

CHAPTER II.

CLIMATIC AND TOPOGRAPHICAL FEATURES—ARBORESCENT
GROWTHS AND PEAT-BOGS.

ETYMOLOGICALLY, the word *prehistoric* includes the entire past of a country prior to the starting-point of the historian; but, practically, it has come to be regarded as only that portion of the indefinite past during which the country has been inhabited by man. Had the Romans found Scotland in the possession of wild beasts, without any evidence of the presence of man then or previously, the phrase "Prehistoric Scotland" would have no relevancy in the sense in which it is used in these pages. The physical and topographical features of a country do not, *per se*, contain the elements with which the archæologist concerns himself, but upon the faintest indication that man moved on the scene they become invested with the highest interest. In following up the trail of prehistoric man, we have to investigate not only his ordinary haunts—rocks, caves, woods, mountain recesses, &c.—but also his entire environments,—the flora and fauna, climatic changes, &c.—in short, everything capable of influencing or of modifying the conditions of human life.

1. *Climatic and Topographical Features.*

There is one notable landmark which, as it fixes an *ab initio* limit to archæological researches in Scotland, must be here briefly touched upon—viz., the Glacial period. The extension of a vast sheet of ice over the entire surface of the country, during the Quaternary period, excludes the possibility of its having been then the abode of man. The extreme and fluctuating climatic changes which accompanied this remarkable phenomenon gradually supervened on a sub-tropical climate, and as gradually disappeared, not, however, without leaving profound traces on the contour of the country. The breaking up and final dispersion of the sub-tropical world of North Britain, by the intervention of what may truly be called an Ice Age, and the subsequent reversion to a more genial climate, together with the incoming of a new flora and fauna, are phenomena of absorbing interest to those who study the civilisation and environments of Palæolithic man. But they lie outside the scope of this work. Scotland was not a congenial home for prehistoric man until its icy mantle had given place to a covering of herbaceous growths, and its primeval glens and forests had become stocked with a numerous and varied fauna. Nor, on the supposition that the Ice Age consisted of a succession of alternately cold and genial periods, is this statement likely to be modified; for, among the organic remains hitherto found in its interglacial deposits, there are no indications of the presence of man. The gradual shrinking backwards of the ice-sheet is the most probable explanation of the fact that in Scotland and Scandinavia—localities where the ice lingered longest—remains of Palæolithic man have not been found.¹ But

¹ The Rev. Fred. Smith, Cromlix, claims to have discovered stone implements of Palæolithic types, manufactured from the ordinary quartzite

although the field of our inquiry is thus lightened and limited by the exclusion of palæolithic controversies, we have still to go hand-in-hand with the geologist, whose deductions are often essential in determining the relative position of sporadic finds in the scale of chronological sequence. Thus, at both ends of the prehistoric period, the materials and methods of archæology interdigitate with those of the collateral sciences.

When the last ice-sheet dissolved, under the effect of a more genial climate, its nourishing rootlets remained as a series of local glaciers, at first filling the great glens, but gradually diminishing, till finally they disappeared altogether. This transformation carried in its train corresponding changes in the fauna of the surrounding seas, as well as of the land surface. So long as Scotland was enveloped in an ice-sheet, whose limits extended far beyond its present area, it is impossible to say what might have been the relative level of the land to the surrounding sea; but when the diminution of the ice allowed the water to come into contact with the land, we find the country submerged at least 100 feet more than it is at the present time. The waters of this sea were inhabited by an arctic fauna, remains of which can still be detected in the marine clays then deposited on the shores. Icebergs, shed by the glaciers which protruded into the estuaries, and other floating ice, deposited morainic *débris* over the submerged area. As the lands in the interior became exposed to atmospheric agencies arctic plants took root on them, and the numberless hollows which studded the *moraine profonde* became converted into and schistose rocks of the district, in the river and coast gravels of the Tay, Forth, Clyde, &c. The most suggestive specimens are water-worn pebbles which, he thinks, were used as implements, and subsequently transported from above the 50-foot sea-margins. See 'Brit. Association Report,' 1892, p. 896; and 'Phil. Soc. Glasgow,' 30th November 1898.

lakelets, whose flora and fauna tell the same story of arctic conditions.

Concurrent with the amelioration of climate which followed the gradual disappearance of the ice, there is now a new element to be considered—viz., a process of land elevation which henceforth became an important factor in determining the physical environments of man. The result of this movement was that the land rose much above its present level. The British Isles became part of the Continent, and the arctic climate gave place to a temperate one—probably more genial than that of the present day. Great forests of oaks, pines, and other trees covered the country, and extended to latitudes and altitudes far above those in which a similar vegetation is now to be found. The extent to which the land rose is not accurately known, as it is difficult to make researches below the sea; but judging from the evidence supplied by the submerged forests, and the wide distribution of the post-glacial flora and fauna, it must have been adequate not only to join Britain to Europe, but to connect it with Ireland, the Hebrides, and other islands in the Atlantic.

While these changes were in progress, the deposits of clay, sand, silt, shells, &c., which were left in the estuaries as the sea retired from the 100-foot level, became exposed to the ordinary disintegrating and denuding agencies. The large rivers and frequently flooded streams cut through them, washing away the finer ingredients and strewing the coarser gravel here and there at lower levels. As already mentioned, organic life was equally active in its varied manifestations, and culminated in the great forests of oaks and pines. How long this arborescent age continued it is almost impossible to say. The first check to its development seems to have been coincident with the commencement of another oscillation in the

land the reverse of the former. The sea now again began to encroach on the land, and continued to do so until it reached 45 or 50 feet higher than it stands at present. This movement seems also to have been concurrent with a cold humid climate, favourable to the growth of peat and injurious to forest-trees; the upshot of which was the re-appearance of valley-glaciers, which extended in some parts of Scotland down to the sea, as we find terminal moraines deposited on the 50-feet raised beach. The cold of this period was, however, not excessive, nor had it induced any marked change in the flora and fauna of the country. A partial destruction of the forests, caused chiefly by the increased growth of peat and a diminution of the altitudes at which they formerly flourished, are the principal changes to be noted. Professor James Geikie, to whom we owe so many advances in this department of research, makes the following remarks on the period in question: "That many of our mountain-valleys contained glaciers at this time cannot be doubted; but, had it not been for the fortunate circumstance that some of these glaciers reached the sea and deposited their moraines on the beaches of the period, we should probably have assigned all the valley-moraines to the closing stages of our epoch of district ice-sheets. We should, in short, have considered these later moraines to have been dropped during the final retreat of the valley-glaciers of the earlier epoch. . . . But the intercalation of the beach-deposits shows clearly that we are dealing with the detritus of a later and less important glaciation."¹

The 50-feet raised beach, which marks the turning-point of this post-glacial submergence, coincides with the maximum cold of the period. As the sea again began to retreat the country passed through climatic conditions analogous to those

¹ Great Ice Age, 3rd ed., p. 312.

which obtained during the previous period of forest growths. Whether this re-elevation of the land to the extent of 50 feet has been effected at a uniform rate, it is difficult to say, as about half-way in its progress there appears to have been a prolonged period of stagnation, now indicated on the land by the 25-foot raised beach. Professor Geikie maintains that this beach was due to another cycle of depression and elevation, with corresponding changes in climate and forest growths.¹ On what grounds he comes to this conclusion I am unable to ascertain. According to his own description of the successive geological phenomena observed in the estuaries of the Forth and Tay, I find no data for such an interval. The carse-clays, beneath which lies the forest-bed, correspond with the submergence which left behind it the "mud silt, clay, and sand, with beds of recent shells," which constitute the 50-foot raised beach. "When these carse-beds," he writes, "are followed down the valleys to the shores of the present estuary, the level of the carse-lands falls more or less gradually away to a height of 25 or 30 feet, and still lower terraces succeed down to the more recent alluvium."² I cannot see where in this sequence the deposits and phenomena of a still later glacial epoch come in, or how they are to be distinguished from the former? In my opinion the upheaval corresponding to the 25-foot raised beach was due to a local earth-movement which had probably nothing to do with glacial phenomena. I have elsewhere³ attempted to prove that it took place during the interval since Neolithic man appeared on the scene, and some time prior to the occupation of the country by the Romans, and that it was contemporaneous with an opposite movement in the south of England and other localities.

¹ Great Ice Age, 3rd ed., pp. 313, 612.

² Prehistoric Europe, p. 400

³ Arch. Journal, September 1898.

In tracing more minutely the successive changes in the appearance of the country since the ice-sheet vanished, down to the development of the arborescent growths and their peculiar fauna, two sets of concomitant phenomena have to be observed. First, the change from an arctic to a temperate climate, with corresponding changes in the flora and fauna ; and second, the alteration in the relative level of sea and land which transformed the British Isles from a series of semi-submerged islands of arctic sterility into part of a vast continent with a luxurious inland vegetation. At the beginning of this transformation, clays, sands, and gravels would be washed into all the hollows left on the surface of the *moraine profonde* ; but as the ice melted away, and the surface-water became diminished, the rivers and streams would also become less muddy. The smaller lakes thus became stagnant pools of clear water, and even those fed by the streams had much less sediment washed into them. The vast reservoirs of spongy peat which now supply a perennial flow were as yet in an incipient stage. Such topographical and meteorological conditions were favourable to the development of a peculiar fresh-water fauna, which have left their remains to this day as shell-marl in most of the lakes of Western Europe. Ever since I began to study the phenomena of lake-dwellings, I have been struck with the number of settlements which had been founded immediately over the marl-deposits (*weisser Grund, blanc fond*) of the Swiss lakes. Such was the case with the settlement of Moosseedorfsee. Mr Lee states that Dr Uhlmann, one of its investigators, informed him that many of the specimens of *Limnæa palustris* and *L. stagnalis* in the shell-marl were larger than those of the present day ; and that it contained *L. auricularis*, and a species of *Paludina* now extinct in the smaller lakes.¹ Immediately above the shell-

¹ Lake-Dwellings, 2nd ed., p. 36.

marl deposits in Scotland, as well as on the Continent, comes the peat, often without any appearance of a transition stage—a fact which may be partly accounted for by the latter spreading over the bottom of the lake from its margin. As a rule, the stratigraphical succession of lake-deposits, especially in the smaller lakes of this country, is first clay, then shell-marl, and finally peat—all reposing on glacial till or bare rock. Doubtless, we have in these successive strata a record of the climatic conditions which obtained in post-glacial times. The suggestion that the period of maximum development of the fresh-water testacea which produced the shell-marl deposits in Scotland correspond, chronologically, with that of the forest growths, is not, therefore, unreasonable. Small stagnant lakes of clear water, fed by calcareous springs, appear to have supplied the most favourable conditions for their development. The icy water of glaciers was too muddy, and probably too deficient in calcareous matter, to be a congenial habitat to these organisms. Nor do they appear to have successfully held ground against the steady increase of peat in the succeeding ages. Sir Charles Lyell states that marl-deposits do not occur in countries whose geological formations consist of granite, gneiss, mica, slate, clay-slate, and greywacke, but are most numerous in sandstone districts, such as Forfarshire, where they are exceptionally abundant.¹

From geologists we learn that in its main outlines Britain has not greatly altered since prehistoric times, and that its mountains, valleys, and river-courses have retained nearly the same relative positions during the whole of the post-glacial period. But it is the minor elements and their ever-changing combinations that furnish the most striking features in a landscape. The view from the Abbey Craig, when the school of whales got stranded on the slimy mud of the inland sea (see

¹ Geological Transactions, 2nd series, vol. ii. p. 79.

chap. iii.) which then occupied the site of the present carse-lands, to the west of Stirling, would be as great a contrast to the primeval forest which subsequently took possession of the bed of the vanished sea, as either scene would be to the present condition of the Forth valley. Such variations in Scottish scenery are always more or less in progress, owing to the unceasing activity of their natural causes; but since man appeared on the scene still greater changes have taken place. One thing is certain, that without the hand of man these carse-lands would have still been covered with a vast peat-bog, such as they were a few centuries ago. The scenery which met the gaze of prehistoric man when he first wandered as far north contained neither stone-built houses, nor cultivated fields, nor trimmed hedges, nor roads, nor dykes. Human interference had not yet set bounds to the primeval forests which clothed the lower hills and the banks of the meandering rivers, nor fettered the roamings of their wild animals. Nature alone regulated the outcrop of the organic world, and the only check to the exuberance of life was the internecine contests of the various animals and plants which there struggled for existence.

2. Arborescent Growths and Peat-bogs.

The actual extent of surface covered by arborescent growths at any given time must always remain a matter of uncertainty. It is probable that it was long before man became an inhabitant of Scotland that the first great post-glacial forests spread over the country, as no human relics, to my knowledge, have ever been identified as belonging to that period. By the time man took possession of the country it would appear that the age of great forests had already passed its zenith, and that the trees were getting into a death-

struggle with the peat which ultimately entombed many of them.

Since the last glaciers disappeared extensive surface changes have taken place in the valleys and river-courses. The areas of lake-basins have become contracted, and many of the smaller ones are now entirely obliterated, in consequence of aquatic growths and the amount of disintegrated materials carried into them through the agency of streams and floods: upland plateaux and hillsides have become carpeted with the decayed remains of successive crops of heather and other plants: the prostrate trunks of trees, which had succumbed either to storms or to the inevitable natural decay, initiated peat-bogs, and so transformed the soil that it no longer formed a suitable habitat for the recurrence of the same species. This is an important point in considering the phenomena of successive vegetations, as it partly explains the frequent changes that take place in this respect. In the fresh morainic *débris* of a glacier the Pine at once finds a congenial home, but with a slight amelioration of climate the Oak would as readily take possession of the same ground. Oak does not grow on peat, and when the peat-cutter encounters its roots he finds them invariably implanted in the virgin soil. But birch, hazel, alder, and Scotch fir are found in the upper deposits of peat, in succession to the buried oaks. Thus nature may be said to work on the system of rotation of crops, so universally practised by experienced farmers of to-day. On these principles the Danish antiquaries have shown that there has been a regular chronological sequence in the forests of their country, beginning with the Pines, which sprung up on the wane of the glaciers, then the Oaks, and lastly the Beeches. Nay more, they have attempted to correlate these successive forests with the three ages of Stone, Bronze, and Iron.¹

¹ See 'Lyell's Antiquity of Man,' p. 9.

As evidence of the scenic and organic changes thus effected we can still point to the stools of huge trees, at the bottom of extensive tracts of moorland peat, in localities where not a vestige of a living forest is now to be found. Early in June 1897, while staying at the Carrick Hotel in the west of Donegal, I became greatly interested in the remains of one of these ancient forests which had been exposed by peat-cutters on the hillside to the east of the hotel, and overlooking the Atlantic Ocean. Here the stumps of huge trees *in situ*, chiefly pines and oaks, could be counted in hundreds, and were as fresh looking as if they had been of a comparatively recent growth. The peat reposes on the original glacial *débris* of the metamorphic rocks of the neighbourhood, in which these widespreading roots had taken a deep hold. I could find no evidence of two forests, an upper and a lower, but occasionally the contorted roots of stunted shrubs were to be seen half-way up in the sections. Similar remains of forests may be seen in nearly all the glens of that neighbourhood. At the present time small shrubs and willows grow in the district, but only in the vicinity of houses.

Those who are conversant with phenomena of this kind, so abundantly met with over the British Isles, especially in districts where peat-cutting is still carried on, as between Shapwick and Glastonbury in England, Lochar Moss in Scotland, and the Bog of Allen in Ireland, may regard further evidence on this subject as superfluous. However, for the benefit of those who are denied these outdoor privileges, the following extracts from old documents, selected almost at random from a large number of similar records, may be interesting:—

“It may be a matter of surprise,” says a writer on North Uist,¹ that though no trees now grow at present in this

¹ Sinclair's Stat. Account of Scotland, vol. xiii. p. 321.

parish, the time has been when the whole face of it was covered with wood. The truth of this assertion is evident from the circumstance that the roots of trees are found in peat-mosses in different parts, and even below high-water mark: where the sand is washed away by the sea or blown away by the wind they plainly appear in a kind of black soil, or rather moss. This is the case particularly in the island of Vallay." After expressing the opinion that the spray of the ocean prevents the growth of forests at the present time, he continues thus: "Though it is evident that the island was once covered with trees, it must have been at a period when the ocean was at a greater distance—that is to say, when the land extended a great deal farther to the westward."

The topographical conditions, on which this writer so judiciously comments, existed when Great Britain, Ireland, and all these western islands, formed part of the continent of Europe. The presence of deer-bones in the peat, as mentioned in an unquoted portion of the same article, and of most of the present flora and fauna of the island, can only be accounted for on the supposition that the British Isles were formerly the central parts of an extensive land area now submerged.

Another writer describes analogous phenomena on the mainland of Scotland as follows: "Of old in the parish of Croy, Inverness-shire, and before the records of the kingdom, there were extensive forests of oak, birch, fir, and hazel, which have been converted into moss, in some places upwards of 20 feet deep. In a moss 400 feet above the level of the sea, oaks of extraordinary size are dug up, some of them measuring from 50 to 60 feet. Where the parish joins the Strathdearn hills large blocks of fir are found, where now, from cold and storm, the

dwarf willow can scarcely raise its downy and lowly head.”¹

A moss in the parish of Kilbarchan, Renfrewshire, from 7 to 9 feet in depth, is thus described: “The soil below is a deep white clay, where has formerly been a forest. The oak is perfectly fresh; the other kinds of timber are rotten. The stumps in general are standing in their original position. The trees are all broken over at about the height of 3 feet, and are lying from south-west to north-east. So, whenever you see a stump, you are sure to find a tree to the north-east. How an oak-tree could break over at that particular place I never could understand. But we may be allowed to form a conjecture, that before the tree fell the moss had advanced along its stem and rotted it there.”²

Sir John Clerk³ in one of his letters thus refers to magnificent oaks found at Drumcrief: “Here in a mosse of small extent, I believe 40 or 50 fathoms at least above the level of the sea, I saw the finest oak my eyes ever beheld. It lay 6 feet under the surface, straight, and above 70 feet in length, all fresh from the root to the top, though it no doubt had lain there 1500 years; near to it were a great many other oaks, and above, near the surface, a whole wood of birch trees, which have grown up after the catastrophe of the oaks.”

Mr Aiton,⁴ in an excellent introduction to his treatise on moss earth, says: “Trees of enormous dimensions have grown spontaneously in many parts of Britain where it would baffle the ingenuity of man to rear a tree of the tenth part of the size. The mosses in all parts of the island

¹ New Stat. Account, vol. xiv. p. 449.

² Old Stat. Account, vol. xv. p. 484.

³ Reliquiæ Galeanæ, p. 333.

⁴ A Treatise on the Origin, Qualities, and Cultivation of Moss Earth, 1811.

abound with trees of much greater dimensions than any now to be found growing in this country." In support of this statement he instances a number of huge trees dug up from peat-bogs in various localities throughout Scotland.

In a letter dated November 19, 1701, in the 'Philosophical Transactions' (vol. xxii. p. 980), describing a buried forest exposed when Hatfield Moss (Chace), Yorkshire, was being reclaimed, the author, Mr Abraham de la Pryme, after mentioning various trees, firs and oaks, from 20 to 35 yards in length (one oak was 120 feet long, 12 feet in diameter near the root, and 11 feet in the middle), thus writes:—

"It is very observable, Sir, and manifestly evident, that many of those trees of all sorts have been burnt, but especially the Pitch or Firr trees, some quite through, and some all on a side; some have been found chopped and squared, some bored through, otherwise half riven with great wooden wedges and stones in them, and broken ax-heads, somewhat like sacrificing axes in shape, and all this in such places, and at such depths, as could never be opened from the destruction of this forest, until the time of the drainage. Near a great root in the parish of Hatfield were found 8 or 9 coins of some of the Roman Emperors, but exceedingly consumed and defaced with time; and it is very observable that upon the confines of this low country, between *Burningham* and *Brumby* in *Lincolnshire*, are several great hills of loose sand, which, as they are yearly worn and blown away with sand, are discovered under them many roots of great Firrs or Pitch trees, with the impresses of the ax as fresh upon them as if they had been cut down a few weeks, which I have several times with pleasure taken notice of, as I have rid that way.

"Hazle nuts and acorns have frequently been found at

the bottom of the soil of those Levels and Mores, and Firr or Pitch tree apples or cones in great quantities by whole bushels together. And at the very bottom of a new river or drain, that the drainers cut, were found old trees squared and cut, rails, stoups, bars, old links of chains, horse-heads, an old ax somewhat like a battle-axe, two or three coins of the Emperor Vespasian, one of which I have seen in the hands of Mr Cornelius Lee of Hatfield, with the Emperor's head on one side and a spread eagle on the other; but that which is more observable is, that the very ground at the bottom of the river was found in some places to lye in *Rigg* and *Fur*, manifesting thereby that it had been plow'd and tilled in former days. . . .

“That which is also very strange, is that about 50 years ago, at the very bottom of a turf-pit, was found a man lying at his length, with his head upon his arm, as in a common posture of sleep, whose skin being as it were tann'd by the More Water preserved his shape entire, but within, his flesh and most of his bones were consumed and gone, an arm of whom one of the workmen cut off, and brought home to his master, which is now in the possession of my honoured friend and great antiquary Dr Nat. Johnson, whose antiquities of this county are earnestly expected by all ingenious men.”

The opinion of the writer was that the Hatfield forest had been destroyed by the Romans, and that the prostrate stems and branches of the trees, by preventing the flow of water, had converted the locality into a peat-bog. Among other examples of great trees buried under peat and associated with the remains of human industry, he instances (*loc. cit.*, p. 984) the following: “Dr Leigh (in his late learned and ingenious history of Cheshire) observes that in the draining of *Martin Meer* (which was performed but a

few years ago) was found multitudes of the roots and bodies of great Pitch trees commonly called Firrs, in their natural postures, with great quantities of their cones, 8 canoes, such as the old Britons sailed in; and in another *More* was found a brass kettle, beads of amber, a small millstone, the whole head of an *Hippopotamus*, and human bodies entire and uncorrupted, — I suppose he means to outward appearance.”

The Orkney and Shetland Islands are at the present time absolutely destitute of woods or trees of any kind; but yet we are informed, on trustworthy authority, that decayed timbers of considerable size are frequently found in the peat-bogs on these islands. In June 1896, while on a short visit to Shetland, I made an excursion to an extensive peat-moor in the vicinity of Lerwick for the purpose of satisfying myself on this question. The peat-deposits in this locality have been utilised as fuel by the inhabitants of Lerwick from time immemorial, and so I had no difficulty in finding numerous sections exposing the structure of the peat down to the virgin clays. These showed two distinct layers, a lower and an upper, of nearly equal thickness. The former was a black, dense, heavy material, which, when cast into peats and dried, looked almost like a piece of coal; the latter was a spongy, fibrous substance, of a brownish colour, with a tendency to lamination. Between these different deposits I noticed in several places an aggregation of the remains of shrubs, and also beneath the lower bed. The bogwood was much decayed, and looked like scraggy contorted stems and roots of stunted hazel or willow. The largest pieces I found measured only 14 and 16 inches in circumference. I visited another peat-bog on the road to Scalloway, where peat-cutting was going on; but there I could find no trace of wood in the sections,

although the two qualities of peat were much the same as in the former.

Mr George Low,¹ more than a century ago, puts on record the following observations on this subject: "Crossed the Parish of Delting, thro' deep moss grounds, for Yell. Observed near the kirk of Scalsta, in the bank where the sea had wore away the earth, a continued stratum of large pieces of wood, in a horizontal position, a few inches above the hard gravel, covered with about 10 feet of moss. This stratum is continued as far as I could search the whole length of this worn bank, and, probably, round the bay; it consists of pieces from 8 inches to half an inch in diameter, roots, stocks, and, in a word, all parts of a tree; seems Hazel and Aquatick woods, but so much rotten that no part can be moved. This, however, is a proof of trees having been here at some period, but this seems to have been very ancient, if we compute from the vast disproportion there is between the thickness of moss below the stratum with that above, and at the same time consider the length of time the latter would require to grow, both in height and solidity, both which it has in a great degree, particularly towards the bottom. The horizontal position seems to indicate that they have all fallen at the same time, or have subsided after some terrestrial convulsion, a partial or universal flood; but however this is, are a plain proof of wood having been here of old, and might be a lesson to the inhabitants to enquire what woods are fittest for, and would be most valuable in, their country."

While the existence of bogwood in the Outer Hebrides, and in the Orkney and Shetland Islands, demonstrates the wider geographical distribution of forests in former times, its presence in the peaty uplands of the mainland is equally

¹ Tour thro' Orkney and Shetland, 1774, p. 146.

conclusive as to the greater altitudes at which they flourished. The most stunted Scotch fir at the present time rarely grows above 1800 feet above sea-level, but in the peat-bogs its roots are found up to 3000 feet, as has been observed at Glenavon,¹ Banffshire, and other localities.

The inferences to be derived from these and similar observations on peat-bogs and their buried forests, throughout Scotland, are somewhat conflicting. There can be no doubt that the climatic conditions which permitted oaks to flourish on the uplands of Scotland, and trees of considerable size to grow in the Orkney and Shetland Islands, where scarcely a stunted shrub is now to be seen in a wild state, were more favourable to the growth of forest trees than those which now obtain. On the other hand, the large pines found in some of the Lowland mosses would seem to indicate a colder climate. The probable explanation of this is, that the pines and oaks, though sometimes found associated in the same bog, belong to slightly different periods of time.

3. *Chronological Data.*

Nothing, in my opinion, can be more certain than that an extensive forest of oaks and other trees sprang up after the sea retreated from the valley of the Lochar and the Carse of Stirling, and that both of them subsequently succumbed to the growth of peat. In the south portion of Lochar Moss I have seen stems and trunks of oak-trees which grew on the subjacent marine clays. Farther inland, where the marine deposits are light and gravelly, the roots of the fir are said to be more abundant—a difference which is readily explained by the nature of the deposits, the oak preferring a clayey soil. These facts are in accordance with the experience of peat-

¹ Old Stat. Account, vol. xii. p. 451.

cutters and others who have recorded their observations from practical knowledge. Nor can there be any doubt that a forest preceded the formation of the Blair Drummond Moss in the Carse of Stirling. A wooden roadway, exposed in the early part of this century, is thus described: "The mosses preserved the remains of an ancient forest chiefly of oak-trees, which had occupied the plain but little above the surface of the river during ordinary floods, part whereof appears to have been lower and marshy, across which a road had been formed of trees laid longitudinally, with a second laid transversely. The depth of Blair Drummond Moss (in which this road occurs), prior to the operations, was 8 feet, extending to 14 towards the upper extremity. Some of the roots of the trees were very large, and occupied their natural position in the soil, their trunks being extended horizontally, many retaining distinct impressions of the axes employed in felling them—an operation commonly referred to the period of the Roman conquest." ¹

The surmise that this wooden pavement was part of a Roman road is not at all improbable, and if this could be substantiated it would disprove the theory advanced by Sir Archibald Geikie and others, that the 25-foot raised beach had been formed since the Romans visited Scotland.² That these peat-deposits in the Forth and Lochar valleys, as well as those of the Cree, Solway, and others within the 25-foot zone of submergence, are comparatively recent, there can be little doubt from the evidence of man's presence in the localities long before their formation. A bronze caldron (fig. 1), now in the National Museum, was discovered in the Kincardine Moss in 1768 "upon the surface of the clay buried under the moss." It is made of thin plates of

¹ Mem. Wern. Soc., vol. v. p. 426.

² Edin. New Phil. Journal, vol. xiv. p. 102.

bronze riveted together—the rounded bottom portion being shaped from one plate—and measures 25 inches in diameter and 16 inches in depth. The everted rim, which is formed of a couple of bands of sheet-bronze fastened to the upper edge of the vessel, bears marks of the rivets by which a pair of ring-handles had been attached. Another caldron



Fig. 1.—Bronze caldron found in the Moss of Kincardine (25 inches diameter).

(fig. 2) of the same type, said to have been found in the west of Scotland, is also in the National Museum.¹ A third caldron (fig. 3), showing the same style of workmanship, but differing from the former in being bucket-shaped with a flat bottom, was found at Cardross, in a small camp on the north-west corner of Flanders Moss, in the valley of

¹ Proc. Soc. A. Scot., vol. xix. p. 315.

the Forth.¹ The globular- and round-bottomed forms are more commonly met with in the British Isles, whereas on the Continent the reverse of this is the case. Both kinds have, however, been found on the Oppidum La Tène. (See 'Lake-Dwellings of Europe,' p. 290, and fig. 92, Nos. 18 and 19.) These vessels appeared in Britain in pre-Roman times,



Fig. 2.—Bronze caldron from the West of Scotland (25 inches diameter).

probably in the late Bronze or early Iron Age; but nevertheless the Kincardine caldron might have been a "Roman camp-kettle," as described in the Museum list of 1782. It was apparently abandoned in the depths of a forest, which had already shown symptoms of decay, and ultimately got covered over with the growing peat.

¹ Proc. Soc. A. Scot., vol. xxii. p. 37.

Another beautiful object of the Late Celtic period was found in Lochar Moss inside a bronze bowl (fig. 4). This is a beaded torque, consisting partly of ornamented beads and partly of a solid portion elegantly chased with a pattern of "late Celtic" design.¹ Other relics reported to have been found in buried forests have already been mentioned; and it may be observed that all of them, so far as the circumstances of their discovery can now be recalled, support the theory

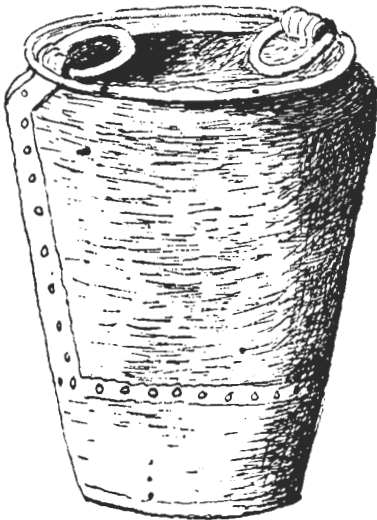


Fig. 3.—*Bronze caldron (19 inches in height) found at Cardross.*

that man was an eyewitness of the successive transformations of sea, forest, moss, and wheatlands which have taken place in the Carse of Stirling. If the facts regarding the Culzean hoard (p. 77) be of any value, the sea had not retired in the early Bronze Age much beyond the 25-foot level. But this evidence could be entirely negated on the supposition that a severe storm would suffice to throw up gravel on a gently shelving beach to that height.

That the relative level of sea and land during the Bronze Age was not much different from what it is at the present time is proved by the position of a small cemetery of the Bronze Age found at Magdalen Bridge, near Joppa, and described by Mr W. Lowson.² The surface of the ground was only 12 to 14 feet above high-water mark. On the top was ordinary soil, and beneath that a layer of sea-sand, 4 to 8 feet thick (in which urns and a bronze blade were found),

¹ Wilson's *Preh. Annals*, vol. ii. p. 140; Plate IX. vol. i. p. 465.

² *Proc. Soc. A. Scot.*, vol. xv. p. 419.

resting on a bed of gravel. This conclusively shows that the sea had then retreated to near its present limits. During Roman times it would appear that the sea had forsaken the Carse of Stirling and Lochar Moss sufficiently



diameter 6 1/2 inches

Fig. 4.—Bronze beaded torque and bowl found in Lochar Moss.

long to admit of forests to grow on areas which in Neolithic times had been sea.

Outside the 50-foot zone of submergence the older and newer peat-deposits cannot be readily distinguished, as the two periods are in a certain measure continuous; but within

it they are often separated by beds of clay, as may be seen in the valleys of the Forth and Tay.¹ It is possibly to the older forest-bed that many of the large trees found in the Cree, and described by Sir Arthur Mitchell, must be assigned. He has recognised their existence in "two distinct positions"—one "on the surface of the clay," and the other in the channel of the river, with "from 10 to 15 feet of sandy clay" above them (see p. 69). It is also probable that many of the great oaks found in peat-bogs, as well as the pines in the higher altitudes, belong to the same older period.

Many of these consecutive changes on the earth's surface are as legible to the geologist as the seasonal indications of flowering-plants, autumn tints, and snowy wreaths are to the country peasant. They are indeed hour shadows on the dial of time. Like the *dies* and the *annus*, the intervals between one ice age and another were measured by precise movements of the heavenly bodies; and they had their consecutive phases—dawn, noon, and evening—distinguished in the book of Nature by concurrent phenomena in the physical and organic environments. The evolutionary phases, which preceded the vegetative garb, now clothing the rugged contour of our country, are also valuable factors in deciphering the history of past ages. But space will not admit of discussing this interesting subject at greater length.

To whatever causes the disappearance of the great forests may be assigned, there can be no doubt that North Britain was more extensively wooded in prehistoric times than at the present day. Roman historians agree in representing the climate of Britain as humid and favourable to luxuriant vegetation, and sufficiently mild to permit of the natives going about in a semi-nude condition. Cæsar states that all

¹ Geikie, Great Ice Age, 3rd ed., p. 291.

kinds of trees grew on it, with the exception of the fir (silver fir) and the beech, and that its climate was more temperate than that of Gaul. Tacitus also describes the climate of Britain as always damp with rains, and overcast with clouds, without, however, the cold being extremely rigorous. He speaks of cutting down woods and draining bogs; and represents the natives, when beaten, as flying for shelter to the woods and marshes. Another writer (Dio Cassius) describes the Caledonians as dwelling in tents, naked, and without shoes; enduring hunger, cold, and all manner of hardships with wonderful patience; and capable of remaining in bogs for many days immersed up to the neck, and without food. In the woods they lived on the bark of trees and roots, and had a sort of food always ready, of which, if they took but the quantity of a bean, they would be neither hungry nor thirsty for a long time after. Herodian describes them as going about partially naked to prevent the beautiful figures painted on their bodies from being hidden. According to him, they wore neither coat of mail nor helmet, to prevent them being encumbered in their marches through bogs and morasses—whence such a quantity of vapours was exhaled that the air was always thick and cloudy.

According to tradition and the annals, the Romans are credited with being the prime movers in the destruction of the British forests; and certainly the quoted extract, about the drainage of Hatfield Moss, supports that view. But however destructive they may have been on the forests, while clearing a way for their legions, it is impossible to assign to this agency more than a nominal value. Forests have equally disappeared in countries and districts never visited by the Romans. That the natives themselves partly contributed to the clearance of the woods and jungles, as they became habituated to the systematic tillage of the land, is

probable. But whatever may have been the real agency of their destruction,—whether the growth of peat, the variation of climate, or the hand of man,—the change was not effected all at once. The numerous place-names, such as Woodlands, Woodend, Woodside, Linwood, Fulwood, Oakshaw-side, Oakshaw-head, Walkingshaw, &c., &c., prove that the south of Scotland was well wooded after the Saxon language had ousted the Celtic. On the other hand, in mediæval times wood was becoming scarce. Cosmo Innes thus alludes to the subject: “At the earliest period illustrated by the Melrose Charters there is sufficient evidence that the southern division of Scotland was not a well-wooded country. On the contrary, the right of cutting wood was carefully reserved when pasturage or arable land was granted; and when that right was conceded for some particular purpose, such as for fuel for a salt-work, or for building, the use was limited in express terms. The high grounds of Ayrshire may be an exception, where there seems to have existed an extensive forest; but elsewhere wood was a scarce and valuable commodity.”¹

¹ Sketches of Early Scottish History, p. 100.