequent contributor to religious and other journals.

#### HISTORIANS.

The most eminent historian connected with Forfarshire is Hector Boece. Born in Dundee, he was the first Principal of King's College, Aberdeen, and compiled one of the earliest books on Scottish History. It was originally written in Latin, and was translated into English by the learned poet, Bellenden. The first History of Dundee came from the pen of James Thomson, a native of the city, and his work was followed by Alexander Maxwell, belonging to a gifted family which numbered amongst its members Charles C. Maxwell, a litterateur of singular ability. The bearer of another worthy name, Mr. A. C. Lamb, devoted a huge volume to the Antiquities of Dundee, whilst his magnificent Dundee Collection was purchased by Mr. Edward Cox, and presented to the city. Then Mr. A. J. Warden wrote a book on "Angus and its

People," besides contributing to the meeting of the British Association in 1867 an exhaustive review of "The Linen Manufacture of Dundee." Nor should the fact be overlooked that Dr. Millar, the City Librarian, has written many historical works on Forfarshire, as well as on Ayrshire, Renfrewshire, and other Scottish counties. In connection with Dr. Millar should be coupled his predecessor in office, Mr. John Maclauchlan, described by Mr. Carnegie as "the Prince of Librarians."

#### JOURNALISTS.

This reference to Dr. Millar leads naturally to the Journalists, for he was connected with the Press long before he became a librarian. He occupied one of the chief posts in the *Dundee Advertiser* under Sir John Leng, and even since his appointment as chief of the City Library and Art Institute, he continues to write on such literary subjects as engage his special attention. Sir John himself was an able editor as well as a shrewd administrator. After coming to Dundee from Hull in the beginning of 1851, he laid the basis of his own and of the *Advertiser's* fortunes by starting *The People's Journal*, with separate editions for Forfarshire, Fifeshire, Aberdeenshire, and other counties. Not only, moreover, did he work hard and successfully himself even after his election to Parliament for Dundee, but he was the means of bringing to the city many distinguished journalists, like the late James F. Stewart, Sir Carlaw Martin, and the present editor of the *Advertiser*, Mr. Urquhart. Before the advent of Sir John Leng, the *Advertiser* had as its editor Mr. Robert Stephen Rintoul, the founder of *The Spectator*. Connected with the *Dundee Courier* there have also been several able journalists, including Dr. George Buist, Mr. David Hill, Mr. Charles Alexander, and the present editor, Mr. John Mitchell.

#### ARTISTS.

George Paul Chalmers, the brilliant member of the R.S.A., belonged to Montrose. Colvin Smith, one of the

foremost portrait-painters of last century, and the painter of the well-known portrait of Sir Walter Scott, in the National Portrait Gallery of London, was born in Brechin. A noted pupil of his, James Irvine, also a portrait-painter of distinction, is claimed as a native of Forfarshire. Dundee has also produced numerous artists of eminence. Though Henry Harwood, the painter of "The Executive," a work widely known, not only in this city, but wherever Dundonians abound, came from England, he spent most of his life in this city. William Simson, whose famous picture, "Cimabue and Giotto," was highly praised by Wilkie, and purchased by Sir Robert Peel, was born in Dundee. So were Robert Gibb, Frank Laing, and James Douglas. The existing Art Circle in Dundee continues strong, and is dealt with in a special article.

#### ACTORS AND VOCALISTS.

The record of actors and vocalists belonging to or connected with Forfarshire is not a very voluminous one. Harry Lauder is claimed as a native of Arbroath, whilst John More Smieton, the composer of "King Arthur," hails from Dundee. It was in this town, also, that John Wilson, the eminent Scottish vocalist, first sung in public, giving his inimitable rendering of "The Flowers of the Forest." Two actors of note were also given by Dundee to the stage. First Tom Powrie, whose performances of "Rob Roy," not only in his native town but also in Drury Lane Theatre, London, gained him flattering opinions from the press and the public. Second, William Mollison, whose chief and favourite rôle was "Bailie Nicol Jarvie." Mr. Mollison, however, had histrionic gifts which extended beyond the personation of the pawky magistrate of Glasgow, having been at one time a worthy member of the talented company gathered under the wing of Sir Henry Irving.

## MEN OF MEDICINE AND PHILANTHROPISTS.

The famous Dr. Abercromby, physician to James II., was a native of Forfar, and so was Dr. Key, whose sister became the wife of Sir David Brewster.

Dr. John Crichton, the eminent lithotomist, belonged to Dundee, and indeed was rarely out of it after settling down there at the end of his medical studies in Edinburgh. And, as matter of fact, he was never out of Scotland. As a surgeon he had an extensive practice, performing upwards of two hundred times the then (before the days of chloroform) difficult and critical operation of lithotomy. Out of all these patients, varying in age from two to eighty-five, it is stated that only fourteen died; the rest making excellent recoveries.

Sir Morell Mackenzie, the eminent throat specialist, was at one time an assistant to Dr. Webster of Dundee, whilst Sir Andrew Clark—Mr. Gladstone's physician—acted in a similar capacity to Dr. Patrick Nimmo. Other notable medical men connected with Dundee, besides the Nimmo's, Patrick and Matthew, were Dr. Arnot, Dr. Munro, Dr. Cook, Dr. Miller, Dr. Crockett, Dr. Pirie, Dr. Greig, whose son is now one of the leading surgeons in the city, which can also boast of practitioners like Professor MacEwen, Professor Stalker, Dr. Sinclair, Dr. Buist, Dr. Mackie Whyte, Dr. Kynoch, Dr. MacGillivray, Dr. Guild, Dr. Campbell, Dr. Templeman, Medical Officer of Health, and Dr. Tulloch.

## PHILANTHROPISTS.

Amongst the philanthropists who have done so much for Forfarshire, a foremost place must be assigned to Lady Jane Ogilvy, daughter of the Earl of Suffolk, and wife of Sir John Ogilvy, Bart. It was to her exertions that two of the noblest charitable institutions in Dundee—the Baldovan Orphanage and the Convalescent Hospital—were established. But independent of this her private benefactions were great. The Hon. Mrs. Ogilvy, daughter

of Lord Kinnaird, and married to the eldest son of Sir John Ogilvy, was distinguished for many worthy acts of benevolence, while to still a third bearer of the name, widow of Sir George Ogilvy, Dundee is indebted for an hospital devoted to the maintenance, clothing, and education of poor boys.

The late Provost Moncur gave many benefactions to the city and neighbourhood, including the sanatorium at Auchterhouse and the Bannatyne Convalescent Home at Newtyle. Two other philanthropists, still carrying on good work, are Sir W. Ogilvy Dalgleish and Mr. J. K. Caird, the latter being the donor of the Cancer Hospital, of several gifts to University College, and of the mansion house and gardens of Springfield to the city as a haven of rest for old and young. Then the Morgan family, with a most romantic career behind them, are to be kept in grateful remembrance for their many noble donations to Dundee, including the magnificent educational institution, the Morgan Academy.

A few lines ought to be given to a philanthropist of another kind, one who, in propagating the famed Victoria potato, bestowed a great gift on the human race. This is William Paterson, whose father was a market gardener in Dundee. Paterson began his experiments with the potato about 1826, and carried them on most successfully in Fifeshire as well as Forfarshire, producing first of all the Victoria, from which all the best potatoes of the present day are descended. It was on this potato that the bulk of the country people subsisted in Ireland during the famine caused by the failure of their own crops. Paterson belonged to an able family. One of his uncles was Dr. Alexander Paterson, noted as an orchid grower and antiquary, while his brother, who served his law apprenticeship in Dundee—Mr. Duncan Wilkie Paterson—became an eminent Solicitor to the Supreme Court in Edinburgh.

Turning from Dundee to Forfar, there is no name or personality more highly honoured than that of the late Peter Reid. By outsiders, more especially by railway

travellers in Scotland, he is known in connection with the "Forfar Rock," but in Forfar itself he is remembered as the "Grand Old Man"—he lived to the long age of ninety-four—as the giver of a public park, opened by Lord Morley; of beautiful halls, which were handed over as a perpetual gift to the town; and of a Convalescent Ward at the Infirmary. He was for many years Provost of Forfar, and besides being a keen student, possessed a most retentive memory, out of which he could pour rich stories, descriptive of the scenes and people of bygone days.

### MEN OF COMMERCE AND INDUSTRY.

As one reason for leaving Merchants, Manufacturers, and other captains of Commerce and Industry, to the close of this roll of fame, it may be pleaded that as the list begins with the patriot Wallace, so it may fittingly end with patriots of a different stamp—men who have laid the foundations of and built up those Forfarshire trades and industries which are world-wide in their reputation. The names of Baxter, Edwards, Cox, Armitstead, Gilroy, Sharp, Scott, Grimond, Henderson, Caird, Gow, Fergusson, Keiller, Low, Halley, Thomson, Carmichael, and others connected with the Jute, Engineering, Shipbuilding, and Marmalade industries of Dundee and other parts of Forfarshire, are everywhere familiar as household words. Their manufactures go all over the globe, and their financial transactions are known in all markets and exchanges. Many of their works will no doubt be thrown open to the members of the British Association now, just as they were in 1867, and those who enjoyed the privilege of attending the meeting forty-five years ago, can have an opportunity of seeing the improvements that have been made in machinery and equipment—improvements that conduce not only to more perfection in the materials produced, but to the greater comfort of the workers.

## James Bowman Lindsay, Scientist and Philologer.

By A. H. Millar, LL.D., Chief Librarian, Dundee.

THE name of James Bowman Lindsay has lately come into prominence not only in Dundee but also on the European continent and in America, especially in connection with the subjects of Electric Lighting, Electric Traction and Motor-power, and Wireless Telegraphy. Fifty years have elapsed since he sank, almost unnoticed, into an undistinguished grave ; and a generation which was not worthy of him, which regarded him as a crank and a faddist, an uncommercial dreamer of dreams and seer of visions, suffered him to slip into oblivion. Few men of genius have been so indifferent to fame as was this humble scientist, who pursued his scientific and philological researches with unselfish devotion, caring little for the applause of his contemporaries, and willing to leave his work for the verdict of posterity.

The life of Lindsay was not full of "loud and strange adventure," yet it is strikingly attractive as a record of constant self-denial, of the pursuit of knowledge under difficulties, and of the triumph of stern resolution over adverse circumstances. In one of the Supplementary Volumes of the "Dictionary of National Biography," I have given a necessarily brief outline of Lindsay's career ; and a slight sketch of his life is alone necessary here, so as to make his position intelligible.

### LINDSAY'S BIRTH AND EARLY YEARS.

James Bowman Lindsay was born at Carmyllie on 8th September 1799. His father was engaged in agriculture, and he would certainly have been devoted to a farming

life had not the delicacy of his constitution forbidden this project. He was accordingly placed as a boy under the care of a local handloom-weaver, and was reared to follow that occupation. He had early shown a decided love of learning, and his calling did not hinder the prosecution of his studies. It is related that "often he would be seen on his way to Arbroath, his web of cloth firmly tied on his back, and his open book in his hand. After delivering his cloth and obtaining fresh material he returned to Carnyllie in the same fashion." His studious nature attracted the notice of his parents, and they decided, with true Scottish self-denial, to limit their expenses so that James might have the privilege of a regular College training.

#### A STUDENT AT ST. ANDREWS.

In 1821, when in the twenty-second year of his age, Lindsay matriculated at St. Andrews University. Up till that time he was entirely self-educated, yet with all the disadvantages thus entailed upon him he took a distinguished place, especially in mathematics and physical science. At this time he did not display that linguistic faculty which latterly entitled him to rank high as a philologist. Following the ancient custom of the poor Scottish student, Lindsay spent the summer recess working at his trade as handloom-weaver; but in the later years of his curriculum he took private pupils, and was thus able to carry on his own studies. His intention was to devote himself to the ministry, and having completed his Arts course, he entered the Divinity Hall, and finished his curriculum as a student of theology. Before he sought the position of a licentiate of the Church of Scotland, however, a new career had opened to him. In 1829 he was appointed Lecturer on Science and Mathematics at the Watt Institution in Dundee. In 1833 Lindsay took up his residence in Dundee, and formed classes for instruction in science. The trend of his scientific investigations and the scope of his teaching is shown by the advertisement which appeared in the *Dundee Advertiser* of 11th April 1834, which is as follows—

“J. B. Lindsay resumes classes for cultivating the intellectual and historical portions of knowledge and instruction on April 14, 1834, in South Tay Street, Dundee. In a few weeks hence a course of lectures will be formed on frictional, galvanic, and voltaic electricity, magnetism, and electromagnetism. The battery, already powerful, is undergoing daily augmentation. The light obtained from it is intensely bright, and the number of lights may be increased without limit. A great number of wheels may be turned (by electricity), and small weights raised over pulleys. Houses and towns will in a short time be lighted by electricity instead of gas, and heated by it instead of coal; and machinery will be worked by it instead of steam—all at a trifling expense. A miniature view of all these effects will be exhibited, besides a number of subordinate experiments, including the discoveries of Sir Humphry Davy.”

In March 1841 Lindsay was appointed teacher in the Dundee Prison, at a salary of £50 per annum; and he remained in this post for seventeen years, resigning it in October 1858. It is said that before he had entered on his duties he could have obtained a position on the scientific staff of the British Museum, but as this would have forced him to leave his aged mother, he gave up the brilliant prospects thus open to him, and remained in comparative obscurity, a willing martyr to filial devotion. Lindsay's skill as a teacher even among the fluctuating pupils in the Prison was so manifest that it is said one of the prisoners upon whom he bestowed especial pains afterwards became an astronomer of some note. The scientific discoveries of Lindsay, to which reference is made below, attracted the notice of several eminent men of science, and his case was mentioned to the Earl of Derby when Prime Minister, and in July 1858, on the recommendation of Lord Derby, he was granted an annual pension of £100 “in recognition of his great learning and extraordinary attainments.” This bounty enabled Lindsay to resign his task as a Prison Teacher, and to devote himself entirely to literary and scientific pursuits. He was not fated to enjoy this relief for a long period. From his childhood he had never been robust, and during his

life as a teacher even the miserable pittance which he earned officially was not expended upon the nourishment which he should have had. His passion for purchasing books relating to his studies, and for acquiring instruments necessary for his researches, led him to starve himself that he might cultivate literature. When disease came at length upon him, his emaciated frame was not able to throw it off. He was seized with a severe attack of diarrhœa, and after five days' extreme illness he died. On the morning of Sunday, 29th June 1862, he passed peacefully away. His remains were interred in the Western Cemetery. When the centenary of Lindsay's birth occurred in September 1899, a movement was originated to have a suitable monument placed at his grave. The late Sir John Leng, M.P., took an active part in the matter, and ultimately a splendid granite obelisk was erected by public subscription, and unveiled in 1901, among those present being Sir W. H. Preece (a personal friend of Lindsay) and Sir James Sievwright. The granite tablets on the obelisk bear quotations from Lindsay's letters regarding the future development of electricity as a motor power and an illuminant. He was never married, and spent his life in Dundee entirely alone. After his health began to give way in 1860, a niece from Carmyllie kept house for him, and he took an interest in her, and began to superintend her studies. A family dispute, however, led to her return to the house of her parents, and from that time till his death Mr. Lindsay lived by himself, wholly absorbed in his philological and scientific studies.

#### LINDSAY'S DICTIONARY IN FIFTY LANGUAGES.

When Lindsay was at St. Andrews University he did not show any special proficiency in the study of languages; but when his interest was awakened in philology he pursued his studies with characteristic energy. In 1828 he began to compile the Pentecontaglossal Dictionary, a work which he regarded as that upon which his future fame would rest. For more than a quarter of a century

he spent all his spare time upon this remarkable compilation, and had made considerable progress with it at the time of his death. The MSS. were collected in 1893 and were handed over to the Trustees of the Dundee Public Library, thus realising in some degree the hope which Mr. Lindsay had expressed to Mr. Henry Robertson shortly before his death. "I may not live to finish it," he said, "in which case I think it ought to be placed in some permanent gallery, possibly the British Museum, so that students may consult it with freedom at pleasure." The merest outline of this gigantic work will give some idea of the immense labour and erudition bestowed upon it. The Pentecontaglossal Dictionary gives synonyms in the following languages, viz. :—English, Scottish, Anglo-Saxon, Gothic, Icelandic, Danish, Swedish, Dutch, German, Greek, Modern Greek, Latin, Italian, Spanish, Portuguese, French, Gaelic, Thibetan, Cornish, Armoric, Manx, Welsh, Hebrew, Chaldee, Syriac, Arabic, Persic, Sanskrit, Hindustani, Russian, Polish, Bohemian, Malay, Chinese, Tonquin, Turkish, Armenian, Coptic, Tonga, Kurdish and Georgian, Susu and Haussa, Ethiopic, Hungarian, Finnish, Tahitan, Raratongan, New Zealandish, Madagascan, Sechuanan, Esquimaux, and Bengali. By adding correlatives from remote dialects he brought up the number to eighty-three languages. Mr. Lindsay's project was to complete the MS. and then visit the principal Continental Universities and secure orders for the work before he began to print it, but death interrupted the scheme. Despite the protracted labour expended on this Dictionary, it is doubtful if it would ever have proved of great utility; and it may rather be regarded as a monument of perseverance under crushing difficulties than as a contribution to practical philology. In 1846 Lindsay published a book entitled "The Pentecontaglossal Paternoster, or the Lord's Prayer in Fifty Languages," which was a specimen of the kind of work in the Dictionary. The book was issued in a limited edition, and is now rare. He published in 1858 his "Chrono-Astrolabe; a full set of astronomical tables," which was intended to assist in the calculation of chrono-

logical periods. It attracted some notice at the time of publication.

#### LINDSAY'S ELECTRICAL RESEARCHES.

When the Dictionary was handed over to the Free Library, Mr. Maclauchlan, the Librarian, found several scraps of MS. in the volume, consisting of mathematical calculations, outlines of sermons, and other memoranda. Among these was the following valuable fragment of autobiography, which is important as showing the time when Lindsay began his experiments in electricity. The announcement of Oersted's discovery of the deflection of the magnetic needle under the influence of an electric current was made in 1820, and apparently Lindsay was then making researches in the same direction:—

“ Previous to the discovery of Oersted, I had made many experiments on magnetism, with the view of obtaining from it a motive power. No sooner, however, was I aware of the deflection of the needle and the multiplication of the power of coils of wire than the possibility of power appeared certain, and I commenced a series of experiments in 1832. The power on a small scale was easily obtained, and during these experiments I had a clear view of the application of electricity to telegraphic communication. The light also drew my attention, and I was in a trilemma whether to fix upon the power, the light, or the telegraph. After reflection I fixed upon the light as the first investigation, and had many contrivances for augmenting it and rendering it constant. Several years were spent in experiments, and I obtained a constant stream of light on 25th July 1835. Having satisfied myself on this subject, I returned to some glossological investigations that had been left unfinished, and was engaged with these till 1843. In that year I proposed a submarine telegraph across the Atlantic, after having proved the possibility by a series of experiments. Inquiries on other subjects have since that time engaged my attention, but I eagerly desire to return to electricity.”

A very interesting article upon James Bowman Lindsay,

from the pen of Mr. J. J. Fahie, a well-known writer on the history of electricity, appeared in *The Electrical Engineer* of 6th and 13th January 1899. When examining Lindsay's connection with the electric light, Mr. Fahie brought together all the notices of electricity as an illuminant which he could find recorded.

At the time when Lindsay took up the subject, and for many years after, the voltaic electric light was nothing more than a rare and costly laboratory experiment, just as it left the hands of Humphry Davy, its discoverer. To show this I need only mention a few historical facts.

On 22nd September 1800 Humphry Davy wrote: "I have found that this substance [well-burned wood charcoal] possesses the same properties as metallic bodies in producing the shock and spark when made a medium of communication between the ends of the galvanic pile of Signor Volta" (*Nicholson's Journal*, October 1800, p. 150). In further experiments of the same kind he found that when, instead of the metals, pieces of well-burned charcoal were employed, the spark was larger and of a vivid whiteness (*Journal of the Royal Institution*, 1802, vol. i. p. 106).

In some experiments described in the *Philosophical Magazine*, 1801, Moyes, of Edinburgh, remarked that the voltaic pile was at the height of its strength if sparks were seen in the light of day, even when taken with a piece of charcoal held in the hand (vol. ix. p. 219).

In March 1802 Citizen Robertson, a celebrated aeronaut, a friend of Volta, and one of the founders of the Galvanic Society of Paris, about that date publicly exhibited the electric light from two pieces of charcoal with a pile of 120 elements of zinc and silver (*Journal de Paris*, 12th March 1802).

In the same year Curtet, according to Quetelet, observed the light between carbon points (*Encyclopædia Britannica*, ninth edition, vol. viii. p. 58).

It was in 1809 that Davy first showed a continuous arc of light from charcoal points with a battery of 2000 pairs of zinc and copper plates. In 1809 and 1811 passing

references are found to the electric light; and in 1834 it is stated in the *Mechanic's Magazine* that a carbon point in a current produced a brilliant but intermittent light. This was the position of the electric light when Lindsay made his first exhibition of a continuous light produced by electricity. The discovery was announced in the *Dundee Advertiser* of 31st July 1835 in these terms:—

“Mr. Lindsay, a teacher in town, formerly lecturer to the Watt Institute, succeeded on the evening of Saturday, July 25, in obtaining a constant electric light. It is upwards of two years since he turned his attention to this subject, but much of that time has been devoted to other avocations. The light in beauty surpasses all others, has no smell, emits no smoke, is incapable of explosion, and not requiring air for combustion can be kept in sealed glass jars. It ignites without the aid of a taper, and seems peculiarly calculated for flax houses, spinning mills, and other places containing combustible materials. It can be sent to any convenient distance, and the apparatus for producing it can be contained in a common chest.”

Previous to this time the electric light had been a mere laboratory experiment, and the uses of electricity for other purposes than telegraphing were unknown. Hence the following letter which Mr. Lindsay wrote is really a prophecy which he did not live to see fulfilled, though it is now the most familiar object in the streets of every city. The letter appeared in the *Dundee Advertiser* of 30th October 1835:—

#### “ELECTRIC LIGHT.

“SIR,—As a notice of my electric light has been extensively circulated, some persons may be anxious to know its present state, and my views respecting it.

“The apparatus that I have at present is merely a small model. It has already cost a great deal of labour, and will yet cost a good deal more before my room is sufficiently lighted. Had circumstances permitted, it would have been perfected two years ago, as my plans were formed then. I am writing this letter

by means of it at 6 in. or 8 in. distant; and, at the present moment, can read a book at the distance of  $1\frac{1}{2}$  feet. From the same apparatus I can get two or three lights, each of which is fit for reading with. I can make it burn in the open air, or in a glass tube without air, and neither wind nor water is capable of extinguishing it. It does not inflame paper nor any other combustible. These are facts.

“As I intend in a short time to give a lecture on the subject, my views on the further progress will be unfolded then. A few of these, however, may be mentioned just now.

“Brilliant illumination will be obtained by a light incapable of combustion; and, on its introduction to spinning mills, conflagrations there will be unheard of. Its beauty will recommend it to the fashionable; and the producing apparatus, framed, may stand side by side with the piano in the drawing-room. Requiring no air for combustion, and emitting no offensive smell, it will not deteriorate the atmosphere in the thronged hall. Exposed to the open air, it will blaze with undiminished lustre amidst tempests of wind and rain; and, being capable of surpassing all lights in splendour, it will be used in lighthouses and for telegraphs. The present generation may yet have it burning in their houses and enlightening their streets. Nor are these predictions the offshoots of an exuberant fancy or disordered imagination. They are the anticipated results of laborious research and of countless experiments. Electricity, moreover, is destined for mightier feats than even universal illumination.

J. B. LINDSAY.

“*Dundee, Oct. 28, 1835.*”

The lecture to which Lindsay referred was delivered by him in the Thistle Hall on Thursday, 15th January 1836, and was repeated in the same place on Friday, 21st April 1837. Unfortunately no details have been found as to the apparatus used, though it is probable that a voltaic battery of some kind supplied the force. Years afterwards, Mr. R. S. Rintoul, formerly editor of the *Dundee Advertiser*, and then founder and editor of the *Spectator*, wrote in the latter paper in January 1849 the following suggestive sentence:—“We remember that many years ago, in his remote Scottish residence, Mr. Lindsay produced a brilliant illumination from minute points of

light." Mr. Fahie thinks that this remark suggests how Lindsay obtained the light. He had devised some method whereby the intermittent spark which Davy had shown could be transformed into a continuous arc of light. The comment which Mr. Fahie makes on Lindsay's experiments is that, "as Sir Humphry Davy is known and honoured as the father of the electric light, so in future history Lindsay should occupy his rightful place as the father of electric lighting."

Extensive inquiries made by myself and others on my suggestion have failed to disclose the generator which Lindsay used for his electric light. The only clue that I have found is in a letter which Lindsay wrote on 26th January 1847 to the late Earl of Crawford, which is printed in that nobleman's "Lives of the Lindsays," vol. ii. p. 451. The following passage occurs in that letter:—

"About fifteen years ago I made a great variety of experiments in Electricity, and constructed an apparatus for procuring electric light for illumination instead of gas. About ten or twelve years ago I gave two public lectures on this subject, illustrated by experiments, in Dundee. About fifteen years ago I also perceived the applicability of Electricity as a telegraph, and mentioned it to many persons, but such an idea was generally ridiculed as Utopian. This was long before such an application was hinted at in the public prints, and before Electric Telegraphs were in existence. I also made many experiments on the application of the same science for power instead of steam, but do not claim the merit of being the first that did so. About nine or ten months [corrected in next letter to 'nineteen months'] ago I proposed and described a submarine Telegraph, and, I am convinced, was the first that made such a proposal. In reference to this, I made many experiments, and telegraphed through ponds in Dundee. An account of this was then given in the local newspapers. The *Lexicon alone* has kept me from turning my whole attention to Electricity, but, were it finished, I would once more be free. The Electric Light I have obtained, being from a model, is necessarily small, the plates being only one inch square; but by enlarging them, a light could be got far surpassing gas in brilliance."

Several points are worthy of notice in this letter. Lindsay speaks of having a battery of plates only one inch square. He evidently depended upon electricity developed by corrosion, and not upon frictional electricity for his electric light. In his advertisement, dated 11th April 1834, he says:—"The battery, already powerful, is undergoing daily augmentation." How he could produce a continuous electric light, even with a Rhumkorf intensity coil, by means of a solution battery that could be "contained in a common chest," is a problem which I leave to modern electricians. To me it seems clear that Lindsay's method, if we only knew it, might enable us to dispense with all the expensive generators of the present day which often make electricity dearer than gas.

#### LINDSAY'S SYSTEM OF WIRELESS TELEGRAPHY.

The recent successful introduction of telegraphing without wires, carried out by Signor Marconi, has attracted notice to the much earlier proposals made by James Bowman Lindsay. Of course every electrician knows that Lindsay's system was radically different from that of Marconi. The latter has developed the vibrations or waves which the late Mr. Herz discovered, and uses the atmosphere as his conducting medium. Lindsay proposed to transmit electricity from a battery to a receiver with water as the medium. In 1832 he had demonstrated the possibility of an electric telegraph by experiments in his class room. Here, as in the case of electric lighting, he was induced to devote more of his attention to philology than to electricity, and thus lost the opportunity of becoming one of the most distinguished scientists of his day. To him belongs unquestionably the honour of proposing to connect Britain and America by wireless telegraphy. His first suggestion of a transatlantic connection appeared in the *Northern Warder* for 26th June 1845, when he proposed to have an uninsulated copper wire as the medium. In this letter he also suggested

welding the wire by electricity, a method of operation only recently adopted.\*

Lindsay's letter to the *Northern Warder* was occasioned by the following paragraph which appeared in that paper on 19th June 1845:—

“SOMETHING NEW.

“A correspondent of a New York paper of recent date has started the project of communicating between England and America by means of a magnetic telegraph! The following is his proposed plan:—Suppose a copper wire properly covered and of sufficient size—say, as large as a pipe stem, and long enough to reach from Maine or Nova Scotia to the coast of Ireland—were wound upon reels and arranged on board a steamer, so as to be reeled off as fast as the boat went, and dropped the whole width of the Atlantic. Its gravity would sink it to the depth where the water was so dense as to be of equal gravity, and, of course, beyond the reach of any collision. Beginning and ending upon a bold shore, beyond the reach of anchors, it would be out of harm's way, and exposed to but two kinds of accidents—viz. (1) from separation by its own weight, and (2) the loss of the coating with which the metal must be protected. The steamer *Great Britain* would carry more wire of this size than would extend to Europe, and its cost, I think, would be less than a million of dollars.”

On 21st June Lindsay wrote the following letter which appeared in the *Northern Warder* of 26th June 1845:—

“ELECTRIC TELEGRAPH TO AMERICA.

“SIR,—The few lines I now send you have been occasioned by a notice in your last in reference to an electric telegraph to America. Should the plan be carried into effect the following hints should be attended to:—The wire should be of pure copper, as otherwise it would be injured by the electro-chemical action of the water. The wire must not be composed of parts joined by soldering, but welded together; this welding can be performed by electricity. In order to prevent the action of water

\* Electric welding was proposed by Lindsay in 1845; by Joule in 1856; by Wilde in 1865; and by Prof. Elisha Thomson (America) and Dr. Benardos (Russia) in 1887.

on the wire, a button of a more oxidable metal should be welded to it at short distances; the best metal for this purpose would be lead. If soldered to the wire, it must be soldered by lead alone. No third metal must be used. If welded, it may be done by electricity. In this way the wire resting on the bottom of the sea might last a long time. The one end of the wire is then to be soldered or welded to a plate of zinc immersed in the ocean on the coast of Britain, and the other end similarly joined to a plate of copper deposited in the same ocean on the coast of America. In reference to the expense, suppose the wire to be a ninth or tenth of an inch diameter, then the length of 100 in. would contain a cubic inch of copper, and three miles of wire would contain a cubic foot, weighing 9,000 oz. of the value of about £36 sterling. Owing to the inequalities in the bottom of the ocean, the distance to America might be 3,000 miles, and the expense £36,000 sterling—a trifle when compared with the resulting benefit. The only injury that the wire is likely to undergo is from submarine eruptions. It may be broken by these. The two ends, however, being accessible, the greater part of the wire may be drawn up, and the necessary length of wire welded to it. It should be remembered that this welding must be done by electricity. To Calcutta, by the Cape of Good Hope, the expense would be £200,000. The wire from Calcutta to Canton would cost £70,000, to New Zealand £120,000, to Tahiti nearly £200,000. A wire might be placed round the coast of Britain, and another along the coast of America. There might be stations at different towns and electric clocks agreeing with each other to a second of time. Each town might have a specific time for intelligence. Suppose Dundee to have the hour from nine to ten. From nine to ten minutes past nine, messages are sent and answers received between Dundee and New York. From ten minutes to twenty minutes past nine communication is made between Dundee and Quebec. The rest of the hour is for intercourse between Dundee and other towns. The same is done with Edinburgh, Glasgow, Liverpool, &c., each town having an hour for itself.—L.

“*Dundee, June 21, 1845.*”

Before he wrote this letter Lindsay had been conducting experiments on land telegraphy, and on 6th May 1845 he published a letter in the *Dundee Advertiser*, explaining a new device, in which, I think, you will find

the very first suggestion of marine wireless telegraphy. It is headed "The Autograph Electric Telegraph":—

"SIR,—An improvement on the Electric Telegraph has occurred to me which, so far as I know, is new. I mentioned it to some gentlemen who also think it new, and requested me to publish an account of it. A similar idea may have occurred to others, although I have not heard of it, and this may happen the more readily because my attention has for some time been turned in another direction.

"In order to understand the improvement alluded to, an account of the Electric Telegraph may be here given. This is the more necessary, as many of your readers may not know the *modus operandi* of the Telegraph; and I shall give the same description of it that I gave to several individuals two or three years before any account of it was in the Journals. Variations there may be in the different Telegraphs, but the principle is the same in all.

"Suppose, then, that intelligence is to be sent in this way from Dundee to Arbroath, a person at Dundee puts a plate of copper and another of zinc into a tumbler of water; the plates must be kept from touching each other. A wire is soldered to the zinc plate extended to Arbroath, and brought back to Dundee. At Arbroath this wire, covered with cotton thread, is wound round a short iron rod. A magnetic needle is put beside this rod. The end of the wire that was brought back to Dundee is now made to touch the copper plate; the iron rod thus becomes magnetic, and causes a vibration or deviation of the needle. A person at Arbroath observes this deviation, and hence concludes that the circle is completed. Suppose now twenty-four wires instead of one, all covered with cotton, rubbed over with wax, bundled up together, and covered over with tarred twine. These wires, which correspond to the letters of the Alphabet and bear their names, are separated from each other at Arbroath. Each is wound round its own iron rod, and each rod has its own magnetic needle. The person at Dundee then spells the words of the message by completing in succession the circles that correspond to the letters. The person at Arbroath observes the order in which the needles vibrate, and from them easily spells the words of the message. In order to give warning to the person at

Arbroath, an additional wire may be used to ring a bell. Such was the plan that occurred to me many years ago.

“The improvement that I have to suggest just now is to render constant watching at Arbroath unnecessary, and to send a communication whether there is any person to observe it or not. This may be done by having all the magnetic needles to move in a vertical plane. Above each needle is a groove, about an inch distant from it, and two feet long. This groove is slightly inclined to the horizon, and filled with pith balls, all marked with the same letter as the needle under them. A catch at the lower end of the groove will prevent them from rolling off. A pin is attached to the extremity of each needle. When this extremity of the needle is raised, the pin passes through a small aperture directly under the lowest pith ball. The pith ball is thus elevated. The other balls roll down a little and prevent the return of the first one. This ball then rolls off, falls into a hopper, which conveys it to a tube, slightly inclined to the horizon, three or four feet long, and having a diameter a little greater than that of the ball. The extremity of the needle being then depressed, the second pith ball occupies the place of the first one, and the process may be repeated.

“In order to make the process more easily understood, an example may be given. Suppose then the communication to be sent is, ‘The train will start at two.’ The wire ‘t’ corresponding to the first letter, is made to touch the copper plate. The rod ‘t’ is thus magnetised, the needle ‘t’ is elevated, the pin ‘t’ raises the ball ‘t’ which falls down and rolls to the lower extremity of the inclined tube. Exactly the same thing is done with ‘h,’ the second letter, and ‘e’ the third, and all the other letters in succession. The balls thus lie in their exact order in the inclined tube. The tube may be made of glass, and the person at Arbroath may read in it—‘The train will start at two.’ In this communication there are twenty-two letters; now, suppose each letter occupies two seconds, the information will arrive in forty-four seconds to Arbroath, Calcutta, or Peking.

“Such is the idea that has casually occurred to me. I have no doubt of the success of it. Other studies prevent me from experimenting at present, but I think the improvement an important one.

J. B. LINDSAY.

“P.S.—Instead of twenty-four wires two might be used, but

with less convenience. The returning wires would be unnecessary if the one plate was inserted in the river at Dundee, and the other in the sea at Arbroath. The plates may be larger than I have supposed, and the water acidulated.

“J. B. L.”

There are two points that claim attention in this remarkable letter. I do not dwell on the “pith ball” notion, for though it is clever, it could never have kept its hold against the Morse system. But you will notice that his postscript is almost feminine in its comprehensiveness. At the time he wrote, the prevailing system required twenty-four wires to correspond to the letters of the alphabet. Lindsay calmly suggests that two would be sufficient. Then, instead of twenty-four returning wires, he states that the return current might be sent by sea without any wires—in short, he proposed wireless telegraphy in theory in 1845, eight years before he demonstrated it by public experiment.

Return now to his proposal for a transatlantic telegraph. Between 1845 and 1853 Lindsay does not appear to have done anything in furtherance of his Atlantic project, being probably wholly absorbed in his linguistic and chronological studies. At all events, we hear nothing from him until 11th March 1853, when the following notice appeared in the *Dundee Advertiser*:—

“LECTURE ON THE ELECTRIC TELEGRAPH.

“Mr. J. B. Lindsay proposes to give a public lecture on the electric telegraph, and to transmit and receive intelligence by means of two machines. The lecture will contain a description of these machines, with their mode of operation, and the most eligible lines by land and water to America, Australia, and other parts of the world will be pointed out. This lecture is appointed for Tuesday evening, March 15, in the Thistle Hall, at eight o'clock. *N.B.*—Mr. L. claims to have been the first that proposed and described the modern electric telegraph. He was the first that executed and announced a submarine one, and he has now discovered that instantaneous intelligence can be transmitted to all parts of the world without the aid of a submerged wire.”

In the same paper a week later, 18th March 1853, a report of the lecture is given as follows :—

“TELEGRAPHIC COMMUNICATION.

“On Tuesday evening our learned and ingenious townsman, Mr. J. B. Lindsay, delivered a lecture on the above subject, one with which he has an acquaintance second to no man in the kingdom. It would be impossible, in the limited space at our disposal, to give any *vidimus* of the lecture; we can only indicate the outline of a recent discovery made by Mr. Lindsay, involving a principle which, if capable of acting irrespective of distance (and we see no reason to doubt that it is), must by and by revolutionise all our ideas of time and space. Mr Lindsay stated the principle to be that submerged wires, such as those now used for telegraphic intelligence between this country and Ireland and France, were no longer necessary. By a peculiar arrangement of the wires at the sides of rivers or seas, the electric influence can be made to pass on through the water itself. This proposition was certainly startling, but he illustrated it on a small scale by means of a water-trough, and, so far as the experiment went, it faithfully developed the principle. Mr. Lindsay, after concluding these experiments, proceeded to point out the lines which appeared to him most eligible for transmitting telegraphic intelligence throughout the world; and, having done so, he wound up with a peroration of great beauty, in which the wonders to be achieved by electric influence in the days to come were eloquently set forth. It is a fine sight to see this learned and philosophic man pursuing the studies of science and literature, not for the sake of any empty applause, but for those pure pleasures they are in themselves so well fitted to bestow. At the same time it is gratifying to know that there are many people capable of appreciating the modest and retiring character of Mr. Lindsay, a fact which was clearly evidenced on Tuesday evening by the numerous and most respectable meeting which then assembled to hear his scientific lecture.”

Having demonstrated wireless telegraphy as a laboratory experiment, Lindsay determined to try his system on a larger scale. His first attempt was made at

Carolina Port, Dundee, and is thus described in the *Dundee Advertiser* of 12th April 1853:—

“MR. LINDSAY’S MARINE TELEGRAPH.

“On Saturday last we had an opportunity of seeing in operation, on a large scale, Mr. Lindsay’s Marine Telegraph. One of the ponds at Carolina Port was the place chosen for the experiment. The breadth of the ‘electric leap’ was about 60 feet, and the longitudinal one about 120—the passage of the current of electricity being indicated on the opposite side by the motion of the magnetic needle. The experiment removes all doubt of the practicability of Mr. Lindsay’s invention; and there is every reason to think that it will soon connect continent with continent, and island with island, in one unbroken line of communication.”

In August 1853 Lindsay delivered a lecture in Glasgow on Wireless Telegraphy. No report of this lecture has been found save the mere statement of the fact. During the following six months he seems to have been working assiduously at the problem of wireless telegraphy. On 6th September 1853 a letter from him on the subject appeared in the *Dundee Advertiser*:—

“*Dundee Advertiser*, 6th September 1853.

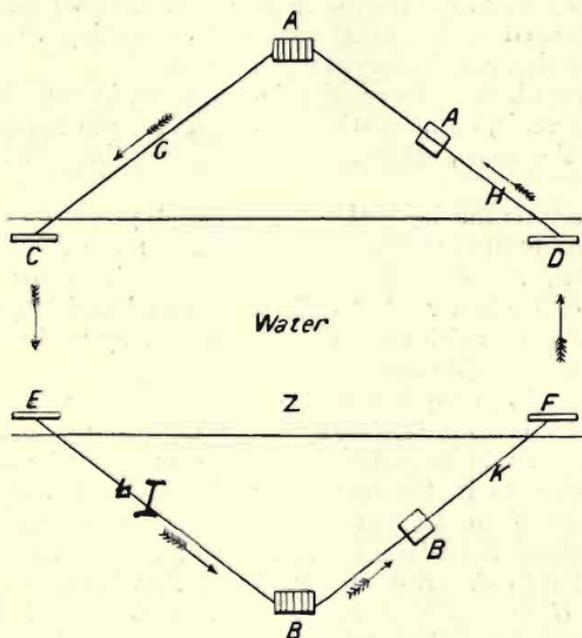
“TRANSMARINE TELEGRAPH.

“SIR,—By further experiments I find that salt water is not necessary, as I at first supposed, for the crossing of electricity. By a larger battery, fresh water does equally well. In attempting to cross the Tay, my idea has always been to begin at a narrow part of the river, and widen gradually, noting at the same time the required increase of battery; the objection to this, however, seemed to be that at the narrow part the water was fresh, and that the experiment on this account would not succeed. This objection no longer exists, since fresh water has been found permeable.

J. B. LINDSAY.”

So sanguine was he of the feasibility of his method that, on 5th June 1854, he took out a patent for it. The

following is a condensed account of it, which is extremely interesting at the present time, as it shows how well Lindsay understood the conditions of the problem nearly sixty years ago.



“ My invention consists of a mode of transmitting telegraphic messages by means of electricity or magnetism through and across water without submerged wires, the water being made available as the connecting and conducting medium by the following means :—

“ On the land, on the side from which the message is to be sent, I place a battery and telegraph instrument, to which are attached two wires terminating in metal balls, tubes, or plates placed in the water, or in moist ground adjacent to the water at a certain distance apart, according to the width of the water to be crossed (the distance between the two balls, plates, or tubes, to be greater than across the water when practicable). On the land which is situated on the opposite side of the water, and to which the message is to be conveyed, I place two similar metal balls, plates, or tubes, immersed as above stated, and having wires attached to them which lead to and are in connection

with another battery and needle indicator or other suitable telegraphic instrument. *A A* in the annexed diagram show the position of the battery and instrument on one side of the water, *Z*; *B B*, the battery and instrument on the opposite side; *C, D, E, F*, metallic or charcoal terminators; *G, H, I, K*, wires insulated in the usual way, and connecting the terminators, batteries, and instruments, as shown.

“As regards the power or primary agent, it may be either voltaic, galvanic, or magnetic electricity, and the apparatus for evolving the same, such as is used for ordinary telegraphic purposes.

“As regards the indicating apparatus, I propose to employ any of the instruments in known use which are most efficient for my purpose, observing that the needle indicator may be arranged either in a vertical or in a horizontal position, and that the coil of wire which actuates the needle may be increased or diminished according to circumstances.

“Suppose it is required to transmit a message from *A*, the operator completes the circuit of the electric current as ordinarily practised. It will be evident that the current will have two courses open to it, the one being directly back through the water from *C* to *D*, and the other across the water from *C* to *E*, along the wires *I K*, through the instrument *B*, and back from *F* to *D*. Now, I have found that if each of the two distances *C D* and *E F* be greater than *C E* and *D F*, the resistances through *C E* and *D F* will be so much less than that through the water between *C* and *D*, that more of the current will pass across the water, through the opposite wires, and recross at *F*, than take the direct course, *C D*; or, more correctly speaking, the current will divide itself between the two courses in inverse ratio to their resistances. As cases may arise, from local or other causes, such as not to admit of the distance between the immersed plates being greater than the distance across the water, I propose then, to augment the force of the batteries, and to increase the size of the plates, so as to compel a sufficient portion of the current to cross. I prefer, however, when circumstances admit of it, employing the first method.”

Lindsay's first public trials were across the Earl Grey Dock at Dundee, and then across the Tay at Glencarse, where the river is nearly three-quarters of a mile wide. In August 1854 he conducted a series of experiments at

Portsmouth, in which, according to a notice in the *Morning Post* (28th Aug.), and *Hampshire Telegraph*, 26th August 1854, he completely succeeded in transmitting messages across the Mill-dam, where it is about 500 yards wide. These experiments are also noticed in *Chambers's Journal*, September 1854, as follows:—"Again has an attempt been made to send a signal through water without a wire; this time at Portsmouth, where it was attended with partial success."

Lindsay repeated these experiments at intervals and at various places, indeed whenever and wherever he had the chance, his greatest performance being across the Tay, from Dundee to Woodhaven, where the river is nearly two miles broad. On one of these occasions, and when an Atlantic telegraph began to be seriously debated, the difficulty of finding a steamer large enough to carry the cable was discussed, when Lindsay quietly remarked, "If it were possible to provide stations at not more than 20 miles distant all the way across the Atlantic, I would save them the trouble of laying any cable."

In September 1859 Lindsay read a paper before the British Association at Aberdeen, "On Telegraphing Without Wires," which drew from Lord Rosse, the president of the section, special commendation. Prof. Faraday and (Sir) G. B. Airy, then Astronomer-Royal, also added their approval of the views enunciated. Prof. Thomson (Lord Kelvin) was also present, and, as is well known, was then deeply engaged with Atlantic cable projects. History does not say what *he* thought of the poor Dundee lecturer, but, with the experience of sixty years, we can easily guess.

An abstract of the paper was published in the annual report of the British Association for 1859, as follows:—

"The author has been engaged in experimenting on the subject, and in lecturing on it in Dundee, Glasgow, and other places since 1831. He has succeeded in transmitting signals across the Tay, and other sheets of water, by the aid of the water alone as a means of joining the stations. His method is to immerse two large plates connected by wires at each side of

the sheet of water, and as nearly opposite to each other as possible. The wire on the side from which the message is to be sent is to include the galvanic battery and the commutator, or other apparatus for giving the signal. The wire connecting the two plates at the receiving station is to include an induction coil, or other apparatus for increasing the intensity, and the recording apparatus. The distance between these plates he distinguished by the term 'lateral distance.' He found that there was always some fractional part of the power from the battery sent across the water. There were four elements on which he found the strength of the transmitted current to depend—first, the battery power; second, the extent of surface of the immersed sheets; third, the 'lateral distance' of the immersed sheets; and fourth, in an inverse proportion the transverse distance, or distance through the water. As far as his experiments led him to a conclusion, doubling any of the former three doubled the distance of transmission. If, then, doubling all would increase the intensity of the transmitted current eightfold, he entered into calculations to show that two stations in Britain—one in Cornwall, and the other in Scotland, and corresponding stations well chosen in America—would enable us to transmit messages across the Atlantic."

A fuller report of this paper appeared in the *Dundee Advertiser*, from which I take the following interesting details:—

"Recently Mr. Lindsay had made additional experiments, and succeeded in crossing the Tay where it was three-quarters of a mile broad. His method had always been to immerse two plates or sheets of metal on the one side, and connect them by a wire passing through a coil to move a needle, and to have on the other side two sheets similarly connected, and nearly opposite the two former. Experiments had shown that only a fractional part of the electricity generated goes across, and that the quantity that thus goes across can be increased in four ways: (1) by an increased battery power; (2) by increasing the surface of the immersed sheets; (3) by increasing the coil that moves the receiving needle; and (4) by increasing the lateral distance of the sheets. In cases where lateral distance could be got he recommended increasing it, as then a smaller battery power would suffice. In telegraphing by this method to Ireland

or France abundance of lateral distance could be got, but for America the lateral distance in Britain was much less than the distance across. In the greater part of his experiments the distance at the sides had been double the distance across; but in those of the Tay the lateral distance was the smaller, being only half a mile, while the distance across was three-quarters of a mile.

"Of the four elements above mentioned he thought that if any one were doubled the portion of electricity that crossed would also be doubled, and if all the elements were doubled the quantity transmitted would be eight times as great. In the experiments across the Tay the battery was of 4 square feet of zinc, the immersed sheets contained about 90 square feet of metal, the weight of the copper coil was about 6 lbs., and the lateral distance was, as just stated, less than the transverse; but if it had been a mile, and the distance across also a mile, the signals would, no doubt, have been equally distinct. Should this law (when the lateral distance is equal to the transverse) be found correct, the following table might then be formed:—

Zinc for Battery.	Immersed Sheets.	Weight of Coil.	Distance Crossed.
4 sq. feet.	90 sq. feet.	6 lbs.	1 mile.
8 "	180 "	12 "	8 miles.
16 "	360 "	24 "	64 "
32 "	720 "	48 "	512 "
64 "	1,440 "	96 "	4,096 "
128 "	2,880 "	192 "	32,768 "

*Note.*—The weight of coil proposed may seem to modern electricians absurdly disproportioned; but it should be remembered that the method of reducing the diameter of the wire to intensify the current was then not understood. The electromagnet first used by Morse on the Washington-Baltimore line (1844), and exhibited in Europe, weighed 185 lbs. The arms were  $3\frac{1}{2}$  in. long and 18 in. diameter, the wire (copper) being that known as No. 16—the same size as the line wire, it being then supposed that the wire of the coils and of the line should be of the same size throughout. Down to 1860 not a few practical telegraphists held this view. See D. G. Fitzgerald in the *London Electrical Review*, 9th August 1895, p. 157.

"But supposing the lateral distance to be only half the trans-

verse, then the space covered might be 16,000 miles, and if it was only a fourth, then there would be 8000 miles—a much greater distance than the breadth of the Atlantic. Further experiments, however, were necessary to determine this law, but according to his calculations, he thought that a battery of 130 square feet, immersed sheets of 3,000 square feet, and a coil of 200 lbs. would be sufficient to cross the Atlantic, with the lateral distance that could be obtained in Great Britain.”

After the reading of the paper Lindsay carried out some very successful experiments across the River Dee, in the presence of Lord Rosse, Professor Jacobi, of St. Petersburg, and other members of the Association. In February 1860 (*Dundee Advertiser*, 21st Feb.) he made Liverpool the scene of his operations, but there, strange to say, he had not the success which hitherto attended him. The experiments failed, being “counteracted by some unaccountable influence which he had not met before.” However, on 10th July 1860, he was again successful at Dundee in his experiments across the Tay, below the Earn, where the river is about 200 yards wide. This was Lindsay’s final public connection with the telegraph; but to the last day of his life (29th June 1862) he remained perfectly convinced of the soundness of his theories, and of their ultimate success. His name is worthy of being associated with the two great electrical triumphs of the nineteenth century—the electric light and wireless telegraphy.

## Roll of Burgesses and Portraits.

By W. H. Blyth Martin, Town Clerk.

IN the year 1581, nine years after the death of John Knox, and when Queen Mary was a prisoner in England, and the young King James practically a prisoner in Scotland, one James Haliburton was Provost, and one Magister Alexander Wedderburn, who resided on the south side of the Nethergate, a little to the west of Crichton Street, was Town Clerk of Dundee.

It was this Alexander Wedderburn, *Archigraphus, Civitatis Deidonanæ*, who in that year began the compilation of the Roll of Freemen or Burgesses of the Burgh of Dundee. The volume which contains these names, and which is known as the Lockit Book, is one of Dundee's most treasured historical possessions, and it is still in use. It is a manuscript volume of 1020 pages of unruled antique paper, bound in leather-covered wooden boards, and closed with two engraved brass clasps fitted with locks and keys, and it is kept in the Charter Room in the Town House.

Although the book was begun in 1581, the author, from the records in his possession, commenced the Roll of Burgesses as from the year 1513, the names of some 1700 Burgesses between the years 1513-1581 being transcribed in the beginning of the volume in what appears to be the same handwriting.

The earliest records of the Burgh were destroyed probably about the years 1547 to 1550, when Dundee was harried by English soldiers, but it is known that from the earliest times there were Magistrates and Councillors exercising authority in the Burgh. What, however, formed the basis upon which the commonwealth of the

Burgh was established was the privileges of freemen or burgesses.

The Burgess Degree was highly valued. None but the sons and the husbands of daughters of freemen could claim admission to it at a reduced price, and to strangers the privilege was only obtainable either by purchase at the full price, or by the gift of the Burgh. The right of admission to the Burgess Roll is always, therefore, for some specified cause, such as *ratione libertatis sui patris*, "through right of his father"; *ad rogatum Regis*, "by request of the King"; *pro bono servitio*, "for good services"; *pro consilio et auxilio suo servendo burgo de Dundee*, "for his council and aid in the service of the Burgh of Dundee"; or for some other good and specified reason.

All Burgesses had to take the Burgess Oath by which they bound themselves to maintain both King and Country as by law established.

The inscription at the beginning of the book is as follows:—

"Heir followis the Names of the Burgessis, friemen, and Brether of Gilde of the Burgh of Dundie, maid sen the moneth of September In the zier of God ane thowsand fyve hundreth and threttene zeiris, and of sic persones as sall obtene the fredome and libertie Thairof in tyme cuming."

To give even the most limited account of the many names in the Lockit Book is quite impossible in this short article. It, therefore, will condescend only on a few of the names which the writer thinks may prove of most interest to the readers. To local readers it may be especially interesting to read the names of families which are still locally honoured.

Under date 3rd October 1513 is the name of

1513.—John Scrymgeour, Constable of Dundee. The name of Scrymgeour is closely connected with the history of Dundee in these early years. In the time of William Wallace, in the end of the thirteenth century, the Castle of Dundee was held by the English. After a siege of

some duration by Wallace it was surrendered to Alexander Scrymgeour, the Royal Standard Bearer, who received from the Guardian of Scotland for his services a grant of the Hereditary Office of Constable of the Castle and of the Town, together with a gift of certain lands in the neighbourhood, and there are many references to difficulties and quarrels between the Town and the Scrymgeours, especially at the time of the Annual Fair, which to this day is held in the Town and goes by the name of the Lady Mary Fair.

1514.—Alexander, Earl of Crawford, and Lord Lindsay.

1515.—James, Lord Ogilvy, whose descendant is the present Earl of Airlie.

1515.—Robert Maule of Panmure, the ancestor of the Earl of Dalhousie.

1535.—Thomas Clayhills, the ancestor of the Clayhills—Hendersons of Invergowrie.

1559.—Alexander Guthrie of Guthrie.

1601.—George Marquess of Huntly.

1603.—William Graham of Claverhouse, the ancestor of Viscount Dundee, known as "Bonnie Dundee."

1620.—John, Earl of Kinghorne, and Frederick Lyon, his brother, a family represented now by the Earl of Strathmore and Kinghorne.

The writer passes over a period now of nearly two centuries, during which many notable names are chronicled, and gives a few names of the more important Burgesses of modern times.

1797.—26th October 1797, Admiral Lord Viscount Duncan of Camperdown, a few months after his great victory over the Dutch.

1816.—Edward Baxter, Merchant in Dundee, the father of the Right Honourable W. E. Baxter of Kincaldrum.

1834.—Earl Grey and Lord Brougham, in recognition of their great services in the passing of the Reform Bill.

1843.—Richard Cobden, M.P., the apostle of Free Trade.

1844.—His Royal Highness Prince Albert.

1850.—Fox Maule, afterwards eleventh Earl of Dalhousie.

1854.—George Armitstead, Merchant, afterwards Member of Parliament for Dundee, and now Lord Armitstead.

1863.—John, Earl Russell, two years before he became Prime Minister.

1867.—His Grace the Duke of Buccleuch. It is specially to be noted that this Freedom was granted on the occasion of the last visit of the British Association to Dundee in that year.

1875.—The Earl of Airlie, in testimony of the Council's approbation of the cordial and equitable manner in which he granted a supply of water from Lintrathen to the Town of Dundee.

1883.—7th August 1883, the Earl of Camperdown and the Earl of Dalhousie, on the occasion of the Opening of University College, Dundee.

And at the same time the Earl of Rosebery.

1884.—John Bright.

1885.—The Duke of Argyll.

1889.—The Marquis of Lorne, and in the same year, William Arrol, the Engineer of the Forth and Tay Bridges.

1890.—H. M. Stanley, the pioneer of Africa.

1893.—Lord Roberts, who signs the Lockit Book. It had not been the practice previous to this date to obtain the signatures of Burgesses, but the custom was begun with Lord Roberts, and from this time onwards the Lockit Book will become even more interesting because of the value of the signatures which it contains.

1894.—George Otto Trevelyan, Secretary of State for Scotland.

1895.—Thomas Francis Bayard, Ambassador of the United States of America.

1897.—William Vernon Harcourt.

1898.—The Marquis of Lothian, Secretary of State for Scotland, and on the same occasion Lord Balfour of Burleigh.

1899.—Arthur James Balfour, and in the same year Miss Helen Haliburton Symers, in recognition of her many

acts of wise beneficence to the city. Miss Symers appears to have been the second lady burghess.

1901.—Viscount Peel.

1902.—Sir William Ogilvy Dalgleish, Bart., in recognition of his high and distinguished position in the staple trade of Dundee, and of his liberality to the charitable and educational institutions of the City, and also of his steady devotion to its social improvement.

1902.—Sir John Leng, M.P., one of the Members of Parliament for the City, and in the same year Ex-Provost Alexander Hay Moncur, in recognition of his incessant efforts in the promotion of good works for ameliorating and advancing the condition of the people, and providing for the comfort of the citizens.

On the same occasion, Alexander Mathewson, recalling his successful administration when Lord Provost of Dundee.

In the same year the Countess of Airlie, and on the same occasion Andrew Carnegie, in respect of his munificent liberality in extending the Public Libraries of Dundee.

1904.—Sir James Thomson Ritchie, Lord Mayor of London.

1906.—Whitelaw Reid, LL.D., American Ambassador, in recognition of his great eminence as a statesman and author; and lastly, William Brownlee, in recognition of his long distinguished and useful career as a Member of the Dundee Town Council.

I now come to the other branch of my subject—Dundee's Municipal Portraits.

Fifty years ago an eminent artist, consulted by the parents of a young man ambitious to be an artist, is said to have comforted them by telling them that, even if their son did not turn out a great artist, he might at least be a good portrait painter. Times have changed since these views were held, and now the most renowned artists of Europe paint portraits; men famous not only in portraiture but in the highest forms of imaginative art.

Whether this is due to the great prices which have been offered to famous artists for portraits, or whether to serious acknowledgment of the view that the greatest artists have always been taxed to their highest powers in a simple portrait, it is not necessary to inquire, but it is easy to prove from Dundee's collection of Portraits the increased honour and importance of portraiture.

During the last twenty-five years there have been added to the Galleries many portraits by men of world-wide fame. It may be matter for regret that collections such as Dundee's do not grow more rapidly in landscape and figure subjects, pictures which are generally more attractive to the public, but the men Dundee has "delighted to honour" she has determined to honour with no stinting hand, and the foremost artists of the day have been commissioned to paint their portraits.

To mention all the portraits would necessarily convert this Article into a Catalogue, but a few remarks about some of the leading portraits may be interesting.

The portrait of Francis Molison, by Sir Francis Grant, P.R.A., is a fine full length portrait, quiet and simple, but dignified and full of gentlemanly grace.

From the easel of Sir William Q. Orchardson, R.A., there are three portraits in the collection—those of Sir Thomas Thornton, LL.D., Town Clerk of Dundee; Sir John Leng, a Member of Parliament for the City; and Henry Balfour Fergusson, a well-known private citizen. Of the portraits of Sir Thomas Thornton and Sir John Leng this criticism may be permitted, that the subjects might have been more suitable for the brush of one of the strong realistic painters rather than for the refining and poetic art of Orchardson; but in the portrait of Mr. Fergusson, which is probably the finest in the Galleries, and which has been many times exhibited in other cities, we have Orchardson impelled by his subject to the utmost charm of his power, resulting in one of the finest creations of this branch of art during the last half-century.

The portrait of John Charles Bell, by George Paul Chalmers, is a picture which created an art sensation when

it first appeared, and has been a great joy to many, in Exhibitions at home and abroad since.

In the Gallery there are four portraits by Sir George Reid—those of Sir John Ogilvy of Inverquharity, Bart., Ex-Provost Moncur, Mrs. Moncur, and Ex-Lord Provost Hunter, all with that consistent excellence in art and portraiture in which Sir George Reid never fails.

In Ex-Provost Brownlee, Mr. J. S. Sargent, R.A., has given an example of his vigorous force and brilliant execution.

Ex-Lord Provost Barrie, by Sir James Guthrie, the present President of the Royal Scottish Academy, is a typical example of the thoroughly conscientious and sound workmanship which has made the Glasgow School famous throughout Europe.

From the brush of Mr. Solomon J. Solomon, R.A., comes the portrait of Ex-Lord Provost Longair—one of the most recent additions to the Gallery—a most pleasing and eminently satisfactory portrait, excellent in likeness and colour harmonies; while in the latest addition, the portrait of Sir William Ogilvy Dalgleish, Bart., by Walter W. Oules, R.A., Dundee, possesses a portrait by a portrait painter, without perhaps the poetry of an Orchardson or a Chalmers, but as a portrait excelled by none in its truthful, intimate, and dignified presentment of the subject.

Ex-Lord Provost M'Grady is an excellent example of Herkomer's art, full of strong and virile painting.

Bailie Duncan Macdonald, by William M'Taggart, R.S.A., is a strong Gallery portrait, improving on closer acquaintance with its unusual manner.

From Sir Daniel Macnee, P.R.S.A., we have the portrait of John Boyd Baxter, LL.D., and from John Pettie, R.A., the portrait of William Harris, Esq., J.P.

Tom Graham, H.R.S.A., has three examples in the collection—those of Alexander M. Grimond, Rev. Peter Grant, D.D., and Ex-Lord Provost Mathewson. Arthur S. Cope, R.A., gives us a fine portrait of George Armitstead, M.P. (now Lord Armitstead of Castlehill, Dundee).

Local artists have furnished some of the most pleasing portraits of the Gallery. First for mention is probably the portrait of Sheriff Campbell Smith, M.A., LL.D., painted by C. L. Mitchell, who has given an excellent likeness, bringing out the distinctly Scotch character and the kindly humour of the subject. Mr. Mitchell has also given us a fine and manly presentment in the portrait of Mr. David Dewar, Chief Constable and Procurator-Fiscal.

Ex-Provost James Yeaman, and Christopher Kerr, Town Clerk, are from the brush of Hugh Collins; while Alexander Grieve is responsible for a pleasing picture in tone and colour of Miss Agnes Husband.

Two of Dundee's noted characters—William McGonegall and Willie Blair—are recalled to us by the brush of W. B. Lamond, R.B.A.; and lastly, among the old portraits in the collection, are one of Graham of Claverhouse, and another of his wife, Lady Jean Cochrane, which are sometimes said to be by Sir Peter Lely, but that is doubtful.

In this Article no attempt is made to give a complete list of the portraits, but it is hoped that it may prove of some service to our visitors from a distance, when they spend some of their time in the Galleries at the Albert Institute, Galleries of which Dundee may be justly proud.

## The Foreland and the Hinterland of Dundee.

By Easton S. Valentine, M.A.

"**BONNIE DUNDEE**" is John Graham of Claverhouse, but the term was first and is often still applied, sometimes sincerely, sometimes ironically, to the town from which that celebrated viscount took his title. Its admirers think of its historical associations, its fine situation, its broad and beautiful river, its noble heights, and its numerous and extensive parks and open spaces; while its detractors can see nothing but factories and chimney-stacks and a canopy of smoke. Too much may be made of these drawbacks, but it would be hard to exaggerate its natural amenities.

The stranger who approaches Dundee from the south by the great Tay Viaduct cannot fail, under favourable conditions, to be impressed with the beauty of its situation. The river is flanked for a length of nearly 5 miles, from Ninewells to Stannergate, by an esplanade, broken only by the openings into the spacious docks of the city, in respect of which, its industries, and its population, it ranks as the third town in Scotland. Within this extensive sea-wall there has been reclaimed during the last hundred years a great area of ground, on which the lower portions and the railways of the city have been constructed. Perhaps no other town in Britain has done more in the way of such reclamation. From these riverside levels, Dundee rises gradually to west and east, and more abruptly to the north, in acclivities that culminate in the picturesque and beautiful Hill of Balgay, the heights of Craigie, and the Law Hill. This last, the most prominent of its natural features, bids fair at no distant date to be completely encircled by the city, its northern suburbs,

Lochee and Downfield, being all but joined. In the background of the panorama are the higher Sidlaws, whose loftiest point, Craigowl, lies directly behind the Law, and some 4 or 5 miles distant from it. Far to the west, from the very boundaries of the city, stretches the fertile expanse of the Carse of Gowrie, while to the east, in almost unbroken succession, extend the beautiful and prosperous suburbs of Broughty-Ferry and Monifieth, which are linked by an excellent tramway system with the parent town. The fine line of the foreshore is picturesquely diversified seawards by the small rocky promontory, on which stands Broughty Castle, and farther out, by the great sand dunes of Barry and Buddon, with their white lighthouses. Alike on a fine morning, when the crystalline air bathes the hills in a dewy freshness, and on a frosty night when the myriad lights of the city flash across the waters, it would be difficult to find a fairer sight.

Seen from the higher parts of the town itself, as one looks southwards, the prospect is scarcely less attractive. The wooded heights and rocky eminences of the Fife hills are varied and beautiful, and along their base extend the pretty southern suburbs of Wormit, Newport, and Tayport. These hills are not so high as to shut out from view the distant shining waters of the ocean, which sparkle around the Bell Rock Lighthouse, and break in foam on the sands and rocks of St. Andrews Bay, while a depression in their heights reveals the venerable towers of the university city itself, 12 miles to the south-east.

Itself situated entirely in Forfarshire, Dundee is thus the centre of a district that belongs in parts to the counties of Fife and Perth. The region between the Firth of Tay and the Forfarshire Grampians is divisible into three well-defined natural belts running east and west—the maritime district, the Sidlaws, and Strathmore.

The staple industry of the wider district that includes the counties on each side of the Firth of Tay is the manufacture of linen. Dundee (nicknamed "Juteopolis") is the centre. In the maritime district of Forfarshire,

Arbroath, and Montrose, and farther inland, Brechin, Forfar, Kirriemuir, Alyth, and Blairgowrie are largely engaged in the same trade. A century ago spinning and weaving flax, which was then extensively grown in the county, were carried on in country hamlets and in the homes of the people; but the application of machinery and steam-power, co-operation, and the attraction of markets have long ago transferred the manufacture to the larger centres. Bleaching is still a semi-rural occupation, but other auxiliary trades, such as dyeing, calendering, and the manufacture of machinery and engines, are also largely carried on in the Forfarshire towns. Tanning and boot-making give employment to many in Arbroath. Dundee, with its docks and railways, has a large export and import trade, and has a wide reputation for ship-building and whale-fishing. Forfarshire is noted for the excellence of its building stones and paving slabs, and quarrying is extensively carried on at such centres as Carmyllie.

Westwards the Carse of Gowrie extends to Glen-carse, a distance of about 15 miles, and is bounded by the upper reaches of the estuary and the curvilinear range of the Sidlaws. It is an alluvial tract of land rich in farms and orchards, hamlets and mansions. Numerous streams wind through it from the hills to the river, and its surface is diversified with fine woodlands that surround such mansions as Castle Huntly and Rossie Priory, while, nearer the hills, the rocky spurs of the Sidlaws, are crested with trees, and form many a sheltered and beautiful retreat.

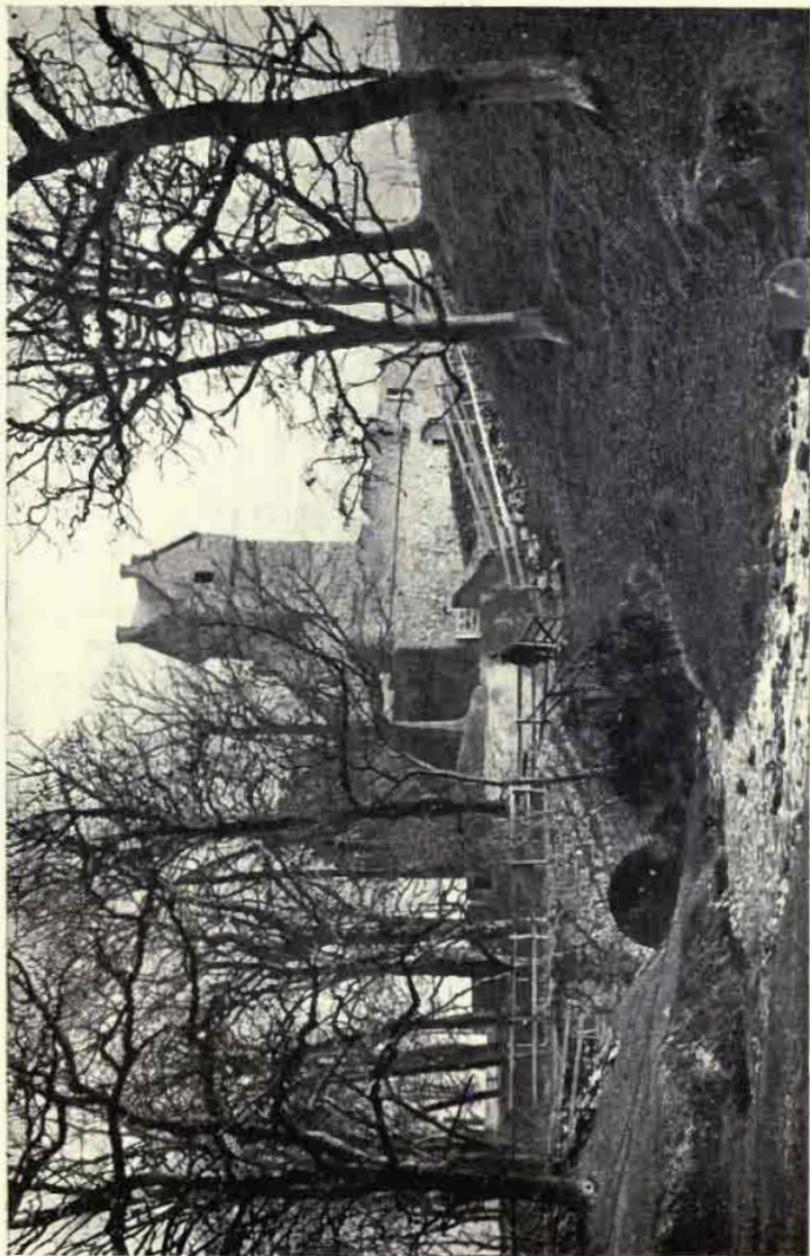
From the western marches of Forfarshire to the mouth of the North Esk, a line traversing the maritime region and parallel to the coast is about 37 miles long. This district, widest in the west, narrows as the hills approach the sea in the east. The curve of the coast from Dundee to St. Cyrus is materially broken only by the promontory of Buddon Ness, the indentation of Lunan Bay, and the tidal waters of Montrose Basin. The ground undulates, and rises here and there into knolls and even hills, many

of which are finely wooded. It is good farming land, its crops and grazing being unsurpassed in the county. Near the sea there are wide expanses of downs or links. At Barry these form one of the best artillery ranges in Great Britain, and are under the direct control of the War Office. The golf links of Monifieth, Carnoustie, Arbroath, and Montrose are extremely popular, and in summer attract visitors from all parts of the country. From time immemorial the coast of Forfarshire has been noted for its fisheries, and the fisherman's calling is prosecuted from the ports of Dundee, Arbroath, and Montrose (the district headquarters of the industry), and from a number of picturesque villages here and there along the shore.

Travelling eastwards from Dundee, the visitor will find on the seaboard of Forfarshire places of varied interest. Broughty-Ferry, mainly a residential town for wealthy Dundonians, is beautifully laid out; and its sumptuous mansions set in spacious and well-kept grounds, its pretty villas, its broad avenues, and its beautifully wooded eminences may fairly entitle it to be reckoned a garden city. Claypotts Castle and the historic fort that guards the entrance to the Tay lend to the place something of the glamour of the past.

The parish of Monifieth, according to the recent census one of the most rapidly growing districts in Scotland, has an ecclesiastical history that goes far back into the Middle Ages. The conspicuous monument on Downie Hill to the east marks a district of no little historic interest. In its vicinity is Panmure House, a seat of the Earl of Dalhousie, and one of the finest mansions of the county. Not far off is Affleck Castle, a noble ruin, with one of the few remaining iron "yetts." The whole district from Barry to Carnoustie is associated with a futile attempt of the Danes, early in the eleventh century to conquer this part of the country. Sculptured stones and other interesting relics of the thwarted invasion have been found here, and farther north, at Aberlemno.

Readers of Scott's "Antiquary" are made romantically acquainted with Arbroath and its environs. It is the



MAINS CASTLE, NEAR DUNDEE.



novelist's "Fairport." The noble ruins of its abbey bespeak an importance second only to that of St. Andrews, the ancient ecclesiastical capital. Hospitalfield, one of most delightfully quaint of Scottish-Baronial dwellings, is the original of "Monkbarns," and was in its oldest part an appanage of the adjacent abbey, and as such intimately associated with the last abbot, afterwards Cardinal Beaton. The cliffs of Arbroath, with their remarkable formations and wonderful caves, are amongst the most striking pieces of rock scenery on the east coast. Auchmithie, an old-world fishing village, is Scott's "Musselcraig"; and beyond that boldest of promontories, the Red Head, is the beautiful curve of Lunan Bay. In early times this portion of the shore was deemed so vulnerable, that it was fortified in the days of William the Lion by Red Castle, a place of strength, whose striking and solitary ruin stands sentinel over the waters of the bay. Beyond this the coast which still preserves in such remarkable formations as the Rock of St. Skae, or the Elephant, its iron-bound character, are the fishing villages of Usan and Ferryden, the latter separated from Montrose by the estuary of the South Esk.

Montrose, which is situated on a tongue of land washed on two sides by salt water, and derives from this circumstance its title of the Scottish Venice, has the reputation of being the most attractive town in Forfarshire. It is approached from the south by a long railway viaduct, which bridges the South Esk; and the view one gets on emerging from the deep railway cutting that leads to the viaduct is extensive and beautiful. To the left stretches the expanse of the tidal Basin, with the distant background of a rich champaign country bounded by mountains; to the right, between the mouths of the two Esks, extend attractive links and sands flanked by the blue waters of the ocean; while in the centre lies the town, with its dreaming spire, a beautiful Gothic structure of great height. Much historical interest attaches to Montrose. Its port witnessed the departure of the good Lord James Douglas with the Bruce's heart, and, centuries

later, the flight of the Old Pretender. On the shores of its Basin were the homes of the Great Marquis and Erskine of Dun. It was at Montrose that Greek was first taught in Scotland, one of our earliest students and teachers of that language being George Wishart. A little to the north is the birthplace of James Mill, the historian of India, and the father of John Stuart Mill.

In the uplands of this maritime region, though space forbids even a brief survey of them, are places of no little interest. Not the least notable is Dunnichen, the scene of one of those early battles that gave subsequent history a decided trend; for here is Nechtan's Mere, whose fight in 685 turned the tide of Anglian conquest and established for centuries to come the *régime* of Picts and Scots.

The well-watered region of the Sidlaws is extensively farmed except in its higher and barer parts, and is noted for its valuable grazings and quarries. Here and there one finds amongst the hills some ancient fort, prehistoric, Roman, or Pictish. Such are that on Denoon Hill, facing Strathmore and the Grampians and Macbeth's castle, so-called, on Dunsinane Hill, looking towards the distant Birnam which Shakespeare has rendered immortal. Starting from Kinnoull Hill, near Perth, which overlooks the windings of the Tay, these hills run for some miles through eastern Perthshire before they enter the county of Forfar at Gask. In this neighbourhood is King's Seat, the most prominent and peaked of the western Sidlaws, and the bold crags of Lundie, whose surrounding woods are jewelled with some pretty lochs. Then in succession, eastward, come the tower-crowned Kinpurnie Hill, near Newtyle, the wooded Auchterhouse Hill, and Craigowl (1493 ft.), in which the range culminates. Along the foot of these stretches the fertile district of Strathmartine, watered by the Dichty, with its flour- and bleaching-mills, in the early days of the linen trade the hardest worked stream in the country.

Three fairly well-marked ridges strike eastwards from Craigowl. One may be traced in the succession of heights, many of them wooded, that descend to the coast near Monifieth; the central ridge broadens out to north and

south as it advances eastwards to the cliffs at Arbroath and the Red Head; and the third and highest, with such well-marked ridges as Finhaven and Turin, extends to the South Esk, whose valley it bounds on the south all the way to Montrose.

In antiquarian and historical interest the Sidlaw region is not inferior to other parts of the county. Fowlis, Auchterhouse, and Tealing have mansion-houses or churches whose annals date from remote times. The district contains notable specimens of prehistoric cromlechs and cairns, and of those curious primitive underground dwellings known as "weems." In the Strathmartine region of Dundee are the ancient castle of Mains and a memorial to mark the site of Claverhouse, and to the north-west of Lochee are the mansion and beautiful grounds of Camperdown, seat of the Earl of Camperdown, whose ancestor, Admiral Duncan, a native of Dundee, was the hero of the victory over the Dutch during the Napoleonic wars.

Roads and railways radiate from Dundee, and strike through the districts already traversed; those going west and north lead into Strathmore, that region of the county bounded by the Sidlaws and the Grampians. The direct railway to Forfar branches off from the through route from Dundee to Aberdeen and the north at Barnhill, a pretty extension of Broughty-Ferry; and the Dundee and Newtyle railway, in its original form the earliest in Scotland, leaves the main line to Perth near Invergowrie, curves eastwards round Balgay Hill, and then, after passing Lochee and bending again to the north-west, ascends Strathmartine. Beyond Auchterhouse it enters the "glack," a pass above Newtyle, which is reached by a sharp elbow-bend leading down to Strathmore, where it joins the main Caledonian line from Perth to Aberdeen. From this central railway branches are thrown off to Blairgowrie, Alyth, Kirriemuir, and Forfar, from which also a direct line following the valley of the South Esk passes Brechin and terminates at Edzell.

The section of Strathmore or the Great Valley that

belongs to our district is naturally divisible into two parts. The western contains the courses of the Isla and other mountain streams that flow down from the Grampians, and turning to the right on reaching the valley enter the Tay some miles above Perth. The eastern comprises the valleys of the South Esk and the North Esk with their affluents, which on descending from the mountains take an eastward trend and reach the sea at Montrose. In the main valley there are two sets of small lakes; one near Forfar with a western drainage, the other on the head waters of the Lunan—Lochs Fithie, Rescobie, and Balgavies. Besides these, several that appear on older maps of the county have been drained, and their sites are now arable land. Amongst the Braes of Angus, the Loch of Lintrathen, a splendid sheet of water, affords Dundee an unrivalled supply for both domestic and manufacturing purposes.

At two points on the roads that enter the strath from the south there are views of its wide expanse that cannot fail to arrest attention. At the summit of Tullybaccart, just where the road from Dundee to Coupar Angus begins its descent to Strathmore, the whole of that beautiful district, hidden by the Sidlaws until the critical point is gained, is in a moment unfolded at one's feet. The rich strath with its woods, pastures, and farmlands, its villages and townships, stretches far to east and west; and beyond, ridge upon ridge, with dome-shaped and peaked summits, runs the great mountain barrier of the Grampians. Far to the south-west is the sharp cone of Ben Voirlich; slightly to the north-east of this the giant mass of Ben Lawers and the Glen Lyon mountains; which is succeeded further in the same direction by the sugar-loaf of Schiehallion, the domes of the Ben-y-Gloes, and the broad summit of Glas Maol, the loftiest mountain in Forfarshire. Beyond Blairgowrie rises the shapely Mount Blair, whose top commands one of the most extensive prospects in this part of Scotland. These mountains and others farther east may be seen from a fine point of view on the Dundee road about a mile to the south of Forfar. Here are also dis-

closed the Braes of Angus, or lower spurs of the Forfarshire Grampians, far into which penetrate Glen Isla, Glen Clova, and Glen Esk. In the distant background to the north is "dark Lochnagar," while prominent in the forefront of the range and just at the edge of the strath are Catlaw and Caterthun, the latter the site of the most remarkable hill-fort in Scotland.

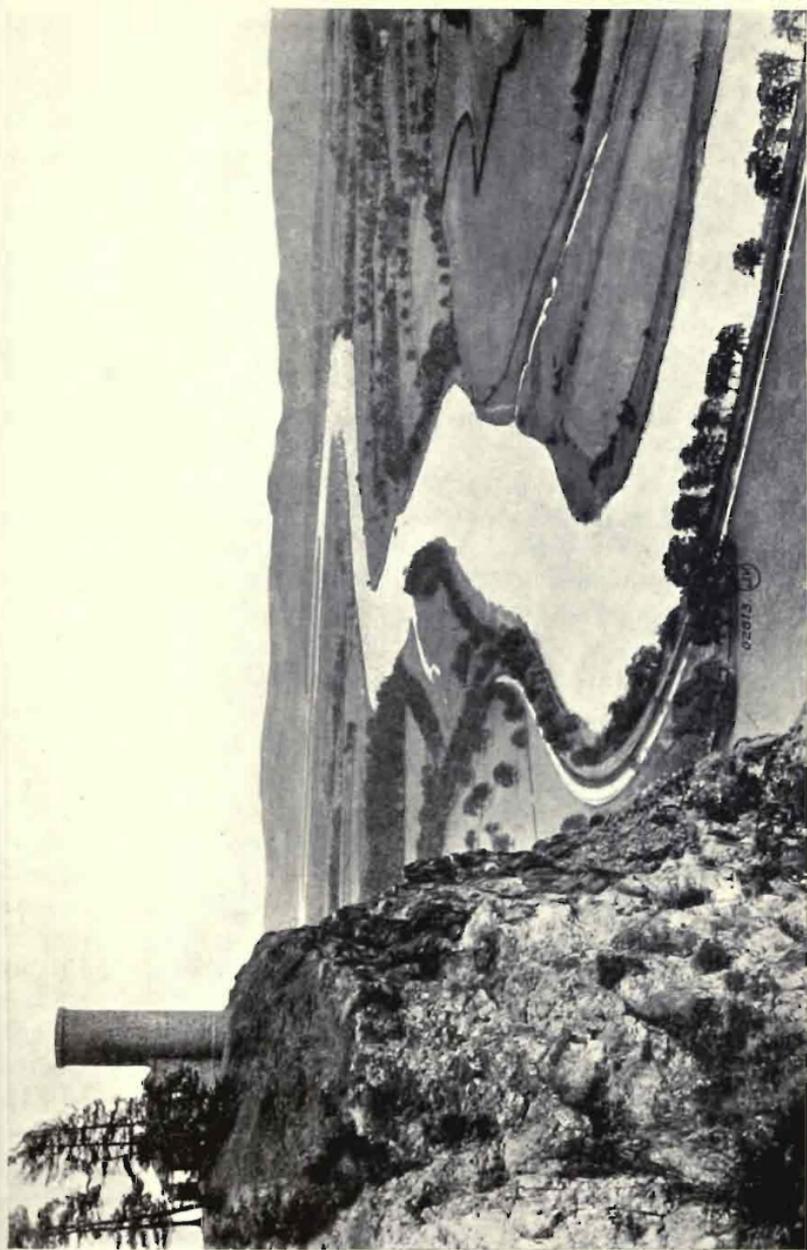
Close to the foot of the ranges that flank Strathmore on either side, lies a series of little towns situated near openings into the hills. At the mouth of Glen Ericht is Blairgowrie, which participates in the staple linen trade, and is also the centre of a rich small-fruit district. Alyth, whose inhabitants are similarly occupied, guards the entrance to Glen Isla. Kirriemuir, which Mr. J. M. Barrie has made classical as "Thrums"—a word that discloses to the initiated its main industry—has two glens behind it—Prosen and Clova, dear to the botanist. Edzell, a remarkably pretty village, is near the outlet of Glen Esk. At the foot of the Sidlaws on the north, are Newtyle and Glamis. Nearer the centre of the strath are Coupar Angus with the ruins of an abbey, Meigle, whose ancient sculptured stones are widely celebrated, and the county town of Forfar, with far-drawn historical associations; while amidst the eastern hills, near Montrose, is the ancient cathedral city of Brechin.

We must confine our attention to only a few of the many places of interest and beauty in Strathmore. There are several camps and other Roman remains. A Roman road appears to have traversed the strath, and to have been joined at Aesica (probably on the Esk) by another which led over the uplands to the east of Dundee, and afforded communication with the Firth of Tay. Beyond Aesica this road penetrated into the Mearns and the north. In olden times the district was a hunting-ground so famous as to attract royal sportsmen; and the remains of large forest areas like the Moor of Montreathmont still bear witness to the fact. It is a region known to the antiquary for its monoliths, vitrified forts, weems, and crannogs. At Brechin is the finest specimen in the

country of those round towers, so common in Ireland, whose origin and purpose remain an insoluble puzzle. Some antiquaries hold that part of Restenneth Tower, near Forfar, the site of a famous priory, belongs to the eighth century, and is thus the oldest fragment of ecclesiastical building in Scotland.

Forfarshire is the land of the Lindsays, the Douglasses, the Ogilvys, the Lyons, the Carnegies, the Maules, and many another sept; their ruined castles, like those of Inverquharity, Finhaven, and Edzell (to name only three), still give mute evidence of the storm and stress of clannish and feudal days. Of the royal palaces of the county town, long the favourite residence of our early sovereigns, every trace has disappeared.

Of castles that survive entire from a hoary past, some are still occupied, but these have been added to, altered, or even completely transformed by successive generations of their proprietors. Yet the changes have been wrought with such architectural skill and sound artistic taste that the result is a happy blending of the old and the new. Such are Cortachy Castle (Earl of Airlie), Glamis Castle (Earl of Strathmore), Brechin Castle (Earl of Dalhousie), Ethie Castle (Earl of Northesk), and Kinnaird Castle (Earl of Southesk). Princely as the others are, it is no disparagement to them to single out Glamis as the one castle of Forfarshire that the visitor must not fail to see. Its antique gateways, its noble demesne, its fine old trees, its curious sundial, are accessories in keeping with the stately pile itself. Glamis Castle is the finest specimen in existence of the Scottish Baronial style of architecture. Turrets projecting from the wall upon bold corbellings and terminating in pointed roofs; towers of circular plan; parapets and battlements; roofs of steep pitch; gables of stepped outline; small square windows; plain unadorned doorways; prominent or lofty chimneys;—in a word, all the distinctive features of that style for which we were in part indebted to our ancient French allies are here exemplified in a strikingly harmonious whole. The numerous apartments of the



CARSES OF THE EARN AND TAY, with lava-escarpment of Kinnoull Hill on the left, and the Ochils on the right.



Castle are as fascinating as are its exterior characteristics; and, dating as the edifice does from the eleventh century, weird stories, ghostly and other, cling to its haunted rooms. It contains a very notable collection of paintings, old armour, richly-carved old oak furniture, and other priceless curiosities.

There are many scenes of great natural beauty within the limits of our district, but only one can here be spoken of. From its source to its union with the Tay, the Isla flows through country rarely equalled for a variety that ranges from the grandeur of precipice and ravine to the sylvan beauty of wooded hills and thriving plantations, and the pastoral quiet of green meadows and still waters. On its course through the Den of Airlie occurs the Reekie Linn, an imposing waterfall. At this point the river, which for some distance has been hemmed in by precipitous banks, plunges over a rock eighty feet high in a cataract which, when the water is swollen, is unbroken in its descent. The smoke-like spray which then enshrouds it gives its name to the fall. Scarcely less remarkable is the Slug of Auchrannie, a rocky gorge about a mile farther down the Den of Airlie through which the Isla boils and foams. Both of these may be seen at one visit, and will well repay the time spent.

It is perhaps scarcely outwith the subject of this article to conjoin with a description of southern Forfarshire a few closing sentences on the general historic interest of the district. It may be too readily assumed that Scottish history, of more than local importance, scarcely belongs to the region north of the Forth. Yet this is an assumption that many facts disprove. Horestia, as our part of Scotland used to be called, can scarcely waive its claim to be associated with the efforts of Agricola to add North Britain to the Roman Empire. In later times it witnessed the struggles between Angles and Picts, and Picts and Scots, and the rivalry between the advocates of Irish, and those of Roman Christianity. It was an important part of the country of Kenneth Macalpin, and of the realm over which Malcolm Canmore and good Queen Margaret

exerted a civilising and beneficent influence. For their more immediate descendants, Forfar was a favourite resort and place of residence. Wallace and Edward I. strove here, as well as in the south, the one to maintain, the other to subvert Scottish independence. Stracathro and Brechin saw the dethronement of John Baliol. The Declaration of Independence emanated from Arbroath and the National Council which declared Bruce to be the rightful king of Scotland met in Dundee. The county was often visited by the Royal Jameses and other Stewart sovereigns. In Catholic times, Arbroath Abbey was the centre of widespread influence. Dundee took the leading rôle on the eve of the Reformation. Both that city and Broughty Castle suffered after Pinkie at the hands alike of Mary of Guise and the Regent Somerset. Dundee was for some time the centre of the contest between Presbyterians and Episcopalians. The Marquis of Montrose laid waste parts of his native county in his attempt to re-establish in Scotland the waning power of Charles I., and it was the scene of one of the unseemly and unkingly escapades of Charles II. in his efforts to throw off the yoke of the Covenant. Dundee, long the second town in the Kingdom, had its prosperity blighted for more than a century after its siege by Monk. Viscount Dundee, so closely associated with the town from which he took his title, set fire to it shortly before marching to Killiecrankie. Forfarshire noblemen suffered confiscation and banishment for the Stewart cause in the rebellions of the eighteenth century. During last century Dundee strongly advocated freedom of thought and freedom of speech in political affairs, and took a prominent part in the days of the Reform movement. Forfarshire may thus claim a not insignificant share in the making of history, and in the record of Scottish progress in matters material, intellectual, and moral.

## The Geology of the Country around Dundee.

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### INTRODUCTION.

THE great fault which separates the rocks of the Highlands from those of the Midland Valley of Scotland can be traced from the coast of Kincardineshire, north of Stonehaven, south-westwards to the Firth of Clyde. Close to this Highland Boundary fault a narrow belt of rocks is found at intervals all along the line, which is marked on the Geological Survey maps as (?) Silurian. To the north of our area some of these have been described by Mr. G. Barrow\* along the southern border of the Highlands, in Forfarshire and Kincardineshire, and others by Dr. R. Campbell† to the north of Stonehaven. The true age of these rocks is still doubtful, but the recent discovery of fossils by Dr. Campbell in the series north of Stonehaven, and the possible occurrence of Downtonian beds to the south of them is of great interest. A broad band of rocks of Old Red Sandstone age follows, extending south-westwards more or less parallel to the fault, and occupying the southern parts of Kincardineshire, Forfarshire, and north-western Fife. These pass under strata of Carboniferous age, which trend in the same direction and spread over the remainder of Fife. Some igneous rocks which penetrate the Carboniferous strata have been regarded as possibly of Permian age, and some of the east and west dykes in the district as doubtfully belonging to the Tertiary volcanic period. Apart from these no younger

\* *Quart. Jour. Geol. Soc.*, vol. lvii., 1901.

† *Geol. Mag.*, 1911.

formations are represented in our area until we come to the Glacial and Post-Glacial Deposits.

The relations of the topography to the geological structure are comparatively simple. The Ochil Hills which are best developed to the west of our district are formed by a broad anticlinal fold of the volcanic rocks of the Lower Old Red Sandstone. This fold trends in a north-easterly direction more or less parallel to the Highland fault. The Firth of Tay has been eroded obliquely along this arch. The northern limb can be traced into Forfarshire along the line of the Sidlaw Hills; the southern limb is prolonged into the hills of north-west Fife as far as Tayport, and thence under the Firth into the north-east of Forfarshire. To the north-west of the Sidlaws the broad plain of Strathmore lies in a synclinal trough of Lower Old Red Sandstone strata.

The Lower Old Red Sandstone formation was folded and denuded before the Upper Old Red Sandstone beds were laid down. The Sidlaws present their dip-slopes to the north-west and their escarpments to the south-east, and in Fife the Ochils show a reverse arrangement. Patches of the Upper Old Red Sandstone formation have been faulted down and preserved in the Carse of Gowrie and at various spots on the coast of Forfarshire. A narrow strip of the comparatively soft beds of the Upper Old Red Sandstone extends from south-west to north-east along the southern flanks of the Ochils, and gives rise to the plain of Kinross and the Howe of Fife.

The Carboniferous area forming the southern part of Fife is diversified by isolated hills and ridges, which owe their prominence to the hard igneous rocks of which they are composed.

The district presents evidence of severe glaciation as shown in the moulding of the hills and in the deposits of Boulder Clay and Sands and Gravels, which spread over the low lands and creep up on to the higher ground. The Carse lands bordering the Tay and the Earn, the

Valley of the Eden, and much of the low ground flanking the coast-line, are covered by deposits belonging to the period of the raised beaches or by sand dunes.

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Quarter inch, sheet. No. 12.

Memoirs. "Geology of Central and Western Fife and Kinross," 1900, by Sir A. Geikie.

"Geology of East Fife," 1902, by Sir A. Geikie.

In these two valuable memoirs by Sir A. Geikie, the geology of that part of our district which lies south of the Tay is described in detail, and a full bibliography of writings having reference to the geology of Fife is given.

Some of the other publications of importance in connection with the geology of Forfarshire and Fife are:—

Sir Charles Lyell. "Principles of Geology."

Sir Charles Lyell. "Student's Elements of Geology."

Hugh Miller . "The Old Red Sandstone."

Rev. J. Anderson. "Dura Den : A Monograph of the Yellow Sandstone and its remarkable Fossil Remains." 1859.

J. Powrie . . "On the Old Red Sandstone Rocks of Forfarshire." *Quart. Jour. Geol. Soc.* 1861.

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The account of the Old Red Sandstone System and of the Igneous Rocks associated with the Carboniferous strata is given by Mr. Balsillie, while Mr. Craig has described the stratigraphy of the Carboniferous rocks and the Glacial and Post-Glacial Deposits.

### THE OLD RED SANDSTONE.

Within the limits of our area both the Lower and Upper subdivisions of the Old Red Sandstone are displayed. We shall deal first with the members of the system which are seen in Forfarshire and Eastern Perthshire.

#### OLD RED SANDSTONE ROCKS OF FORFARSHIRE AND EASTERN PERTHSHIRE.

##### A. Lower Old Red Sandstone.

Broadly speaking, the Lower Old Red Sandstone of the district is made up of three successive rock groups, each of which possesses its own distinctive petrographical characters. The strata comprised in the highest of these

consist of conglomerates, sandstones, flags, and marls and are the rocks which underlie the broad lowland tract known as Strathmore. The middle subdivision is formed mainly of a great series of andesitic lavas, with some subordinate intercalations of tuff. The rocks of this volcanic zone give rise to the ranges of the Sidlaw and Ochil Hills which form conspicuous features in the topography of the area under notice. The lavas appear to have been out-poured from different volcanic centres, and in some places they thin out and interdigitate with ordinary sediments. Notably is this the case to the north and east of Dundee. Sir Archibald Geikie regards the volcanic zone as occurring several thousand feet above the base of the system and about a similar amount beneath the highest strata in the Valley of Strathmore. The lowest subdivision, whose base in the region is nowhere visible, includes sandstones, flagstones, and mudstones, as well as a series of volcanic rocks in the neighbourhood of Montrose.

With regard to the stratigraphical evidence afforded by fossils, it may be said that the Lower Old Red Sandstone of Forfarshire, with the exception of some 4,000 feet of strata about the middle of the formation, is singularly barren of organic remains. The highest strata in Strathmore appear to be almost unfossiliferous. There is, therefore, no evidence to prove, as the late Mr. Goodchild and Dr. Hickling have pointed out, that these beds may not be contemporaneous with the uppermost members of the Orcadian series of the north of Scotland.\*

Near the base of the Strathmore sandstones is a bed which has yielded the myriapods *Kampecaris* and *Archidesmus*, along with the remains of the plant *Psilophyton robustum*.

One of the best known fossiliferous horizons in Forfarshire, and that which has furnished the chief Acanthodian fish remains, occurs on a lower platform exposed at Tillie-whamland Quarry, Turin Hill. From this locality the following species were enumerated by the late Mr.

\* J. G. Goodchild, *Geol. Mag.*, 1904. G. Hickling, *Geol. Mag.*, 1908.

Powrie:—*Mesacanthus Mitchelli*, *Ischnacanthus gracilis*, *Climatius scutiger*, *C. uncinatus*, *C. reticulatus*, *Parexus recurvus*, *P. falcatus*, *Euthacanthus Mitchelli*, *E. elegans*, *E. gracilis*, *E. curtus*, *Cephalaspis Pagei*, *C. asper*, *Thelodus Pagei*, along with *Pterygotus anglicus*, *Stylonurus ensiformis*, and *Parka decipiens*. A horizon furnishing similar fossils occurs at Farnell. The Turin Hill beds are on the north limb of a great anticline, whose axis ranges from the junction of the Tay and Earn north-eastward across the country until it reaches the sea to the north of Montrose. Thus the horizon of Turin Hill is repeated to the south of the above-mentioned line.

On a still lower horizon but yet above the main mass of the lavas there have been collected from a bed at Auchtertyre to the west of Newtyle *Cephalaspis Lyelli*, *Pteraspis Mitchelli*, and a few Acanthodians.

The Carmyllie beds which underlie all the above horizons have long been famous as furnishing some of the finest specimens of Eurypterids obtained from Forfarshire. Magnificent examples of *Pterygotus anglicus* from this locality may be seen in the Albert Institute Museum, Dundee. The Carmyllie beds have also yielded Acanthodians of the types occurring at Turin Hill, and in addition the obscure form known as *Parka decipiens* as well as the plant *Zosterophyllum Myretonianum*.

The lowest fossiliferous horizons appear to be those at Myreton, Tealing, and Leoch.

The beds exposed in Balruddery Den, five miles to the west of Dundee, deserve mention. Here the Balruddery Burn, which in some parts of its course forms the dividing line between the counties of Perth and Forfar, has cut a deep ravine in the Lower Old Red Sandstone strata which consist of dark fine-grained bituminous sandstones dipping towards the south-west. These beds have yielded *Mesacanthus Mitchelli*, *Climatius reticulatus*, *Cephalaspis Lyelli*, and *Pterygotus anglicus*. The sandstones at Balruddery appear to be on the same geological horizon as the beds at Myreton, Tealing, and Leoch.

Dr. Hickling has made a detailed examination of the

Lower Old Red Sandstone of Forfarshire, and he estimates the thickness of the strata as being upwards of 14,000 feet. He subdivides the beds displayed in the area adjoining the coast-line into a number of stages, to each of which he gives a special name. The extensions of these subdivisions inland have not been fully described. A full account of his investigations will be found in the *Geological Magazine* for 1908. The lowest group is that of *The Stonehaven Beds*, which are followed by *The Dunottar Conglomerate*. These two groups occur on the coast to the north of our area. South of Montrose lavas border the coast-line as far as Lunan Bay. Inland these lavas are seen to pass under *The Carmyllie Series*. Following the coast-line southwards the following stages occur in ascending order:—

*The Cairnconnan Series* is obscured in Lunan Bay by raised beach material, blown sand, and marine alluvium. Elsewhere this subdivision is seen to be made up of dull red or grey grit with bands of conglomerate. At the south end of the bay a series of volcanic rocks have been instructively exposed.

*The Red Head Series* occupies the cliffs from the promontory known as Red Head south as far as Rumness. In the lower part are fine red thin-bedded sandstones, with intercalations of hard bright red shale, while the upper portion consists of thicker bedded sandstones.

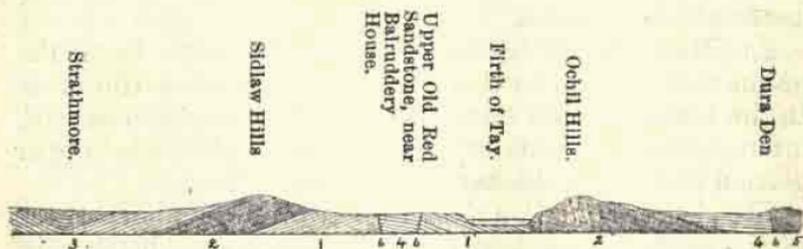
*The Auchmithie Conglomerate* overlies the above group in the cliffs to the north of the village of Auchmithie. The series is made up of three thick zones of conglomerate, with subsidiary intervening sandstones and conglomerates. The pebbles in the conglomerates are well rounded and consist in the main of quartzite.

*The Arbroath Sandstone*. This is the highest member of the Lower Old Red Sandstone seen on the coast of Forfarshire. It may be examined in the neighbourhood of Arbroath, and also on the shore to the east of Carnoustie. The rock is a coarse, gritty, occasionally pebbly sandstone, generally red in colour. Immediately above the base of the series at the Signal Tower, Arbroath Harbour, is

a bed of marlstone with calcareous nodules. Dr. Hickling remarks that this bed is noteworthy in view of the almost complete absence of lime from the Lower Old Red Sandstone. He points out that the Geological Survey have traced a thin bed of limestone in Strathmore for some miles, and suggests the possibility that this stratum is on approximately the same horizon as the one detected by himself on the seacoast. If this should prove to be the case, it would form a valuable datum line in the elucidation of the stratigraphy.

It ought to be stated that the above-mentioned subdivisions from the Carmyllie Series upwards are repeated on the north side of the anticlinal, and thus underlie the highest strata in the Valley of Strathmore. The horizon at Tilliewhamland Quarry, Turin Hill, probably lies in the Cairnconnan Series of Dr. Hickling.

The following section will help towards a proper understanding of the structure of the county and the distribution of its different rock groups.



Diagrammatic Section across Strathmore and the Firth of Tay, from the east of Alyth to Dura Den.

1. Sedimentary rocks underlying the lavas ; 2. Volcanic rocks of the Lower Old Red Sandstone ; 3. Sedimentary rocks overlying the lavas ; 4. Upper Old Red Sandstone ; 5. Carboniferous rocks ; 6. Faults.

Referring now to the volcanic rocks, it is noteworthy that, as pointed out by Sir Archibald Geikie, the prevalent type of Lower Old Red Sandstone lava is intermediate in composition between the lavas of the older Silurian on the one hand, and those of the younger Carboniferous on the other. The majority of them may be classed as

andesites, though some are rather more basic in composition. They are usually dark in colour, the tints varying from grey to purple, brown, and green. While some show a compact structure, well-developed vesicles filled with agate, quartz, calcite, or zeolites, are usually characteristic of these rocks. Their chief mineral constituents are a glassy plagioclase felspar, along with a monoclinic and sometimes a rhombic pyroxene. On fresh surfaces lath-shaped felspars may frequently be detected with the naked eye. Microscopic examination often shows a more or less glassy or devitrified base, with abundant feldspathic microlites.

Within our area the volcanic rocks have been described by Sir Archibald Geikie,\* who points out that they have probably come from two different centres of eruptive activity. This fact enables us to divide them naturally into two groups, namely:—

- (1) The Volcanic Rocks of the Montrose Centre.
- (2) The Volcanic Rocks of the Sidlaw and Ochil Centre.

We may refer briefly to each of these:—

(1) *The Volcanic Rocks of the Montrose Centre.*—These attain their maximum development around the town of Montrose, the main orifices of eruption lying probably somewhere to the east of the present coast-line, under the waters of the North Sea. From Montrose, both to the north-east and south-west, the lavas become intercalated with sandstones and conglomerates, and gradually die away. The pile of ejected material must reach a thickness of several thousand feet, but owing to the folding the base is not seen. The rocks consist chiefly of andesitic lavas and volcanic conglomerates, true tuffs not being at all conspicuous. The volcanic rocks are well exposed on the coast to the north and south of Lunan Bay. An interesting feature is the way in which some of these andesitic lava flows show cracks on their surfaces, which have subsequently become filled with pale green and red sandy sediment. Those on the south side of Lunan Bay

\* "Ancient Volcanoes of Great Britain," vol. i.

belong to a higher horizon than those on the northern side. The lowest visible portion of this volcanic group occurs near Montrose Harbour.

(2) *The Volcanic Rocks of the Sidlaw and Ochil Centre.*—The lavas, agglomerates, and tuffs of the Ochil Hills attain their greatest development in the neighbourhood of Stirling, where they reach a thickness of about 6,500 feet without revealing their base. Most of the active vents probably existed in that neighbourhood, but they lie hidden somewhere to the south of the Ochil chain, under the tract which is overspread by the Carboniferous rocks.

Near Bridge of Earn the Ochils branch into two divergent portions, one of which can be followed for a distance of about sixty miles to the north-east, extending in Fife as far as Tayport, and thence on the north side of the Firth of Tay, from Broughty-Ferry to near Arbroath, where the lavas overlap those of the Montrose group. The other branch, hidden for some distance below the alluvial plains of the Earn and the Tay, appears as a high ridge near Perth, and stretches north-eastwards into Forfarshire, forming the chain of the Sidlaw Hills.

This bifurcation is due to the fact that the great anti-clinal fold into which the Ochils have been thrown opens out towards the north-east. The rocks of the Sidlaws forming the northern limb dip to the north-west, while those of the continuation of the Ochils in Fife, forming the southern limb, dip to the south-east. The beds of the Lower Old Red Sandstone underlying the volcanic series might be expected to appear along the crest of the anticline, but partly owing to faulting on both sides of the top of the arch, and partly owing to the unconformable overspread of Upper Old Red Sandstone strata underlying the Carse of Gowrie, these lower members are concealed.

The lavas which build up the Sidlaws are sometimes separated from one another by intercalations of conglomerate, ashy sandstone or grit. Blocks up to two feet in diameter are seen in the conglomerates, which consist mainly of andesitic material with some pink felsites and pieces of greenish and hardened sandstone.

Inspection of the geological map will show that to the north of the valley of Strathmore andesitic lavas appear in proximity to the great Highland Boundary fault on both sides of the line of fracture. Some of these probably represent a continuation of the volcanic rocks of the Sidlaws underneath the synclinal trough of Strathmore.

To the west of Dundee solitary necks may here and there be observed, one of the best examples occurring near Over Durdie, which is filled with agglomerate. Masses of basalt and dolerite are marked on the map at several places to the north and west of Dundee, some of which are probably sills. Dundee Law marks a boss or pipe, with which is associated a sill extending south-westwards to the shore. Reference may here be made to a group of acid intrusions which occur in the northern part of the area. The rock forming these is known as the Lintrathen porphyry, and has been intruded into rocks mainly of sedimentary origin, but is also found cutting the lavas. The age of these intrusions has not yet been determined.

#### *B. Upper Old Red Sandstone.*

To the north of the River Tay the Upper Old Red Sandstone is found developed (1) as a number of isolated patches along the Carse of Gowrie; and (2) as a series of outliers on the coast of Forfarshire. We shall deal briefly with the rocks displayed at each of these separate areas.

(1) *Upper Old Red Sandstone of the Carse of Gowrie.*  
—Here the formation owes its preservation to two powerful displacements which, running along both sides of the crest of the great Tay anticlinal, have allowed the Upper soft red sandstones to sag into the hard volcanic rocks of the Ochils. In this manner they have escaped the general degradation which has removed all traces of them from the surrounding country.

The northern of these two faults can be satisfactorily traced from Craigend, about two miles to the south of Perth, in a direction slightly to the south of east along the southern slopes of Moncrieff Hill as far as Rhynd. Here it bends to the north-east and runs in the direction of Dundee. The southern line of displacement, which runs

approximately parallel to the first, has been followed from Glenearn in a roughly easterly direction as far as Abernethy. At this point it also, like its correlative, turns to the north-east and is lost under the alluvium of the Tay at Newburgh.

Strata of Upper Old Red Sandstone age may be seen at Inchturre, Clashbennie, Bridge of Earn, and other localities within the trough faults. They consist mainly of dull-looking, reddish, or greyish-yellow sandstones, which are frequently marked with circular spots of a greyish-yellow colour. Many of the beds show sun-cracks and ripple-markings. In the neighbourhood of Clashbennie their dip is a little to the east of due south. This locality has long been famous to geologists as having yielded the type specimen of *Holoptychius nobilissimus*. Along with the remains of *Holoptychius* there have also been found at Clashbennie the scales and plates of another fish, *Phyllolepis concentrica*.

At Quarry Hall, near Bridge of Earn, the Upper Old Red Sandstone was formerly seen to be resting unconformably upon the lavas of the Lower series, but this exposure is no longer accessible.

(2) *Outliers on the Coast of Forfarshire*.—The descriptions of these have been taken from the paper by Dr. Hickling cited in the list of references.

Dr. Hickling points out that the identification of these outliers as belonging to the Upper Old Red Sandstone depends on their lithological character and general tectonic relations, no recognisable organic remains having yet been obtained from their strata. They are younger than the folding which has affected the subjacent Lower Old Red Sandstone, and also later than a good deal of the denudation which followed it. He believes that before the deposition of the Upper Old Red beds, over 8,000 feet of rock were removed from the folded Lower Old Red strata.

Two distinct types of sedimentation occur in the rocks as developed along the Forfarshire coast, viz.—the sandy type, and the cornstone type.

*Outlier at Arbroath*.—The main mass of this outlier, as

will be seen from the map, has been let down into the Lower series between a pair of parallel faults. In it the sandy type alone is developed, the materials being similar to those of the Lower Old Red on which it rests, and consisting of soft red sandstones, with numerous bands of conglomerate which are usually thin and irregular, occasionally thicker and more persistent. Broadly, the whole mass might be described as a conglomerate. No trace of calcareous material occurs except in the form of veins and patches about Whiting Ness. Dr. Hickling says, "These veins are of value as indicating that there have formerly been calcareous strata overlying these beds, as would be expected from a comparison with the deposit in other areas."

The conglomerates here displayed, it may be added, have not yielded pebbles of later date than Lower Old Red Sandstone age, and this fact has been taken as confirming the Upper Old Red age of the outlier.

Interesting sections along the coast-line show the unconformable junction between the members of the Upper and Lower subdivisions as on the foreshore at Victoria Park, at Whiting Ness, at Seaton Point, and in an inlet in the cliff on the west side of Lud Castle.

*Outlier at Boddin Point.*—Here the Upper Old Red Sandstone is brought down against the lavas of the Lower series by a powerful fault which is well exposed on the south side of the headland. The lower part of the section shows red sandstone, the upper part cornstone. About 40-50 feet of soft yellow or white sandstone, mottled with light red, is exposed below the cornstone, while the base of the series is thrown below sea-level.

## OLD RED SANDSTONE ROCKS OF FIFESHIRE.

### A. *Lower Old Red Sandstone.*

In that portion of Fifeshire which falls within the limits of our district representatives of only the middle or volcanic zone occur. The rocks form, as has been explained, the southern limb of the great Tay anticline, so that their dip

is to the south-east. For this reason, as would be expected, the oldest members of the series are found along the north-western portion of the county, whilst the youngest sink under the Upper Old Red Sandstone of the Howe of Fife and the Eden valley.

The volcanic group of the Lower Old Red Sandstone consists here, as elsewhere, of sheets of andesitic lava, between which are intercalations of sandstone, shale, and conglomerate. The best exposures occur along the southern shores of the Firth of Tay. Examination of these, along with the evidence afforded by watercourses and quarries, has shown that in the volcanic subdivision, as here displayed, two minor groups can be made out. Of these the lower is thinner, and, owing to the large amount of intercalated sediment, may be called the Lower or Sedimentary Group, while the upper appears to be entirely built up of lavas, and is termed the Upper or Lava Group.

*Lower or Sedimentary Group.*—The best exposures of this group are seen on the beach and in cliff section between Wormit Bay and Tayport. These have been fully described by Sir A. Geikie in his Memoir on East Fife, and the following is a condensed summary of his account. Starting from the west end the following rocks may be examined.

- (1) Pink felsitic lava, with abundant kaolinised feldspars, forming the headland of Peashill Point.
- (2) Yellowish, highly felspathic, sandstones, faulted down against (1).
- (3) Dark shale, 6 feet thick, which has yielded *Mesacanthus Mitchelli*, *Ischnacanthus gracilis*, *Climatius scutiger*, *Pterygotus* sp., *Eurypterus* sp., *Kampecaris forfarensis*, and *Parka decipiens*. This important fossiliferous locality occurs on the west side of Wormit Bay.
- (4) Sandstones, 50 feet, well exposed at the base of a quarry cliff.
- (5) Andesitic lavas, probably 200 feet thick, overlies the above sandstones, and strike north-east-

ward along the beach for 700 yards. They form the shore reefs to the west of the southern end of the Tay Bridge.

- (6) Purple, flaggy, felspathic sandstone, 8 feet thick.
- (7) Hypersthene andesite.
- (8) Conglomerate, on which the most southerly piers of the Tay Bridge are built.
- (9) Pink, felspathic sandstone, seen on the east side of the Tay Bridge.
- (10) Thin sheet of very slaggy andesite, abundantly traversed by veinings of green sandstone.
- (11) Thin conglomerate.
- (12) Pinkish-yellow breccia, made up of angular fragments of dacite.
- (13) The above graduates into a fine conglomerate with green matrix.
- (14) Greenish-white well-stratified sandstone.
- (15) Amygdaloidal andesite.
- (16) Breccia, forming the cliff-line for about 200 yards, whose most abundant constituent, either as enclosed blocks or in the matrix, is a pinkish or purplish-red dacite, showing beautiful flow structure. Nests in this dacite were found by Mr. James Durham, of Newport, to contain portions of undevitrified volcanic glass, the microscopic characters of which have been described by Professor Judd.\*

At Scroggieside Farm the above section is terminated by a fault which has brought down the overlying andesites against the breccia. Further exposures of the sedimentary group, probably furnishing a sequel to the succession of events recorded by the above strata, may be seen on the beach below East Newport, where some conglomerates with intercalated andesite occur. These rocks strike inland, but again appear on the foreshore to the west of Tayport, where they may conveniently be studied.

In addition to the sedimentary rocks above described,

\* *Quart. Jour. Geol. Soc.*, vol. xlii.

two other zones require mention which lie on a higher platform. The first of these ranges from Balmerino westward along the Tay to beyond Newburgh. Its component strata are exposed to the south-west of Balmerino, where they overlie a thick mass of andesitic lava, to the south-west of Birkhill House in Corbie Den, and again on the shore to the west of that ravine. They are made up of reddish, grey, yellow, and whitish sandstones, marls, and cornstones. For some miles to the west this sedimentary zone is concealed by the low flat shore of the firth, but it is again exposed at Jock's Hole and Parkhill on the east side of Newburgh. It was here that Fleming found the first specimens of the obscure form afterwards named *Parca*.

Less than 1000 feet higher in the volcanic series lies the other sedimentary zone. It consists of grey felspathic sandstones which have been quarried on the roadside to the north-east of Corbiehill, in the parish of Balmerino. A feature of interest at this exposure is the occurrence of a basic dyke which traverses the sandstones in a direction slightly to the west of north.

*Upper or Lava Group.*—This group occupies the remainder of the Lower Old Red Sandstone area south of the Tay. Two distinct petrographical types occur in the lavas—pyroxene andesites and dacites, the former of which are by far the most abundant. The best sections of the Upper or Lava Group are to be seen on the shore to the west of Tayport. Here all the structural features of the andesites are well displayed. Sandstone veinings are abundant in the slaggy types. Occasionally a platy lava may be seen to have its base in a condition of brecciation.

To the south of Tayport the lavas are exposed on the hill slopes and in quarries. The most common type appears to be the slaggy amygdaloidal rock, the only exception to the general uniformity of character in the lavas being afforded by the rock of Lucklaw Hill. This is another example of a dacite in a somewhat fresher condition than that at Peashill Point.

In the more westerly portions of Fife there are intercalated among the andesites, as will be seen from the map, some zones of fragmentary material. The most noteworthy of these is a great thickness of conglomerate which extends from near Strathmiglo in a westerly direction for over 9 miles. This deposit in its lower portion affords evidence, in the rounding of its enclosed blocks, of having been accumulated under water; the upper portion is an andesite agglomerate.

### *B. Upper Old Red Sandstone.*

The Upper Old Red Sandstone of Fife, which does not appear to measure more than 900 feet in thickness, flanks the south-eastern slopes of the Ochil Hills, and extends under the Howe of Fife and the plain of Kinross. It rests unconformably on the members of the Lower Old Red Sandstone, and indeed overlaps the lavas, although no section in the district is now visible, showing this relation.

Within the limits of the area included in the map exposures of the Upper Old Red Sandstone may be seen in the Glen Burn, to the east of the Lomond Hills in such artificial openings as quarries, and in the admirable section at Dura Den.

The section in the Glen Burn, which is unique, in that it shows the conformable passage upwards into the base of the Carboniferous System, exposes, at least, 1500 feet of strata. These consist of sandstones, marls, and conglomerates. The prevailing colour is dark red, but just under the cornstone lies a thick zone of white and yellow sandstones, which have been shown by Dr. Peach to contain fish remains. It is probable that these may represent a westerly extension of the famous Dura Den beds.

With reference to the quarry exposures, none of these deserves special mention with perhaps the exception of that at Drumdryan, near Cupar. It was here that the first *Holoptychius* scales from Fife were collected by Fleming in 1831.

The Dura Den section exposes about 200 feet of strata belonging to the higher part of the formation. The rocks are nearly horizontal—yellow, red, and greenish sandstones, with intercalations of clay or marl. They are fine-grained, somewhat fissile, and have partings of green clay. The yellow colouring though predominant alternates with layers of red. “The chief interest,” says Sir A. Geikie, “of this locality to the geologist is undoubtedly furnished by the fish remains that have been obtained here in such numbers. . . . One of the platforms on which the ichthyolites have been best preserved lies in the channel of the burn 150 yards above Yoolfield Mill. Here occasional scales and more connected portions of the exoskeleton of *Holoptychius* and other fishes may be collected. These remains occur as carbonised impressions on the fine-grained pale yellow stone, and sometimes lie crowded on each other as thickly as herrings may be seen strewn on a harbour pier from the boats on a summer morning. The contrast between the black scales and the light-coloured ground on which they lie suggests at a little distance a sheet of lithographic stone on which the organisms have been carefully drawn in black.”

Dr. Traquair gives the following as including all the species of fishes that have been collected from Dura Den:—

- Bothriolepis hydrophilus*, Ag.
- Phyllolepis concentrica*, Ag.
- Glyptopomus minor*, Ag.
- Glyptopomus Kinnairdii*, Huxley.
- Gyroptychius Heddlei*, Traquair.
- Holoptychius Flemingii*, Ag.
- Phaneropleuron Andersoni*, Huxley.

“From the number of species,” continues Sir A. Geikie, “the remarkable abundance of individuals and the frequency with which the entire bony outer-skeletons of the animals have been preserved, it is obvious that in the deposit at Dura Den we have the record of some altogether exceptional geological conditions. . . . The

fishes appear to have been suddenly killed in shoals, and to have been entombed among the fine sandy silt on the spot before large numbers of them had time to decay and fall to pieces, and before any agitation of the waters of the lake could separate and scatter their scales and bones. Various causes have been suggested for such rapid and extensive destruction of life, such as earthquake shocks, the escape of mephitic gases, and the isolation of the animals in pools where the waters ceased to be adequately oxygenated. No definite clue, however, has been found, either in the strata themselves or in the position or condition of the fish remains to indicate what may have been the agent that in this instance wrought such havoc in the fauna."

The uppermost beds in Dura Den, with the conformable passage upwards into the base of the Carboniferous System, are cut out by a fault which crosses the ravine near the Laurels. The actual line of dislocation is concealed, but on the roadside immediately to the south, the Carboniferous strata, which have been here invaded by a doleritic sill, may be seen dipping sharply to the south-east. This fault appears to die out in a south-westerly direction.

#### THE CARBONIFEROUS STRATA.

In the following notes an attempt is made to give a brief account of the nature and distribution of the several subdivisions of the Carboniferous Strata within the area included on the accompanying map, and to indicate where good exposures can be seen and examined.

The subdivisions of the Carboniferous rocks in this district comprise the following from below upwards :—

- A. Calciferous Sandstone.
- B. Carboniferous Limestone.
- C. Millstone Grit.
- D. Coal Measures.

They will be dealt with in order, taking the oldest first.

*A. The Calciferous Sandstone.*

Rocks of Calciferous Sandstone age occupy nearly the whole of the eastern part of Fife east of a line from Elie on the south to Blebo Craigs on the north. They form a narrow border along the northern margin of the Carboniferous area from Blebo Craigs on the north-east to the Lomond and Bishop Hills on the south-west. A roughly semicircular exposure occurs at Burntisland, while other small exposures are found around Markinch and Craigrothie. In the western part of the area with which we have to deal the main structural feature is the great anticline, the axis of which extends from Midlothian across the Firth of Forth to Burntisland, and there turning to the north-east runs in the direction of Markinch. The lowest strata exposed in this district are therefore to be seen at Burntisland, but these belong to the upper part of the Calciferous Sandstone. Rocks belonging to the lower part of the Calciferous Sandstone and similar to those seen beneath the volcanic plateau of the Campsie Hills and in the bed of the River Devon are exposed on Ben Arty Hill, and are believed to occur on the western and northern slopes of the Bishop and Lomond Hills. Here, so far as can be made out from the imperfect exposures seen, it appears that the Calciferous Sandstone is not more than 100 feet thick; in other words, that a rapid thinning out of these beds takes place towards their northern limit. The thinning out of these strata and its significance will be referred to again in dealing with the Calciferous Sandstone in East Fife. A small outlier of strata of the western or Ballagan type of the Cementstone Series occurs at Dron, near Bridge of Earn, and is well exposed on the east side of the Glenfarg Railwayline, where it lies conformably upon the Upper Old Red Sandstone. This is the most northerly occurrence of rocks of this type, and the only known exposure of Carboniferous rocks north of the Ochils.

A study of the Calciferous Sandstone rocks in West Fife shows that they can be divided on physical grounds into two groups—a Lower or Cementstone Group and an Upper or Burdie House Limestone and Oil Shale Group.

The Cementstone Group consists of red and yellow sandstones, with red and green clays and marls, along with thin seams of impure limestone or "cementstone."

The Burdie House Limestone and Oil Shale Group consists of white sandstones and black shales, with the thick Burdie House or Burntisland Limestone.

In both groups plant remains are common, while many of the limestones and shales, with the exception of those in the upper 300 feet, contain entomostraca and fish remains indicating estuarine or fresh water conditions of deposit.

The Upper or Burdie House Limestone and Oil Shale Group is exposed on the beach between Burntisland and Seafield Tower, near Kirkcaldy, where it is associated with a great development of contemporaneous volcanic rocks. More than half the section consists of basaltic lava flows and layers of tuff. In the lower part of the section, namely that between King Alexander's Crag and Kinghorn, there are only a few thin intercalations of sedimentary material, but the upper 300 feet are relatively free from volcanic material, and contain two well-marked marine calcareous bands—the Abden Limestones. Near Seafield Tower a third limestone is reached which is about 50 feet thick, and like the two last contains marine fossils. This is the limestone which was taken by Sir A. Geikie as the base of the Carboniferous Limestone Series in this district. As the prevailing dip of the strata is to the north-east, the Calciferous Sandstone dips beneath the higher subdivisions of the System and reappears again in the eastern part of the county, where good sections can be studied on the coast from Pittenweem to Fife Ness, and from Fife Ness to St. Andrews.

In East Fife, however, the Calciferous Sandstone differs markedly from strata of the same age in the west of Fife. There seems to be a complete absence in East Fife of the contemporaneous volcanic rocks seen between Burntisland and Kirkcaldy; in fact, nowhere in East Fife has there been found so far any trace of contemporaneous volcanic activity except in the Upper Limestone Group, and probably part

of the Coal-bearing Group of the Carboniferous Limestone Series near Leven. There is a further difference in the nature of the sediments themselves. While in the west of Fife there is a well-marked division of the Calciferous Sandstone into a Lower or Cementstone Group, and an Upper or Burdie House Limestone and Oil Shale Group both containing fossils which, with the exception of those in the upper 300 feet of the Oil Shale Group, are considered to be of estuarine or freshwater type, no such twofold division has been established in East Fife. In addition, in the eastern part of the county, there are from twenty to thirty different horizons on which marine fossils are abundant.

The best exposure of the Calciferous Sandstone in East Fife is seen on the beach between Anstruther and Coal Farm, near Pittenweem. At Anstruther these rocks are folded into an anticline, the axis of which runs north-west and south-east. The eastern half of the fold is itself thrown into a number of minor undulations, and the strata can only be followed as far as Crail, where the sequence is broken, while several faults help to complicate the structure. The western half, though affected by several small faults which do not appear to have a large displacement, is probably complete, and the section from Anstruther westwards displays a succession of beds from a horizon, which cannot be far above the Upper Old Red Sandstone, up to and including the lower part of the Carboniferous Limestone. This section which is 2 miles long, and cannot be much less than 4,000 feet thick, gives the most complete exposure of the Lower Carboniferous rocks which is to be seen anywhere in Scotland. It was very carefully studied by the late Mr. J. W. Kirkby,\* who measured the thickness of each individual bed, and collected and determined the fossils where these were present. The strata exposed show a succession of sandstones, shales, fireclays, thin

\* J. W. Kirkby, "On the Zones of Marine Fossils in the Calciferous Sandstone Series of Fife," *Quart. Journ. Geol. Soc.*, vol. xxxvi., 1880, p. 559.

coal seams, and limestones. Bands of this nature appear in varying order again and again.

The sandstones, which are often thick, frequently show false bedding and a curious crumpling of the layers. They are often stained red, brown, or yellow, but the colouring is not uniform throughout a single bed or series of beds, but occurs in bands and irregular patches.

The shales are dark grey or black in colour, sometimes coaly, and vary in thickness from a few inches up to 50 feet. Many of them are traversed by bands and layers of clay ironstone, and some contain fossils—remains of ostracods and lamellibranch valves in such amount as to become partly calcareous.

The limestones, which are always impure, may reach a thickness of 5 feet. They are brown or brownish-grey in colour, remarkably hard and compact, and are almost entirely made up of the remains of marine organisms. These marine bands number about 27, and the lowest of them, which has up to the present been detected, lies in this particular section 3,800 feet beneath the base of the Carboniferous Limestone Series.

Between Crail and Randerstone, on the north side of Cambo Sands, also on the south side of the same bay beside the erratic known as the "Humlie," and again 500 yards east of Randerstone Castle beside the "Fluke Dub," there is exposed an impure brecciated limestone with cherty nodules. This bed which is associated with red and green clays and shales, and reddened sandstones, has been noticed by Sir A. Geikie,\* who remarks on its resemblance to the cornstone and associated strata, which mark the base of the Cementstone Group in West Fife. It is possible that this cornstone, with its red and green clays and shales, may be lower than any of the beds seen in the Anstruther section, and actually represent the top of the Upper Old Red Sandstone and the base of the Carboniferous System.

Another section, which is important because of the

\* Sir A. Geikie, "Geology of East Fife," *Mem. Geol. Surv.* p. 75.

valuable light it throws on the nature and conditions of life in this district during Lower Carboniferous times, is to be seen on the shore between Randerstone Castle and Cambo Ness. The rocks are bent into a syncline, the axis of which runs north-east and south-west, and there is a fault on each side so that the relations of the rocks forming the trough to those on either side of it have not been exactly ascertained. The eastern half of the syncline exposes about 450 feet of strata, including 11 well-marked marine bands. The late Mr. J. W. Kirkby,\* who made a detailed study of these rocks, correlated them on palæontological grounds with the lower part of the section at Anstruther.

From Cambo Ness to St. Andrews harbour the rocks are thrown into a series of anticlinal and synclinal folds, but the sections exposed have not been exactly correlated with the Anstruther section.

At St. Andrews between the West Sands and the harbour there is a continuous section dipping to the south-east, and exposing about 1,000 feet of strata. The most important horizon here from a palæontological point of view is the "Encrinite Bed," which in the Anstruther section lies 2,280 feet beneath the base of the Carboniferous Limestone Series. This bed can be seen cropping out along the base of the cliff opposite the Step Rock and striking out to sea opposite the Castle. A continuous exposure of nearly half a mile can thus be examined. It has yielded abundant remains of echinoderms, brachiopods, lamellibranchs, polyzoa, &c., and is one of the most persistent bands in the Calciferous Sandstone. It has been already noted that at Anstruther the "Encrinite Bed" is 2,280 feet beneath the base of the Carboniferous Limestone. At St. Andrews it is probably not more than 1,600 feet beneath the limestone, which is mapped as the base of the Carboniferous Limestone in Cairnsmill Den.

From St. Andrews the "Encrinite Bed" and its asso-

\* J. W. Kirkby, "On Lower Carboniferous Strata and Fossils at Randerston, near Crail, Fife," *Trans. Edin. Geol. Soc.*, vol. viii. p. 61.

ciated strata strike westwards until, in the valley of the Eden, they appear to strike against the Upper Old Red Sandstone. On the road just south of Yoolfield Mill in Dura Den the line of junction between the Calciferous Sandstone and the Upper Old Red Sandstone is seen to be a fault, but farther to the north-east the ground is drift-covered. It is probable, however, that the boundary line is a continuation of the fault already noticed, and that in this direction the downthrow increases, while to the south-west the fault dies out in the Calciferous Sandstone towards Wester Pitscottie.

From the fault at Yoolfield Mill for about 4 miles in a south-westerly direction the relations of the Carboniferous Rocks to the Upper Old Red Sandstone cannot be examined owing to superficial deposits and the presence of several intrusive sills, the largest of which forms Walton Hill. From the west side of Walton Hill the thick limestone which marks the base of the Carboniferous Limestone Series can be followed in a series of quarries through the Cults and Bunzion limeworks. From thence for 3 miles to the south-west it is concealed, but appears again at the Forthar limeworks, and can be traced at intervals along the northern slope from the East to the West Lomond, where it turns south along the western slope of the Bishop Hill. Reference to the map will show that between the base of the Carboniferous Limestone and the top of the Upper Old Red Sandstone there is only a narrow strip left for the whole of the Calciferous Sandstone; and, further, that from Walton Hill to the Bishop Hill this strip becomes gradually narrower. This is due to the rapid thinning out of the Calciferous Sandstone. In the neighbourhood of Cults its thickness cannot be more than 300 feet, while on the West Lomond it has thinned to probably less than 100 feet of sediments, which represent the 4,000 feet at Anstruther, and the thick masses making up the Cementstone Group and the Oil Shale Group in West Fife.

It will thus be seen that the two main features of interest in the Lower Carboniferous rocks of this area are—  
(1) the difference in character between the Calciferous

Sandstone in East Fife and its equivalent in West Fife; and (2) the thinning out of these rocks along their northern limit. Commenting on these two points, Sir A. Geikie\* has said: "From these facts it would appear that in the early part of the Carboniferous period extensive subsidence took place over the upper part of what is now the hydrographic basin of the Firth of Forth, and likewise over the site of the east of Fife, while the ground remained practically stationary in the north of Fife and to the south of the Lothians. We may be tempted to speculate on the possible connection of these stable areas across the tract where the Firth of Forth now lies. There can at least be no doubt that while the opener sea seems to have gained only occasional and brief access to the western lagoons in which the oil shales and cyprid limestones were laid down, it overspread the eastern coal swamps and estuaries much more repeatedly and for longer intervals, since it has left behind memorials of its presence in many successive seams of stone crowded with the relics of a varied marine fauna."

### *B. The Carboniferous Limestone.*

Strata belonging to the Carboniferous Limestone Series are exposed in the western part of our area around the northern end of the Burntisland anticline. With the exception of the small Kinglassie coalfield and the narrow strip of Calciferous Sandstone already noticed on the north, and the triangular area of the Millstone Grit and Coal Measures on the south, they cover the greater part of the Carboniferous region of Central Fife. In the eastern part of the county they cover the whole area west of a line from Elie on the south, to Blebo Craigs on the north. Beyond this line two small areas extend into the Calciferous Sandstone region of East Fife. The first of these is the small trough which reaches Cairnsmill Den, near St. Andrews, and the second is the Pittenweem Coalfield. The latter is a small double syncline which has been

\* Sir A. Geikie, "Geology of East Fife," *Mem. Geol. Surv.*, p. 72.

thrown down by a powerful east and west fault, on the line of Anstruther Wester and Kilconquhar, against the Calciferous Sandstone on the north.

The base of the Carboniferous Limestone Series as at present mapped within our area is the thick limestone seen on the beach at Seafield Tower, near Kirkcaldy, the White Limestone at Pittenweem, the limestone in Cairnsmill Den, near St. Andrews, and the limestone of the Cults, Bunzion, and Forthar limeworks. On account of its similarity to the Hurlet Limestone of the Glasgow district which occupies a similar position, it is referred to in the Memoirs of the Geological Survey on East and West Fife as the Hurlet Limestone. The thick limestone at Seafield Tower is taken as the equivalent of the Charlestown Limestone farther west, which was formerly considered to be the equivalent of the Hurlet Limestone of the Glasgow district. In a more recent publication\* of the "Geological Survey," however, a limestone, 150 feet lower than the Charlestown Limestone, occurring on the beach below Charlestown railway station, has been taken as the base of the Carboniferous Limestone Series, as being more nearly the equivalent of the Cobinshaw-Hurlet and Hurlet Limestone farther west.

In Fife the Hurlet Limestone, where exposed, is usually recognised by its thickness, its purity, and the abundant corals it contains of the genus *Lithostrotion*, but it is to be remembered that limestones tend to vary when traced over a wide area. It is also to be noted that, so far, no definite group of fossils has been found by which the Carboniferous Limestone can be rigidly separated from the Calciferous Sandstone, nor is the Hurlet Limestone the lowest horizon on which *Lithostrotion* occurs. The uppermost 300 feet of the Calciferous Sandstone resembles the Carboniferous Limestone, and might be included in it, but the Hurlet Limestone was chosen as the base of the Series, not because it was palæontologically distinct from the limestones above or below it, but because it was a

\* "The Geology of the Neighbourhood of Edinburgh," *Mem. Geol. Surv.*, 1910, p. 116.

convenient datum line in the elucidation of the stratigraphy and in the search for coal.

Broadly speaking, however, there is a strong physical difference between the Calciferous Sandstone and the Carboniferous Limestone. The latter undoubtedly shows, where well exposed, that in its lower and uppermost parts the conditions of deposit were more purely marine than in the case of the Calciferous Sandstone. There is a well-marked threefold division into a Lower Limestone Group, an Edge Coal Group and an Upper Limestone Group. The Lower Limestone Group is composed of thick white sandstones and black shales, with three or more marine limestones, the Hurler and Hosie Limestones. It is well exposed on the beach north-east of Seafield Tower, also in East Fife, between Pittenweem and St. Monans. The exposure here is particularly interesting on account of its completeness. As before mentioned, the rocks are folded into a double syncline, and beds can be compared on both sides of the trough. Near Coal Farm, Pittenweem, the Hurler Limestone is seen white and brown in colour, 18 feet thick, and made up for the most part of *Lithostrotion junceum* and *L. irregulare*. About 10 feet above it comes a curious bed which might be called a limestone-conglomerate. This remarkable deposit appears to thin out rapidly towards low-water mark, and to be replaced by a shale. The same bed, or a similar bed, also occurs on the south side of the Firth of Forth, at Aberlady and Dunbar. At heights of 30 and 60 feet respectively above the Hurler Limestone come the first two Hosie Limestones, while the third occupies the centre of the trough, and can be seen about 50 yards east of St. Monans Harbour. On the west side of St. Monans Harbour the beds are repeated, but the limestone-conglomerate has not so far been detected. Compared with the sections at Seafield Tower, and between Pittenweem and St. Monans, the exposures inland are poor, most of the information which we have regarding them having been obtained in the course of mining and quarrying operations.

The second or Edge Coal Group is marked by the

absence of marine bands and the presence of valuable coal seams. In the west of Fife they comprise the coals of the Kirkcaldy, Markinch, and Rameldrie coalfields, while in the east of Fife they form the coalfields of Elie and Earlsferry, St. Monans, Colinsburgh, Largoward, Radernie, Ladeddie, Drumcarrow, Denhead, Lumbo, and Ceres. Owing to the extremely complicated structure of these rocks in East Fife, through folding and faulting, and the destruction of the coal seams by numerous intrusive sills of dolerite, mining operations have been seriously hindered.

The third or Upper Limestone Group shows the recurrence of marine conditions similar to those under which the lowest group was deposited. The strata here included consist of sandstones and shales, with three marine limestones—the Index Limestone at the bottom, the Calmy or Gair Limestone near the middle, and the Levenseat or Castlecary Limestone at the top. Where fully developed this group is probably about 800 feet thick. It contains several thin coal seams which, in the Capeldrae district, are workable, though their value has been somewhat impaired by igneous intrusions. The upper part of this group can be seen in section on the coast east from Pathhead, though here the Index Limestone is concealed. Another small exposure occurs in Aithernie Den, 3 miles north of Leven, in which can be seen an intercalation of volcanic material, tuffs, and basalts, pointing to contemporaneous volcanic activity during Upper Limestone time.

In the east of Fife rocks of the Upper Limestone Group if present are probably confined to a small area west of a line from Earlsferry to Lathallan, and south of a line from Lathallan to Teuchats limeworks, but their presence there has not been definitely proved.

### *C. The Millstone Grit.*

The Millstone Grit occupies a belt of country on the west side of the Dysart coalfield, which varies in breadth from half a mile at the coast, where it is exposed to

probably more than two miles in the north from Stenton to Coaltown, where its presence has been made known in borings and occasional exposures in streams. From Stenton a narrow strip runs south-westwards to near Kinglassie, forming the southern margin of the Kinglassie coalfield. On the north side of the Dysart and Leven coalfield it again occurs, but its outcrops have been shifted by three powerful east and west faults, the most northerly of which running between Bankhead and Lower Largo brings down the Millstone Grit and overlying Coal Measures against the Carboniferous Limestone. No exposures of Millstone Grit are seen farther east than Lower Largo.

A good section of this subdivision of the Carboniferous System can be seen on the shore between Pathhead and Dysart. The length of this section is about half a mile, and the thickness of rock exposed cannot be less than 700 feet, though in the neighbourhood of Stenton and Coaltown, and along the northern border of the Coal Measures, the thickness is probably less. The section on the coast shows that above the Levenseat Limestone the first 40 feet of the Millstone Grit is made up of shales with a few sandstones. Above this zone of shales comes 250 feet of sandstones and quartz-conglomerates, many of them stained red and yellow. This arenaceous zone is followed by 30 or 40 feet of shales, which are followed by 250 feet of coarse sandstones. These latter towards the top become interleaved with shales and carbonaceous bands and pass up gradually into the Coal Measures.

#### *D. The Coal Measures.*

With the exception of the small Kinglassie coalfield, the Coal Measures are confined within an area which is bounded on the west by a line from Dysart to Markinch, and on the north by a line from Markinch to Lower Largo; on the south-east they pass underneath the Firth of Forth and reappear again in the Midlothian coalfield.

As in other parts of Scotland, the Coal Measures can be

conveniently divided into two groups. The first of these, the Lower or Coal-bearing Group, about 1,700 feet thick, is made up of white and grey sandstones, black shales, oil-shales, ironstones, fireclays, and workable coal seams. Plant remains are plentiful, and are similar to those commonly associated with the Coal Measures in other parts of the country. They have been studied by Dr. Kidston, who suggests that the Lower or Coal-bearing Group of the Scotch Coal Measures is the equivalent of the lowest division of the Coal Measures of England.

The lamellibranchs and fish remains found here are also common to the Coal Measures in other parts of the country, but it is of particular interest to note that Mr. Kirkby detected near the top of the group a shale charged with the remains of marine forms similar to those which occur in the Carboniferous Limestone. The forms discovered by Mr. Kirkby include *Lingula*, *Discina*, *Productus semi-reticulatus*, *Bellerophon Urei*, *Orthoceras*, and *Discites*.

A good section of this lower group can be seen on the beach between Dysart and Wemyss Castle.

The second subdivision, namely, the Upper or Red Sandstone Group, is probably not less than 1,000 feet in thickness, and can be well seen in section on the coast between Wemyss Castle and Scoonie Links. The strata of this group, which rest conformably on the lower rocks, are made up of red and white sandstones, fireclays, shales with plant remains, and two or more thin seams of coal. The lowest beds composed of red grits and sandstones are followed by a thick mass of red and purple clays and shales, followed by the red and purple sandstones of Buckhaven Harbour. These are followed by a second series of clays and shales, including two seams of ochre, which in turn are overlain by sandstones, one of which is calcareous. Above the sandstone, and associated with 60 or 70 feet of shale and impure limestones, come two coal seams. Above the uppermost coal lies a shale from which Mr. Kirkby collected a large number of fish and crustacean remains, but this fossiliferous horizon is now concealed. This fossiliferous

shale is succeeded by red shales and sandstones which have yielded a few fragmentary plant remains. These are succeeded by sandstones which mark the highest beds seen, though probably not the actual top of the Red Sandstone Group.

#### IGNEOUS ROCKS ASSOCIATED WITH THE CARBONIFEROUS STRATA.

It is here proposed to give an outline account of the Igneous Rocks associated with the Carboniferous strata of eastern Fife.

##### *A. Vents.*

The fragmental rocks of the volcanic necks of eastern Fifeshire were known to scientists long before geology had emancipated itself from the retrogressive teachings of the Professor of Mineralogy in the University of Freiberg. The Rev. John Fleming, minister of Flisk parish, on the southern shores of the Firth of Tay, appears to have been the first to bring them to notice. Being in his earlier days a staunch supporter of the tenets of the Wernerian school of thought, he prepared geognostical accounts of various parts of the county, and occasionally cited such evidence from the clear sections displayed along its coast-line as he imagined would in some measure help towards a final vindication of the enunciations of the Neptunists. Thus, in the year 1813, we find him contributing a paper to the Memoirs of the Wernerian Society on the "Mineralogy of the Neighbourhood of St. Andrews." In this communication he gave descriptions of the remarkable "trap tufts" in the vicinity, and talked about them in characteristic Wernerian terminology as belonging to the "newest Floetz-trap formation." Referring to the agglomerate and "spherical concretion" of basalt at the Rock and Spindle, he maintained that the two rocks could be seen to pass insensibly into one another, and accounted for the whole in light of his adopted hypothesis by infer-

ring that it was "partly a mechanical and partly a chemical deposit." It may be said that later the author saw reason to change his opinions.

From the time of Fleming for over the next sixty years little appears to have been accomplished towards a true elucidation of the natural history of the tuffs of East Fife. They were mapped by the officers of the Geological Survey as masses interbedded with the rocks among which they occur, and this idea found expression on the one-inch map, sheet 41, published in 1861. After the lapse of eighteen years from this date, however, a change in concept was brought about by the appearance, in 1879, of Sir A. Geikie's well-known paper "On the Carboniferous Volcanic Rocks in the Basin of the Firth of Forth; their Structure in the Field and under the Microscope." In that paper the author clearly recognised the intrusive nature of the tuffs, and asserted that they represented the sites of former active volcanoes which must have come into eruption long after the deposition of the Carboniferous sediments which they penetrate. More recently the same author has again given an account of them in his "Ancient Volcanoes of Great Britain," also in the Geological Survey Memoir on East Fife, published in 1902. To the latter of these works the inquirer is particularly referred; in it he will find full descriptions of each individual neck, an account of the light which the body of evidence they afford throws on the problems of vulcanicity, and lastly, a discussion as to their probable age.

*(a) General Account of the Vents.*

The distribution of the vents, which are of all sizes from a few feet up to a mile or more in diameter, may be readily seen from an inspection of the geological map. As will be noticed, they are confined to the Carboniferous area, and occur, roughly speaking, in a broad, south-westerly belt extending between St. Andrews and Elie. Inland their infilling material appears almost invariably to have been possessed of greater durability than the sedimentary rocks through which they have risen, so that

they now in general form conspicuous eminences. These in the majority of cases have become grassed over, and only their approximate relations are now capable of elucidation. As might be expected, therefore, it is not these particular instances which are most instructive, but the limited number which have been laid bare along the margin of the sea. Here, on both the northern and southern shores of the county, the waves have been the effective agents in exposing clearly the relations of the fragmental to the stratified rocks. So replete, indeed, with instruction to the volcanic geologist are these exposures on the foreshore that, according to Sir A. Geikie, they are probably unsurpassed in any other volcanic region in the whole country.

As regards shape, the vents may be roughly circular, elliptical, or quite irregular. A good example of a nearly circular opening, though of small size, may be seen on the upper part of the foreshore at the west end of Kinkell Cliffs, St. Andrews. Elliptical openings such as that which occurs at Kellie Law might be readily conceived to result either from the coalescence of two adjacent circular ones or, as suggested by Sir A. Geikie, to a slight shifting of the focus of activity at a single vent. When the ground plan is eccentric, it may be inferred that the stratified rocks have yielded unequally to the explosive forces. Occasionally an opening becomes so elongated as to assume a dyke-like appearance. An instance of this has been exposed at the west end of Kinkell Cliffs, to the north of the circular opening referred to above, and another immediately to the east of the Rock and Spindle. It is probable, however, that such examples are really "explosion-fissures." When these are filled entirely with non-volcanic debris, as indeed is generally the case, it may sometimes be very difficult to distinguish between their enclosed fragmental material and a true fault rock. In this connection, however, it may conveniently be stated here, that mapping of the vents has shown that they appear, when considered together, to have risen quite regardless of the structure. Thus we may have vents

penetrating comparatively undisturbed strata, in which case it is possible to trace the same beds on both sides of an opening, or they may rise through the centre of a synclinal trough, as at Cairnsmill, south-west from St. Andrews, through the crest of an anticline, as at Buddo Ness, on the margin of a dome, as at Kinkell, or again in an area traversed by a plexus of faults, but in no instance can the faults be clearly seen to dislocate the agglomerate.

A curious and prevalent feature is the bending down of the strata at the periphery of the necks, so that they all dip inwards to the opening. A striking exception to this general rule may be seen at Newark Dovecot, near St. Monans. Probably the bending down is to be accounted for by the subsidence of the fragmental accumulations within the vents, so that the marginal rocks have been dragged down.

With reference to the alteration produced by the volcanic forces on the contiguous strata great variation occurs. Sometimes the sedimentary rocks appear to have been subjected to excessively high temperatures. Shales have been greatly hardened, coal seams fused, and sandstones converted into a kind of quartzite. Again, these effects may be absent when perhaps it is a safe inference that either there was but a transient manifestation of volcanic energy, or that the channel of active communication between the exterior and deeper portions of the earth was confined to the centre of the opening, the peripheral areas being lined, and therefore protected by fragmental debris.

Coming next to a brief consideration of the materials filling the vents, these appear naturally to be divisible into three categories:—

(1) Fragments of the sedimentary rocks through which the vents have risen.—These occur in all sizes from mere grains up to masses that must weigh many tons. An instance of a very large mass in a vent can be seen 5 miles to the west of St. Andrews, near Blebo Mains. Here a quarry was opened in a portion of the Hurlet (?) Limestone which must have been torn from its parent stratum. So large was this disrupted mass of

calcareous material, that the working of it had to be abandoned only owing to increasing depth of cover.

The fragments, generally speaking, consist of Carboniferous sandstones, shales, fireclays, coals, ironstones, cementstones, &c., no portion of any older sedimentary rocks having yet been detected. Occasionally fragments belonging to a higher stratigraphical horizon than any of the adjacent beds can be seen to occur in the agglomerate.

Many of the smaller vents are filled entirely with non-volcanic debris. It seems likely that in such cases the volcanic display was one only of brief duration.

In all the larger vents the major proportion of blocks of sedimentary rocks occur round the margin of the opening, while towards the centre they become diminished in size, and there is an increase in the amount of truly volcanic material.

(2) Volcanic Agglomerate.—The volcanic agglomerates infilling the vents are in general composites of various basic lava fragments along with fragments of the underlying and surrounding sedimentary rocks, embedded in a paste derived apparently from the intermingled dust of the shattered sediments and lava. In the ground mass pea-like portions of finely vesicular dull green basic pumice are abundant. Curiously rounded quartz grains are of frequent occurrence in many of the vents. Occasionally, where the proportion of carbonaceous matter is high, the agglomerate becomes from dark grey to black in colour.

Numerous fragments of such minerals as sanidine, augite, hornblende, pyrope, and biotite occur in many of the agglomerates as well as in the basaltic intrusions which traverse them. Their origin has not yet been satisfactorily explained.

By becoming finer in texture the agglomerates pass into tuffs. These in the main have a ground mass of very fine ash in which lapilli of minutely vesicular basic pumiceous material occur abundantly. They enclose frequently numerous fragments of various basic igneous

rocks. The non-volcanic constituents of the tuffs differ only as regards size from those described under (1).

(3) Dykes and Intrusive Masses.—In addition to their fragmental accumulations many of the vents afford, in the veins, dykes, and plugs of basalt which intersect the tuffs and agglomerates, striking testimony to the uprise in the chimneys of liquid rock and its solidification at or near the surface. The rock-type of this intruded material is generally a highly basic one—olivine basalt or limburgite. Some of the intrusions are remarkably fresh, and enclose large unaltered olivine crystals. Others are noteworthy for the abundance of their included xenocrysts.

With regard to arrangement of the materials in the vents, it may be said that in the smaller openings the agglomerates are usually without perceptible assortment. Many of the larger necks, however, show a distinct stratification of their infilling accumulations, the layers being conspicuously irregular. Very often layers of coarser fragments are interposed between zones of finer material. Frequently this is repeated again and again, and brings vividly to the imagination successive ejections from the vent. Generally the stratification is towards some central portion of the neck, and the layers are sometimes inclined at a much higher angle than that at which the material would normally repose. It is obvious that when this occurs there have been movements within the orifice subsequent to extinction. Probably in many of the vents there was a tendency for the uppermost layers to slide towards the centre and choke up the channel of eruption.

*(b) Special Account of some of the more Interesting Examples.*

These will be taken in the following order:—

- (1) Vents on the North Coast of the County.
- (2) Vents on the South Coast of the County.
- (3) Vents occurring Inland.

(1) *Vents on the North Coast of the County.*

In a distance of 6 miles to the east of St. Andrews over eighteen distinct volcanic openings have been laid bare either in ground plan on the beach or in cliff section by the sea. They appear to fall into three main groups which probably represent three separate foci of activity, viz. :—A group at the west end of Kinkell Cliffs; a group at Kinkell Ness, 2 miles east from St. Andrews; and a group at Kittocks Den, 4 miles east from St. Andrews. In addition to these there are outlying examples at Buddo Ness and Pitnilly.

*Group at the West End of Kinkell Cliffs.*—At the west end of Kinkell Cliffs there is exposed a small group of volcanic necks. The first of these can be examined immediately to the north of the small footbridge which here crosses a watercourse. It measures only 49 feet from north to south by 46 from east to west, and is filled with non-volcanic detritus.

About 40 yards to the north of this opening a remarkable dyke-like mass of agglomerate is visible, which trends generally in an east and west direction along the strand. At the western end it is concealed by boulder-clay, but eastwards it can be traced on the foreshore for over 400 yards. There are two conspicuous expansions on its course, in one of which the infilling material is green and ashy, is traversed by calcite veins, and encloses large crystals of glassy felspar.

The agglomerate of another vent is exposed on a grass-covered, ancient cliff line in the field just to the south-west of the bridge above referred to.

*Group at Kinkell Ness.*—In the space of 600 yards east from Kinkell Ness there are probably not less than eight distinct sites of eruption. Of these the well-known Rock and Spindle is the most important and will therefore receive somewhat full mention.

*Rock and Spindle.*—The largest, best exposed, and most interesting vent along the northern shores of Fife is that which has been laid bare at the headland of Kinkell Ness, and a portion of whose enclosed material has



ROCK AND SPINDLE, two miles east from St. Andrews. On the right is a mass of stratified agglomerate whose bedding-planes are inclined almost vertically.



been sculptured into the picturesque shore stack known as the Rock and Spindle. ("These two words," as Sir A. Geikie points out, "are generally misunderstood. 'Rock' is the Scots word for a distaff, and 'Spindle' as here used has reference to the stellate mass of basalt resembling a spinning-wheel.") Reason for this appropriate designation will be readily gathered from the accompanying photograph.

The margins of the vent, which are well defined and easily traceable, show its infilling accumulations to stretch in a north and south direction for over 300 yards. All of this extent however does not appear to belong to one site of eruption, two nearly detached areas of agglomerate on the north probably marking independent orifices.

The strata that form the walls of the opening can be seen on the north to have been violently disrupted. Large blocks of various sandstones have here been torn from their parent strata and incorporated at all angles in a fragmented mass, which sometimes consists entirely of non-volcanic debris, sometimes of fine grained green basic tuff.

The eastern margin of the neck, from which a seaward prolongation of the agglomerate runs out beyond the limits of the lowest tide, can be readily followed, truncating the sedimentary rocks which at this part consist of thin-bedded sandstones, with thick intervening shale bands (one of these is crowded with *Naiadites*). Where it runs into a remnant of the 25 feet raised beach above high-water mark, an instructive section has been exposed showing how the strata at the walls of a vent have been crushed, faulted, and dragged downwards. The western margin occurs just inside the line of cliffs.

With regard to the infilling materials, whilst some of the peripheral portions are coarse and in the main consist of non-volcanic detritus, by far the larger area is made up of a dull green or greyish-black granular or gravelly tuff of pea-like fragments of basic lava and fine ash. In this ground mass are distributed numerous blocks of basalt and of various sedimentary rocks. Conspicuous among these latter are rounded or sub-angular fragments of a grey

limestone weathering white. A curious interest attaches to these. Careful examination has shown that they contain the remains of such forms of marine life as *Lithostrotion junceum* and *L. irregulare*, as well as other corals, brachiopods and lamellibranchs, the species being common forms in the Carboniferous Limestone Series. The significance of this will be appreciated when it is stated that the strata now surrounding the opening belong to an inferior suite of sediments—the Calciferous Sandstones. The interpretation to be placed on the observed facts would appear to be that some of the basement beds, at least, of the Carboniferous Limestone Series formerly overspread this portion of the county and were actually penetrated by the vent. The disrupted fragments became enclosed in the agglomerate, which subsequently subsided within the orifice, while the overlying and surrounding sedimentary rocks have been entirely swept away. Support for this opinion is obtained from the fact that, wedged in almost vertically in the seaward extension of the agglomerate are several large masses of a limestone whose parent stratum must have measured some 10 feet in thickness. These appear almost certainly to belong to the base of the Carboniferous Limestone Series.

Throughout most of the vent the infilling materials show an obvious assortment. Standing about 10 yards to the east of the middle of the three protruding masses on the beach, a concentric disposition of the outcrops of the tuff layers will be visible; furthermore, it will be noticed that radii to these outcrops would intersect somewhere in the north-western portion of the vent. Probably the main erupting orifice was situated in this part of its extent.

The tuff layers are conspicuously irregular and show false-bedding. Layers of fine ash, alternate with zones of coarser material. Occasionally the former can be seen to have been indented by some larger fragment which must have fallen into them. "The whole aspect and structure of the agglomerate," says Sir A. Geikie, "vividly suggest to the observer the intermittent energy of an active volcanic crater, from which fine dust and lapilli were ejected, while

occasional more vigorous explosions threw large blocks of basalt over the inner and outer slopes of the cone." The agglomerate, which is traversed by innumerable veins of calcite, has in one place a portion of its mass, with the bedding-planes standing vertically.

The uprise of molten rock in the chimney is shown by dykes and other intrusions which ramify through the fragmental material. These intrusions belong to more than one period, as can be seen in the stack where the basalt forming the spindle is cut by a later dyke. Sir A. Geikie explains the Spindle as having been formed by the injection of basaltic lava into a cylindrical cavity, which, on cooling, assumed a columnar structure, the columns lying at right angles to the cooling surface.

Vent No. 1. East of the Rock and Spindle.—About 40 yards to the east of the Rock and Spindle an extraordinary opening has been laid bare at the upper part of the beach, which trends in a northerly direction for about 50 yards. It is filled entirely with non-volcanic debris, and has been designated by Sir A. Geikie an "explosion-fissure" or "blow-hole."

Vent No. 2. East of the Rock and Spindle.—Eighty yards to the east of the above vent another dyke-like opening can be seen. It also runs in a north and south direction, and extends from the cliff above high water to beyond the limits of low water. The infilling material consists of the intermingled debris of shattered sedimentary rocks, with an admixture of fine ash. Towards the north the agglomerate is a thoroughly volcanic one.

Vent No. 3. East of the Rock and Spindle.—Less than a hundred yards east from the last-mentioned opening another vent occurs, and is conspicuous in that its enclosed agglomerate protrudes above the general level. The agglomerate is unstratified, and has a basaltic intrusion running approximately parallel to its northern margin.

Vents Nos. 4 and 5. East of the Rock and Spindle.—A short distance farther east other two vents will easily be detected. The western is the larger, and can be seen

to have disrupted a 6 ft. *Naiadites* limestone. The agglomerate of these vents is unstratified, and basaltic intrusions occur in each.

Group of Dykes at Craigduff.—About 600 yards east from the vents last described a group of dykes may be seen which, although they are not in obvious association with any area of agglomerate, may be conveniently referred to here. The largest extends in an east and west direction along the shore for over 400 yards. Near its western limit several smaller intrusions run parallel to it. Where these have been in contiguity with, or now traverse, black shales they have undergone the customary alteration to white-trap. An instructive example of a dyke sending off a small sill which changes its horizon can also here be seen.

Group at Kittocks Den.—Three-quarters of a mile to the east of Craigduff a group of six vents can be seen near the opening of the seaward end of Kittocks Den. The most westerly protrudes from the cliff on to the beach, so that its intimate relations can be there examined. To the south-east a small exposure of agglomerate on the cliff marks the site of another vent.

The material filling the third of the vents when looked at from the beach would be readily thought to be conformably overlain by sedimentary rock—shales with crinoidal limestone ribs and sandstone. Closer examination however shows that here also the agglomerate is intrusive.

On the beach immediately to the north-east the remaining three vents are exposed. All are in connection with one another. A basalt intrusion occurs in the most westerly, having large xenocrysts of hornblende. This vent is connected to the middle one by a basalt dyke containing fragments of a sandstone which is much altered, and has cavities filled with bituminous material. The strata surrounding these vents have been much disturbed.

Vent at Buddo Ness.—This vent is remarkable on account of its having risen on the crest of an anticline. The agglomerate is coarse and unstratified, with an intru-

sion of olivine-basalt running beneath low water. A noteworthy feature here is the development of a series of divisional planes, parallel to the margin of the opening, along which the sediments have been let down in slices.

Vent at Laws Castle.—A mile and three-quarters east from Buddo Ness still another vent can be seen trending, dyke-like, across the strand towards the north-east. It has a conspicuous dilatation near the upper part of the beach, but narrows before passing above high-water mark. A number of basaltic intrusions occur in the agglomerate, which are remarkably fresh and contain xenocrysts of biotite and amphibole. This vent is the most easterly which has been detected along the northern coast of Fife.

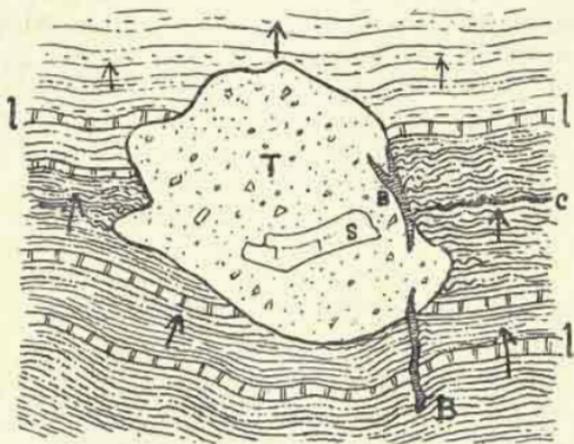
(2) *Vents on the South Coast of the County.*

To the west of St. Monans, on the southern coast of Fife, another remarkable assemblage of volcanic vents has been exposed. Considerations of space preclude more than a brief statement of the salient features of interest of some of them.

Vent at St. Monans Church.—This measures about 200 yards from east to west, by about 600 yards from north to south. Its infilling material is an unstratified agglomerate traversed by calcite veins, and veins filled with black micaceous sandstone. A noteworthy feature here is the large number of intrusions. Particularly does one dyke deserve mention, viz.—that which runs westward from the vent, along the north side of a cart road, which has been trenched at the upper part of the beach through a high ridge of sandstone, and ultimately turning north, insinuates itself along a thick band of black carbonaceous shales. It is in reality a composite dyke, and portions of sediment can be detected between successive intrusions. Where ramifications have been sent into the carbonaceous strata, they are now in the condition of white-trap.

Vent at Newark Dovecot.—Probably the most perfectly exposed of all the necks in East Fife has been laid bare in ground plan on the beach in front of Newark Dovecot.

It is irregularly oblong in shape, and measures 60 yards in length by about 37 in breadth. The contents of the neck consist mostly of non-volcanic debris embedded in a base of greenish tuff, and includes one large mass of sandstone, 20 yards long by 7 yards broad.



Ground-plan of small neck, beach below Dove-cot, Newark Castle, St. Monans.

(A) Beds of limestone, cement-stone, and ironstone. (C) Thin coal seam lying among black shales; (B) Basalt-veins; (T) Agglomerate of the neck; (S) Large block of sandstone in the agglomerate. The arrows show the direction of dip of the surrounding strata (after Sir A. Geikie, from *Geol. Surv. Mem. on East Fife*).

Vent at Coalyard Hill.—In front of Coalyard Hill, near Ardross Farm, the agglomerate of a large vent stretches along the shore and can be minutely examined. An interesting feature here is the large number of intrusive basalt masses, dykes, and veins which traverse the fragmentary material. At the western margin of the vent there is wedged in a large mass of white coral limestone, probably a fragment of the Hurlet Limestone.

Vent at Ardross.—About 200 yards to the west of the headland, on which stand the ruins of Ardross Castle, the agglomerate of another vent has been laid bare. It is of the common type, veined by calcite, and intersected by dykes which run wall-like across the strand.

Vent at Elie Ness.—This vent, whose eastern margin

is well exposed, is more than 500 yards in diameter. The enclosed material is a dull, green basic agglomerate, more or less distinctly stratified, the layers tending in the main to dip towards some central portion of the opening, and that frequently at high angles. The tuff encloses, in many of its layers, irregular fragments of hornblende and pyroxene, as do also large numbers of the basalt blocks and dykes. The non-volcanic constituents of the tuff include limestone fragments, and pieces of fossil wood, which are always enclosed in an envelope of crystalline calcite. At the westmost portion of the vent, just above low-water mark, is a remarkable plug of basalt-breccia.

Vents at Elie Harbour.—On the promontory at Elie Harbour, the agglomerate of probably two distinct vents can be seen. The most interesting feature to be noted with regard to these is the well-marked concentric bedding observable in the western opening. "It offers a remarkably clear-cross section of a volcanic vent," says Sir A. Geikie, "and displays the internal concentric structure better, perhaps, than any other example along the whole coast."

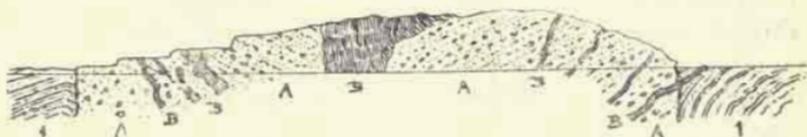
Basalt of Chapel Ness.—Extending along the shore for about 600 yards to the south-west of Earlsferry is a large intrusive sheet of basalt. It is a fresh black compact amygdaloidal olivine-basalt, and contains, like the dykes in the vents, xenocrysts of glassy felspar. It shows columnar structure, and the amygdaloidal character is more marked towards the base where the intruded material is in the condition of white-trap.

Vent at Kincaig Hill.—About a mile to the west of Elie is a line of cliffs, which rises above high-water mark to a height of 200 feet. This has been carved out of the agglomerate of the great volcanic vent of Kincaig Hill, which, as far as the evidence shows, measures about a mile from east to west by over half a mile from north to south.

The margins of the vent can be seen on the beach at the east and west sides of the hill. The enclosed material which in the peripheral portions is made up largely of

non-volcanic detritus, varies in the main from a fine tuff to a gravelly agglomerate, and encloses blocks of basalt as well as fragments of sedimentary rock. These latter in the inner portions of the neck generally consist of black shale or limestone, with occasional fragments of fossil wood.

The tuffs are distinctly stratified, and dip in the main towards the centre of the opening. They have been pierced by numerous intrusions—dykes and veins of basalt—but the feature for which the vent is unique is the plug of basic igneous rock which apparently has solidified in the bottom of the crater, and exhibits magnificent columnar structure. "The outward tilt of the columns away from the centre of the vent," says Sir A. Geikie, "suggests that the basalt filled up a saucer-shaped depression from the coal sides and bottom of which the prisms of contraction started."



Section from west to east across the great neck of Kincaifg Hill, Ellie.

1. Carboniferous Limestone Series. (A) Agglomerate; (B) Basalt (after Sir A. Geikie, from Geol. Surv. Mem. on East Fife).

Vent on the Largo Shore.—About a mile to the east of Largo there is a large area of tuffs and agglomerates apparently infilling another volcanic vent. Some of the tuffs are distinctly stratified, and the suggestion is made by Sir A. Geikie that these may have been accumulated in one or more crater-lakes.

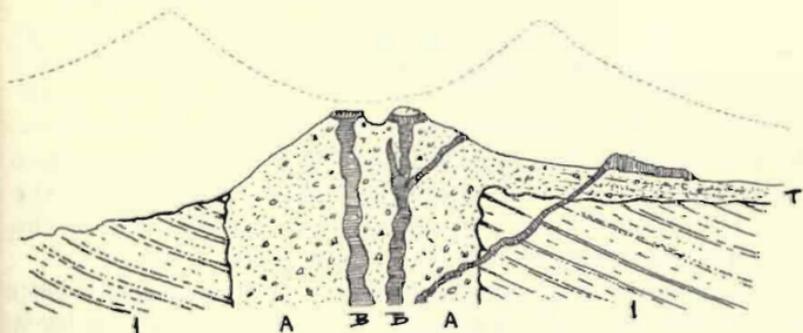
\* Vent at Lundin Links.—On the foreshore at the eastern end of Lundin Links another vent has been partially exposed. The enclosed rock is a pale green, fine-grained tuff. Towards the margin the material is largely made up of the debris of the surrounding red sandstones and clays. The principal feature of interest in connection with this vent is the fact that it rises through the highest part of the Coal Measures.

(3) *Vents occurring Inland.*

Concerning these little need be written. It is sufficient to state that they are mostly filled with the same basic gravelly agglomerate or fine tuff with which we have already familiarised ourselves along the shores of the county. In only a few instances is there any discernible assortment of the infilling materials. Basaltic intrusions occur in many of them, as also ejected blocks of similar petrographic type.

The most interesting of the vents falling under this head is that of Largo Law, which rises cone-like to a height of 949 feet above sea-level on the north side of Largo Bay. It is built up of dull green granular unstratified agglomerate which encloses numerous blocks and bombs of various cellular basalts.

The accompanying is a diagrammatic section through the hill. The small mass of igneous rock on the eastern declivity shows beautiful columnar structure, and is probably the remains of a lava flow.



Theoretical diagram to show the supposed structure of Largo Law.

1. Carboniferous Limestone Series. (A) Agglomerate; (B) Basalt; (T) Overlying sheet of stratified tuff. The dotted line is meant to indicate that a large part of the original volcanic cone has been removed (after Sir A. Geikie, from Geol. Surv. Mem. on East Fife).

### B. *Interbedded Lavas and Tuffs.*

With regard to the erupted materials of undoubted Carboniferous age the following require mention. In Aithernie Den there is intercalated in the Upper Lime-

stone Group of the Carboniferous Limestone Series a volcanic zone which measures 130 feet in thickness. It consists of well-stratified fine red and green sandy tuffs, and includes a central band of compact blue basalt. To the south-east of Kinraig Hill there are exposed on the foreshore some fine decayed sandy tuffs and ashly sandstones. These are probably interbedded among strata high up in the Edge Coal Group of the Carboniferous Limestone Series.

Reference may here be made to a large area of tuffs and agglomerates to the south and east of Largo Law. This sheet of fragmentary rock which stretches south to the northern shores of Largo Bay, and east as far as Rires, covers a tract of country some four or five square miles in extent. It appears to rest unconformably on the folded Carboniferous strata, and is probably only a remnant of what was once a more extensive mantle of similar material. In some places it must formerly have measured over 400 feet in thickness.

*C. Intrusive Igneous Rocks other than those in immediate connection with Vents.*

The intrusive igneous rocks other than those in association with the vents appear to fall naturally into two categories, viz.—Sheets or Sills and Dykes; by far the largest proportion of the intrusions coming under the first of these heads.

Sheets or Sills.—Examination of the geological map will show that the distribution of the sills, which have been introduced at all horizons in the Carboniferous rocks, is in a broad belt which stretches from beyond the western limit of the map north-eastward across the county almost to St. Andrews. This belt in its eastward passage attains a maximum breadth of about 7 miles somewhere between Colinsburgh and Pitscottie, but thereafter narrows, dying out in a narrow intrusion in the Lumbo coalfield.

Topographically, by virtue of their greater relative durability, the sills, like the necks, usually form con-

spicuous eminences, and might be said to form a sort of protruding backbone in the Carboniferous portion of the county.

Structurally, they exhibit all the characteristic features of the type of intrusion to which they belong. Thus they can frequently be seen to steal from one horizon to another, and to have altered the strata superincumbent upon them. The great intrusive masses of the Lomond Hills exemplify these phenomena very clearly.

Petrographically, no great variation occurs in the character of the sills. They are nearly all dolerites. Some of them contain olivine, others are olivine free. Ophitic structure is frequently developed. Sometimes there is evidence to show that prior to or during consolidation a process of differentiation has taken place, whereby more acid portions of the magma have segregated into veins, pockets, and patches. An intrusion at Blebo Mills, near Dura Den, exhibits well the results of this intramagmatic change.

With reference to the age of the sills, it appears certain that all do not belong to the same epoch of injection. In some cases the faults which have displaced the Carboniferous strata can also be seen to have affected the igneous rock which has been introduced among them, while in others a large mass of intruded material may be situated in an area traversed by powerful faults and yet not participate in their effects.

In addition to the main belt of intrusions, there are some outlying examples which require mention. The first of these occurs in the Cameron Burn to the east of Hazleden, where a small thickness of intrusive rock has been folded with the sediments among which it occurs. Another has been laid bare on the south side of Balcomie Sands, and affords admirable illustration of the manner in which a sheet or sill may send off ramifications, and the change produced in its substance where it comes in contiguity with carbonaceous strata. A thin sill of igneous rock which has been introduced into a series of shales at Spalefield, 2 miles to the north of Anstruther, is unique,

in that it belongs to a petrographic type nowhere else found in the district. A thin slice of this material was examined by Dr. Flett, and he reported it to be a teschenite made up of augite, olivine, hornblende, biotite, apatite, and plagioclase in poor preservation, with which there is in association much analcite filling up the interstices between the other minerals. Among the sills must be included the Isle of May.

Dykes.—The dykes not in association with the vents which occur in Eastern Fifeshire are few in number, and only one falls here to receive notice. It trends mainly in an east and west direction, and extends, as will be seen from the map, from some quarries to the west of Strathkinness eastward as far as Kittocks Den,  $3\frac{1}{2}$  miles to the east of St. Andrews. It is a coarsely crystalline dolerite, and appears to form one of the great series of east and west dykes which run across Scotland, and which have been doubtfully regarded as of Tertiary age. The most interesting exposure of this dyke is a little past the second milestone on the road from St. Andrews to Crail. Here, in a field to the north of the highway, it can be seen cutting the agglomerate of one of the volcanic vents.

#### GLACIAL AND RECENT DEPOSITS.

There is no important difference between the Glacial and Post-Glacial deposits of this region and those of the remainder of the Central Valley of Scotland. It will not be necessary, therefore, to do more than notice briefly the nature of the best developed of these deposits and some of the localities where they occur.

The whole area bears the impress of intense glaciation. Before the advent of the Glacial epoch, the main lines of drainage and relief were probably similar to those which exist at the present time, but the surface of the ground may have been more rugged and covered by a thick mantle of weathered rock.

The ice-sheet descended from the Southern Highlands,

overspread the lower ground, crossing with little deviation the Sidlaws and the Ochil Hills, and passed out into the present basin of the North Sea in a direction which in Fife was approximately east, while along the coast of Forfar and Kincardine the direction was north-east.

Evidence in support of the foregoing account of the movement of the ice in this district is afforded by—

(a) *Glaciated Rock Surfaces*.—Glacial striæ have in general been preserved on the hardest rocks only, namely, on the andesites and other igneous masses of the Lower Old Red Sandstone of the Ochils and Sidlaws, and upon the dolerite sills which form the higher parts of the Carboniferous region of East Fife. The softer sandstones have nearly always had their glacial markings obliterated by subsequent weathering except where covered and protected by boulder-clay. The direction of these striæ is nearly east and west in Fife, north-east and south-west near the coast in Forfarshire. In addition to actual striations, rounded and polished rock surfaces are everywhere common, especially on the highest ground.

(b) *Boulder-clay*.—This is a deposit varying considerably in thickness which overlies the solid rock over the whole district except on the high ground, where it has probably never been present, and from tracts of low-lying ground, from which it has been removed by denudation. The distribution of the clay is interesting. It covers the long, round-backed ridges and conical hills of the Carboniferous region of East Fife, frequently to their summits, and always lies thickest on their eastern slopes. Even where it does not completely cover a hill to its summit, it lies higher up on the eastern than on the western side. This is well seen at Largo Law, where the boulder-clay lies 700 feet up the seaward slope, but hardly 300 feet above sea-level on the landward side. Along the ridges of the Old Red Sandstone lavas of the Ochils in north-east Fife, and of the Sidlaws in Forfarshire, similar examples of "crag and tail" are common.

The nature and composition of the boulder-clay itself is instructive. It is a tough unstratified clay which varies in

colour according to the rock which has contributed most to its formation. Thus in Forfarshire, and in and around the Old Red Sandstone region of Fife, it is brown or reddish-brown, while in the south of Fife it is dark brown or blackish-grey, owing to the abundance of black and grey Carboniferous shales. Wherever exposed it is seen to be crowded with sub-angular striated stones which vary in size from mere pebbles up to masses weighing more than a ton. These rock fragments have been for the most part derived from local rock masses. There are red sandstones, conglomerates, andesites, from the Old Red Sandstone, white sandstones, black shales, fragments of basalt and dolerite from the Carboniferous, but in addition, numerous specimens can always be found of the schists, gneisses, quartzites, granites, and other rocks of the Southern Highlands.

(c) *Erratics*.—In addition to the rock fragments already noticed occurring in the boulder-clay, numerous erratics of various sizes are found scattered over the whole district from the highest ground down to and probably below low-water mark. Most of these belong to rock masses which occur in position in the district, and where they can be traced to their source, they show that their general direction of movement has been from west to east; but besides travelled boulders of local origin there are others which have most probably come from the Highlands. Good examples of this latter class can be seen in the neighbourhood of Dundee on the south side of the Firth of Tay, between Tayport and Newport, and again at Wormit Bay. The best example here occurs at the east side of the bay, near high-water mark, resting on Lower Old Red Sandstone rocks. It is a crumpled, schistose grit weighing upwards of 20 tons, and having its long axis lying east and west.

*Sands and Gravels*.—Overlying the boulder-clay, but more restricted and irregular in distribution, comes a variable and inconstant series of sands and gravels. These are mostly confined to the low ground, but the height to which they ascend varies in different parts of the district,

and it is not certain either that they all belong to the same period or have had the same mode of origin.

In Forfarshire they are best developed opposite the mouths of the large mountain valleys. In Fife they can be seen in the neighbourhood of Leslie and Markinch on both sides of the River Leven. Farther east, in Kingsbarns parish, they form the rolling tract, with pools of water in the hollows between the Kilduncan Burn and the Kenly, passing up the course of the Wakefield Burn, a tributary of the Kenly as far as Kinaldie. At St. Andrews these deposits cannot be sharply distinguished from the sands and gravels of the 100-foot terrace. They reach their greatest development on the tract of ground near St. Fort, between Leuchars and Wormit, passing westwards along the hollow through which the north of Fife railway now runs, until they join with the great series of sands and gravels, among which lies the Loch of Lindores. Good exposures can be seen near St. Fort station. They consist of coarse shingle gravel and sand, with occasional large boulders. The bulk of this material is made up of local rocks—the red sandstones, conglomerates, andesites, and dacites of the immediate neighbourhood, but there are also fragments of a bright red sandstone which closely resembles the Upper Old Red Sandstone of the Carse of Gowrie, and numerous specimens of the schists and other crystalline rocks of the Highlands. These St. Fort sands and gravels were probably deposited during the retreat of the ice-sheet. Examples of overflow channels also occur, but they have not yet been worked out in detail.

*Raised Beaches.*—Around the coast of Fife and Forfar are preserved relics of a number of platforms or terraces which are considered to mark pauses in the uplift of the land since Glacial times. On the exposed parts of the coast these terraces are not well preserved as a rule, but in the estuaries of the large rivers they are well developed, and can be more easily recognised. Their exact number is doubtful, but three at least can be traced with fair certainty.

(a) *The 100-foot Terrace.*—The oldest of these terraces

which can be satisfactorily recognised, lies approximately 100 feet above the present level of the sea. Variations from this elevation may be original or more probably due to subsequent denudation. It is partly a terrace of erosion, and partly a terrace of deposition cut out of the boulder-clay, and occasionally out of the solid rock. On the open parts of the coast the materials deposited at the time when the land stood at this level consist of sand, gravel, and water-worn stones. In the more sheltered parts of the estuaries of the Forth, Eden, and Tay these sands and gravels pass into and are associated with fine clays which, on account of their fossil remains, will receive special notice later.

Within our district this platform can be fairly well seen. In the south of Fife it extends up the valley of the river Leven. At the west end of Kincaig Hill it is a terrace of erosion cut out of tuffs and agglomerates. Along the north-western slope of the hill this platform can be followed for a short distance, but from the south side it has been entirely removed through the cutting back of the cliff by the sea. From Kincaig Hill, east and north-east, it forms a broad terrace running behind Elie, St. Monans, Anstruther, and Crail, gradually narrowing from Crail to Kittocks Den, between which and the Maiden Rock it can only be seen at wide intervals on the top of the cliffs. From the Maiden Rock it passes inland, broadening out behind St. Andrews, and easily traceable westwards by Seafeld and Kincaule, until it disappears on the slope near Nydie. Seven miles farther inland, however, at Cupar Muir, a series of clays are found at the same level, apparently a continuation of the same terrace. On the south side of the Firth of Tay it probably occurs, but is not easily distinguishable among the terraces of the Old Red Sandstone lavas, which occur at this part. On the north side of the Tay the same terrace is well seen, and can be traced up the river beyond Perth, also in the lower reaches of the Earn. When followed up the river, the sands and gravels pass into fine laminated clays and sands, with occasional boulders, and

with crumpling and contortion of the layers. Above Perth they pass into shingle gravel and sand of fluvial origin. Northwards, from the estuary of the Tay, the 100-foot terrace is seen at intervals along the coast at Barry, Arbroath, and Montrose. At the last-named locality it is overlain by morainic gravel and shingle.

Shell-bearing Marine Clays.—It will be convenient to deal here with a series of clays and sands which in one or two places, as at Cupar Muir and the Carse of Gowrie, are associated with the deposits of the 100-foot terrace, while in other localities the relations of the two have not been ascertained. These clays are interesting because of the fossils they contain, which indicate that they were deposited at a time when our climate was arctic or sub-arctic in character.

At Cupar Muir, as has already been indicated, the sands and gravels of the 100-foot terrace are replaced by finely laminated clays which, from their use in the manufacture of bricks, are usually known as "brick-clays." Here they have yielded the skeleton of a seal, *Phoca hispida*, a species which does not now visit our coasts. Nearer the sea, at Guardbridge and by Kincapple to Seafield, a similar clay occurs, though its relations to the 100-foot terrace are not known. In the clay pit of the old brickworks at Guardbridge and Seafield this clay is seen to be stratified, with occasional crumpling and distortion of the layers. It is brownish-red in colour, with layers of fine sand and calcareous concretions or "fairy-stones." Enclosed in the clay, but at wide intervals, are pieces of hard chalk, fragments of the local Carboniferous sandstones and shales, and rarely blocks of crystalline, igneous, or metamorphic rocks. From the Seafield clay pit, now disused, numerous specimens of a starfish, *Ophiolepis gracilis*, have been obtained, and from a similar opening at Guardbridge the humerus of a seal of the same species as the specimen obtained at Cupar. These specimens are now in the University Museum.

A similar clay occurs at the mouth of the Kinness Burn, St. Andrews, but is now concealed, and again in the Cockle

Mill Burn, west of Elie, also in Woodhaven, near Elie Harbour. At the last-named locality it was well exposed, and was seen to rest on boulder-clay, and to be overlain by sand and gravel, followed by a thin bed of peat, which was in turn followed by the sand and gravel of the youngest raised beach, with blown sand above. It agreed in character with the description already given of the clay at Guardbridge, Seafield, and Cupar, but contained in addition a number of well-preserved molluscan remains, including the following species, which now inhabit colder seas:—*Yoldia arctica*, *Pecten groenlandicus*, *Tellina calcarea*, *Thracia myopsis*.

Similar forms have been found in the neighbourhood of Dundee, at Errol and Barry, also at Arbroath.

(b) *The 50-foot Terrace*.—The second terrace occurs at a height approximately 50 feet above present sea-level, but it is neither so well marked nor so well preserved as the last described.

Like the 100-foot and the 25-foot beaches it can be well seen as a terrace of erosion on the west side of Kincaig Hill, from which it can be traced along the northern slope of the hill, finally passing under the blown sand, north of Earlsferry. Around the coast of Eastern Fife it has been preserved at intervals, north and east of St. Monans, on the Isle of May, and at St. Andrews, where it forms a conspicuous feature of the cliffs immediately to the east of the town, and from which it can be followed westwards, as a well-marked terrace, by Seafield and Kincaple until, like the 100-foot terrace, it disappears on the slope overlooking the Eden, near Nydie. From the Eden to the south side of the Tay this terrace cannot be followed with certainty, but on the north side of the Tay it forms the flat plain known as the Carse of Gowrie. Strictly speaking, the Carse of Gowrie is not exactly 50 feet above the sea, the greater part lying at a height of between 30 and 40 feet and rising gradually towards its inner margin, which abuts against the Sidlaws. According to Professor James Geikie, the succession of deposits here is as follows:—

First and oldest is the boulder-clay, which does not differ in any important respect from the boulder-clay elsewhere in the district, and therefore does not call for further notice. Resting upon the boulder-clay comes a series of deposits, in some places consisting of gravels and sands, in others of finely laminated clays, which have been already noticed in connection with the 100-foot terrace. Resting upon the denuded surface of these arctic shell clays come river gravels and silts, which are free from admixture with clay, and show false bedding, indicating that they were arranged by water flowing steadily down the river. Their thickness is not known, nor have they yielded any organic remains which might



Section across Carse of Gowrie.

1. Till; 2. Clay, &c., of 100-ft. terrace; 3. River-gravel and sand; 4. Peat-bed; 5. Carse-clay of 45-50 ft. terrace; 6. Recent Alluvia (after Prof. James Geikie, from "The Great Ice Age").

indicate their age, or the climatic conditions under which they were deposited. Overlying the gravels and silts just noticed, or where these are absent upon the clays below, is a bed of peat, which in the neighbourhood of Dundee lies at or below low-water level, but when traced up the river appears to rise gradually, for at Abernethy it lies about the level of high-water mark, while in the continuation of the Carse lands, along the course of the Earn to Bridge of Earn, it has reached a height of several feet above the river. Varying in thickness from a few inches up to 4 feet, this peat is made up of the remains of reeds, sedges, and mosses, with roots, stems, and twigs of birch, alder, willow, hazel, and pine. Most of this is drifted material, but that the peat, in places at least, represents an old soil is shown by the rootlets which pass

down from it into the beds beneath. The peat is followed by the gravels and clays of the 50-foot terrace which form the Carse. The fine sediments of the Carse differ from the clays of the 100-foot beach in the complete, or almost complete, absence of boulders and stones, and in being silts rather than true clays. At Polgavie and Inchtute they have yielded numerous specimens of *Scrobicularia piperata*.

A succession of deposits similar to those of the Carse of Gowrie has been worked out at Montrose.

(c) *The 25-foot Terrace*.—This is the youngest and the best preserved of the raised beaches to be noticed here. At the west end of Kinraig Hill, like the 50-foot and the 100-foot beaches, it forms a well-marked terrace of erosion, while to the east it passes under the links of Elie and Earlsferry. From Elie round the coast of Fife to St. Andrews the 25-foot beach forms practically a continuous terrace except where cut back by the sea. It can be easily recognised, because it always contains numerous shells and other remains of forms still living on the beach. On the exposed parts of the coast the cliff, which here and there forms its inner margin, is undercut, wave-worn, and frequently hollowed out into caves. Good examples of these are M'Duff's Cave, near Elie, the Coves, near Crail, and at Buddo Ness. To the west of St. Andrews this terrace broadens out, forming a wide plain underlying the Links and the cultivated ground between them, and the foot of the slope which runs from Strathtyrum and Seafield towards Guardbridge. On the ground between the Eden and the Tay it underlies the sand dunes of Tents Muir and stretches inland as far as St. Michaels, from which the inner margin runs nearly parallel with the road from St. Michaels to Tayport. From Tayport, along the south side of the Tay, it can be followed at intervals by Newport, Wormit, and Balmerino, as far as F'lish. North of the Tay it forms the platform on which rest the blown sands of Barry, Carnoustie, and Montrose.

*Sand Dunes*.—Of the other superficial deposits which occur in the district, the best developed and most interest-

ing to both geologist and botanist are the various stretches of blown sand known as links. In Fife the best examples occur between Leven and Largo, at Elie, St. Andrews, and at Tents Muir; in Forfarshire, at Barry, Carnoustie, and Montrose.

## The Fossil Fishes of Dura Den.

By A. S. Woodward, Natural History Museum,  
London, S.W.

THE great accumulation of fossil fishes in a layer of the yellow sandstone in Dura Den is an interesting illustration of the accidental nature of most of our information concerning extinct backboned animals. As all these fishes are whole, or only little disturbed by crushing in the rock, they must have been suddenly killed and very quickly buried. Similar fishes doubtlessly lived in equally great abundance during the whole of the time while the successive layers of the sandstone were being deposited; but when they died singly, they were either eaten by predaceous companions or became broken up by decomposition, and not more than fragments remained to be preserved. It was only when there was some local catastrophe—such as an unusual incursion of mud or noxious gases, or a sudden lowering of temperature—that the dead bodies could escape at least partial destruction. Fortunately during the lapse of geological time such catastrophes have happened often and in many regions both on land and in the sea; so that although our knowledge is restricted to the several disconnected episodes they represent, we are able to form a good general idea of the succession of backboned animals and their mutual relationships.

The episode represented in Dura Den relates to the time when gill-breathing fishes were just giving rise to lung-breathing amphibians—the earliest land-animals. At that time it was usual for the hard skeleton to be restricted almost or completely to the skin. The greater part of the internal skeleton was of soft cartilage or gristle, too little hardened to be preserved when fossilised. A change, however, was just beginning, and as soon as there was a

tendency to the hardening of the internal parts at the expense of the external skeleton, amphibian life began.

The commonest fish in the destroyed shoal in Dura Den is *Holoptychius Flemingi* (or *H. Andersoni*), representing the Crossopterygian (fringe-finned) order, of which the paddle-like paired fins might be changed into amphibian limbs as readily as into ordinary fish-fins. It must have been a stout, round-bodied fish, for in the fossils it is usually displayed from above or below; and it varies in length from about 1 to 3 feet. Its head is completely armoured with thick bony plates, which are covered with tubercles; its body is enveloped in round bony scales, which are deeply overlapping and conspicuously ornamented with coarse radiating ridges of enamel; while its tapering tail is of the simplest kind known among fishes. The internal skeleton of the trunk is never preserved, and so must have been little if at all hardened. All Crossopterygians are closely related to the lowest lung-breathers; but in the curiously complex microscopical structure of its conical teeth, and in the arrangement of certain head-bones, *Holoptychius* is especially similar to the earliest lung-breathers, or Labyrinthodonts, which began to multiply as soon as this fish had become extinct.

The Crossopterygians are also represented in Dura Den by occasional specimens of two smaller species, *Glyptopomus minor* and *G. Kinnairdi*, which are long-bodied fishes with ornamented rhombic scales and short-lobed paired fins. In these the teeth are of simpler structure, though still tending towards the Labyrinthodont pattern; and the skull is interesting as having the roof of the brain-case pierced by a "pineal foramen," such as always occurs in Labyrinthodonts but scarcely ever in fishes.

With true fishes which exhibit so many resemblances to the early lung-breathers, it is not surprising to find a typical Dipnoan, *Phaneropleuron Andersoni*, closely similar to *Ceratodus*, which still survives in certain fresh waters in Australia. In this fish the round overlapping scales are thin, and the internal skeleton of the

trunk is sufficiently well hardened for its stout ribs and other vertebral arches to be conspicuous in the fossils. The Dipnoan type of fish has, indeed, changed very little since Upper Devonian times, and *Phaneropleuron* approaches a more primitive condition in scarcely any feature except the tuberculation of its tooth-plates, which seem as if they had just originated by the fusion of patches of ordinary conical teeth.

Nearly all the fishes in the Dura Den shoal are these by-products, so to speak, of the impulse which resulted in some of the highest gill-breathers becoming lung-breathers. With them, however, is associated a single survivor of the race of most primitive fish-like organisms, the Ostracodermi, which first acquired hard parts at the end of the Silurian, and died out before the dawn of the Carboniferous period. *Bothriolepis hydrophila*, as this animal is named, is so peculiar in appearance that it was originally mistaken for a beetle, and its relationship to fishes is at first sight not easily recognised. The fossil is essentially an elongate-oval bony box, about 3 or 4 inches in length, with a pair of long paddles movably articulated with its sides. This armour enclosed both the head and the principal part of the trunk; but there originally extended from its hinder opening a slender, naked tail, which has been seen as an impression on the rock in a corresponding fossil from Canada. The eyes are conspicuous, close together, piercing the bony roof of the head, which must have been slightly movable on the trunk; while the jaw-plates beneath are not like those of ordinary fishes, and must have worked in a different manner.

*Bothriolepis* is associated with *Holoptychius* and allied Crossopterygian fishes in several other localities not only in Scotland and England, but also in Russia and North America. The special Upper Devonian fish-fauna, of which Dura Den affords a glimpse, had therefore an extremely wide geographical distribution, and it always occurs on approximately the same level in the series of geological formations.

## The Flora of Forfarshire.

By James Brebner, M.A.

IN his article on the Botany of Forfarshire contributed by the late Mr. Edward Moir to Warden's "Angus or Forfarshire" he says:—"The county of Forfar, owing to its great diversity of surface, including rocky coast and grass-covered sandy links, wooded dens and fertile straths, lochs and marshes, mountains and glens, presents to the botanist a peculiarly rich and interesting field of study and research."

According to the London Catalogue of British plants (1908), the number of species and sub-species of plants in the United Kingdom is a little over 2000,\* and of these about half are reckoned as belonging to Forfarshire.

**Littoral Region.**—The stretch of coast-line extending about 30 miles from Invergowrie Bay to the mouth of the North Esk embraces grassy links, sandy dunes, bold cliffs, rocky banks, and shingly beaches, and each portion possesses its characteristic flora. In bygone days a considerable number of plants flourished at Wills' Braes and Harecraigs, on the Tay estuary, to the west and east of Dundee, but they have been mostly destroyed by building and railway operations or city improvements. Among the survivors are *Fumaria capreolata*, *Potentilla verna*, and *Sedum anglicum* at Broughty-Ferry; *Ranunculus sceleratus* at Magdalen Green; and at Wills' Braes there are still to be found *Papaver Argemone*, *Barbarea vulgaris*, *Reseda Luteola*, *Astragalus danicus*, *Agrimonia*

\* In his "List of British Plants" (1908), Mr. G. Claridge Druce gives the following classification:—Native species, 1390; Sub-species, 401; Species somewhat doubtfully native, 89; Alien species well established, 144—Total, 2024.

*Eupatoria*, *Poterium Sanguisorba*, *Valerianella olitoria*, *Tragopogon pratensis*, *Anchusa sempervirens*, *Echium vulgare*, *Linaria vulgaris*.

The Sands of Barry, about 10 miles to the east of Dundee, are especially rich in Botanical treasures and formed a favourite hunting ground of Gardiner, one of our most distinguished local botanists. The vegetation of the sandy shore is limited but interesting, consisting of such plants as *Cakile maritima*, *Arenaria peploides*, *Calystegia Soldanella*, *Atriplex rosea*, *Salsola Kali*, characterised by their low growth, fleshy texture, and straggling habit.

The next Zone consists of sand Dunes, in which the dominant plants are *Carex arenaria*, *Ammophila arundinacea*, *Agropyron junceum*, and *Elymus arenarius*. The Dune built up by these sand-binders is unstable and liable to shift, and in order to produce the continuous sward which converts the Shifting Dune into the Permanent Dune, some of the finer grasses and ordinary inland plants of various affinities are required, and by these Plant Associations a flora of ever-increasing variety spreads over the sand and forms the undulating coastal links beloved by the expert golfer. The following are some of the examples of this mixed vegetation:—*Teesdalia nudicaulis*, *Erophila verna*, *Ononis spinosa*, *Trifolium arvense*, *Lotus corniculatus*, *Potentilla Anserina*, *Galium verum*, *Gentiana Amarella*, *Thymus Serpyllum*, *Salix repens*, *Koeleria gracilis*, *Festuca rubra*, *Agropyron repens*, *Equisetum variegatum*, *Botrychium Lunaria*.

In the moist hollows between the Dunes, where water will sometimes stand, there may be found *Parnassia palustris*, *Myosotis caespitosa*, *Pinguicula vulgaris*, *Corallorhiza trifida*, *Orchis incarnata*, *Juncus balticus*, *Scirpus rufus*, *Tolypella glomerata*, *Chara foetida*, besides Rushes, Sedges, Mosses, Puff-Balls (*Lycoperdon pusillum*), and Lichens, such as *Cladonia furcata*.

The vegetation of the cliffs and rocks between Arbroath and the Redhead varies according as the plants have

rooted themselves in the clefts and crevices, or on the rubble slopes at the base of the cliffs, or on the shingly beach, or on the steep grassy slopes and "dens" leading down to the sea. The following list of some of the most noteworthy plants has been furnished by Mr. R. H. Corstorphine, B.Sc., who is working at the Flora of the Arbroath district:—*Ranunculus hederaceus*, *Cochlearia danica*, *Silene maritima*, *S. noctiflora*, *S. nutans*, *Geranium sanguineum*, *Spergularia marginata*, *S. rubra*, *Trifolium scabrum*, *Astragalus glycyphyllos*, *Ornithopus perpusillus*, *Vicia lutea*, *V. tetrasperma*, *Potentilla reptans*, *Agrimonia Eupatoria*, *Poterium Sanguisorba*, *Arctium nemorosum*, *Carlina vulgaris*, *Artemisia maritima*, *Solidago Virgaurea*, *Campanula glomerata*, *Centaureum umbellatum*, *Plantago Coronopus*, *Armeria maritima*, *Hippophae Rhamnoides*, *Parietaria officinalis*, *Allium vineale*, *Eupatorium cannabinum*, *Asplenium marinum*, *Phyllitis Scolopendrium*.

In the "Annals of Scottish Natural History" (1901), Mr. G. Claridge Druce gives the following list of plants met with at Lunan Bay and neighbouring cliffs:—*Thalictrum dunense*, *Cerastium tetrandrum*, *Dianthus deltoides*, *Erodium cicutarium*, var. *micranthemum*, *Trifolium striatum*, *Astragalus danicus*, *Vicia sylvatica*, *Pimpinella Saxifraga*, var. *major*, *Symphytum tuberosum*, *Artemisia Stelleriana*,\* *Pneumaria maritima*, *Atriplex laciniata*, *Salix Smithiana*, *Allium oleraceum*, *Carex vulpina*, *Koeleria gracilis*, *Agropyron junceum*, *Elymus europaeus*, *Festuca arundinacea*, var. *strictior*, *Glyceria maritima*.

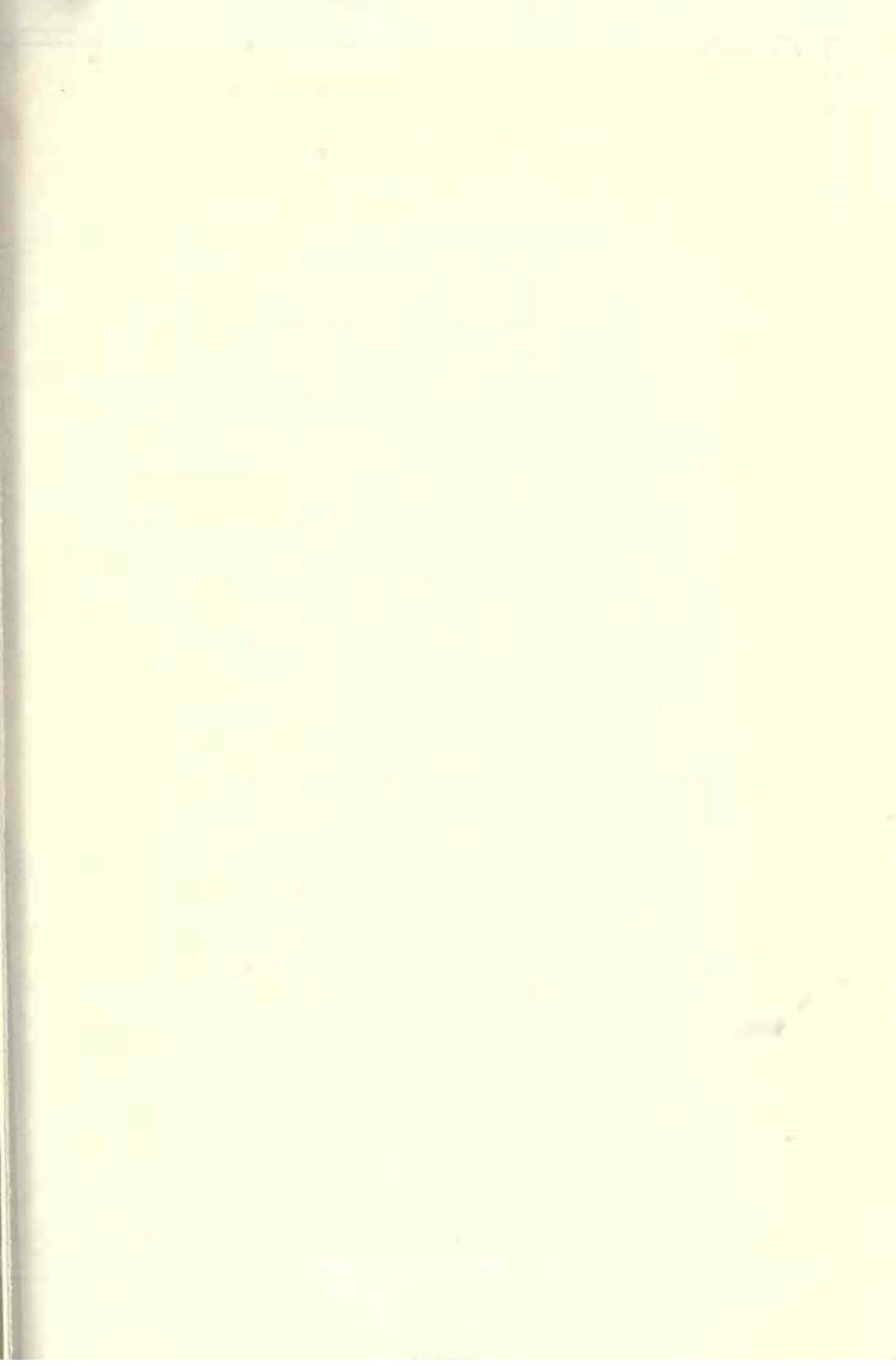
The mud flats which are found in the tidal estuaries of large rivers, such as the South Esk, have a vegetation distinct from that of the sand Dunes. On the muddy beach of the Montrose Basin the following plants occur:—*Aster Tripolium*, *Statice Armeria*, *Plantago maritima*, *Salicornia herbacea*, *Suaeda maritima*, *Juncus Gerardi*,

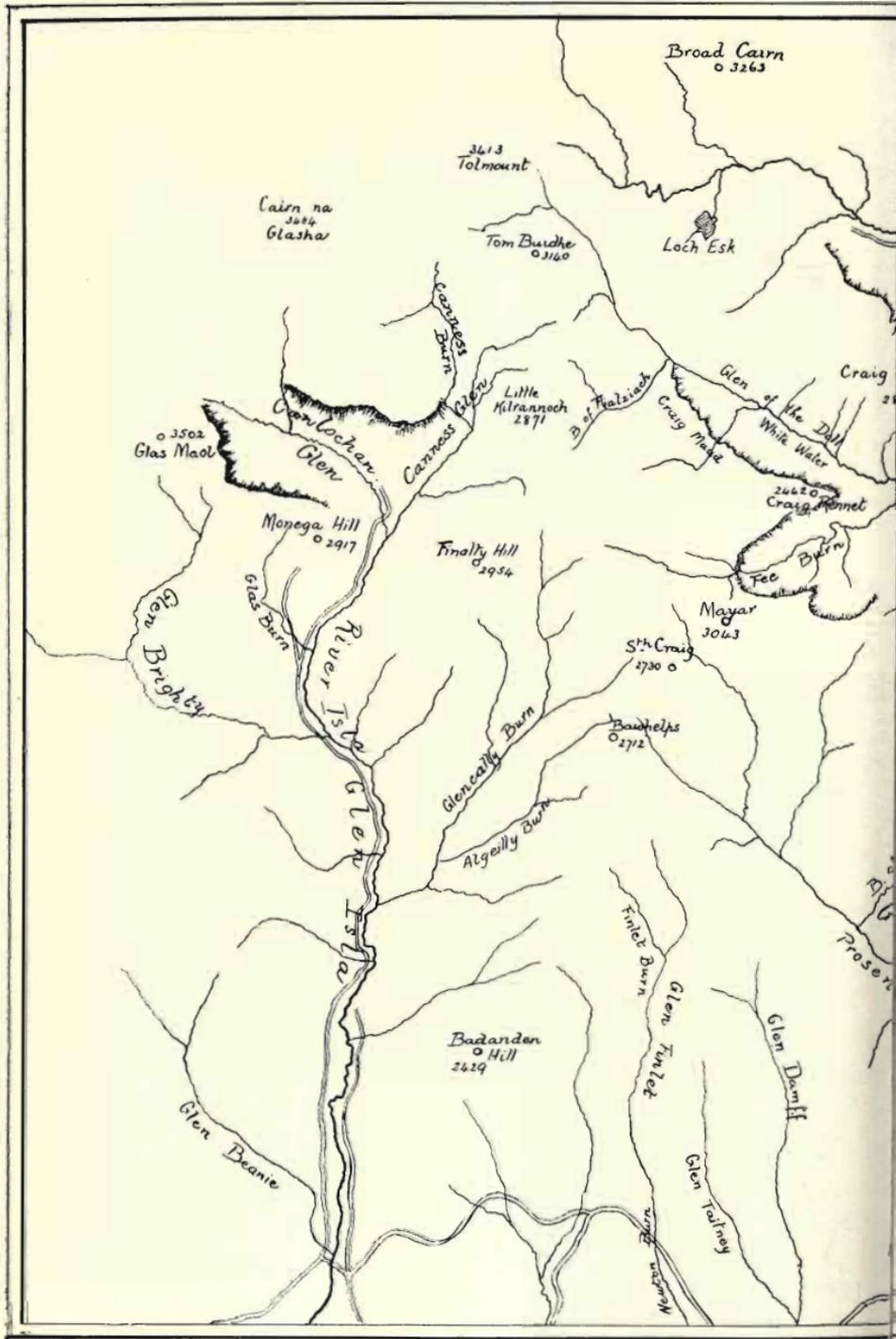
\* This plant is a native of Kamtschatka, but it has become quite naturalised in Scania, in South Sweden, which is in the same latitude as Lunan Bay.

*Zostera marina*, *Triglochin maritimum*, *Scirpus maritimus*, *Agrostis alba*, var. *maritima*.

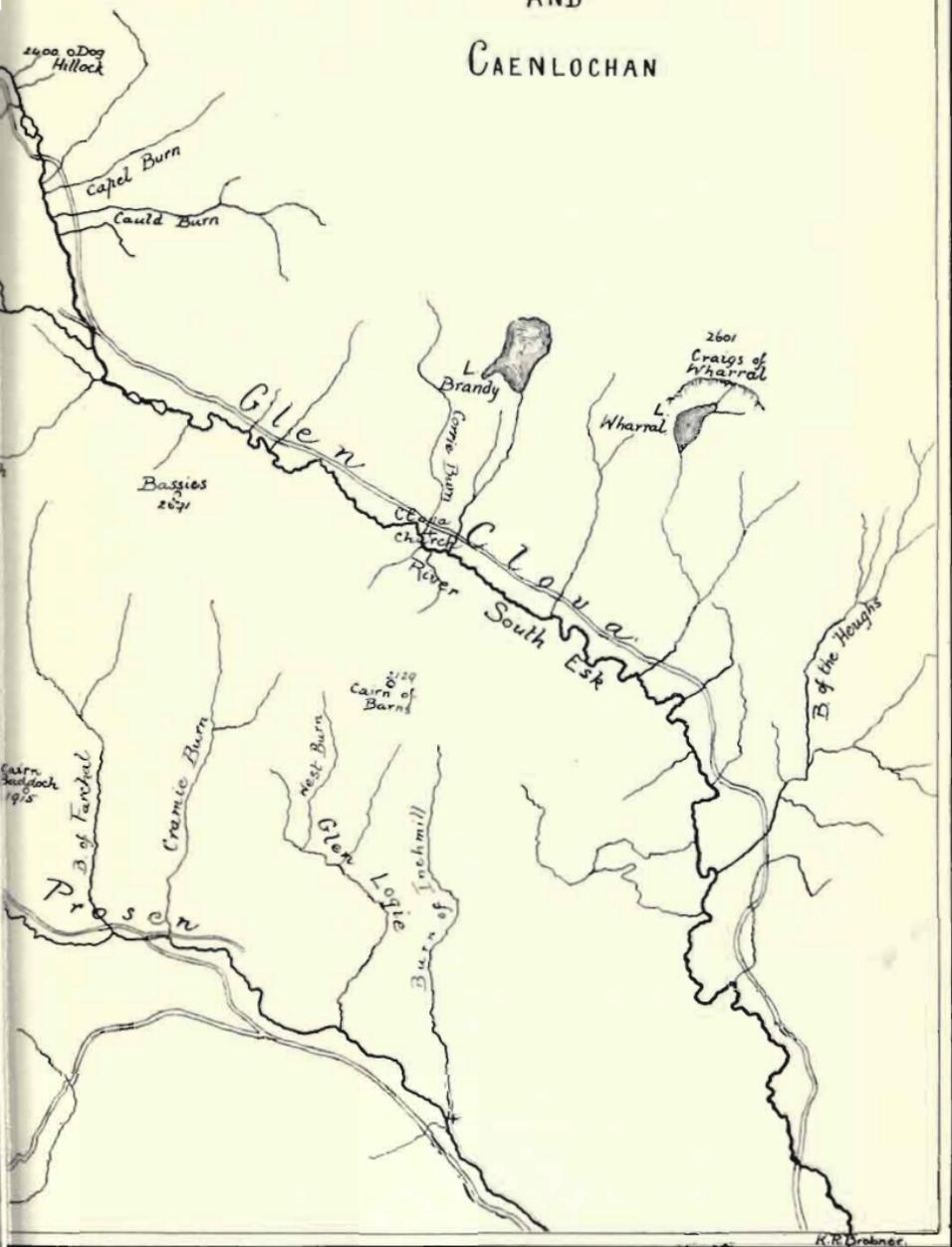
The rare *Carex divisa* recorded by Don in 1813 was re-discovered near Montrose by Mr. Menzies, Perth, in 1901, and *Koeleria arenaria* is also to be met with in the vicinity. In the "Journal of Botany" for January, 1890, will be found a list of about 150 Marine Algæ from the coast in the neighbourhood of Arbroath, collected or reported by Mr. James Jack, Arbroath. The following are a few of the rarities:—*Dichtyosiphon Chordaria*, *Myrionema strangulans*, *Chaetopteris plumosa*, *Ectocarpus granulosus*, *E. sphaerophorus*, *Rhodomela lycopodioides*, *Delesseria Hypoglossum*, *Nitophyllum punctatum*, *Calithamnion spongiosum*, *Bryopsis plumosa*, *Cladophora albida*.

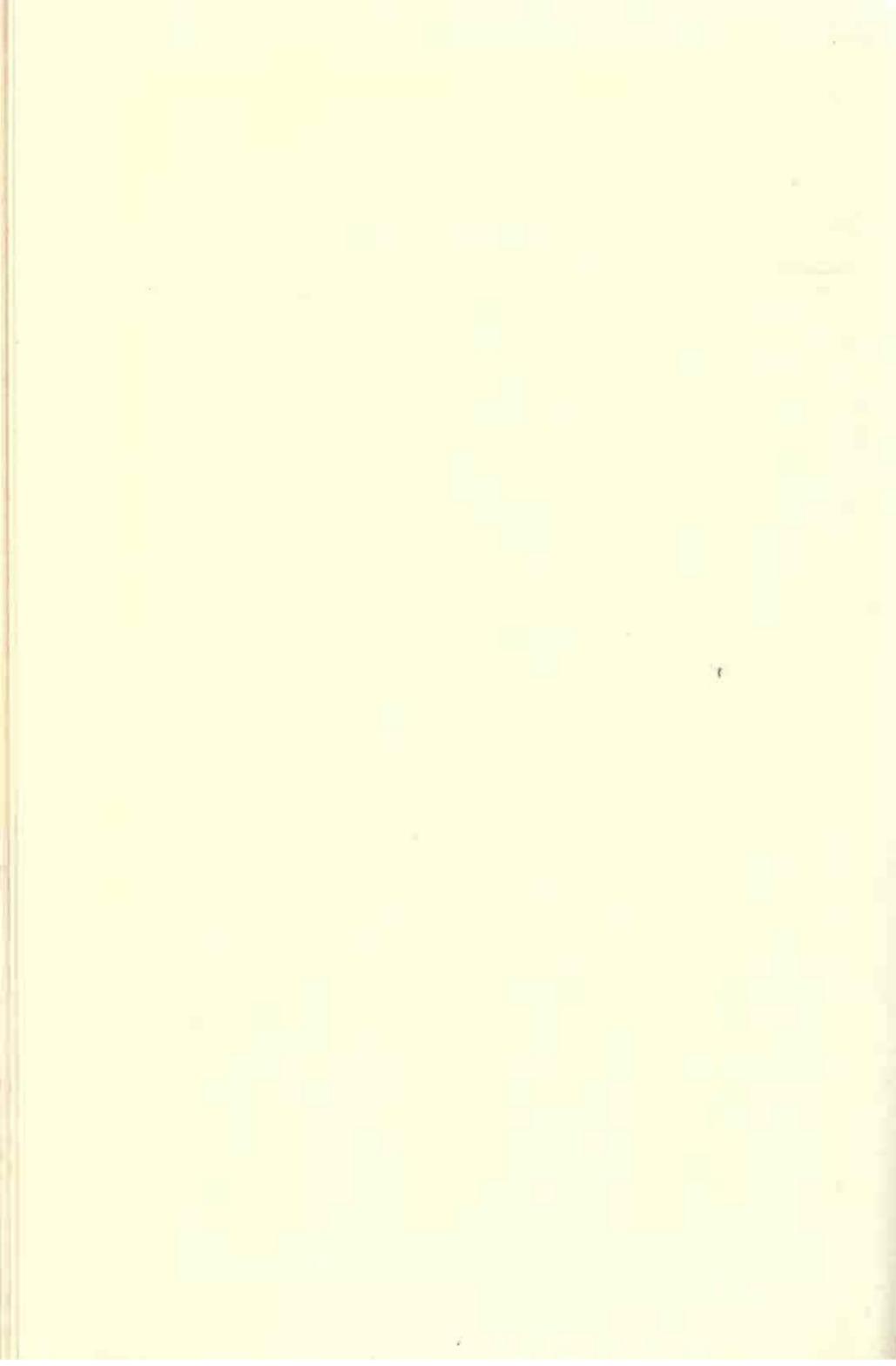
**The Sidlaw Hills.**—The portion of the range in Angus extends, with occasional breaks and interruptions, from Gask Hill eastwards to the Redhead, a bold promontory on the North Sea, nearly 300 feet in height. The highest summits are Craig Owl (1493 feet) and Auchterhouse Hill (1399 feet). The Plant Associations and geology of these hills are very fully described and illustrated by vegetation maps of the district in a series of valuable papers contributed to the Scottish Geographical Magazine (Botanical Survey of Forfar and Fife) by the late Mr. Robert Smith, B.Sc., and his brother, Dr. W. G. Smith, College of Agriculture, Edinburgh, who are justly recognised as pioneers in the department of Ecological Botany in this country. Their summits consist chiefly of grass heath and heather moor, with small areas of peat bog, and at a lower elevation grassy hill pasture and farm land. *Calluna Erica* is the characteristic plant on most of the hill-tops, and among its associates are *Potentilla erecta*, *Galium saxatile*, *Antennaria dioica*, *Vaccinium Vitis-Idæa*, *V. Myrtillus*, *Juncus squarrosus*, *Luzula campestris*, with the grasses, *Agrostis tenuis*, *Deschampsia flexuosa*, *Molinia varia*, *Nardus stricta*. On one or other of the types of grassy pasture some of the more local species of the





# MAP OF CLOVA AND CAENLOCHAN





district may be found, such as—*Trollius europæus*, *Viola lutea*, *Helianthemum Chamaecistus*, *Polygala vulgaris*, *Hypericum quadrangulum*, *Geranium pratense*, *Parnassia palustris*, *Trientalis europæa*, *Euphrasia officinalis*, *Thymus Serpyllum*, *Listera cordata*, *Habenaria conopsea*. Fourteen species of Ferns, including *Phegopteris Dryopteris*, *P. Oreopteris*, *Cryptogramme crispa*, *Botrychium Lunaria*, and *Lycopodium clavatum*, *L. selaginoides*, *L. alpinum*, *L. Selago*, are also found on the Sidlaws.

According to MacVicar's Census Catalogue of British Hepatics (1905), there are 124 species belonging to Forfarshire, and of these 54 have been gathered on the Sidlaws between Lumley Den and Lundie by Mr. James Aimer, Lecturer on Botany at the Dundee Training College.

On the south side of the Sidlaws, in the Parish of Lundie, are two small lochs which, as has been pointed out by the authors of the articles on "Forfar and Fife" in the Botanical Survey of Scotland, have this remarkable peculiarity that, though they are only about one mile apart, the vegetation of the Long Loch (720 feet) and the Round Loch (650 feet) are as different as if the one had been in the highlands and the other in the lowlands. The former is distinguished by the presence of such submerged plants as *Subularia aquatica*, *Lobelia Dortmanna*, *Isoetes lacustris*, *Littorella uniflora*, while the shores of the Round Loch are fringed by rushes, reeds, and mare's-tails, and the water is covered by the floating leaves and chalice flowers of *Castalia alba*.

**Valley of Strathmore.**—This low-lying tract of fertile land lies between the Sidlaws and the mountain rampart of the Grampians. The part within the county of Angus is about 33 miles in length and from 4 to 6 miles in breadth. The flora is such as is commonly found elsewhere in inland woods, fields, meadows, dells, and on the banks of streams. Taking as a typical locality the Den of Airlie, a winding ravine about 4 miles in length, which

leads up from the valley to the Reeky Linn at the entrance to Glen Isla, we find the following plants:—*Ranunculus auricomus*, *Trollius europæus*, *Cardamine amara*, *Arabis hirsuta*, *Lychnis Viscaria*, *Stellaria Holostea*, *Cerastium arvense*, *Arenaria trinervia*, *Geranium pratense*, *G. lucidum*, *Vicia sylvatica*, *V. Orobus*, *Rubus saxatilis*, *Potentilla sterilis*, *Saxifraga granulata*, *S. hypnoides*, *Chrysosplenium alternifolium*, *Adoxa Moschatellina*, *Galium Cruciata*, *Asperula odorata*, *Valeriana officinalis*, *Doronicum Pardalianches*, *Onicis heterophyllus*, *Pyrola media*, *Lithospermum officinale*, *Trientalis europæa*, *Scrophularia nodosa*, *Lysimachia nemorum*, *Primula veris*, *Melampyrum sylvaticum*, *Alisma Plantago*, *Paris quadrifolia*, *Allium ursinum*, *Listera ovata*, *Convallaria verticillata*, *Melica nutans*, *M. uniflora*, *Avena pratensis*, *Equisetum hyemale*, *Hymenophyllum Wilsoni*.

The following Hepatics reported by Mr. Aimer were found in this same district near the Reeky Linn, and a list of them may indicate the comparative wealth of this picturesque gorge which, like others to the east and west, conveys the drainage from the Grampians into Strathmore:—*Reboulia hemisphaerica*, *Conocephalum conicum*, *Marchantia polymorpha*, *Aneura pinguis*, *Metzgeria furcata*, *M. conjugata*, *M. pubescens*, *Pellia endiviaefolia*, *Blasia pusilla*, *Nardia scalaris*, *N. obovata*, *Aplozia riparia*, *Lophozia Mülleri*, *L. barbata*, *Plagiochila spinulosa*, *P. asplenioides*, var. *major*, *Lophocolea bidentata*, *Kantia Sprengelii*, *Blepharostoma trichophyllum*, *Diplophyllum albicans*, *Scapania subalpina*, *S. intermedia*, *S. purpurascens*, *S. irrigua*, *Radula Lindbergii*, *R. complanata*, *Madotheca laevigata*, *M. rivularis*, *Lejeunea cavifolia*, *L. patens*, *Frullania Tamarisci*, *F. dilatata*.

In the neighbourhood of Forfar occur the following:—*Camelina sativa*, *Dianthus deltoides*, *Spergula sativa*, *Rubus Selmeri*, *R. caesius*, *Myrrhis Odorata*, *Carduus nutans*, *C. crispus*, *Campanula rapunculoides*, *Gentiana uliginosa*, *Epilobium angustifolium*, *Utricularia major*,

*Habenaria viridis*, *Phleum pratense*, var. *nodosum*,  
*Arrhenatherum tuberosum*.

*Eriophorum alpinum* and *Deyeuxia neglecta*, once found in the Moss of Restennet and the White Mire marsh, near Forfar, have been destroyed by drainage.

At Tannadice, on the banks of the South Esk, Mr. Knox, Forfar, found on a small "plat" no fewer than seven species of *Orchis* in flower at the same time—viz., *Habenaria conopsea*, *H. virescens*, *H. albida*, *H. bifolia*, *Orchis maculata*, *O. latifolia*, *O. incarnata*. Near the same spot were gathered *Trollius europæus*, *Lepidium Smithii*, *Curdamine amara*, *Mulva moschata*, *Genista anglica*, *Sedum Fabaria*, *Circæa lutetiana*, *Galium boreale*, *Hieracium prenanthoides*, *Mimulus Langsdorfii*, *Calamintha Clinopodium*, *Euphorbia platyphyllos*.

**Lochs and Marshes.**—One of the most interesting localities in the county is the chain of lochs and marshes in the valley drained by the Lunan, where a rich harvest of marsh and aquatic plants can be reaped. The most important of these are the lochs of Rescobie and Balgavies, about 3 miles to the east of Forfar. In and around these the following may be seen:—*Ranunculus Lingua*, *R. heterophyllus*, *R. peltatus*, *R. circinatus*, *Castalia alba*, *Nymphæa lutea*, *Montia fontana*, *Potentilla palustris*, var. *villosa*, *Alchemilla vulgaris*, var. *alpestris* and *pratensis*, *Hippuris vulgaris*, *Myriophyllum alternifolium*, *M. spicatum*, *Callitriche autumnalis*, *C. intermedia*, *Hydrocotyle vulgaris*, *Apium inundatum*, *Cicuta virosa*, *Sium erectum*, *Lobelia Dortmanna*, *Lysimachia thyrsiflora*, *Myosotis caespitosa*, *M. palustris*, *Veronica Anagallis*, *Utricularia vulgaris*, *U. intermedia*, *Scutellaria galericulata*, *Littorella lacustris*, *Polygonum amphibium*, *Ceratophyllum demersum*, *Stratiotes Aloides*, *Corallorhiza trifida*, *Orchis incarnata*, var. *lanceata*, *Sparganium erectum*, var. *microcarpum*, *S. simplex*, *S. minimum*, *Alisma Plantago*, *A. ranunculoides*, *Potamogeton zosterifolius*, *P. obtusifolius*, *P. Friesii*, *P. praelongus*, *P. heterophyllus*, *P. lucens*, var. *acumin-*

*atus*, *P. perfoliatus*, *P. crispus*, *P. pusillus*, *P. pectinatus*, *P. polygonifolius*, *P. alpinus*, *P. angustifolius*, *P. decipiens*, *Zannichellia palustris*, *Scirpus lacustris*, *Carex limosa*, *C. hirta*, *C. diandra*, *C. lasiocarpa*, *C. Æderi*, *Phragmites communis*, var. *nigricans*, *Isoetes lacustris*, *Chara hispida*.

*Caltha radicans*, which was reported by Don, the Forfar botanist, in 1790, was re-discovered by Mr. Graham, Rescobie, in 1880. A new Batrachian *Ranunculus*, flowering and fruiting in deep water, was discovered by Messrs. Sturrock, Knox, and Graham in 1880. At first it got the name of *R. trichophyllus*, later it was named *R. confervoides*, and is now known as *R. aspergillifolius*.

*Lastræa* (*Dryopteris*) *Thelypteris* grows in a neighbouring marsh at Restennet, and is said to be found nowhere else in Scotland.

*Pilularia globulifera* occurs in pools at Finavon Mill, near Aberlemno.\*

In the valley, about 5 miles west from the county town, stands Glamis Castle, the princely mansion of the Earl of Strathmore, and the finest existing specimen of the Scottish Baronial style. In the extensive grounds may be seen an interesting collection of Conifers, which is fairly representative of this group for Forfarshire, and includes the following among others:—*Abies concolor*, *A. concolor*, var. *violacea*, *A. homolepis*, *A. magnifica*, *A. grandis*, *A. Nordmanniana*, *A. Pinsapo*, *A. Veitchii*, *Abietia Douglasii*, *Cupressus nootkatensis*, var. *compacta*, *Libocedrus decurrens*, *Picea ajanensis*, *P. Alcockiana*, *P. excelsa*, *P. orientalis*, *P. Engelmanni*, *P. pungens*, var. *glauca*, *P. sitchensis*, *Pinus Balfouriana*, var. *aristata*, *P. koraiensis*, *P. Lambertiana*, *P. monticula*, *P. parviflora*, *P. ponderosa*, *P. sylvestris*, var. *aurea*, *Taxus baccata*, *Thuia gigantea*, *T. vervaeneana*, *Tsuga Albertiana*, *T. canadensis*, *T. Hookeriana*.

\* See "A Botanical Report on the Loch of Rescobie," in the *Scottish Naturalist*, by the late Mr. A. Sturrock, after whom *Potamogeton Sturrockii* is named.

**Grampian Area.**—That part of the Grampian range which bounds the valley of Strathmore on the north, and forms the northern boundary of Forfarshire, consists of a plateau rising to an average height of about 3000 feet, from which a series of spurs leads down to the Great Valley, intersected by Glen Esk, Glen Clova, Glen Prosen, and Glen Isla. The two most interesting of these are Glen Clova, watered by the South Esk, and Caenlochan Glen, at the head of the River Isla. Most of the 50 species of Alpines to be met with in Scotland are said to be found in these two glens, which, along with Ben Lawers, in Perthshire, may therefore be considered the headquarters of our Scottish Alpine flora.

When a botanist visits these two localities for the first time, he is surprised to find plants such as *Statice maritima*, *Cochlearia officinalis*, *Sedum roseum*, and *Plantago maritima*, which he has associated with the sea-shore, growing near the summits of the highest mountains, while they are but rarely to be met with in the intermediate zone.

It would be out of place in this short sketch to deal with the origin and distribution of our British plants. The subject has been fully treated by Mr. Clement Reid in his book entitled "Origin of the British Flora" (1899), and in his paper on "The Relation of the Present Plant Population of the British Isles to the Glacial Period," read and discussed at the Portsmouth meeting of the British Association last year.

The adaptations of Alpine plants to the rigorous conditions in which they live are varied and interesting. Their typical peculiarities are specially adapted to a severer climate and ungenial soil. Many are dwarfed and stunted and depressed in habit, e.g., *Salix herbacea* and *Potentilla Sibbaldi*; some grow in thick masses, with tufted moss-like foliage, e.g., *Silene acaulis*; sometimes the stems are succulent and the leaves thick and fleshy, e.g., *Sedum roseum*; usually the roots are very woody or well shielded by a sheath, e.g., *Loiseleuria procumbens*; in some cases the stems are inclined to form viviparous

bulbils, e.g., *Polygonum viviparum*; others have their leaves protected by a thick covering of wool or hair, e.g., *Salix lanata*; many are evergreen, e.g., *Linnæa borealis*; frequently the leaves become puckered or wrinkled on their upper surface, e.g., *Dryas octopetala*, and almost all are perennial.

**Glen Clova.**—This glen, which is about 15 miles in length, is watered by the South Esk, the largest of our Forfarshire rivers. The flora in the lower part of the valley is partly lowland and partly sub-alpine, and is not particularly interesting to the botanist. Among the plants found are *Botrychium Lunaria*, *Tofieldia palustris*, *Habenaria albida*, *H. viridis*, *Malaxis paludosa*, and *Listera cordata*. In the heath region, associated with *Calluna Erica*, are *Vaccinium* spp., *Empetrum nigrum*, *Arctostaphylos Uva-ursi*, *Rubus Chamaemorus*, *Betula nana*, and four *Lycopods*; and in a pool near the upper part at Loch Brandy are to be found *Lobelia Dortmanna*, *Subularia aquatica*, and *Isoetes lacustris*, plants characteristic of a highland loch.

On the plateau to the north of the Glen may be found *Loiseleuria procumbens*, *Gnaphalium supinum*, *Juncus trifidus*, *Salix herbacea*, *S. reticulata*, *S. lanata*, *Carex rigida*, *C. atrata*.

In the crevices of a rocky (felspathic) tableland, about half an acre in extent, which crowns the summit of Little Culrannoch (2750), a low hill equidistant from Glen Doll and Glen Isla, may be found the rare *Lychnis alpina*, and associated with it *Cochlearia micacea*, *Statice maritima*, and *Areneria sedoides*.

But it is worthy of note that it is not on the elevated peat plateau that the wealth of rare species is to be found. The characteristic Alpine plants occur chiefly on the exposed cliffs below the plateau, where the Phee and White Water break quickly down from the table-land to the valley, or on the crags and ledges of Craig Rennet and Craig Maud, which link up the gorges cut out by these streams. The most of the following were observed

among the sheltered crags and wet rocks above Clova:—*Thalictrum alpinum*, *Arabis petraea*, *Draba incana*, *Cochlearia alpina*, *Silene acaulis*, *Cerastium alpinum*, *C. triviale*, *Sagina nivalis*, *S. saginoides*, *Oxytropis campestris*,\* *Potentilla Crantzii*, *P. Sibbaldi*, *Saxifraga nivalis*, *S. stellaris*, *S. oppositifolia*, *Sedum roseum*, *S. villosum*, *Epilobium alpinum*, *E. alsinesifolium*, *Cornus suecica*, *Linnaea borealis*, *Erigeron alpinus*, *Saussurea alpina*, *Hieracium alpinum*, *H. eximium*, *H. gracilentum*, *H. lingulatum*, *H. chrysanthum*, *H. nigrescens*, *H. holosericeum*, *H. graniticolum*, *H. curvatum*, *H. Marshalli*, *H. sinuans*, *H. submurorum*, *H. Leyi*, *H. nitidum*, *H. aggregatum*, *H. sagittatum*, var. *subhirtum*, *H. Sommerfelti*, *H. callistophyllum*, *H. clovense*, *H. micracladium*, *H. sarcophyllum*, *H. expallidiforme*, *H. rotundatum*, *H. euprepes*, *H. caesium*, *Lactuca alpina*, *Pyrola rotundifolia*, *P. secunda*, *Veronica alpina*, *V. humifusa*, *V. fruticans*, *Euphrasia brevipila*, *E. gracilis*, *E. Rostkoviana*, *E. scotica*, *Rhinanthus borealis*, *R. monticola*, *R. Drummond-Hayi*, *Bartsia alpina*, *Oxyria digyna*, *Salix Arbuscula*, *S. Myrsinites*, *S. nigricans*, *S. lapponum*, *Tofieldia palustris*, *Luzula spicata*, *Juncus triglumis*, *J. trifidus*, *J. castaneus*, *Triglochin palustre*, *Carex aquatilis*, *C. rariflora*, *C. canescens*, and var. *fullax*, *C. vaginata*, *C. capillaris*, *C. Gruhami*, *C. saxatilis*, *C. Halleri*, *C. Goodenowii*, var. *stenocarpa*, *C. rigida*, *Alopecurus alpinus*, *Phleum*

\* *Oxytropis campestris* was formerly thought to be confined in Britain to the cliff on the right-hand side of Glen Phee, but in 1887 another station was discovered by the late Rev. J. Fergusson, Fearn, near Loch Lochs, in Perthshire.

In the *Scots Magazine* for January 1888 there is an interesting article by Mr. Fergusson on "Clova: its Flowers," in which he mentions the spots in which each of the rarer Alpines is to be found. It was a great disappointment to local botanists when it was learned that his unique collection of the plants of the north-east of Scotland had been destroyed by fire.

*Astragalus alpinus* was discovered in Glen Doll in 1831, but it seems to have disappeared. It grows abundantly in the deer forest at Little Craighendal, Braemar, and in the summer of 1885 I found the plant on Ben Bhrackie, Perthshire (J. of B., October 1885).

*alpinum*, *Deschampsia alpina*, *Avena alpina*, *Poa alpina*, *P. glauca*, *Festuca rubra*, var. *barbata*, *Juniperus sibirica*, *Asplenium viride*, *Athyrium alpestre*, *Cystopteris dentata*, *Polystichum Lonchitis*, *Woodsia alpina*, *Equisetum palustre*, var. *nudum*, *Lycopodium annotinum*.

**Caenlochan Glen.**—This glen, which is remarkable for the grandeur of its scenery and the richness of its Alpine flora, is distant about 20 miles from the valley of Strathmore, and forms one of the branches into which Glen Isla divides, the other being Glen Canness. The head of the glen is enclosed by a cirque of precipitous cliffs, extending to a considerable distance on either side, except at one corner, where a grassy slope leads up to the high level which connects Glas Maol (3502) and Cairn-na-Glasha (3484). The rocks consist of micaceous schist, whose clefts and shelves are watered by innumerable rills trickling down from the melting snow on the table-land above, and yield many interesting Alpine rarities. The following have been found and identified by botanists in recent years:—*Thalictrum alpinum*, *Arabis hirsuta*, *Draba incana*, *Silene acaulis*, *Cerastium alpinum*, *Arenaria sedoides*, *Rubus saxatilis*, *Dryas octopetala*, *Potentilla Sibbuldi*, *Chrysosplenium alternifolium*, *Galium boreale*, *Epilobium alsinefolium*, *E. alpinum*, *Erigeron alpinus*, *Saussurea alpina*, *Hieracium diaphanum*, *H. holosericeum*, *H. eximium*, *H. lingulatum*, *H. chrysanthum*, *H. Schmidti*, *H. ciliatum*, *H. rivale*, *H. murorum*, var. *varicolor*, *Lactuca alpina*, *Vaccinium uliginosum*, *Loiseleuria procumbens*, *Pyrola rotundifolia*, *P. secunda*, *Gentiana nivalis*, *Veronica alpina*, *V. fruticans*, *Salix herbacea*, *S. Myrsinites*, *S. reticulata*, *Juncus triglumis*, *Carex atrata*, *C. rigida*, *C. vaginata*, *C. capillaris*, *C. rariflora*, *C. aquatilis*, *Alopecurus alpinus*, *Phleum alpinum*, *Avena alpina*, *Poa alpina*, *Cryptogramme crispa*, *Asplenium viride*, *Athyrium alpestre*, *A. flexile*, *Polystichum aculeatum*, *P. Lonchitis*, *Splachnum vasculosum* (on plateau).

In this brief sketch of the Flora of Forfarshire no account has been given of the Fungi and Lichens. Gardiner gives a list of about 160 Fungi, but Professor Traill says he does not know how far it may be relied on. In 1879 the late Rev. Dr. Stevenson, Glamis, published his "Mycologia Scotica," containing a list of over 2000 species of Fungi, but in only a comparatively small number of cases does he indicate those which were found in Forfarshire.

There does not seem to be any complete record of the Lichens in Angus, though Gardiner makes occasional reference to their occurrence in the introduction to his Flora.

#### EMINENT LOCAL BOTANISTS.

Special articles on Don, Gardiner, and Robert Brown appear elsewhere in the Handbook.

Mr. A. Croall in his youth worked as a joiner. In middle life he became a teacher at Hillside, near Montrose, and in his leisure hours made himself familiar with the botany of the land and sea in Forfarshire and neighbouring counties. He is mentioned no fewer than 250 times in Gardiner's "Flora of Forfarshire" as the discoverer or recorder of its rarer plants. On Sir W. J. Hooker's recommendation he prepared a set of the plants of Braemar for Queen Victoria and Prince Albert. His great work, however, was his volumes on British Seaweeds, now out of print. He left Hillside School and went to Derby as Librarian to the Museum, and when the Smith Institute was erected at Stirling, he was appointed Curator. He died at Stirling in 1885 at a ripe old age.

Mr. Thomas Drummond, gardener at Invereighy, and successor to Don at Dovehill, Forfar, is described by Gardiner as "perhaps the most enthusiastic practical botanist that Britain has produced." His *fasciculi* of the Mosses of Scotland (*Musci Scotici*), now in the possession of Mr. Knox, Forfar, are among the earliest and most valuable contributions to the Bryology of the country. One beautiful Moss (*Orthotrichum Drummondii*) and a Horse-tail (*Equisetum Drummondii*) discovered by him,

were named in his honour. During an expedition to North America as naturalist he made a collection of American Mosses (*Musci Americani*), which was published in two quarto volumes. His success induced Sir W. J. Hooker to send him to investigate the Botany and Zoology of some parts of the Southern and Western United States, and after undergoing four years of formidable perils and privations, broken down by his exertions, he died in 1835 at Havanna, in Cuba.

## The Mosses of Forfarshire.

By James Fulton.

IN Forfarshire we find conditions of climate, soil, and configuration of the surface eminently favourable to the production of a rich and varied growth of mosses. These plants are delicately responsive to the various conditions of the environment, and where these are very diverse, we may confidently expect a corresponding variety in the moss-flora. Our high hills, wide moors, extensive woods, numerous streams; our long coast-line, partly rocky, and partly low, marshy flats, all combine to produce this variety. Even the presence and works of man are by no means adverse to the growth of these plants. Agriculture and draining are no doubt destructive to some species but quarries, walls, roofs, bridges, ponds, ditches afford congenial habitats for many others, so that the operations of man may often result in increasing the number of species within a given area. Some kinds may be almost said to be domesticated with us. They seem to follow man wherever he goes, giving the finish of nature's grace and beauty to his bald utilitarian work. *Barbula muralis* we find on every stone and lime-built wall. Without saying, by your leave, it takes possession, quite as a matter of course, just as if the wall had been built for its special convenience. *Bryum capillare* is almost equally common. *Fissidens bryoides* is found on the side of every ditch. *Ceratodon*, *Funaria*, and especially *Bryum argenteum*, take up their abode even in the heart of our cities. They are only kept down by the constant efforts of the sanitary authorities, but they are quite irrepressible, and cheerfully come up smiling after every stroke of the scavenger's broom. Then our fields, pasture and arable, are the homes of many of the smaller, less conspicuous

kinds, as *Pottia*, *Phascum*, *Ephemerum*, which are seldom found in any other situation. Barry links, the cliffs and coves of our east coast, the Sidlaw Hills, are all fruitful hunting-grounds.

But it is to the great extent of mountainous ground in the north and west that Forfarshire chiefly owes its reputation as a rich botanical region. Rising to well over 3000 feet, these hills not only have sufficient altitude, but a variety of structure and mineral composition that fits them to support a rich Alpine vegetation, in which mosses are largely represented. On the mountain summits, on the steep sides of corries and ravines, in the bogs, on the margins of tarns, by waterfalls, the mosses force themselves on our attention. In our upland woods the ground is carpeted with thick beds of *Polytrichum* and *Sphagnum*, mixed, it may be, with luxuriant species of *Hypnum*. On the opener plateaux wide tracts are covered with *Racomitrium* and *Dicranum*, while the scattered blocks and boulders are dotted over with *Andreaea* and species of *Grimmia*. In marshes we have acres covered almost exclusively with *Aulacomnium*, which even the least observant cannot fail to notice, if they have eyes at all for the phenomena of nature. It is thus seen that the mosses fill no unimportant place in the economy of nature in the area we are concerned with. The plants are there, in great abundance and bewildering variety, inviting our attention and study. Has this call been responded to? Have we done our part in endeavouring to discriminate, arrange, and understand this wealth of material presented to us? Something at least has been done in this direction.

In 1811, George Don of Forfar, whose name is familiar to British botanists, drew up an account of the natural history of Forfarshire as an appendix to "Headrick's Agricultural Survey" of the county. In this he gives a list of about 100 mosses, being only the rarer species known to him. Many of these are now known to be quite common, but a good few are rather rare, and one or two have but seldom been found elsewhere. A few

examples may be given with the nomenclature modernised—*Seligeria Doniana*, *Dicranum montanum*, *Hypnum reflexum*, *Ditrichum glaucescens*, *Dicranum flagellare*, *D. strumiferum*, and others could be given.

Probably it was Don's account that drew the attention of leading botanists to the floral wealth of the county, and induced some of them, as Hooker, Greville, Balfour, to visit it; and through their writings, Clova, Glen Doll, and Caenlochan came to be recognised as serious rivals to the Breadalbane Hills. But the real work of exploring our crags and corries, our marshes and moors, was done by others whose names are less known to fame, of whom only one or two can be referred to. Charles Lyell, of Kinnordy, father of the eminent geologist, was a zealous student of mosses, and especially of the closely allied liverworts. *Orthotrichum Lyelli* bears his name, and he was the finder of some good plants, as *Dicranum spurium*.

Nor should Alex. Croall be forgotten. He did excellent work as a field-botanist, not only in Forfarshire but also in Aberdeen and Kincardine. His best find was *Philonotis Wilsoni*, a beautiful and very rare moss.

But perhaps the most successful and distinguished of all our Forfarshire botanists, after Don, was Thomas Drummond. A professional naturalist and collector, he had an adventurous career, and his untimely death was a loss to science. He must have been a keen and close observer, for he found some of our very rarest mosses, as—*Timmia norvegica*, *Hypnum umbratum*, *Pottia latifolia*, *Camptothecium nitens*, *Grimmia unicolor*, *Neckera pennata*, *Ulota Drummondii*.

A worthy compeer of those we have mentioned was William Gardiner, of Dundee—an earnest student and lover of nature. With limited opportunities, and not too robust health, he devoted himself to the study of botany, especially the flora of his own district. He wrote many papers on natural history, and published "Lessons on British Mosses," "Botanical Rambles in Braemar," and finally, "The Flora of Forfarshire." He died in 1852 at the age of forty-three, and it is understood that he was

buried somewhere in the Howff, but the spot is unmarked ; we have so many living candidates for fame nowadays that the poor dead people have no chance.

In "The Flora of Forfarshire" we get a complete list of the mosses then known to have been found within the county. It includes the previous list of Don, and the total number of species and varieties is given as 277, the British species being 460,

The nomenclature and arrangement of mosses have been greatly altered since Don's, and even since Gardiner's, time, and in discussing their records it is often difficult to know what plants are meant. A somewhat careful revision shows that there has been some error in the enumeration, and that, in one or two cases, the same plant has been entered twice under different names. Then some that were then reckoned as species are now held to be varieties, and *vice versa*. Taking all this into account, the list contains about 250 species. This, of course, does not include the hepatics or liverworts, which are reckoned separately. These plants, though, like lichens, often associated in idea and phrase with mosses, differ in important respects, and are not considered *musci genuini*. They are referred to here, because they are so often found along with the mosses, and really are their nearest allies. Lichens, of course, are entirely different. The total of 250 species recorded from Forfarshire in 1848 shows that rapid advance was being made, for Hooker's "Flora Scotica," 1821, has only 225 for the whole of Scotland.

Perhaps Gardiner's chief merit is, that he brought together into one view all that had been done locally in this branch of botany, both by himself and others ; and he is careful to give due credit to his predecessors and to those who worked along with him. One of his most interesting finds was *Buxbaumia aphylla*, which was then thought to be a very great rarity. And, indeed, it seems to be still an imperfectly understood plant. It is mysteriously referred to as being "of a capricious nature, seldom reappearing twice in the same locality." The over-zealous collector may sometimes be responsible for

this, but it is otherwise easily accounted for, when we consider that the plant is so minute that it cannot be seen on the ground except when in fruit, and that, like many other diceious plants, it fails to fruit some years, probably on account of insufficient moisture to permit of fertilisation at the proper time. But if a portion of the soil from a known station is microscopically examined, plenty of plants, male and female, may be found, showing that its disappearance is caused by the absence of the conspicuous capsules, and is not so very mysterious after all.

Gardiner found many other interesting plants, such as *Hypnum molle*, *Ædipodium*, *Philonotis seriata*, and he is generally very careful to give definite stations for them, a great merit in a local Flora. One or two plants which he certainly knew do not appear in his list, probably through some accident. *Encalypta streptocarpa* is one of these, although it is common on walls about Dundee, and generally over the county. *Hypnum revolvens*, too, is omitted, although he gives a real specimen of it in his "Lessons on British Mosses." These are trivial faults in one who is generally a most conscientious and painstaking writer. Here we are only concerned with one small section of his work, but it may be permitted to remark that, if we consider his opportunities, William Gardiner, both for scientific attainments and literary ability, reflects credit on his native city.

But sixty years have come and gone and many discoveries have been made since Gardiner's time. In 1868 a list of Forfarshire mosses, supplementary of that given by Gardiner, was published by the Rev. John Fergusson, late of Fearn, who for many years was reckoned one of our leading British bryologists, and who enjoyed exceptional opportunities for the detection of the rarer Alpine species. This was a notable addition to the county list, consisting of no less than 126 species, a great many of them very uncommon plants, chiefly confined, in Britain at least, to the mountain districts of Scotland. Of most of these Mr. Fergusson was the first finder in the county, and he con-

tinued for many years after to make fresh discoveries. We note just a very few of these plants—*Hypnum dimorphum*, *H. arcticum*, *H. hamulosum*, *Dicranum molle*, *Grimmia elongata*, *G. elatior*, *Anomodon longifolius*, *A. attenuatus*, and to these many might be added.

With lapse of time, it becomes of course increasingly difficult to find anything new, yet a number of good plants have been found since Fergusson's list was drawn up, some of them by that gentleman himself. Some of these are simply plants that had been overlooked, but most of them are by no means common, at least with us. We subjoin a few of these—*Buxbaumia indusiata*, *Didymodon gemmascens*, *Webera gracilis*, *Bryum neodamense*, *Barbula inclinata*, *Mnium spinosum*, *Grimmia contorta*, *G. Ungerii*, *Phascum curvicolle*, and others to the number of about thirty, thus making about 400 in all that have been reported from Forfarshire; about two-thirds of the number found in Britain.

Comparisons of recent date with neighbouring counties are not easily available, but we find that Dickie, in 1860, has 213 species for the counties of Aberdeen, Banff, and Kincardine, while, about 1888, Howie records 295 from Fife and Kinross. Probably only Perth can pretend to rival Forfarshire in this field. But then its area is more than double ours; and again the Breadabane Hills have been the common hunting ground of botanists from all over Britain, who have added many to their list of rarities, whereas almost all our rare plants have been found by native botanists. Healthy emulation in this as in other pursuits is helpful to progress. The number of species found within a given area depends obviously on the thoroughness with which it has been searched. The plants must be there, or they will not be found, but they may well be there, and in abundance, unnoticed and unknown, if they are not sought for with perseverance and skill. And they must be sought at all seasons, and in all weathers, and not merely as the pleasant diversion of a summer holiday.

Our record goes to show that the energies of the men of

Angus have not been entirely used up in agriculture or cattle-raising, in the building of ships and engines, in whale-hunting, or in the making of marmalade, hessians, and sailcloth. They have found time to devote to some less obviously practical pursuits. And let it not be thought that the study of such small things as mosses is trivial and of no importance from a utilitarian point of view, for so close and intimate are the relations between the different forms of life, that we cannot afford to neglect the study of even the least of the productions of nature.

## The Birds of the Estuary of the Tay.

By James B. Corr, Assistant-Curator, Dundee Museum.

FOR ornithological purposes the Estuary of the Tay may be said to extend from the mouth of the Earn to Buddonness, a distance of 24 miles. At its widest part, opposite Invergowrie, it attains a breadth of  $3\frac{1}{2}$  miles. This estuary was formerly and is still, though to a less extent, a favourite haunt of British Waders and Swimming Birds. This is largely due to the numerous and extensive sandbanks uncovered for many hours at ebb-tide. Moreover, the northern bank of the river west of Invergowrie is fringed with dense reed swamps and wide marshy mud flats, overgrown with a rank growth of marine grasses, sedges, and rushes. These reed-covered swamps, stretching for miles along the northern boundary of the estuary, are a favourite resort for wild-fowl, since they afford an excellent feeding ground, with the addition of shelter and retirement.

Near the mouth of the estuary are the great tracts of moorland and sandhills of Barry and Tentsmuir. Both these districts in former days were great breeding stations for many of our east coast Waders and Web-footed birds, where, unmolested, they were able to rear their young in peace and safety. Barry is now a military station, and during a considerable part of the year, instead of the trilling cry of the Curlew, and the shrill pewit of the Lapwing, we hear the crack of the rifle and the boom of the cannon, so that this district has ceased to be a breeding station. At Tentsmuir, where many of our wild birds found the necessary shelter and solitude during the breeding season, the number has been greatly reduced, owing to the wilful destruction of their nests and eggs. Recently, however, this tract of moorland has been converted into a game preserve, and the number and varieties of birds nesting on the moor are again on the increase.

Many of our most interesting local birds are only casual visitors. The Estuary of the Tay being in the line of the migration of birds from the north, not a few of these casual migrants are Arctic birds which breed regularly within the Arctic Circle, but visit us occasionally in search of food during severe winters. Of this Arctic fauna occasionally found on our estuary during the winter months, the following have been placed on record:—

#### I.—ARCTIC BIRDS.

King Duck.	Pomatorhine Skua.
Little Auk.	Richardson's Skua.
Glaucous Gull.	Buffon's Skua.
Iceland Gull.	Great Northern Diver.

All these, with the exception, perhaps, of the Great Northern Diver, must be regarded as only occasional winter visitants.

The Great Northern Diver may almost be considered a regular winter migrant to the Tay. Mr. John Nelson informs us that a few individuals are seen about Broughty-Ferry every winter, and in the spring of 1880 he saw a fine example in full summer plumage. These handsome birds frequently remain with us well into the spring, and even summer months.

We may mention here that a collection of most of the birds frequenting the Estuary of the Tay is exhibited in the Dundee Museum. This collection is the property of the Dundee Naturalists' Society, and contains many rare specimens for which the Society is greatly indebted to Mr. John Nelson, Broughty-Ferry, a gentleman who has always taken a keen interest in local ornithology.

The King Duck, though seldom met with on British shores, is not unfrequently seen off the mouth of the Tay. In the winter of 1879 I observed them on the river between Dundee and Newport. This bird closely resembles the Eider Duck, but far surpasses it in beauty of plumage, the colouring being much more vivid.

The Little Auks are frequently driven ashore during

severe gales, and occasionally, though at wide intervals, we may have quite an invasion of this species, as in 1841, 1871, 1879, 1882, and 1894. Numerous specimens were noticed on the river during the past winter.

The two Arctic gulls, the Glaucous and the Iceland Gull, are only observed on the river on rare occasions. A Glaucous Gull in its first year's plumage was obtained by Mr. Nelson in 1880, and is now in the Naturalists' Society's collection, but we have no example of the Iceland Gull.

With the exception of the winter of 1879, the Pomatorhine Skua and Richardson's Skua must be regarded as rare birds on the Tay. A specimen of Buffon's Skua is in our collection, but no date is given.

The following occasional winter migrants come to us from various quarters:—

## II.—OCCASIONAL WINTER VISITANTS.

### A. *Waders.*

Bittern.	Turnstone.
Whimbrel.	Great Snipe.
Sanderling.	

### B. *Swimmers.*

Wild Swan.	Horned Grebe.
Bewick's Swan.	Black Guillemot.
Shoveller.	Puffin.
Pintail Duck.	Fulmar Petrel.
Smew.	Storm Petrel.
Great Crested Grebe.	Shag.

Don considered the Bittern a rare bird in this district even in 1813. Colonel Drummond Hay mentions a fine example shot on the Tay, near Newburgh, in the spring of 1864. Since then several specimens have been obtained in the neighbourhood of the estuary.

Whimbrel, a passing migrant only.

Sanderling, almost a regular autumn visitant, frequently observed at Monifieth.

Turnstone, occasionally in winter. Three local specimens are in the Naturalists' collection.

Wild Swans frequently visit the river in severe winters.

Great Crested Grebe, observed occasionally in the river, but usually in immature plumage. Great Crested Grebes were abundant on the estuary last winter. A specimen of the Horned Grebe was shot in the estuary by Mr. Nelson on the 13th February 1890.

Black Guillemot, occasionally to be seen on the river, and also in St. Andrews Bay.

Puffin makes its appearance at the mouth of the Tay in the autumn and spring months.

Storm Petrel, occasionally driven to the mouth of the river by eastern gales.

Shag or Green-crested Cormorant, a rare bird on the estuary, though frequently seen in St. Andrews Bay.

The following list includes our Regular Migrants. Most of them visit the estuary in winter, only six coming to us in summer:—

### III.—REGULAR MIGRANTS.

#### I. WINTER MIGRANTS.

##### A. *Waders.*

Green Shank.	Godwit.
Water Rail	Knot.
Spotted Crake.	Jack Snipe.

##### B. *Swimmers.*

Grey Lag Goose.	Common Scoter.
Bean Goose.	Velvet Scoter.
Pink-footed Goose.	Golden Eye.
White-fronted Goose.	Long-tailed Duck.
Brent Goose.	Goosander.
Pochard.	Red-breasted Merganser.
Tufted Duck.	Red-throated Diver.
Widgeon.	Black-throated Diver.
Scaup Duck.	

## 2. SUMMER MIGRANTS.

*A. Waders.*

Sandpiper.

*B. Swimmers.*

Common Tern.

Sandwich Tern.

Arctic Tern.

Gannet.

Lesser Tern.

Most of the above Waders may be observed on the mud banks during the autumn and winter months. The Spotted Crake, however, is a very shy and retiring bird, and by no means common.

The Wild Geese, with the exception perhaps of the Brent, are very partial to the salt water, and may frequently be seen on the upper reaches of the estuary, moving, according to the tide, to and fro in their well-known V-shaped flight. The Bean and the White-fronted Goose are becoming rare birds on the Tay.

Eight Ducks are recorded as visiting the estuary regularly every winter. Specimens of all these may be seen in the Naturalists' Society's collection. The Pochard, Scaup Duck, Widgeon, and Tufted Duck, though not very numerous, are all pretty generally dispersed on the tidal part of the river. The Common Scoter and Velvet Scoter are usually abundant in the lower parts of the estuary every winter. The Golden Eye is more frequent in the upper reaches, while the Long-tailed Duck is to be looked for near the mouth of the river.

The Goosanders and Red-breasted Mergansers are regular visitants during the winter months. Both breed on lochs within the Tay Basin, though the nesting stations of the Merganser are much less numerous than those of the Goosander. The distance from their nesting habitats in summer and the mouth of the river in winter, represents the extent of their migrations.

The Red-throated Diver, though not common, is frequently seen during the winter months, but seems to confine itself to the lower reaches of the river.

The Black-throated Diver, a bird not uncommon on some of the fresh-water lochs of the interior, is a rare bird on the lower Tay. One of these birds, shot in the winter of 1879, is now in the collection of our Naturalists' Society.

Of our half-dozen summer visitants the Sandpiper and the Terns generally arrive early in May. I have frequently observed the Terns on the river for the first time about the 15th of May. They nest together in large colonies on Tentsmuir, where I have often seen their nests crowded together about one to the square yard.

The Gannet, though Mr. Nelson informs us that it ascends the river as far as the Tay Bridge, is more frequently seen fishing off the mouth of the river.

#### IV.—RESIDENT BIRDS.

##### A. *Waders.*

Heron.	Curlew.
Lapwing.	Redshank.
Golden Plover.	Dunlin.
Ring Plover.	Common Snipe.
Oyster Catcher.	

##### B. *Swimmers.*

Shieldrake.	Great Black-backed Gull.
Wild Duck.	Lesser Black-backed Gull.
Teal.	Herring Gull.
Eider Duck.	Common Gull.
Razorbill.	Kittiwake.
Common Guillemot.	Black-headed Gull.
Cormorant.	

Our Residenters are all well known to our local students of bird life. The four Ducks mentioned in the above list are all fairly common. The Eider Duck remains near the mouth of the river, and nests on Teatsmuir. The Shieldrake is distributed all over the estuary,

while the Teal and the Wild Duck prefer the upper reaches. All these Ducks are subject to a considerable amount of persecution which is tending greatly to reduce their numbers.

The Common Guillemots may often be detected fishing at the mouth of the river. They nest occasionally at the Red Head, where Dr. Dewar, of Arbroath, saw their eggs on the shelving of the rocks in 1905. In the winter of 1878, Mr. Nelson obtained an example of the Bridled variety at Broughty-Ferry, now in the Society's collection. This variety is not common on the Tay, though I have seen them in great numbers in Orkney.

Cormorants may generally be discovered on the river at all seasons. Though preferring the lower part of the tidal basin, they are by no means rare higher up the estuary. The home of the Cormorant, however, is Orkney, where they may be seen in hundreds on the cliffs. They are beautiful divers, and can swim more rapidly under water than on the surface. When alarmed they dive suddenly but quietly, and on coming to the surface again show little more than their eyes above the water.

The above half-dozen Gulls are all familiar birds on the estuary, both in young and mature plumage. The beautiful little Kittiwake is a frequent visitor in our harbours, while crowds of Herring Gulls are always surrounding the pier at Newport. In winter the mature birds are always accompanied by young birds in the grey speckled plumage of the first year. These young Herring Gulls, however, must be carefully distinguished from the young of the Greater Black-backed Gull which are also found on the river in winter.

For many of these brief remarks on our local birds, I must express my obligations to "Notes on the Birds of the Basin of the Tay," published by Colonel Drummond Hay in the *Scottish Naturalist*.

Space will not permit of any extension of these few brief notes on the Birds of the Estuary of the Tay, and we have still much to learn with reference to our local bird fauna. We hope, however, that the Ornithological

Section of the Dundee Naturalists' Society, recently organised under the leadership of Professor Sutherland of University College, Dundee, will collect a considerable amount of information on this subject, and that before long we shall be in possession of reliable data with reference to our local birds, which will form a valuable contribution to British Ornithology.

## Evolution of Race in Forfarshire.

By David Lennox, M.D., F.S.A. (Scot.), Fellow of the Royal Anthropological Institute.

IF evolution be true, man did not live coeval with the monsters of an early epoch, but came into being, in the fulness of time, when the face of nature was much as it is to-day, and when the higher mammals, now known, had multiplied and filled the earth. Even then, it was untold ages after the most man-like of apes, or most ape-like of men, had dwelt in the tropical jungles of Java, that River-drift men spread from the south over Western Europe and occupied Britain as far north as a line drawn from Flamborough Head to the Severn, when, as yet, the English Channel was not, and Europe was united to Africa by land stretching from Spain and Italy. With facilities for migration up to the edge of a glacial region, these people were accompanied by southern forms of life, and entered into association with survivals from the Early Pleistocene period. After another long lapse of time, a more highly cultured type—the Cave men—wandered from Asia over Central Europe, and with northern animals came to Britain. But at the close of the Pleistocene period, when Albion became an island, with a climate such as now, the southern and northern forms of life died out, and palæolithic man disappeared entirely without bequeathing his civilisation to neolithic successors in the long subsequent prehistoric days. Indeed, there is no evidence “that the present European peoples are the lineal descendants of those who ranged over Europe in the Pleistocene age” (Boyd Dawkins, *Journ. Anthropol. Inst.*, vol. xl. p. 263). Nevertheless, the culture and equipments of these primitive hunters passed along the Arctic Circle to the Eskimo, and it may be, also their blood.

During post-glacial times, there streamed westward from Asia into Europe three main currents of immigration. Branches of the Mediterranean race spread over southern and western Europe and entered the British Islands; then forerunners of a highland or Alpine wave passed up the Danube, and crossing the Rhine, settled in central France; and, finally, Northern or "Nordic" dolichocephals, probably a variety of the Mediterraneans, spread to the highest latitudes. Bodies of tall and short stocks of Alpine peoples entered Germany, Denmark, and south-western Norway, and blending with the Nordics produced the Teuton. This mixed race, with a predominance of the northern element in its veins, was tall, long-headed, fair-haired, and blue-eyed. The pure Alpine Kelts had round heads, hazel-grey eyes, light chestnut hair, and were thick-set and of medium height. All the fair-haired people north of the Alps the Greeks named "Keltoi" (Ridgeway, Art. "Celts," *Encycl. Brit.*; and Haddon, "The Wanderings of Peoples," p. 40).

In studying historical ethnology, it cannot fail to be observed that every race has physical and social peculiarities of its own, that distribution in time in the same locality is equivalent often to racial peculiarities, and that the peculiarities may be, and frequently are, less than national. With all their variations, men of a common race have a common individuality, which is preserved most constantly in the characteristics of their skulls and the pigmentation of their hair and eyes. If each race had been good enough to lay aside a duly authenticated craniological collection for future investigators, it would have left prehistoric and later morphological chronicles which neither philological nor historical research would have corrupted or disputed. Unfortunately some of these people have had very inconsiderate customs, such as cremation, which have destroyed the most reliable records. And much of the evidence left by others either has been "cast as rubbish to the void" by bucolic utilitarianism or rifled in a rude search for spoil.

In order to determine the sequence of races in a district,

it is necessary to record with accuracy the precise archaeological associations exhibited by the remains examined. That is to say, the identification of burial antiquities belonging to each age has chiefly to be considered. Racial customs illustrated by other evidences, folk-lore and philological relationships have obvious bearings on the subject. When these fail, inquiry has to grope through the darkness of prehistoric and quasi-historic times, guided by such degrees of illumination as the more or less imaginative or perverting early chroniclers can throw on the matter. It must be confessed that inattention to archaeological as well as ethnological methods of determining racial peculiarities has led to the loss of much valuable material for elucidating the mystery of the origins of the inhabitants of Forfarshire, and that the data now available are scanty.

A "Kitchen Midden" at the Stannergate or eastern boundary of Dundee (Mathewson, *P.S.A.S.*, vol. xiii. p. 303), one at Den of Dun (Lumsden, *P.S.A.S.*, vol. xxxi. p. 240), and another at Fithie, Farnell (Jervise, *P.S.A.S.*, vol. viii. p. 474) are the most distant signs of human habitation in the district. From their extent and depth they were evidently the haunts of man for a prolonged period. Similar refuse heaps are abundant on Tentsmuir, at the estuary of the Eden, and they are found on the coast of Elginshire, Ross-shire, Caithness, Shetland, Argyllshire, at Largo Bay, Elie, Inchkeith, Gullane Bay, Dunbar, The Wash, Hastings, Ventnor, Tenby, Devonshire, Cornwall, and Cork Haven, as well as on the Danish coast, whence by many a neolithic dolichocephalic people are supposed to have come to Britain (Deniker, "The Races of Man," p. 309). These middens usually have been assigned to an early period of the Neolithic age, when the polishing of stone, if known at all, was rarely practised, but some prominent archaeologists have referred them to a later period ("British Museum Guide to the Stone Age," p. 57). In the midden at the Stannergate a finely polished Celt of flinty slate was discovered, and in a midden at Gullane grain was found. Kitchen middens are common in many parts of the world—*e.g.*, along the eastern shores of the United States, and on

the west coast of South Africa from Walfish Bay to the Cape Peninsula.

The remains of the shell-fish and bones of the mammals found in these Forfarshire and other kitchen middens belong to species existing at the present day. The neolithic period is therefore post-glacial, and the physical conditions of the climate were similar to those of modern times ("Guide to the Stone Age," pp. 8, 73). Even then they are of great antiquity. The midden at the Stanner-gate had some 8 feet of undisturbed earth superimposed upon it, and above that another 4 to 5 feet of earth, in which a Bronze Age cemetery, with long and short cists, containing bones was laid bare, so that, taking into account the evidence of the stone implements found, it belonged to the Neolithic Age. The people of the shell mounds in Sweden and Denmark represent the ancestors of the Scandinavians and Teutons (Taylor, "Origin of the Aryans," pp. 229, 235; Retzius and Fürst, "Anthropologia Suecica"). Whether these local fish-eaters were men of the northern race or not, it is suggestive of a very remote connection of the inhabitants of this island with those of the other side of the North Sea, if the Bronze Age began in Scandinavia in the seventeenth or eighteenth century B.C. (Deniker, "The Races of Man," p. 315), and the Stone Age only came to an end in Britain about 1800 B.C. ("Guide to the Stone Age," p. 89). There is no evidence of the existence in Scotland of any type of man of higher antiquity or of lower culture than that of the Neolithic Age (Anderson, "Scotland in Pagan Times": The Bronze and Stone Ages, p. 385).

Other remains of a Stone Age people are abundant in Forfarshire, but no undoubted interment of the period has been discovered. The Long Barrows, found in no other country than Great Britain, which have furnished ethnologists with a neolithic people presenting a remarkable homogeneity of type, are conspicuous by their absence in Southern Pictavia. Distributed over England, and extending to Argyll, Caithness, and Orkney, they suggested to Rolleston that a homogeneous race of people

were then spread over the whole area of Britain. The completely structural construction of these homes of the dead, with their long entrance tunnels and outer and inner chambers, and the uniformity in the measurements of the crania, supported his view. Without exception the skulls are dolichocephalic, with a cephalic index of 65 to 75 for the males. These men had oval faces, poorly developed chins, and an average stature of 5 feet 5½ inches (*vide* Anderson, "Scotland in Pagan Times," vol. ii.; Thurnam, "Ancient British Barrows"; Beddoe, "The Races of Britain"; Davis and Thurnam, "Crania Britannica").

Urns of the Stone Age were made of dark coloured, thin, hard-baked pottery, not thrown on the wheel, bowl-shaped, wide-mouthed, shallow, round-bottomed, and thick-lipped. The lip was often bevelled outwardly, recurving over the vertical rim, which was usually highly ornamental. The system of ornamentation was simple, consisting of markings with the finger-tip and nail, making shallow flutings or scorings in straight lines, arranged in groups contrasting as to their direction (Anderson, "Scotland in Pagan Times": The Bronze and Stone Ages, p. 303). Such urns have been found in Scotland only in the regions of the Chambered Barrows. But it is probable that urn burial without overground erections preceded as well as was contemporaneous with and subsequent to interment in Chambered Barrows, and if so, it is possible that of the many urns laid bare in Forfarshire, some may have belonged to the Stone Age type, since not a few have been lost, and their peculiarities have not been always carefully recorded.

Implements and weapons of stone have been discovered casually in abundance in Forfarshire (*vide* Collection in Albert Institute Museum). Arrowheads of flint have been found at Carmyllie, Dunnichen, Fithie, Inverarity, Melgund, Monikie, Tannadice, and West Leys of Dun; stone axes at Affleck, Airlie, Auchterhouse, Balhousie, Brechin, Carnoustie, Cotton of Carnegie, Drumour, Dundee, Edzell, Fallaws, Glen Clova, King's Muir, Kirriemuir, Luckieslap, Loch of Kinnordy, Montrose, and Tealing;

stone hammers at Glamis and the Mains of Baldoon ; stone knives at Kirkbuddo and Monikie (Bankhead, Downbank, and Oakbank); stone-scrapers at Monikie, and other implements at Baldoon, Dunnichen, the Laws, and Tannadice (*vide* Catalogue of Sturrock Collection, 1889; and General Index, Proc. Soc. Antiq. Scotland). All of these are not necessarily relics of the Age of Stone. Some have been found in association with the Ages of Bronze and Iron. Others, such as the carved stone balls found at Airlie, Broughty, Kirriemuir, and St. Vigean; and the stone cups at Barry, Carsegowrie, and the Laws, are distinctive of the Age of Metals. "It is difficult, if not impossible, in the present state of our knowledge, to point to a single form of stone implement or weapon commonly found in Scotland which can be proved by evidence to be exclusively a Stone Age type. They appear to have continued in use after the introduction of bronze, and probably till similar tools and weapons of metal became abundantly and readily obtainable" (Anderson, "Scotland in Pagan Times": Bronze and Stone Ages, p. 306).

To what extent, therefore, a neolithic race occupied the dense forests of Angus is not certain from archæological evidence, although the widespread and abundant occurrence of the above implements and weapons makes a general distribution of people in that stage of culture not improbable. The degree, if any, to which this primitive race was represented in the later inhabitants of Forfarshire is doubtful, and there is no morphological evidence that it differed from its successors in being dolichocephalic, unless this difference is indicated by the mixed character of the skulls of the pre-cremation period.

Whether due to introduction by invaders, or to progress in native invention, the use of metal began to replace that of stone. Evidences of the Bronze Age which, in Scotland, succeeded the Stone Age, apparently without the intervention of a Copper Age, are scattered everywhere throughout Forfarshire. The houses of the dead were not homelike, but mere cists, although food and weapons were

considered necessary to bodies which in those days of uncertain physiological knowledge might revive, or which at all events might require them in another materialistic world. Boulders and other physical, and perhaps magical, means were taken to prevent travellers returning across that bourne, from which it is inconvenient to have *revenants*, just as the Lapps swathed the dead in winding sheets lest a spirit should wander from its prison-house. Gradually a far higher grade of culture was evolved. Bodies were finally disposed of by cremation, and eschatology became more refined and spiritual.

According to antiquaries the sepulchral remains of the Bronze Age in Scotland consist first of rude stone cists covered with a structureless heap of stones. These tumuli usually contain a single burial, but sometimes include a group of interments placed more or less centrally in the mound. In the second stage they are family or tribal burying places, enclosed by colossal stone circles (which may have been temples), or marked by an upright monolith. After cremation was introduced, single interments without a tumulus precede small flat cemeteries. All those sepulchres are of a pagan character, and are accompanied by deposits of grave goods, such as flint scrapers and arrowheads, cutting instruments of bronze (but never of iron), personal ornaments of gold, peculiar beads of jet, and clay urns of distinctive types. The relative chronology of those urns is indicated approximately by the occurrence of comparatively small "drinking-cups" and "food-vessels," and by generally large cinerary receptacles, with a plain conical under part. The pre-cremation groups degenerated in form from high brimmed globose cups into ovoid cups with recurved rims, and finally into low brimmed bowls, ornamentation becoming inversely more elaborate; and cinerary urns, so far as Scotland is concerned, developed from simple vases, with overhanging rims, into urns circled near the top by hoops or cordons, and eventually into those with encrusted decorations (Abercromby, *P.S.A.S.*, vols. xxxviii., xxxix., and xli.). The decorative designs in all these urns

is of that purely geometrical character which is characteristic of Alpine people, and none of these urns are wheel made. Abercromby holds that the drinking-cup type persisted for 200 years, and that it came from the Continent, especially from the valley of the central Rhine (*Journ. Anthropol. Inst.*, vol. xxxii. pp. 375-394). Müller of Copenhagen states that cremation is a characteristic of Aryan peoples, and was practised in Europe from not long before the year 1000 B.C. until the introduction of Christianity. Abercromby (*P.S.A.S.*, vol. xl. p. 185) argues from the relative chronology of cinerary urn types, that cremation was brought to the south-west of England not earlier than 300 B.C. by invaders from the north and north-west of France, and that the custom spread chiefly by the sea-board counties to Scotland.

If cremation extended by maritime influence to Southern Pictavia, a change of custom in the disposal of the dead does not necessarily imply a change of race. The immigration of an idea does not postulate always the immigration of a people. Even if not introduced by peaceful penetration, fresh customs and changed ways of living do not consequently determine the disappearance of an old race unless the inhabitants affected are unable to adapt themselves to their new environments. Seldom, indeed, a conquered race dies out, often it remains numerically the predominant factor. The persistence of a race is more remarkable than the persistence of a custom. In northern Scandinavia cremation became common in the latter part of the Bronze Age without an ethnological cataclysm. In Forfarshire there is proof that the old orders changed slowly. With burial in short cists signs of the Stone Age endure (*e.g.*, Kirkbuddo), and with it evidence exists of contemporaneous cremation (*e.g.*, Tealing).

Non-cremated bones or drinking food-vessel urns in stone cists have been described in the following localities in Forfarshire:—Stannergate and Craigie Cemetery, Dundee (Small, "Statistical Account of Dundee," 1792; Mathewson, *P.S.A.S.*, vol. xiii. p. 303; Hutcheson, *P.S.A.S.*,

vol. xxxvii. p. 233); Ninewells Cemetery, Dundee (*P.S.A.S.*, vol. v. p. 81; vol. vi. pp. 216, 394); Wellgrove, Lochee (*P.S.A.S.*, vol. xl. p. 40); Barnhill Cemetery (*P.S.A.S.*, vol. xi. p. 310; vol. xxi. p. 316); Middlebrighty, Murroes (Sturrock Collection); Dundee Street Cemetery, Carnoustie (*P.S.A.S.*, vol. xii. p. 611); King's Well, Fallaws, Monikie (*P.S.A.S.*, vol. viii. p. 166; vol. x. p. 25); Cross of Camuston, Monikie (Anderson, "Scotland in Pagan Times," vol. ii. p. 66); Haercairns, Monikie (Warden, "Angus or Forfarshire," vol. iv. p. 426); Carr Hill, Monikie (Catal. Nat. Mus. Antiq. Scot., p. 173); "The Pretty Thing Knoll," Quarry Park, Letham Grange (Jervise, *P.S.A.S.*, vol. v. p. 100); Lunanhead, Forfar (*P.S.A.S.*, vol. xii. p. 288); Priesttown, Edzell (Catal. Nat. Mus. Antiq. Scot., p. 176); Greenford, Guynd (Catal. Nat. Mus. Antiq. Scot., p. 172); Carmyllie (Cat. Nat. Mus. Antiq. Scot., p. 173); Kirkbuddo Station (*P.S.A.S.*, vol. xiv. p. 264); Three Laws of Craigo, Logiepert (Warden, "Angus or Forfarshire," vol. iv. p. 235); Murley Wells, Glamis (*P.S.A.S.*, vol. v. p. 81); Fenton Hill, Baikie, Airlie (*P.S.A.S.*, vol. v. p. 346); Baitland Farm, Airlie (*P.S.A.S.*, vol. v. p. 346); Meikle Kenny, Kingoldrum (Warden, "Angus or Forfarshire," vol. iv. p. 28; and Cat. Nat. Mus. Antiq. Scot., p. 173); Balcalk, Tealing (*P.S.A.S.*, vol. viii. pp. 381, 383; *P.S.A.S.*, vol. xiv. p. 260); Rye Hillock, Stracathro (Jervise, "Mem. of Angus and the Mearns," vol. i. p. 29); Zabothy Hill and Hatton Cairn, Inverarity (*P.S.A.S.*, vol. xxiv. p. 9; Cat. Nat. Mus. Antiq. Scot., p. 174); King's Cross, Dundee (Warden, "Angus or Forfarshire," vol. iv. p. 177); Mill of Marcus, Fern (*P.S.A.S.*, vol. xxiv. p. 470); and Noranside, Balquharn, and Drumcuthlaw, Fern (*P.S.A.S.*, vol. xxvii. p. 66). Samples of the "drinking-cup" type of urn occur in the interments at Linlathen, King's Wells, Noranside, Middlebrighty, Kirkbuddo, and Prestwell, but the majority of the pre-cremation urns collected in the county belong to the "food-vessel" class.

Crementation cemeteries have been found at Blackgate of Pitscandly (Jervise, "Memorials of Angus and the Mearns,"

vol. i. p. 27); St. Medan's Knowe or Battle Cairn, Airlie, (*P.S.A.S.*, vol. v. p. 346); Carmyllie Hill (*P.S.A.S.*, vol. vi. p. 313); Gilchorn, Inverkeilor (*P.S.A.S.*, vol. xxv. p. 447); Edzell (Cat. Nat. Mus. Antiq. Scot., p. 163); Tannadice (Old Statistical Account); Tumulus at Dichty Water, Monifieth (*P.S.A.S.*, vol. vi. p. 313; Cat. Nat. Mus. Antiq. Scot., p. 169); at West Broughty Ferry, and a doubtful one at Cairn Greg, Linlathen, Monifieth (*P.S.A.S.*, vol. vi. p. 98; vol. xii. p. 437), which Anderson ("Scotland in Pagan Times": Bronze and Stone Ages, p. 10) considers probably an unburnt example. A group of cinerary urns were obtained at Westwood, Newport (*P.S.A.S.*, vol. vi. p. 388). Sometimes cinerary urns contain smaller vessels of various shapes ("incense-urns"), such as in those discovered at the Dichty Water, and at Gilchorn.

Numerous other cists and cemeteries have been unearthed in Forfarshire, but their characteristics were so carelessly noted as to make their classification impossible. Not a few cists contain both burnt and unburnt bones—*e.g.*, Barnhill and Tealing Hill (*P.S.A.S.*, vol. viii. p. 381), indicating a period of transition.

Short cists prevailed in the Bronze Age, being smaller for cremation purposes than for interment, but full length burial was not practised to any great extent before the beginning of the Iron Age and Christian era (Anderson, "Scotland in Pagan Times": Bronze and Stone Ages, p. 87; and Hutcheson, *P.S.A.S.*, vol. xxxvii. p. 239). Full-length oriented stone cists have been unearthed at Barnhill cemetery (*P.S.A.S.*, vol. xxi. p. 316); Craigie (*P.S.A.S.*, vol. xxxvii. p. 233); Pitkerro (*P.S.A.S.*, vol. xliii. p. 317); Auchterhouse (*P.S.A.S.*, vol. xxxiv. p. 393); and Montrose Parish Church Steeple (MSS., Libr. Soc. Antiq. Scot., 1834). The Barnhill coffin contained a clay urn of the food-vessel type, the Craigie coffin a penannular brooch, "which looked like iron," and the Montrose coffin, four incense urns of an early Christian type (Anderson, "The Iron Age," p. 11). Long and short cists of a pagan period sometimes lie east and

west (*e.g.*, Barnhill, Wellgrove, and Tealing), but in these interments the skull may be at the east, facing the entrance to the under world. None of the long cists referred to were of the type found in Scandinavia, where in primitive days orientation was almost always north and south (Du Chaillu, "The Viking Age," vol. i. p. 129).

The direction in which either the body or its enclosing cist is disposed is not in itself conclusive proof either of pagan or Christian sepulture (Wilson, "Prehistoric Annals of Scotland," vol. i. p. 100). For the zodiac doctrines of the Euphrates valley, devised when the spring equinox stood in the sign of Gemini, and fully developed in the age of Taurus, spread by migration of ideas over the whole prehistoric world. Fully 2000 B.C. when the spring sun passed out of the sign of The Twins into that of the Bull, Orientation was transferred from the celestial north pole to the east, at which point, then, the powers of light and life overcame those of darkness and death. These phenomena of nature not only gave rise to the widely diffused pagan expectation of a Redeemer arising in the east, but also suggested the belief of a resurrection in some new form of life (Jeremias, "The Old Testament in the Light of the Ancient East," vol. i. pp. 5 and 32; and Budge, "Osiris and the Egyptian Resurrection"). There is a remarkable consensus of custom, evidently due originally to solar symbolism, for the practice of laying the body east and west (Funeral Rites, "Encyclopædia Britannica," 9th ed.). Throughout all Gaul an astral religion, with a belief in the immortality and transmigration of the soul, was distinctive (*vide* Cæsar, "De Bello Gallico," Book VI., chap. xiii. *et seq.*). Forbes Leslie ("The Early Races of Scotland and their Monuments") has collected proof of the solar and planetary worship prevalent in ancient Caledonia.

The Stone Circles of Forfarshire have not been carefully studied, with the exception of those at Balgarthno, Liff (*P.S.A.S.*, vol. ii. p. 443), and Auchterhouse Hill, West Mains of Auchterhouse (*P.S.A.S.*, vol. xxxii. p. 205). The latter is a cairn enclosing cists with calcined bones and weapons of bronze, and surrounded by a double row of

stones. Sepulchral cists were noted in connection with circles at Dalbog, Edzell, and Caldhome, Kirriemuir (Warden, "Angus or Forfarshire"). Other circles marking tribal or family burial-places exist or have existed at Colmeallie, Edzell, Fern, Baldowie, Kettins, Law of Balrownie, Menmuir, Scurrock Hill, Kingoldrum, Pitscandly Hill, Rescobie, Craigendowie, Braco, and Clash of Blairno, in Lethnot and Navar (Warden, "Angus or Forfarshire"), Haercairns of Monikie (Wilson, "Archæology of Scotland"), and Balckembeck, Tealing ("Old Statistical Account").

Hoards of Bronze, not connected with interment, have been dug up, the burials representing the earlier, and the hoards the later period of the Age of Bronze. At Balmashanner, near Forfar, a hoard of bronze, amber, and gold personal ornaments was found in association with a cinerary urn (*P.S.A.S.*, vol. xxvi. p. 182). Bronze sickles, such as that found in the Tay, near Errol, have been discovered. But no quern or other implement for grinding corn, or whorl for spinning wool, clearly belonging to the Bronze Age has yet been found in Scotland. A perforated stone battle axe, often associated with implements of bronze, is, consequently, assigned to that period, and a tiny quadrangular whetstone, like that found at Coupar-Angus, is characteristic of the epoch. There is no example of a dwelling or stronghold which can be assigned with certainty to the Age of Bronze (Anderson, "Scotland in Pagan Times": Bronze and Stone Ages).

From an ethnological point of view it is unfortunate that the custom of cremation should have existed from the middle of the Bronze Age until the dawn of Christianity. It has destroyed the continuity of morphological record. No human skulls can be obtained from cinerary interments, and the archæology of Scotland is singularly destitute of native sepulchral remains and burial customs during the Pagan Iron Period. The only cist of the early Iron Age was discovered on Leat Hill, Moredun, Midlothian. It lay nearly east and west, was 4 feet 2 inches in length, and contained two skeletons.

The skull of the elder—about twenty-four years of age—approximated to the modern type. Practically, there is an ethnological hiatus in cranial measurements from the period of unburnt inhumation until early Christian interments were established when historical evidence of racial movements is available.

The leading types of skulls in Western Europe during the Bronze and early Iron Ages were these:—The primitive long-headed neolithic race were pressed towards the Atlantic littoral by a round-headed Alpine people who, in the centre of France, amalgamated with the original dolichocephalic race. The older people are known as Spanish Basques, the combined race as French Basques. These French Basques occupied the *Gallia Centralis* of Cæsar, and are the "Kelts of History," now represented by the Auvergnat or Rhætian race, and are allied to the Lapps. The Auvergnians have light grey eyes, chestnut hair, and are short and thick-set (Broca, "Revue d'Anthrop.," vol. ii.). The mean cephalic index of the Auvergnians is 84 (Broca), or 84.6 (Durand), and of the Lapps 85 (Broca), or 84 (Pruner-Bey).

In Scandinavia and Denmark the inhabitants of the Bronze Age were dolichocephals or mesocephals, of tall stature and fair hair (Montelius and Hausen; Beddoe, "Mem. Anthr. Soc. Lond.," vol. iii. p. 378-383).

The Frisian skull is of remarkably small vertical diameter, and although broad, it is dolichocephalic, and looks long and narrow. The occiput is prominent, the face oval, the cheek-bones flat, the nose straight, and the hair of all colours, but seldom very dark (Lubach, *vide* Ripley, "Races of Europe"; Virchow, "Verh. Berl. Ges. f. Anth.," pp. 282-289, 1871-72; "Archiv. f. Anth.," vol. vi. pp. 85-118).

In England the people of the round barrows had round skulls. They were sub-brachycephals, with a cephalic index of 82, and a height (on the basio-bregmatic plan) of 70. The skulls had great parietal breadth, marked development of the supraciliary ridges (*i.e.*, were beetle-browed), and prominent nose and chin. They were a tall

and stalwart race (Davis and Thurnam, "Crania Britannica," Ancient British Barrows; Beddoe, "The Races of Britain"). They resemble a type which abounds in the Stone Age tombs of Denmark, and which is represented by the Walloon descendants of the Belgæ. Beddoe states that, "Anthropologically, Britain has been always a stage further back in development than the Continent," and suggests that the Bronze Age people were Cimbric from Juteland and Belgic Gaul ("Races of Britain," p. 16). According to Sir William Turner (*P.S.A.S.*, vol. v. p. 279): "During the past few years a large amount of evidence has been accumulated which seems to prove that, in the British Islands, and generally throughout Western Europe, a short-headed race preceded the existing longer and more oval-headed races—a brachycephalic people, allied to the Finns and Lapps of Northern Europe, but now quite unrepresented in the west except perhaps by the Basques and the mountaineers of the Rhætian Alps." Studer and Barmwirth (*Crania Helvetica antiqua*) are of opinion that the Rhætian type is quite distinct from that of the British round barrows.

Wilson ("Prehistoric Annals of Scotland"), and Beddoe ("Races of Britain") describe a Keltic or Romano-British type of skull which the former ascribes to a race of invaders subsequent to the period of the Bronze people. The crania are pear- or coffin-shaped, "intermediate in length and breadth between the long barrow and round barrow forms, with the prominent occiput of the former, with some degree of the parietal dilatation of the latter, and a long flattened temporal region gradually widening out to the point of maximum breadth, which is generally rather far back." It differs from the Scandinavian type in the temporal flatness being more marked, the forehead flatter and squarer, and the eye deeper cut. The average longitudinal diameter is 7.37 inches (187 mm.), the parietal breadth 5.43 (138 mm.), the frontal breadth 4.64 (118 mm.), the occipital breadth 4.54 (115 mm.), the vertical height 5.37 (136 mm.), the horizontal circumference 20.69 (526 mm.), and the cephalic index 73.6.

The Anglo-Saxon skull is elliptic, with a well-arched forehead and no beetling brows (Horton-Smith, "Jour. Anth. Inst.," vol. xxvi. pp. 82-102). The average longitudinal diameter is 7.2 inches (183 mm.), the extreme breadth 5.1 (130 mm.), the frontal breadth 4.6 (117 mm.), the occipital breadth 4.3 (110 mm.), the vertical height 5.4 (137 mm.), the horizontal circumference, one inch above the flabella, 20.4 (518 mm.), the cephalic index 75, and the vertical index 73 (Davis and Thurnam, "Crania Britannica," Table VII.).

Without entering into morphological detail, the most important data regarding the few local crania which have been preserved may be mentioned. Out of eight skulls found in short cists, belonging to the period previous to the hiatus caused by cremation, two are dolichocephalic, four are mesocephalic, and two are brachycephalic. The obvious conclusion to be drawn is, that different types of skulls are represented, indicating either that the early Bronze period of culture continued through several successive races, or that the people of that age were originally a mixed race. Nevertheless, in all these mesocephalic crania, the tendency is more towards a brachycephalic than towards a dolichocephalic type. As a general rule, therefore, these skulls are akin to the Alpine brachycephals, and not to the Scando-Teutonic and Mediterranean dolichocephals. To some extent, however, a long-headed type occurs, either from the persistence of an old, or the introduction of a new race. According to Sir William Turner (Craniology of the People of Scotland, "Trans. Roy. Soc. Edin.," vol. xl., Pt. III., No. 24), a brachycephalic type of skull prevailed in Fife, Forfar, and other north-eastern counties, whereas in the six crania he examined, from the Dalraid Scots' counties of Argyll, West Perth, Ross, and Sutherland, the length-breadth index was in no instance above 75, and two of these were hyper-dolichocephalic. In well-pronounced long-headed races, like the Eskimo, the height is generally greater than the breadth (Wilson, "Prehistoric Man," Table XV.; and Duckworth, "Morphology and Anthropology," p. 478); but a striking feature

Locality and Sex.	Short Cist Interments.						Full-Length Interments.				
	Kirk-buddo.	Stanner-gate, A.	Stanner-gate, B.	Stanner-gate, C.	Barn-hill. Whole skull-cap (with hole).	Barn-hill. $\frac{3}{4}$ skull-cap.	Barn-hill. R. $\frac{1}{2}$ skull-cap.	Tealing.	Auchterhouse.	Montrose.	Montrose.
	M.	M.	M.	F. ?	M.	M.	M.	M.	F. ?	M.	M.
Maximum Length (glabell-occipital)	mm. 173	mm. 192	mm. 185	mm. 170	mm. 180	mm. 173	mm. 180*	mm. 183	mm. 185	mm. 180	mm. 182
Maximum Breadth (parieto-squamous)	132	138	140	140*	142	138	156*	135	136	157	145
Frontal Breadth (minimum)	95	102	100	100*	110	117	...	112	111	106	97
Asterionic Diameter (lateral angles of occipital)	112	132	113	130*	112	96*	...	102	115	116	105
Vertex Height (from exter. auditory meatus)	105	120	125	100	123	108	128	133	118	140	117
Horizontal Circumference (glabell-occipital)	498	540	526	500*	520	490*	...	529	525	540	523
Cephalic Index	76.3	71.8	75.6	82.3*	78.8	78.6	86.6*	72.9	73.5	87.2	79.7

\* Approximate.

FOOTNOTE.—The bones and grave goods of the Stannergate cists are preserved in the Albert Institute Museum, and the stone coffins and skeletons from Barnhill and Auchterhouse in Dudhope Museum.

of these early Forfarshire skulls is the preponderance of the cephalic over the vertical index.

With regard to the full-length interments at Auchterhouse and Montrose, one skull is dolichocephalic and the other brachycephalic. Details regarding the second Montrose skull, which is mesocephalic, are wanting. In full-length burials, if signs of Christianity are present, the possible ethnological influence of the missionary expansions of the churches of St. Ninian and St. Columba ought to be borne in mind—*e.g.*, church of Salorch, Montrose.

The conclusions of morphology being dubious, from paucity of material from which to obtain data it is interesting to turn to two other questions. (1) When did the Bronze Age come to an end? and (2) Who were the inhabitants of the country at the time?

Fortunately, there is evidence more certain than the speculations of archaeologists to indicate the first beginnings of the Iron Age in Britain. Julius Cæsar states that the inhabitants of Britain used either brass or iron rings, determined at a certain weight, as their money, and that a small quantity of iron was produced in the maritime regions ("De Bello Gallica," Lib. V., chap. xii.). He also alludes to the fact that the Nervii of Belgic Gaul, who did not differ much from the Gauls of Kent, had no supply of iron tools ("Gallic War," Book V., chapter xlii.). And Herodian, describing the expedition of the Emperor Severus against the Caledonians in 208 A.D., avers that "They know not the use of clothing, but encircle their necks and loins with iron, deeming this an ornament and an evidence of opulence."

Evidently from 55 B.C. to 208 A.D., the early Iron Age was only in its initial stages. The metal was precious. It was not sufficiently common to be used for cutting implements. The onus of proof rests with those who assign an earlier date.

Now, in Cæsar's time, the inhabitants of the south-east maritime portion of Britain were Gauls who had passed over from the country of the Belgæ for the purpose of plunder and making war ("Gallic War," Book V., chap. xii.).

The people of the interior ("quos natos in insula ipsa memoria proditum dicunt") claimed to be born in the island (*Ibid.*, Book V., chap. xii.). Of course the value to be attached to the reports of barbarians as to the duration of occupancy is small. This is admitted by Tacitus ("Agricola," chap. xi.), who divides the inhabitants of Britain into Caledonians, Silures, and Gauls, and suggests that the Caledonians were of German derivation. At a later date, Eumenius ("Pan. Constantin," chap. vii.), after referring to the Picts in 296 A.D., makes the first historic mention of them by name under the date 310 A.D.: "Non dico Caledonum aliorumque Pictorum silvas et paludes," from which it appears that the Caledonians were only a part of the Pictish race. When the Picts were conquered by Theodosius in 368 A.D., Ammianus Marcellinus ("Roman History," Book XXVII., chap. vii. § 5) says: "Eo tempore Picti in duas gentes divisi Dicalydonas et Verturiones." Professor Rhys ("Celtic Britain," pp. 158, 308) identifies the Verturiones (fort or enclosure builders) with the "men of Fortrem" of later history, whose forts can still be traced in Strathearn and Strathmore. The Latin name "Picti," applied to those insular Picts, is derived from the Indo-European stem "peik," signifying "tattoo" (Kennedy, "Keltic Researches," p. 8), and according to Claudian ("Laud. Stilich," ii. 250)—

"Me quoque vicinis pereuntem gentibus inquit  
Munivit Stilichon."

A verse in Ausonius runs—

"Viridem distinguit glarea muscum  
Tota Caledoniis talis est, pictura Britannis."

Even now tattooing is a common habit in Angus and its neighbourhood, and, in local dialect, prehistoric "standing" or "hir-stones" are called "pech-stanes."

Southern Pictavia occupied the territory corresponding to the counties of Fife, Forfar, Kincardine, and eastern Perthshire (Hume Brown, "History of Scotland," vol. i. p. 11), a district largely visible from the top of King's Seat, east of Dunsinane.

As to the origin of the Picts, speculation has run riot. That the inhabitants of Kent resembled the Gauls and passed over from the country of the Belgæ we have on the authority of Cæsar. That the swarthy complexion and curly hair of the Silures, together with their situation in relation to Spain, render it possible that a colony of the ancient Iberi possessed themselves of the south-west territory of England, and, therefore, differed from the Kelts in language, customs, and laws, speaking a Basque dialect, we have on the authority of Tacitus, Cæsar, and Strabo ("Agricola," chap. xi.; "Gallic War," Book I., chap. i.; Strabo, Book IV., chap. i. § 1; chap. ii. § 1). But who were the Caledonians, that branch of the Picts, with ruddy hair and large limbs, "rutilae comae, magni artus" (Tacitus, "Agricola," chap. xi.). The probability of invaders finding their way to the white chalk cliffs of Albion, visible on the other side of the Straits of Dover, does not exclude the possibility of immigrants from the Atlantic seaboard following the line of Phœnician maritime traffic to the south-west portions of the British Islands, or the likelihood of northmen crossing the German Ocean, as Frisians, Danes, and Vikings did in later days. The distribution of the kitchen middens in the neolithic age is presumptive of the last connections.

Were they Germans as Tacitus imagined? Were they people from Scythia driven by storm upon Ireland and advised to settle in the northern parts of Britain, obtaining wives from the Irish Scots on condition that when any difficulty arose, they should choose a king from the female royal race rather than from the male, a custom observed until 735? (Bede, "Ecclesiastical History," Book I., chap. i.). Or did they, as Nennius supposed ("History of the Britons," chap. xii.), about the fourth century B.C. descend upon Orkney and seize the left side of Scotland? Geoffrey of Monmouth ("British History," Book. IV., chap. xvii.) combined the accounts of Bede and Nennius with picturesque amplifications. Hector Boece ("History of Scotland"), referring to "our eldaris" before the time of Malcolm Canmore, stated that "They usit the rites and maneris of

Egyptians, fra quhone they tuk thair first beginning," evidently on the strength of the resemblance between Keltic sculptures and hieroglyphics. Maule ("Hist. of the Picts," p. 11) "would assuredly, with Camden, think that the Picts came from no place at all, but were the very natural Britons themselves." Camden ("Britannia") believed that the Picts were originally Britons who fled into the northern parts of the island from Roman invasions. Father Innes ("On the Ancient Inhabitants of Scotland," p. 57) considered it probable that the Picts were of the same origin as the Britons of the south, and that they originally came from the nearest coasts of Gaul. Stillingfleet ("Orig. Brit.," chap. v.) was of opinion that they came from Scandinavia. The fierceness with which their Keltic or Gothic origin was debated by ethnological controversialists furnished to Sir Walter Scott some of the most piquant scenes in "The Antiquary" (a Forfarshire story). At the present day the rival theories are that the Picts were the last and least Aryanised representatives of the non-Aryan people of Basque kindred who inhabited Britain before the Keltic Aryans arrived (Rhys, "Rhind Lectures," 1889), and that they were Aryan Kelts (Kennedy, "Keltic Researches").

The only morphological description of the Picts which can be depended on is that of Tacitus, who described the Caledonian branch as having "rutilae comae, magni artus." Now, according to Deniker ("Races of Man," p. 49), "red hair of all shades is only an individual anomaly. . . . There are no red-haired races, but light and chestnut hair may have a reddish reflection in it." Tocher thinks red hair is evolved from dark brown by some of its black pigment being converted into orange. It is rare, therefore, in a very blonde population ("Man," vol. viii., No. 27). Dr. Beddoe, on the other hand, is inclined to maintain that red was the original hair colour of men in Europe. Fair wavy hair, with all its shades, is frequent among the people of Northern Europe. It is found in 84 per cent. of Scandinavians (Gould), and 16 per cent. of Scotsmen (Beddoe). In Forfarshire, at the present day, fair hair of

the colour of dry sand, like that covering the body of a lion, is very common, especially in youth, in adult life it often becomes light brown, but the beard remains fair, with a faint reddish tinge. The hair on the scalp differs from the damp-looking yellow hair of the Frisian population, which is generally of two shades on the same individual, and has frequently a reddish tinge. The eyes are the grey or greyish-blue of the Kelt, not the blue of the Teuton.

According to Tocher ("Biometrika," vol. vi., Pts. II. and III.), an excess of blue eyes and, with some exceptions, of fair hair occurs in the north and north-east of Scotland, including Southern Pictavia. Unfortunately the value of pigmentation surveys, especially if carried out in detail by untrained people, depends on the definiteness of the colour classes, the personal equation of the observers, and on the numerical data being strictly comparable. Indeed, unless a colour meter is used, little scientific reliance can be placed on the results. Beddoe ("The Races of Britain," p. 151), out of 641 cases observed in Forfarshire, found the gross index of nigrescence 83.5, and the percentage index 13.0. The writer, out of 500 young men of local origin, found the gross index 98.0, and the percentage index 19.6. Uniformity of methods is essential if, as has been suggested recently, race mixtures may be analysed into their original elements by the Mendelian formula on a basis of free mating and equal fertility (Brownlee, "Journ. Roy. Anthropol. Inst.," vol. xli. p. 179).

The stature of the people of Forfarshire is not, as a rule, great. Averaging all occupations in accordance with their proportions in the Census Returns, the nude height of more than 10,000 men of all classes, between 18 and 25 years of age, was 66 inches, and their maximum chest capacity 35.6 inches; they were comparatively short and thick-set.

Judging from the Bronze Age skulls, the Picts were probably a mixed race, with a pronounced tendency to a round-headed stock. Hence it is of some ethnological importance to study their language and customs in order to determine the predominating element.

What the Pictish language actually was is only known from geographical and historical names, and from some dozen and a half inscriptions in the Ogam alphabet, or miniscules such as on the Drosten stone at St. Vigean's. The Kelts used these letters, and the Scando-Gothic nations Runes (*vide* the description of Beowulf's sword hilt). These Pictish inscriptions are distributed from Scoonie and Abernethy in Fife along the east coast of Scotland to the Orkneys and Shetlands (Rhys, *P.S.A.S.*, vol. xxvi. p. 263). Without entering into philological detail, it may be stated that Kennedy ("Keltic Researches") maintains and gives ample illustration that Pictish was peculiar in the preservation of the letter "P," an Indo-European letter only retained by the primitive Goidelic branch of the Kelts. It was used by the Picts in the transmission of ancient titles to land as late as the tenth century. In the Kymric branch the letter "P" is a mutilated "qu" sound which, in Irish and Highland Gaelic—both Goidelic branches of Keltic—became "c" "ch" and "gh." Evidence of Pictish occupation is therefore to be found in place-names having the prefix "Pett" or "Pitt," signifying a place or dwelling. For the land was named after its possessor or occupier; the modern Scottish habit in which the landlord bears the name of his property, and the tenant of his holding being a curious reversal of this custom. Dr. Christison (*P.S.A.S.*, vol. xxvii. p. 275) has collected a list of such names. He finds 37 in Fife and Kinross, 31 in Crieff, Perth, and Blair Atholl district, 20 in Eastern Perthshire and Forfarshire, 68 in the counties of Kincardine, Aberdeen, Elgin, Nairn, and Banff, 6 in North-Eastern Inverness, 4 in Eastern Ross and Cromarty, 2 near Golspie, and 1 in Orkney. His enumeration of Forfarshire names is deficient as will be seen from the following list:—Pitkenney (Aberlemno), Pitcundrum (Arbirlot), Pitnacree (Alyth), Pitskelly (Barry), Petpollokes, Pittendriech, Pittenschall, Pitforthie (Breachin), Pittorthie (Careston), Pitarrow (Carmyllie), Pitarries (Craig), Pitmuies (Dunnichen), Petreuchie (Forfar), Pithouse (Inverarity), Peattie, Pitcur, Pitdowney (Kettins), Pitkerro

(Dundee), Pikehardy (Lethnot), Pitalpin (Liff), Pitlyell (Lundie), Pitempan (Mains), Pitmedie (Menmuir), Pidditie (Monifieth), Pitairlie (Monikie), Pitnappie (Newtyle), Pitlivie (Panbride), Pitscandly (Roscobie), Pitquhortheis (Stracathro), Pitpointie (Tealing).

Such words as Angus, Mearns, Dünnichen (Nectan), Monikie, and Meigle are Pictish (Kennedy). To a less certain extent the prefix "Aber," signifying the inflow of a river, is Pictish. It occurs locally in Aberlemno, Aberbothrie, Aberbrothock, Aberdagy, Arbikie, Arbirlot, Abercairney, and Abernyte. The Western or modern Gaelic form is represented by Invergowrie, Invermark, Invermarkie, Inverqueich, Inverquharly, Inverarity, Inverharly, Invereighty, Inverkeilor, Inverlunan, Inverpeffer, Inveraddie, and Inverskandle.

If, as Rhys contends, the Pictish language was not Keltic, not Aryan (*P.S.A.S.*, vol. xxxii. p. 324), an analysis of the place-names given above ought to support his theory, and a study of the names applied to prominent geographical features should reveal non-Aryan roots. According to Isaac Taylor ("Words and Places," pp. 130, 145), "River names, more particularly the names of important rivers, are everywhere the memorials of the earliest races. . . . For antiquity and immutability the names of mountains and hills come next in value to the names of rivers." Yet the Esk, the Isla, the Evening (or Avon), and the Dean are generic names coextensive with Keltic occupation (Taylor). The Tay, the Mark, the Tarf, the Dye, the Cruick, the Prosen, the Carity, the Lemno, the Lunan, the Ericht, the Alyth, the Lochty, the Dichty, and the Gowrie are Keltic names (Johnston, "Place-Names of Scotland"). The word Pow, so prevalent in the Carse of Gowrie—*e.g.*, the Pow of Errol, Powgavie, Pilmore—may be the Keltic Pol or Pool, a descriptive term applied to dead waters, like a pool, flowing through level country.

The names of the chief Forfarshire mountains in the Grampian range dividing Southern from Northern Pictavia are Cairn-na-Glasher, Cairn Bannoch, Cairn Aighe, Cairn Inks, Broad Cairn, Braid Cairn, East Cairn, Cock Cairn,

Ben Tirran, White Hill, Black Hill, Hill of Cat, Hill of Wirren, Mount Keen, Tolmount, Mount Blair, Driesh, Mayar, Finalty, Bonstie Ley, Monamenach, West Knock, The Bulg, Naked Tam, and the White Caterthun. In the Sidlaw Hills are Auchterhouse Hill, Gallowhill, Gash, Keillor, and Hayston Hill. A number of hills or groups of hills are known by the name of law, viz.—Sidlaws, Dundee Law, The Laws, Monifieth, the Laws of Ester Athy, the Laws of Careston, the Law of Balnabreich, Green Law, Drumcuth Law, Denoon Law, Catlaw, Ruthven Law, Hilton Law, Windsor Law, the Three Laws of Craigo, the Law of Balrownie, Maryton Law, Oathlaw, and Dickmontlaw, Black Law, Wolff Law, Dronlaw, law being an old English word for hill (Taylor and Johnston).

Keltic is the chief language in the nomenclature of Forfarshire until and after the introduction of English. Indeed, in all countries overrun by that race, Keltic names replaced or obscured aboriginal names even in the case of streams and hills. The Aryan speech possesses in a marked degree the power of extirpating languages less highly organised than itself (Taylor, "The Origin of the Aryans," p. 221). Accordingly, the very persistence of numerous Pictish names in a Keltic district is in favour of them belonging to an Aryan speech. But when all is said, the ethnological value of comparative philology, taken by itself, is extremely small (Broca, "La Linguistique et l'Anthropologie," p. 259).

In this discussion as to the origin of the Picts, it is more important to compare their ethnological customs with those of that primitive Alpine people who dwelt in the great mountainous forest-zone of central Europe. These aboriginal Aryans were nomad herdsmen almost ignorant of agriculture, and their dress consisted of skins sewn together. They lived in huts during the summer and in pits during the winter, and erected crannogs in suitable situations. They never ate fish. Marriage was a recognised institution, but polygamy and not polyandry was characteristic of the race (Taylor, "The Origin of the Aryans," chaps. i. and iv.).

Whether these Aryans were golden-haired brachycephals of Ugric type, speaking a tongue which philologists call Keltic and who became Belgic Gauls, or whether they were tall, yellow-haired, blue-eyed dolichocephals, Scandinavians, and Teutons, has been debated acrimoniously. Judged by the test of customs, the Kelts were more civilised than the Teutons; judged by the test of language, the Lithuanian is older than the Teuton tongue. The Alpines, although often pile-dwellers, never ate fish, the Scandinavians lived largely on edible molluscs and fish at a time synchronous with the occupation of European pile dwellings (Taylor, *Ibid.*, chap. v.).

When Britain appears on the horizon of history, its inhabitants were possessed of great herds of cattle. Most of the inland people did not sow corn and had no skill in agriculture. They lived on flesh and milk and were clad in skins (Cæsar, "Gallic War," Book V., chaps. xii., xiv.). Caractacus, before the battle at the Grampian hills in Southern Pictavia, is represented by Tacitus ("Agricola," chap. xxxi.) as pointing out to the Caledonians that they had no cultivated lands which would induce the Romans to preserve them for labour thereon. "No quern or other implement for grinding corn, or whorl for spinning wool, has yet been found in Scotland in associations which certainly assign it to the Bronze Age" (Anderson, "Bronze and Stone Ages," p. 202). The kraals occupied by the Britons, Cæsar compares to those of the Gauls ("Gallic War," Book V., chap. xii.). Diodorus, the Greek historian, writing shortly after the death of Cæsar, refers to the "earth houses" used in the country ("Bibliotheca," Lib. V., chap. xxi.). Examples of such "earth houses," "Picts' houses," or "Weems" are common in Forfarshire and its borders. Several were discovered on Stoney Roofs Farm, between Gray and Camperdown (*P.S.A.S.*, vol. vi. p. 216); one at Lundie ("Old Statistical Account"); four were found at Auchterhouse (*P.S.A.S.*, vol. xxxiv. p. 209); several at Tealing (*P.S.A.S.*, vol. x. p. 287); one at Auchtertyre, Newtyle (Warden, "Angus or Forfarshire"); one at the Murroes (*P.S.A.S.*, vol. viii. p. 164); one at Lintrose, Kettins

(Warden, "Angus or Forfarshire"); three at the Carr and Ballo fields, Pitcur, Coupar-Angus (*P.S.A.S.*, vol. v. p. 81; vol. viii. p. 25; vol. xxxiv. p. 203); "several" at Mudhall, Bendochy ("Old Statistical Account"); one at Coupar-Grange (Pennant, "Tour in Scotland"); one at Meigle (*P.S.A.S.*, vol. xxxiv. p. 210); one at the Kirk of Ruthven (Marshall, "Historic Scenes in Forfarshire," p. 153); four at Airlie (*P.S.A.S.*, vol. v. p. 352; vol. viii. p. 24; "The Antiquary," July 1898; Anderson, "Scotland in Pagan Times": The Iron Age, p. 292); one at Clova (*P.S.A.S.*, vol. xii. p. 356); one at Quarry, Parkfield, Fithie, Farnell, near Brechin (*P.S.A.S.*, vol. ii. p. 197; vol. vii. p. 533; vol. viii. pp. 25, 473); one at Letham, Arbroath (*P.S.A.S.*, vol. viii. p. 24); and one at the West Grange of Conan, St. Vigean (*P.S.A.S.*, vol. iii. p. 465; vol. iv. p. 492).

Evidence of their use in Roman times is to be found in the occurrence of "Samian" ware within the earth houses at Tealing, Pitcur, and Fithie, and of late habitation in pieces of iron in the two last mentioned, and of querns for grinding corn in those at Auchterhouse and Airlie.

Forfarshire has not many lakes, so that examples of pile dwellings must always have been scanty. But one such "crannog" was discovered in 1781 forming Queen Margaret's Inch in Forfar Loch (*P.S.A.S.*, vol. vi. p. 125); and another is known as "The House of the Loch," Kinnordy, Kirriemuir.

According to Dion (Ap., Xiph., Lib. II., xxvi. § 12) the northern Britons did not eat the fish which so abounded on their shores and in their rivers, a prejudice against its use being observed in some Keltic districts until quite recently ("Crania Britannica," chap. v. p. 67). The taste for fish and the art of fishing seem to have been developed at a comparatively late period amongst the Aryans (Taylor, "The Origin of the Aryans," p. 169). Even yet, in Forfarshire, the expression "fish cadger" is used as a term of reproach, just as "fish-eater" was in the days of Herodotus.

Cæsar noted that, in Britain, polyandry was customary, ten, or even twelve men, generally near relatives, had but

one wife ("De Bello Gall.," Lib. V., c. xiv.). Severus describes the Caledonians as having wives in common. Eusebius ("Præp. Evang.," Lib. VI., c. 10), in the fourth century, alludes to the fact that one woman is common to many men, and the Pictish rule of maternal succession points to the same condition of affairs—a laxity of sexual relations which the returns of the Registrar-General indicate is not altogether extinct in strongly Pictish districts of Scotland.

Polyandry, however, is not a sign of less civilisation than polygamy. It never occurs among the lowest savages; but is adopted as a social necessity by warlike hunters and nomads, to whom female labour is of slight value, and a surplus of men is essential. In this way, it is more a matter of circumstance than of racial peculiarity (*vide* Westermarck, "The Origin and Development of the Moral Ideas," vol. ii. p. 387 *et seq.*).

Finally, cremation was practised. The Gauls cast into the fire all things, including living creatures dear to the deceased when alive ("De Bello Gall.," Lib. V., c. xix.).

Cæsar mentions ("De Bello Gall.," Lib. V., c. xlii.) that the Nervii of Belgic Gaul learnt the art of fort-building from Roman prisoners, but as they had no supply of iron tools requisite for this service, they made their works of turf and earth; and Tacitus ("Annals," Book XII., chaps. xxxiii.-xxxv.) states that Caractacus fortified himself against Ostorius with an aggar of stones, "rudes et informes saxorum campages . . . in modum valli præstruit."

If the Kelts did not know the art of fort-building before contact with the Romans, it is remarkable that Ammianus Marcellinus ("Roman History," Book XXVIII., chap. viii. § 5) describes the inhabitants of Southern Pictavia in 368 A.D. as "Verturiones," fort or enclosure builders. Along Strathmore many of these earthworks seem to form lines of military opposition to Roman entrenchments, and there are none in the Grampians. Others (*e.g.*, on Brochstane Moor, Arbirlot, and The Law, Dundee) serve for coast defence. "The Forts, Camps, and other Field Works of Perth, Forfar, and Kincardine" have been carefully

described by Christison (*P.S.A.S.*, vol. xxxiv. pp. 43-120, and "Early Fortifications in Scotland"). In this district there are twenty-five earthworks which are perhaps more like mottes than forts; these are at no great elevation, and are only exceptionally in positions of natural strength. Thirteen earth forts differ from the mottes in being on situations of considerable military strength but at no great height, generally under 500 feet. Twenty-three stone forts or aggars exist. They are practically all at high elevations, such as hill tops. Compared with those in other districts, they are small in number but large in size. Only one or two of them have been carefully excavated. "The result, so far as it goes, is that the finds are compatible with the existence of the forts about the Roman period, but not necessarily earlier, and that the range is considerably into mediæval times." If the Kelts first learnt the art of fort-building from the Romans, it would seem that the Verturiones—if they were Kelts—must have acquired it at a comparatively recent date.

If the form of artistic expression is a racial peculiarity and not an indication of development, then that art which is distinctively known as "Keltic" might present a difficulty in reconciling the identity of the people who practised cremation urn burial and those who created the later form of art. For the designs on cinerary urns differ essentially from the elaborate work on bronze of the Keltic Pagan period. The art of the urns is a rectilinear system. Whereas "Keltic" art consists of repoussé diverging spiral scrolls. The figures are not of a geometric character and are unsymmetrical. Often the work is zoomorphic in form but never in detail of design. These curvilinear embellishments in Scotland are locally distinctive as seen in the personal ornaments peculiar to Pictavia (Anderson, "Scotland in Pagan Times": *The Iron Age*, pp. 114, 172). Illustrations exist in the spiral snake armlets found at Pitalpin (*P.S.A.S.*, vol. xv. p. 346), and at the Grange of Conan (*P.S.A.S.*, vol. x. p. 462). The true conclusion seems to be, not that there was a change of race, but that the use of bronze reached the full perfection of ornamenta-

tion owing to that metal being retained in common use to a late period of the development of the nation.

"The Sculptured Stones of Scotland" corroborate this view of the late development of "Keltic" art (*vide* Chalmers, "The Sculptured Stones of Angus and Mearns"; Stuart, "The Sculptured Stones of Scotland"; Jervise, "Memorials of Angus and the Mearns"; Anderson, "Scotland in Early Christian Times," vol. ii.). Whether the Pictish inscribed stones were all concerned with the occupation of land (Kennedy, "Keltic Researches," p. 65), or whether the incised and relief crosses were erected in honour of locally revered saints (Anderson), whether their symbolism is in part heraldic or altogether religious, the art displayed in the stonework is peculiarly "Keltic," especially in the absence of foliage, and is limited to the Pictish area. All the evidence goes to show that the designs were expressions in stone of decorations previously displayed in manuscripts, and the characteristics of their art and their symbolism indicate that they were introduced by the Irish and not by the early Columban Church. Romilly Allen ("Celtic Art in Pagan and Christian Times") considers "the so-called Celtic style to be a local variety of the Lombardo-Byzantine style." "We shall not greatly err if we assign the decorated monuments of Scotland to a period later than the commencement of the tenth century, and the incised monuments to the period immediately preceding" (Anderson, "Scotland in Early Christian Times," vol. ii. pp. 82 and 95).

The historical or rather quasi-historical evidence of the origin of the Picts may be gathered from the writings known as "The Pictish Chronicle" (Skene's edition). In this collection the periods given for the duration of the Pictish Kingdom differ considerably. Dating backward from 844-850 these are 1061 years, 1070, 1187, 1224 $\frac{2}{3}$ , 1239 $\frac{1}{3}$ , 1360. The first two dates are probably approximately correct, so that the commencement of the Pictish Kingdom may be assigned to 226-211 B.C.

Rice Holmes ("Ancient Britain and the Invasions of Julius Cæsar") states that bronze was brought to Britain

about 1800 B.C. by members of the Alpine race, and that the first of the various invasions by Keltic-speaking people arrived probably about 800 B.C. According to Festus Avienus, and Aristotle, in his "Treatise of the World" (*vide* Skene, "The Highlanders of Scotland," 2nd ed. p. 3), this island was inhabited by a people called Albiones in the fifth century B.C. Beddoe ("Races of Britain," p. 16) is disposed to think, on anthropological grounds, that bronze civilisation was introduced into Britain by a race identical with or nearly allied to the Kymry, who were expelled from Jutland into Belgic Gaul by a long-headed race of conquerors, Danish or Anglian. Kennedy ("Keltic Researches," p. 111), on philological evidence, maintains that the Kymry came to Britain first, and the Goidels followed and drove them into the interior, the second invasion being stimulated by the Roman conquest of Cisalpine Gaul in 222 B.C. Rhys ("Celtic Britain," p. 213) confirms these two Keltic invasions of Britain but inverts the order, placing the Goidels first and the Kymry last.

Influences leading to an intermixture of race in Southern Pictavia began at an early date. When the Southern Kelts invited the Saxons to cross and help them against the invading Picts and Scots and thereby sealed their own national doom ("The Works of Gildas," § 23), the "fierce and impious" barbarians from the Continent not only settled in Kent, but another band, after ravaging Orkney, took possession of many regions beyond the Frisian Sea, even to the confines of the Picts (Nennius, "History of the Britons," § 38). The first rebellion of the island tribes against Roman power in Britain in 360 was made by hordes of Picts and Scots (Amnianus Marcellinus, "Roman History," Book XX., chap. i. § 1), but in 364 the native forces consisted of "Picti, Saxonesque, et Scotti et Attacotti" (Marcellinus, Book XXVI., chap. lv. § 5), the name Saxon being given to all immigrants from the seaboard population between the Rhine and the Elbe. The seat of these northern Frisians appears to have been Fife and Kinross, the maritime part of Forfarshire south

of the Sidlaws, and as far as Stonehaven. Nennius describes them as occupying "plurimas regiones ultra mare Fresicum," and the Durham commentators add "quod inter nos Scotorque est," which shows that the Firth of Forth is meant; and this is confirmed by Jocelyne, in his "Life of Kentigern," who terms the shore of Culross "Frisicum litus," or the Frisian shore (Skene, *P.S.A.S.*, vol. iv., Part I, p. 174). The frequency of the Old English word "law" or hill in the southern and eastern parts of Forfarshire has already been referred to. Frisian settlements are indicated by the place-names Westhaven, Easthaven, Ferryden, Ethiehaven, Ulishaven, Finhaven, Covehaven, and Johnshaven. Caldham at Brechin, and the ancient name of Conghoilles, applied to the parish of Inverkeilor ("Old Statistical Account"), are equally notable. The Frisian invaders were probably called Comgalls, just as the Norse and Danish bore the names of Fingalls and Dubhgalls (Skene, *Ibid.*, p. 175). They were eventually overcome by the Picts, and it would appear that some of them were placed in a condition of servitude, for in the time of William the Lion, Ethie estate, with the village of Auchmithie, was gifted to Arbroath Abbey, and the fishermen were thralls (Warden, "Angus or Forfarshire," vol. i. p. 111).

The Fri-ian fringe of fishing communities is distinct to this day. Such names as Cargill, Beattie, Coul, Gall, Spink, Swankie, Norrie, and Pert are common amongst them. Norrie is probably a corruption of Nordie, an appellation given to the northern race in Europe, who in part amalgamated with the Alpine race. From the East Neuk of Fife to Stonehaven the intonation of the fishing population is identical and differs altogether from that of the various landward dialects. These people do not mix with the general population; the men cannot marry outsiders. For their wives have to perform arduous labours, such as beaching of boats and wading ashore, with their husbands on their backs, not to speak of carrying heavy creels of fish on their shoulders, and dressing in picturesque short skirts, which other women would not care to do.

Intermarriage and its consequences are therefore prevalent.

Feebler waves of Anglicism continued to beat fitfully against the Pictish Kingdom. Between the Tweed and the Forth by 547 the English leader Ida had founded Bernicia, the northern province of Northumbria. In 658 Oswy of Northumbria subdued and made tributary the greater part of the nations of the Picts (Bede, "Ecclesiastical History," Book II., chap. v.; Book III., chap. xxiv.). But this suzerainty was not firmly established and did not continue long. For in 684 Ecgfrith, King of Northumbria, found it necessary to ravage the Picts. The latter, under Brude, King of Fortrem, made a strategic show of flight, and drawing the enemy into Nectan's Mere, Dunnichen, defeated them and slew their king. As the result of this engagement, the Picts recovered their own lands and made many of the Angles slaves (Bede, *Ibid.*, Book IV., chap. xxvi.).

By the unification of the Picts and Scots in 787, under Kenneth M'Alpine, the beginning of Scottish nationality was effected, and no forcible permanent occupation of Southern Pictavia by alien people was subsequently made. The exact nature of that amalgamation is of some ethnological significance. The popular belief in the final conquest of the Picts by the Scots rests on the ecclesiastical and political misrepresentations of the late Irish editors of "The Pictish Chronicle." The truth is that, in 741, ten years after, Bede's "History" closes with a statement that the Scots were satisfied with their own territory, the colony of Dalraid Scots in Argyllshire was completely conquered by the Picts (Skene, p. cxxxii.). The Scottish princes, subsequent to that date, were chosen because of Pictish maternity, and were under the suzerainty of the King of the Picts. "The country thenceforth formed a dependency of the Picts" (Rhys, "Celtic Britain," p. 175). Skene believes that Dalraida was under Pictish rule only for a century (p. cxxxiii.); Kennedy ("Keltic Researches," p. 89) that the weight of evidence is exactly in the contrary direction,

and that the Scots never obtained ascendancy over the Picts. The fight in which Alpin fell (according to the Irish monks) decided the superiority of the Scots over the Picts, and was, if that supposition be correct, of much ethnological importance, appears to have been only the result of an inter-Pictish feud to determine the right of succession. The descendants of Eogain had attempted to establish paternal succession contrary to the laws of the Picts, and Alpin attacked them on behalf of his son Kenneth's maternal claim. The result of the contest was the alternate election to the monarchy of the descendants of Kenneth and of Greig (Kennedy, "Keltic Researches," p. 84). "Rex Pictorum" was the title given to the three successors of Kenneth. The Ulster Annals, in 874, regarded the military forces of the country as Pictish; and when, in 878, the name Pict disappears from its pages, the people are not called Scots but "men of Alba"—"Albanaich." Even then the old distinctions were not lost, for in "The Chronicle of Fabius Ethelward," written in 975, it is mentioned that in 939 "The Scots and Picts also bow the neck." Scotland is a modern term. The Gaels are "Albanaich."

Although only of antiquarian interest it may be suggested, contrary to Skene's opinion, that Pitalpin, right in the heart of Southern Pictavia, and not far from the centre of its monarchy, is a more likely site for the inter-Pictish fight in which Alpin, the father of Kenneth, fell than the distant wilds of Galloway, where the large pillar stone called "Laicht Alpin" stands on the bank of a stream falling into Loch Ryan. That place may mark the burial-place of the earlier Alpin, who reigned from 736 to 741, and after being deposed, fled into Dalraida and invaded Galloway, where he was killed by a man in ambush in a wood overhanging a ford on a river ("Chronicle of the Picts and Scots").

Furthermore, the description in the Welsh "Bruts" of the fight, in which Meuruc defeated Roderic, King of the Picts, and set up a great stone, with an inscription to retain the memory of Meuruc for ever, a battle generally

supposed to have been fought in Wales, is suggestive of an epoch-making episode in history localised in Forfarshire by the names "American" or "Meric's Muir" and "King's Cross" at Westmuir, Mains of Baldovan, north by west of Dundee Law. For the Picts whom King Meuruc put to flight had just come from Scythia with a fleet and made conquest of Alban, and after the fight were given a district of Alban to inhabit—a statement of ethnological and chronological importance.

The unified Picto-Scottish kingdom appears to have been fairly organised to resist attack in Southern Pictavia. It is true that, in 875, the northern division of "the Great Army" of Danes under Halfdan conquered Northumbria, and oftentimes spoiled the Picts ("Anglo-Saxon Chronicle"). It was then that Thorstein "held such a triumphant course, that he actually made himself master of 'more than half' of the country beyond the Forth" (Hume Brown, "History of Scotland," vol. i. p. 33), but the occupation only lasted a year. A defeat of the Danes at Luncarty by Kenueth II. in 986 is asserted, long after the event, on the authority of Hector Boece alone ("History of Scotland"). The enemy, according to one account, are said to have advanced from Montrose through Strathmore, burning Brechin in their progress. Another otherwise unrecorded attempt at invasion, resting upon local tradition, and described by Boece, was under Camus, the Dane, in 1012. If it ever occurred it speedily ended in failure at the Battle of Barry, and its leader's spoil was six feet of earth at the Cross of Camuston. But the Danes, under Thorfinn, Jarl of Orkney, according to an old Norse Saga (Skene's "Collectanea de Rebus Albanicis," Iona Club), did defeat Duncan at Burghead, on the Moray Firth, and pursue him as far as Fife. Apparently no permanent settlement was made, for Macbeth assumed the reins of government on Duncan's death.

Thus, there seems to have been little or no direct infusion of Viking blood into Forfarshire. What there is comes second-hand from the Anglo-Danes of Northumbria, and a few Norman families of the Conquest. There are

evidences that the Northern Rovers had nautical familiarity with the coast, but place-names indicating colonisation and settlement are almost absent. Such landmarks as Blackness, Buddon Ness, Whiting Ness, Rumness, Bodden Ness, and Milton Ness distinguish the shores of Forfarshire. The only inland Scandinavian names are Buttergill, Shieldhill, and Ravensby. Hedderwick, near Montrose basin is also sufficiently inland to be either Danish or Anglo-Saxon (Taylor, "Words and Places," p. 107). It will be noted that Hedderwick, Buttergill, near Brechin, and Shieldhill, in Strathmore, are on the reputed line of Danish march to Luncarty, and that Ravensby is close to the site of the Battle of Barry. Corbie Knowe, on the shore near Denmark Farm in Inverkeilor, is supposed to mark a Danish camp. No certain sepulchral remains of the Vikings have been found in Forfarshire. But one bronze plate, with a Runic inscription, was discovered in a fort on the Laws (*P.S.A.S.*, vol. xvii. p. 51). The eight letters inscribed on it are M. K I T I L: T H A, of which the first word is evidently part of a man's name, possibly Grimkitil, but the ornamentation on the plate is distinctly Keltic, indicating a craftsman or owner of mixed Norse and Keltic origin (Anderson, "Scotland in Early Christian Times," vol. ii. p. 47), a combination which would correspond with Thorfinn's temporary occupation of the district.

By far the most important ethnological event affecting the district since the Keltic invasion was the battle of Carham in 1018, by which Malcolm II. annexed Bernicia to Scotland, and made its Anglo-Danish population an integral part of the kingdom. The flight of English nobles into Scotland at the time of the Norman Conquest, and the wholesale transportation of English prisoners as slaves by Malcolm Canmore in 1070, did not add new ethnological factors. Lowland influence extended until, by the middle of the twelfth century, it had become predominant. Subsequent dynastic struggles, which led to the introduction of Norman blood, affected the bulk of the population to a very limited extent. The aristocratic

families of Forfarshire who came from France are of small ethnological importance, scarcely equal to that of their original train of vassals and dependants. But the gradual spread by peaceable means of the Anglo-Danish people south of the Forth into Fife and Forfar has so profoundly altered the racial characteristics as to make the English element not less extensive than the Pictish.

In the twelfth century Flemings of an old Belgic type, not Walloons, settled in Scotland, bringing with them their skill in weaving linen and woollen goods ("Crania Britannica," p. 190; Beddoe, "Races of Britain," p. 21). Evidence of their presence is to be found wherever there is an old Wauk or Fulling mill (Hallen, "Preface to Register of Episcopal Church at Muthill"), as at Friockheim, Letham, Lin, Craigo, and Cruick, and in such personal names as Adams, Halley, and Douglas (Chalmers, "Caledonia," vol. i. p. 603).

Traces of the sailors of the Spanish Armada are believed by some to be found on the coast. The place named Cossins is said to be derived from Guzman.

Around the northern and western borders of Forfarshire, long after the rest had been Anglified, a purely Keltic population existed. The nearest of these Highland neighbours were the Ogilvys, Spaldings, Fergusons, M'Thomasess, Farquharsons, Stewarts, Robertsons, Murrays, and Campbells (Johnston and Robertson, "Historical Geography of the Clans of Scotland"), and the comparatively recent migration of these Gaels and Dalraid Scots has led to a fresh infusion of Keltic blood.

Although the ancient Kelts sometimes indicated descent by the term "Mac," surnames generally are a modern invention. They were introduced by the Normans, and were only in partial use in England as late as the fifteenth century. Being mostly creations of the last 400 years, they "can be of no value as evidence of *early* intermixture between Celts and Saxons. They can only be proofs of recent intermixture" (Nicholas, "The Pedigree of the English People," p. 427). Even then Norman and English families frequently are disguised by the Keltic

names of their properties, and true Kelts by English names descriptive of occupations, or personal peculiarities. The Carnegies are Norman, and many pure Gaels are Smiths. In Highland districts nearly everyone had to adopt the family name of the local magnate. Changes of property led to changes of name, and particular exploits led to the assumption of a new name. Doughty deeds made a Carron a Scrimgeour and originated the Napiers. Surnames, therefore, are a very unreliable indication of racial origin. Bearing this precaution in mind, the leading varieties of surnames prevalent in the district before railways had time to radically affect migration are of some ethnological interest.

The chief names of Forfarshire people from 1545 to 1700 in the "Inquisitionum ad Capellam Domini Regis Retornatarum Quae In Publicis Archivis Scotiae Adhuc Servantur" are:—Adam, Adamson, Alexander, Anderson, Arrat, Auchenleck (Affleck); Balfour, Ballardie, Bannatyne, Barclay, Barrie, Beaton, Bechartown, Blair, Blyth, Bower, Boyd, Bruce, Burgh, Burness; Cant, Cairncross, Campbell, Carmichael, Carnegie, Clayhills, Collace, Crichton; Davidson, Doig, Donaldson, Douglas, Drummond, Duncan, Duquhar, Durham; Erskine, Esplin; Falconer, Fenton, Ferguson, Forrester, Fotheringham, Fullerton; Gardyne, Gourlay, Graham, Gray, Guthrie; Hallyburton, Hamilton, Hardie, Hay, Henry, Hepburn, Hunter; Irving; Keilor; Kyd, Kinnaird; Lamb, Lichtown, Lindsay, Livingstone, Lovell, Luke, Lundie, Lyell, Lyon; M'Duff, M'Kenzie, Maule, Maxwell, Melville, Milne, Morris, Mowat, Mudie, Murray; Ogilvie, Oliphant, Ouchterlony; Peddie, Petrie, Philip, Pierson; Rae, Ramsay, Rait, Reid, Robson, Rollock, Ross, Ruthven, Rynd; Seaton, Scott, Scrimgeour, Sharp, Skene, Smith, Spalding, Speed, Strachan, Strathachin, Steven, Sturrock, Symer; Thornton, Tullo; Walker, Wedderburn, Winton, Wishart, Wood; Yeaman and Young. To this list may be added from the County Valuation Roll of 1823, Arklay; Binny; Craik, Corsar, Crerar; Dalgairus, Dempster; Greig, Grewar; Keith, Kinloch; Laird, Lunan; Mair, Moncur, M'Nicoll; Patullo;

Rattray; Soutar, Speed; Thom; Webster and Wise; and from the Dundee Directory of 1809, Baxter, Bell, Brown, Butchart; Caithness, Cathro, Christie, Clark, Colville, Coupar, Crawford; Dick, Duff; Henderson, How; Jobson; Keay; Low; Macdonald, Miller, Mitchell; Pullar; Robertson, Rodger; Sim, Small, Stewart; Taylor, Thomson; Watt, Watson, and Wilson. Readers gifted with a philological imagination may find these patronymics instructive.

During the fifties and sixties of last century large importations of Irish labour occurred, the nationality of the descendants of these immigrants not now being indicated in Census Returns. Children of unmixed Irish blood are represented as born in Scotland. The actual Roman Catholic population in Forfarshire may be safely put down as not exceeding 27,000, four-fifths of whom are from Ireland or of Irish extraction. According to Beddoe ("The Races of Britain," p. 139), "The Irish in Scotland are mostly immigrants from Ulster—many of them are more or less Scottish by blood in origin. Moreover, the connecting link furnished by the Gaelic Highlanders helps to facilitate their admixture with the general mass." This explanation is beautiful in theory but entirely fallacious in practice. For in Forfarshire the religion of the Irish population largely prevents intermarriage with the native inhabitants. A number of Scottish highlanders are Catholics, but the lowland people as a whole are Protestant. So far as a blood communion of races is concerned the Irish are with us but not of us. Nor does it appear that the local Irish are chiefly immigrants from Ulster. The names of those of Irish birth or extraction indicate generally an origin in the Catholic part of Ireland.

In conclusion, it would appear, from the evidence in the foregoing pages, that human life did not exist in Forfarshire until post-glacial days; that, whatever the neolithic aborigines were, a short-headed race, allied to the Alpine stock, occupied the district in the early Bronze Age; that these people of the precremation period were ethnologically distinguished from the Scandinavians

and Dalraid Scots; that, whether the Picts were primitive Goidelic Kelts or not, the weight of evidence is in favour of them being closely akin to, if not identical with, these Alpine inhabitants, whose physical characteristics still clearly persist in the locality; and that the population of Forfarshire, since mediæval history commenced, has been essentially Anglo-Pictish until the beginning of modern industrial conditions.

## Art in Dundee.

By A. H. Millar, LL.D., Chief Librarian and Curator.

THOUGH Dundee now ranks as one of the important art-centres in Scotland, the history of Art in the city has no very ancient date. It is interesting to note that the great progress of Dundee in this respect during recent years was largely due to the very remarkable Exhibition of Pictures organised in connection with the visit of the British Association in 1867. Previous to that date no such extensive collection of pictures of high quality had been exhibited; and so highly was it appreciated that the Fine Art Committee soon became a permanent institution, and arranged to have Annual Exhibitions. The first of these was held in the Albert Institute in 1873, and they were continued annually (with slight interruptions) until 1895. The opening of the Victoria Art Galleries in 1889 gave ample opportunity for the efficient display of works of Art; and from successive Exhibitions many of the finest pictures were acquired by generous citizens, and presented to the Permanent Collection. Subsequent to 1895, Exhibitions were held almost annually by the Graphic Arts Association (now the Dundee Art Society), and from these also important pictures were acquired and given to the Corporation. The fame of the Permanent Collection is now so well-established that pictures have been frequently lent on request to Exhibitions at London, Liverpool, Burnley, Bootle, Bury, Edinburgh, Glasgow, Paris, and Rome. In the Exhibition organised in connection with the present visit of the British Association to Dundee, only a representative selection has been made from the Corporation Pictures, so that space might be left for the very valuable loan pictures included.

## DUNDEE ARTISTS.

The earliest Dundee artist who attained considerable renown in the world of Art was George Willison (1741-1797), a member of a family long connected with the city. He was the grandson of the Rev. John Willison (1680-1750), a famous Dundee divine and poet, and was also cousin, name-son, and *protégé* of the celebrated George Dempster of Dunnichen and Skibo (1732-1818), the social and political reformer. Dempster early recognised Willison's artistic tastes, and sent him to study in Italy, where he spent several years, attaining high reputation as a portrait-painter. While Dempster was one of the Directors of the East India Company, he sent Willison to India, where he amassed a large fortune through his skill as portraitist. One of his pictures, a full-length portrait of the Nawab of Arcot, was sent by that Prince to George III., and was placed in the Royal Collection at Hampton Court. Willison exhibited pictures frequently at the Royal Academy from its foundation in 1768 till 1777. He was commissioned by Dundee Town Council in 1786 to paint a portrait of his patron, George Dempster. This portrait, which has been wrongly attributed to Reynolds, is now in the Permanent Collection. Willison died at Edinburgh in 1797.

In the early years of last century the position of Drawing-Master in the Academy (now High School), Dundee, was occupied by an eccentric genius, Robert Mudie (1777-1842), who had a variegated career. He began active life as a shepherd-boy, then became a weaver, next he enlisted in the Militia, and though entirely self-educated, was appointed teacher at Fortrose Academy. In 1808 he removed to Dundee Academy, having there the composite task of teaching Drawing, Writing, and Arithmetic. This fact gives an idea of the low position of Art in Dundee a hundred years ago. Mudie's tastes were more literary than artistic; but he lacked discretion, satirised the Town Council by whom he had been

appointed, started two periodicals which were unsuccessful financially, and ultimately gravitated towards London in 1820, where he spent the last twenty-three years of his life as reporter on the *Morning Chronicle*, editor of the *Sunday Times*, and author of a formidable array of books on Natural History, the titles of which occupy about two pages of the British Museum Catalogue. Copies of his works are in the Libraries of the Royal Society and the Linnean Society. His skill as a draughtsman was not great; yet it enabled him to illustrate some of his own volumes. He died at London in 1842.

A notable family of Dundee artists was that of the three brothers Simson, sons of a local merchant. George Simson, the eldest, was born in 1791, and began his career as a printer in the *Dundee Advertiser* office; afterwards was an engraver, and ultimately a painter of portraits and *genre* subjects of considerable merit. He studied at Edinburgh and in Italy, and worked in conjunction with his abler brother William. In 1862 he was elected an Associate of the Royal Scottish Academy, and in that year he died. His Diploma picture, "Girl at a Well," is in the Scottish National Gallery, Edinburgh. William Simson (1800-1847) was a more conspicuous figure in Scottish Art. He began his studies at the Academy in Edinburgh, and for ten years he worked with moderate success; yet he was able to save as much as enabled him to proceed with his brother George to Italy where they studied together from 1835 till 1838. He had been elected an Associate of the Scottish Academy in 1829, but after his return he settled in London, where he soon commanded notice, receiving the commendation of Sir David Wilkie, and the patronage of the Marquess of Lansdowne and Sir Robert Peel, the latter of whom purchased his "Cimabue and Giotto" at the Royal Academy Exhibition in 1838. There are seven of William Simson's works in the Scottish National Gallery, and several in the Sheepshanks Collection at South Kensington. He died at Chelsea in 1847, in the forty-seventh year of his age. He has been described as "a

kind of Scottish Bonnington." The youngest brother, David, gained moderate fame as an engraver.

Though not a native of Dundee, Henry Harwood (1803-1868) was associated with the city nearly all his life. His father, whose name was Coleshurst, was a Lieutenant in the Royal Navy, but when he retired on half-pay he married an actress and became a theatrical manager, taking the professional name of Harwood, which designation his artist son retained. The father died when Henry was a mere boy, and the widow came to Dundee to fulfil an engagement, leaving her son here in charge of a friend. He had already shown some artistic ability, and he prosecuted his studies with such assiduity that he soon gained a local reputation. Portraiture was his chosen department, and during the fifty years he lived in Dundee he painted many portraits of great merit. Especially memorable is his picture called "The Executive," depicting a group of local notables assembled in the High Street of Dundee, which shows keen appreciation of personal character, and a distinct sense of humour. It was painted when he was about eighteen years of age. Harwood died at Dundee in 1868, aged sixty-five years.

Another Dundee artist connected with the theatrical profession was Montague Stanley, A.R.S.A. (1809-1844). He was the son of an actor, and was born at Dundee while his father was engaged at the theatre here. Only the years of his childhood and youth were spent in Dundee, where he began his training for the stage. He adopted the professional name of Manby, and performed at York in 1824; but he resumed his own name, and between 1826 and 1838 he fulfilled engagements at Edinburgh, Dublin, and London, winning a measure of renown. During all this time he had been cultivating his artistic talents, occasionally exhibiting landscapes. At length in 1838, under the influence of religious convictions, he gave up the stage and devoted himself entirely to painting. In the following year (1839) he was elected an Associate of the Royal Scottish Academy. He took up his residence at Ascog, Bute, where he

assisted the musical service in the Chapel there until his death in 1844. He was buried in the romantic little graveyard at Ascog, where a monument marks his resting-place. Though his work had great vogue in his later years, it is now lightly esteemed; and it has been acutely remarked that "he carried much of his earlier, into his adopted, profession."

Robert Gibb (1801-1837) was the son of a house-painter in Dundee, and studied at the Academy in Edinburgh, making such rapid progress that he exhibited frequently at the Royal Institution from 1822 till 1830. He was one of the original founders (like William Simson) of the Scottish Academy in 1826, and was chosen a Scottish Academician three years after. He died in 1837 before the Academy had received its Royal Charter, hence he is designated only "S.A.," though he held the highest rank available. His Diploma picture, "Borthwick Castle," is in the Scottish National Gallery.

While most of the artists already mentioned gained reputation outside of their native city, there were several of more than average ability who remained in Dundee, and won at least local renown. These were chiefly portrait-painters, and among them may be mentioned John Zephaniah Bell, John A. Stewart, George MacGillivray, William Alexander, and Robert Hardie, all of whom flourished previous to 1850; while Hugh Collins, who died at an advanced age in 1896, belongs to a later period. There are examples of the work of nearly all these portraitists in the Permanent Collection, some of them being full-length life-size figures of prominent citizens. Among local engravers, and black-and-white artists of last century, the names worthy of note are Thomas Ivory, William Fenton, James Valentine, D. Angelo Andrews, and Gershom Gourlay Cumming (1810-1898), by whom the plates for *Forfarshire Illustrated* were engraved.

Among the Dundee artists of a later time who had greater facilities for study than their predecessors, there are several that attained to more than local fame, but

whose careers were unfortunately brief. Among these may be mentioned John S. Fraser, a water-colourist of no mean rank, who was rapidly approaching official recognition when he died in 1893; Frank Laing, A.R.E. (1852-1907), equally famous as etcher and painter, whose work is highly esteemed in Paris as well as in this country; William Yule (1868-1900), a young artist of great promise, who studied in Spain for some time, and caught a portion of the Iberian spirit of J. B. Burgess, but whose progress was suddenly arrested; George Dutch Davidson (1879-1901), whose brief career was almost tragic in its pathos, and whose studies at Antwerp, Venice, and Florence seemed likely to give him a high position as a decorative artist; Charles S. Mills (1859-1901), Davidson's devoted friend and co-worker, who died only two days after he had buried his comrade; James Douglas (1855-1911), a water-colourist of very special ability; Max Cowper (1860-1911), who attained high rank in London among black-and-white artists, being art-editor of *Black and White*, and for years a constant contributor to the *Illustrated London News*; and George S. Peddie (1883-1911), who was rapidly reaching a good position in the same department of Art, as well as in water-colour. Even from this melancholy list it may be judged that when this century began, Art in Dundee was in a more flourishing condition than at the dawn of the Nineteenth Century.

The reason of this progress may be found in the stimulus which the study of Art obtained in the latter half of last century by the establishment of local societies. In 1876 "The Dundee Amateur Art Association" was founded for practical instruction under proper conditions. After four years the Association developed into "The Dundee Art Club," which provided means of study both from the cast and the living model. It continued in existence till 1890, when the Dundee Art Club was absorbed by a new and extensive organisation called "The Graphic Arts Association," with enlarged views and a wider scope of study. The Association flourished under that designation for twenty-two years, and did much to foster Art and the

taste for Art in the city by studio-practice and by Exhibitions. In 1904 the title was changed to "The Dundee Art Society," which is still an active agency in Dundee, with a continuous tradition of progress during the past thirty-six years. Without venturing upon delicate ground, it may be noted that among the living artists who have reached distinction and are members of the Society are the following:—John Duncan, A.R.S.A.; W. B. Lamond, R.B.A.; Stewart Carmichael, C. L. Mitchell, David Foggie, C. G. L. Phillips, Alec Grieve, J. G. H. Spindler, Allan Ramsay, and Edwin J. Smith, to name only a few. Examples of the work of all these Dundee artists are included in the Loan Exhibition organised in connection with the 1912 Visit of the British Association to Dundee.

## The Drama in Dundee and District.

By Frank Boyd.

IN Dundee, as in other Scottish towns, dramatic shows for a long period formed the chief amusement of the community. A large piece of ground, known as the Playfield, was set apart for the use of the townspeople, where they might gather on days of high festival to witness the performance in the open air of "moralities" or "miracle plays." The Playfield of Dundee was of considerable extent. It was situated outside the town wall at the West Port, on the ground which slopes down towards the present Guthrie Street, and part of which is traversed by Brown Street. The description of "the green braes lying about the Playfield" suggests just the sort of place where a large audience could assemble in comfort and enjoy an uninterrupted view of the stage.

We can hardly doubt but that the "green braes" were covered by a dense throng when James Wedderburn submitted to the approbation of his townsmen a "mystery play" founded on the subject of the beheading of John the Baptist. Another of Wedderburn's plays—"Dionysius the Tyrant"—was enacted in the Playfield of Dundee. All that is known regarding these productions is that they were in the vernacular, and "nipped the Papists." Rough, biting humour, broad allusions that none could fail to comprehend, scenes ludicrous, if grossly indelicate—the whole exhibiting the delinquencies of the friars—were likely to be the qualities that would commend these plays to the Playfield crowds.

The Wedderburn productions were performed some time about the year 1540. But there is no reason to suppose, from the absence of notice in the town's records, that stage plays were a new thing in Dundee. In the

year 1490 it would seem that a Company of French comedians had set up their booth in the Playfield, for we read in the Exchequer Rolls—"Item, on Fryda the xxiiij Julij in Dundee to the king to gif the Franschemen that playt xx unicornis xviii li."

The history of the modern theatre in Dundee dates from 1734. In August of that year the Edinburgh Company of Comedians, in which Allan Ramsay, the poet, had an interest, set out on a short provincial tour, giving performances at Dundee, Montrose, and Aberdeen. In Dundee the players seem to have been "well bestowed," and it appears that their visit was regarded in the town as an event of no small importance. We learn that they were well received here, "and acted frequently to the entire satisfaction of the gentlemen and ladies. Particularly on the 27th past, they played for the entertainment of the Ancient and Honourable Society of Freemasons, the grand-master patronising the same by assembling all the Masons of his Lodge, and marching at their head to the playhouse in their proper apparel, with hautboys and other musick before them. The *Jubilee* and *Devil to pay* were played to them, with the Freemason's Prologue and Epilogue, and the song of an entered mason apprentice, sung in chorus by four of the company who have the honour to be Freemasons."

Influences, however, were at work, and proved sufficiently strong to suppress for a time theatricals in Scotland. But the actors were astute enough to discover a means of circumventing the authorities. Thus we find that a company of players came to Dundee in the spring of 1755, giving performances during the months of May and June in the Town House, and they were very careful to announce that they made no charge for the dramatic portion of the entertainment. The people were invited to attend "A Concert of Musick"—this in big type, and then in very small letters—"After the first part of which will be presented (Gratis) a comedy called 'The Recruiting Officer.'" It was a very nice subterfuge. In these days the doors opened at five, and the curtain rose at six sharp.

Apparently the vigilance of the moral mentors had relaxed somewhat, for in 1767 a "Company of comedians from Edinburgh Theatre Royal" visited Dundee for a short season, giving performances in the Town Hall on Mondays, Wednesdays, and Fridays. After the erection of the Trades Hall in 1778, at the east end of the High Street, actors from Edinburgh gave performances at frequent intervals in the large room of the building.

In 1784 the Town Council were summoned to consider what course to pursue consequent on a projected visit by the Edinburgh Theatre Company. At a meeting held on the 9th of August, the following weighty resolution was adopted:—"The Council and Trades being informed that Mr. Jackson, Manager of the Edinburgh Theatre, and his Company intend to perform plays in this Burgh, they are of opinion that exhibiting plays here is not authorised, but in direct opposition to the laws of the country, and prejudicial in many respects to the interests of society. They, therefore, unanimously resolve by every legal means to oppose Mr. Jackson and his Company in exhibiting plays here, and they recommend to the Magistrates to take every proper step for that purpose."

Apparently the "legal means" were not sufficient to daunt a courageous manager, for Jackson brought his Company from Edinburgh to Dundee in the autumn of 1787, the season closing with the last week of October. Nor was there any serious opposition manifested when Mrs. Inchbald came to Dundee in 1797 and presented a dramatic entertainment called "The World as it Goes." There was talk about this time of other companies visiting the town but being unable to secure a suitable building.

At last Dundee was to be provided with a theatre. It was erected at the east end of Yeaman Shore on the site now occupied by the Parcel Office of the West Station. The building was opened on 23rd July 1800 by Messrs. Moss & Bell. The first named was a pupil of Macklin, and was said to be second only to Kean as Shylock. He filtered down through the profession till he got so low as barns, and died in poverty. In the Yeaman Shore house

John Kemble, Edward Kean, and Dowton appeared, and here also these heroes of the prize-ring, Belcher and Mendoza, exhibited. Subsequently theatrical performances were given in a building near the top of New Inn Entry.

On 27th June 1810 the Theatre Royal in Castle Street was opened, the management being taken over by Mr. Henry Siddons, and six years later the house came under the control of Mr. W. H. Murray. The theatre, however, received very poor support in Dundee, and for several years it was opened only at fitful intervals. Mr. Corbet Ryder, who had found a gold mine in "Rob Roy"—first produced in Scotland by his company at Perth, 22nd June 1818—now included Dundee in his circuit, which extended from Aberdeen to Perth. It was under Ryder's management that Macready gave a series of performances in the northern towns. Mr. Charles Bass, a frequent visitor at Montrose, Perth, and other towns, took over the Dundee house in 1826.

Though it was evident that theatrical property was a doubtful speculation in Dundee, a movement was set on foot to provide another house, and in July 1841 the Thistle Hall in Union Street was opened as a theatre. With two theatres there was now keen rivalry, but in a few weeks the Thistle Hall Company were starved out. The old Yeaman Shore Theatre shortly after this was refitted, but all efforts to make it pay proved unsuccessful. In 1844 Miss Helen Faucit appeared in the Castle Street house, and in the following year she played Juliet to the Romeo of Mr. Barry Sullivan. In 1855 Mr. J. L. Toole gave an entertainment in the Thistle Hall; but for many years the drama was in a languishing condition. Under the management of Mr. J. H. Robb, the Theatre Royal in 1864 enjoyed a revival of prosperity, and this was continued under the management of Mr. E. D. Lyons. Mr. A. D. M'Neill and Mr. R. Cowie were succeeding managers of the Theatre Royal, and it was during the reign of the former, in 1871, that the first complete touring company visited Dundee. When Mr. W. M'Farland took over the

house in 1877, the "stock company" system was on its last legs, and it soon expired.

The Theatre Royal was finally closed in 1885. During its long career the building had enjoyed a singular immunity from fire, yet after ceasing to be a Thespian temple, it was on two occasions the scene of a great conflagration. The new theatre — Her Majesty's — in Seagate seats 1700. It was opened 19th October, 1885, by Mr. M'Farland, passed later into the hands of The Robert Arthur Theatre Company, Ltd., under whose management the house is being conducted in conjunction with Messrs. Howard & Wyndham, Ltd., the present licencee and resident manager being Mr. Lewis Karpe.

## Music in Dundee—1867-1912.

By James Buchan.

It is impossible within the limits of space allowed to deal completely, even in a general way, with the subject of Music in Dundee. Let us then content ourselves with comparing the musical life of Dundee in 1867, when the British Association last met here, with that of the present time, and mentioning the most outstanding events during the intervening years.

In 1867, we had several amateur societies, the most important being the Amateur Choral Union—conducted by the late Mr. Henry Nagel—which is still with us, and despite its fifty odd years of life, as strong and vigorous as ever; the Philharmonic and St. Cecilia Societies—orchestral and choral respectively—who combined for concerts, and the Dundee Tonic Sol-fa Association. The Philharmonic and St. Cecilia Societies, the conductors of which were Mr. W. G. Spindler and Herr Arnold respectively, had the honour of giving a complimentary concert to the members of the British Association on 11th September 1867 with Madame Lemmens-Sherrington, Miss Kling, Mr. Henry Varley, and Signor Foli, as soloists, the Chevalier Lemmens at the, then new, organ in the Kinnaird Hall, and Herr Arnold conducting. Both these Societies died long ago, and the Sol-fa Association, of which Mr. Frank Sharp was the conductor, followed suit after attaining its majority.

Then, as now, the name of Mr. Alexander Simpson was prominent in the musical world, and to him Dundee was, and still is indebted, for opportunities of hearing the greatest artistes of the day. In 1867 Mr. Simpson brought to Dundee a party, consisting of Mdlle. Titiens, Mdlle. Bauermeister, Madame Demeric-Lablache, Mr. Santley,

Mr. Tom Hohler, a then famous tenor, Mr. Svensden, the great flautist, with Signor Bevignani at the piano.

In September 1867 Mr. Simpson gave concerts both in Dundee and Arbroath, with the same artistes who appeared at the British Association concert, and later another concert was given under Mr. Simpson's auspices at which there appeared Miss Poole, Madame Patey - Whytock, Mr. Sims Reeves, and Mr. Patey. Dundee was highly favoured in hearing such superb artistes as Mdlle. Titiens, Madame Patey - Whytock, Mr. Sims Reeves, and Mr. Santley in one year, and it is interesting to note that even in those early days Mr. Simpson was able to arrange special trains for the convenience of those in the country wishing to attend his concerts. In fact, before Dundee had its Kinnaird Hall, Mr. Simpson used to arrange special trains to enable Dundonians to hear concerts in Perth, which was then, as it is again now, better off than we are in Hall accommodation.

In 1867 there was also given a grand concert under the auspices of the Dundee Temperance Society; a National Scottish opera, "Insurrection of 1745," was produced in the Music Hall; the original Christy's Minstrels appeared. Miss Louisa Pyne's Royal English Operetta Company gave a series of performances; and a Farewell Concert to Dr. Chipp recalls the fact that the composer of "Naomi" spent some time in Dundee as Official Organist of the Kinnaird Hall.

Nowadays concerts are legion. We have two regular series of subscription concerts given by Mr. Simpson and Messrs. Paterson, Sons and Co. respectively. Last season Mr. Simpson brought us MM. Ysaye and Pugno—the most perfect combination of talent of the day—Miss Elena Gerhardt and Madame Julia Culp, and the London Symphony Orchestra, conducted by Mr. Arthur Nikisch. Messrs. Paterson's chief concerts consisted, as they have done for many years, of performances by the Scottish Orchestra under their brilliant new conductor, Mr. Emil Mlynarski, with M. de Greef, M. Zacharewitsch, and Miss Lucy Gates as soloists; and Messrs. Paterson's

excellent series of Saturday Afternoon Popular Concerts introduced us to M. Rachmaninoff, the famous Russian, and Sir Charles Villiers Stanford, and enabled us to renew our acquaintance with M. Moisewitsch, Mischa Elman, Mr. Plunket Greene, and others. To Mr. W. P. Fleming, who has done so much for the cause of Chamber music, we were indebted for a return visit of the famous Brussels Quartet.

The Dundee Amateur Choral Union, under Mr. C. M. Cowe's energetic conductorship, gave a spirited performance of Berlioz' "Faust," and other musical societies worthy of mention are Mr. Marshall's Select Choir, and the Dundee Orchestral Society.

The interests of Scottish music are kept alive by the Dundee Scottish Musical Society, which has existed for well on to fifty years, and by the Leng Trust, which, thanks to the generosity and patriotic spirit of the late Sir John Leng, annually gives some sixty silver medals for competition among children attending Dundee schools, and two gold medals for competition among the silver medallists, the subjects of competition being entirely Scottish.

Looking back over the years since 1867, we have only space to mention the fine series of Saturday Evening Popular Concerts organised by Mr. Simpson, in the course of which Miss Marguerite M'Intyre made her first appearance in Dundee; the frequent visits of Sir Charles and Lady Hallé; the magnificent orchestral concerts under the conductorship of Dr. Richter, Sir Charles Hallé, Sir Henry J. Wood, and Mr. Landon Ronald; the visits of the Heckmann Quartet; many performances of the Glasgow and Scottish Orchestras, under Mr. Manns, Mr. Henschel, M. Bruch, Mr. Kes, and Sir Frederic Cowen; the Choral Union Concerts conducted by Mr. John Hullah, Sir Michael Costa, Signor Randegger, Sir Arthur Sullivan, Sir Charles Hallé, Sir A. C. Mackenzie, and Sir Frederick Cowen, as occasional conductors, and by Mr. Nagel, Mr. R. H. Turner, Mr. Carl D. Hamilton, Mr. David Stephen, and Mr. W. P. Fleming

as regular conductors; and the Harrison Concerts, which brought us Mesdames Patti, Albani, and Melba. All the greatest artistes have visited us, and Dundee has unforgettable memories of Ella Russell and Tetrizzini, of Trebelli-Bettini, and of Kirkby-Lunn, of Marchesi and Oltzka, of Edward Lloyd and Joseph Maas, of W. H. Weiss and Andrew Black, of Arditì, Rubenstein, Pachmann, Lamond, D'Albert, Paderewski, and Rosenthal, of Joachim and Sarasate, and of Piatti and Popper, in addition to most of the "prodigies" of recent years.

Professional performances of opera have not been frequent. The old Theatre Royal saw spirited productions by the Henry Corri Opera Company and the Carl Rosa Opera Company, and Her Majesty's has been visited often by Mr. J. W. Turner and his Company, and less frequently by the Carl Rosa, and Moody-Manners Companies. Performances of outstanding merit were the first production by the Carl Rosa Company of "Cavalleria Rusticana," in which Madame Ella Russell sang with thrilling effect, and the great performances of "Aida," by the Moody-Manners Company. It is possible that in the near future we may have opera produced on a much grander and more complete scale, for Herr Ernst Denhof, whose festival performances in Edinburgh and elsewhere have been so successful, hopes to include Dundee in his next tour. Recently we had a visit from an Italian Opera Company—the first to Her Majesty's Theatre—and are promised a return very soon.

The frequent performance of the delightful Gilbert and Sullivan Operas call for comment, from the fact that they never fail to attract, and also on account of their own intrinsic brightness, sparkle, and freshness.

In the department of amateur opera, however, Dundee has a reputation of which we may well be proud. As far back as 1872, a performance of "The Bohemian Girl" was given by a company, all the members of which, with the exception of the leading two ladies, were amateurs. This was unquestionably the first attempt at anything approaching Grand Opera by amateurs in Scotland, if not

in England as well. The performance was under the musical direction of Mr. S. C. Hirst, Organist of the Parish Church of St. Mary's, and with occasional intervals during the succeeding forty years, amateur performance of opera have been regularly given under Mr. Hirst's baton. The operas have ranged from Gounod's "Faust," and Bellini's "La Sonnambula," and "Norma," to Planquette's "Les Cloches de Corneville," Offenbach's "Grand Duchess," and Edward German's "Merrie England." In many of the lighter operas the whole of the principal parts were filled by amateurs, and even in "Faust" the only professional was the representative of Mephistopheles. Various other Companies have existed for briefer periods in Dundee and the neighbouring towns, when the favourite fare has been operas of the Gilbert and Sullivan series.

Another feature of Dundee's musical life, of which we have every reason to be proud, is that of the singing in our schools. Thanks to these two early disciples of the Tonic Sol-fa system, Mr. Frank Sharp and Mr. Alexander Adamson, the singing in our public schools is not excelled in Scotland. In fact, Mr. John Curwen, author of the Sol-fa system, said in Dundee that there were more children well taught in singing here than in any other town in Britain, and Dr. Somervell paid a somewhat similar compliment to the singing of Dundee school children.

This excellent training in the schools gave rise to a performance in 1879, which made Dundee famous in the musical world. In that year school children, numbering about 200, trained and conducted by Mr. Sharp, sang the soprano and alto chorus, and solo, parts in Handel's "Messiah" in Dundee. Many strangers came to hear the performance, and the result was, that two performances were given by invitation in Aberdeen, and two in the great St. Andrew's Hall, Glasgow, before crowded houses. The tenor and bass parts were, of course, sung by gentlemen, and Dr. Peace, then organist of Glasgow Cathedral, accompanied the "Children's Messiah" on the organ no fewer than fifteen times, repeatedly

expressing his enthusiastic approval. Performances on similar lines were given, under Mr. Sharp's direction, of Mendelssohn's "St. Paul," and, for the first time in Dundee, Gade's "Erl King's Daughter," Macfarren's "Christmas," &c., &c.

Dundee has not given birth to many artistes of the first rank, but mention must be made of two composers whom we can claim as our own. The late Mr. John More Smieton, whose early death we all deplore, did much charming work, and would have done more but for the competing claims of business; and Mr. David Stephen is one to whom we still look hopefully for even greater things. The concert given by the Dundee Amateur Choral Union, when the programme consisted of one new work by Mr. Smieton, and another new work by Mr. Stephen, was a unique experience, and it may be that the invitation to Mr. Stephen to score the late Learmont Drysdale's Opera, "Fionn and Tera"—libretto by the Duke of Argyll—may turn that composer's mind into a new channel.

Many Societies of different kinds have come and gone during the past forty-five years, notable among which are the Dundee Harmonic Society, the Dundee Musical Society, and various Male Voice, Glee, and Select Choirs, all of which have helped to elevate the taste of the community.

Among musicians, no longer with us, but who have left their mark on our musical life, are Mrs. A. C. Haden, Miss Resch Pettersen, Mr. John Kinross, Mr. A. C. Haden, Mr. W. H. Richmond, Mr. M. T. Horton, and Mr. Magnus Peterson.

In these days when entertainment is only popular, if it is light, when Picture Palaces and Variety Theatres are pushing hard upon the regular theatres, and when it takes the profits of pantomime to make up the losses on Shakespeare, it is matter for congratulation that the support accorded to our Choral Union and our Orchestral Concerts was last season better than it has been for some time. In a great industrial community such as ours, and with so

many smaller towns in our close vicinity, Dundee seems an ideal centre for a Competitive Musical Festival such as has been so successful in Aberdeen, and it would be a fitting finish to this eventful year in our history were steps taken for the inauguration of such a Festival.



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