CHAPTER VI

1837–39

ROSNEATH—SCIENTIFIC INTERESTS—MY FATHER'S SUCCESSION TO THE DUKEDOM—SKERRYVORE LIGHTHOUSE.

I SUPPOSE it is impossible for those who have no special interest in natural history to realize the delight experienced by others who have that interest in the first sight of a species entirely new to them. That delight befell me later in the year 1837. A message was sent to me from Rosneath that a flight of strange birds was frequenting the woods of that estate, and especially one which was called the Darkwood, very near the castle. That wood occupied the greater part of a promontory separating two lovely bays of the sea. It was composed almost entirely of spruce firs, at least a century old. They had been planted thickly, and had not been thinned out, till by mutual pressure all the lower branches had been killed off, and the stems ran up clean and straight like a wood of stately masts. Towards the top, with free access to light and air, they spread out into splendid heads of foliage. In that particular season, these were covered with an unusually abundant crop of cones, full of fertile seeds. I soon found by the débris thrown down upon the ground, and by specimens which I was able to shoot, that the strange bird was the crossbill—a comparatively rare and a most curious species. I was immensely interested in its structure and in its habits. The drawings in books had given me no accurate idea of the extraordinary bill which has been

specially adjusted to its special food. Nor had I seen any description of its parrot-like attitudes in clinging to the cones, head or back downwards, when engaged in wrenching open the closely-adhering scales which cover and protect the seed. Neither had I realized from books the beautiful colouring of the crossbill. The hen is indeed sober enough in her dress. But the cock bird in full plumage is of a splendid scarlet, whilst the young males have the scarlet feathers mottled with golden yellow.

The perfect adaptation between the organic structure of animals and the functions which they are destined to perform, is indeed a conspicuous and universal fact throughout the whole world of living things. But every here and there particular instances of it occur which are more striking than others, from the extreme limitation of the field of operation for which some special apparatus has been fitted. The crossbill seems to be a near ally of the finches; and some of them, such as the bullfinch and the hawfinch, have bills well adapted to open a great variety of hard buds or seeds. But the beak of the crossbill has a special adaptation for one kind of seed-case alone—one of the toughest and most intractable of all the protective coverings which have been provided in Nature for the safety of vegetable seeds—namely, the cones of the pine tribe. To gather those generally small seeds after they have been shed would exhaust the activities of the most industrious birds. Yet there are enormous areas of surface both in the old and in the new world which are entirely covered with pines, and if the countless millions of seeds produced, over and above those which are needed for the preservation of the species, are to be utilized at all, it can only be done by giving to some animal a special implement by which access can be gained to the seed before it is scattered to the winds. The reason, therefore, for the existence of such an apparatus as the twisted mandibles of the crossbill is satisfactory enough, when we consider the

ubiquity of life on our globe, and the system which undoubtedly prevails of leaving no area wholly untenanted by creatures fitted to enjoy it. But how such a very special apparatus began, and how it seems to be now confined to two nearly allied species on the globe, are questions which it is impossible to solve on any merely mechanical theory of creation. Familiar as I was with the idea of adapted means in the flight of birds, I confess I was more than ever struck with it when I looked at the almost deformed aspect of the crossbill's beak, when I felt the powerful muscles at the root of the jaw, which reminded me of the same feature in the parrots, and when I saw upon the ground under the pines the dense and tough cones cut, and torn, and rifled of their innermost contents by this extraordinary bird. Not less was I puzzled to understand how this flight of crossbills knew that year of the unusually rich crop of the favourite food in a country not their own, and far from their usual haunts. That beautiful wood of pines, all about 100 feet high, has, alas! been blown down since then, and I have never seen the crossbill again.

In 1839 a new interest came to me, for in that year I came by mere accident to be much impressed by one of the most wonderful of all the physical sciences —namely, that of chemistry. It happened that a small estate, consisting of a couple of farms, lying adjacent to the lands belonging to Inveraray, fell into the market, and their geographical position induced my father to buy them. On procuring a very old map of these, he found the word 'Mine' on the area of a heathery moorland belonging to the property. He had studied chemistry more or less, such as the science then was, when a young man, with his friend Dr. Robertson, and his library was well stored with manuals of analysis. It was always his greatest pleasure to do for himself everything that he needed to be done in the way of any kind of handiwork. He directed an immediate search for minerals on the

ground, and in books for the best methods of testing the metallic ores. Very little search was needed as to finding the old 'Mine,' for lumps of a very heavy ore were found upon the ground, and a low face of rock in the channel of a rivulet showed whence they had been taken. A few blasts opened up a new face, and the ore was seen in considerable quantity in the bedding of the strata. The greater part of it was a dense grey ore, evidently some form of sulphuret of iron. But associated with it were smaller quantities of the yellow sulphuret of copper, some of which showed the beautiful iridescent colours of what is called 'peacock ore.' My father, jumping to the conclusion that he had found what might prove a valuable copper-mine, at once sent for a skilled mining engineer from Cornwall, and in the meantime set to work on the chemical processes needed to test the quality of the ore.

In this work he associated me with him, and for a very considerable time, extending over several years, one of my greatest amusements was the working of these mineral analyses. The initiation into the physical sciences which consists in dealing with the practical application of them to the purposes of life is a method which may not carry us very far. But so far as it does go it has one great virtue—that of making us familiar with fundamental facts in their characteristic phenomena, and thus preparing us to understand and to assimilate the continuous results of investigation into the more abstract conceptions, which are always the highest results to be obtained.

Chemistry was in a very different condition from that in which it now stands, when my father studied it. Dalton had not then reached that atomic theory which placed on a true physical basis the curious intuitive imaginings of some of the oldest of the Greek philosophers. The doctrine of the 'valency' of those atoms, each according to its kind, to form an intimate union with a definite number of others of a different kind, and with neither more nor less of

these—this doctrine had not been reached. Dalton's discovery of it had not been published till some years after my father's escape from the clutches of Napoleon, and when his life in the House of Commons had diverted his attention from such pursuits. When he resumed them for a practical purpose in 1839, he had not grasped the new atomic philosophy of chemical combination, as I certainly never heard him mention it. But, none the less, the main fact was known of special chemical affinities prevailing among the elements of matter, and of the consequent power which was given to mental processes both in the analysis and synthesis of natural substances, so that all combinations could be pulled to pieces, and some of them recombined with powers and properties absolutely different.

This was the great mystery of chemical affinity, and it still remains a mystery, none the less, but all the more, since the seat of it has been traced to certain ultimate particles of differentiated matter, all of which have some inalienable property in certain special qualities and powers. Without learning anything of ultimate atoms and molecules, such as are now handled by the mind as known existences, I saw in the comparatively simple operations of getting pure metallic copper out of its ores some of the most curious examples of the power which was given to intelligence by even an empirical knowledge of the laws of chemical affinity. We tried in vain to overcome by intense heat and fusion the desperate tenacity with which iron, copper, and sulphur were held together in one amalgamated material. But we always failed. We could find no extraneous substance which as a 'flux' would so unite with the iron and sulphur as to leave the copper pure. The result of all our meltings—the 'button' at the bottom of the crucible—was always the same useless mixture, only a little more concentrated. So we were driven to the 'wet process'—that is to say, the method of dissolving the ore in acids, and then dealing with the combined solution by adding to it certain appropriate

reagents. Reducing the ore to the liquid state by heat had produced no effect in tearing its ingredients asunder. But reducing it to a liquid state by dissolving it in powerful acids made them at once accessible to such different and imperious affinities that they could no longer resist the separation we desired.

I was intensely interested in the absolutely new phenomena which I saw produced. The solution of solid salt or of sugar in water or in tea is a process so quiet and so familiar that we are lulled to sleep over the wonder which it really involves. But when the raw metallic ores of iron, copper, and sulphur are exposed to the potent acids which dissolve even gold, then the fierceness of chemical affinities is seen in forms which at once arrest attention. Violent effervescence, with the sudden evolution of great heat, and the rise of choking fumes of a poisonous gas—all these attest the action of a force still utterly unknown in its ultimate nature, but certainly one of the most powerful in the making of the world. Then came another wonder, still further illustrating the virtues of this force in the management of matter. The dissolved ore, with whatever metals it contained, resulted in a liquid, transparent and green in colour. On strong ammonia being added, the transparent liquid became instantly as thick as a red mud. It was the red oxide of iron, the whole of which metal was thrown down in flocculent masses, thus separating that metal, in virtue of its violent affinity with the abundant oxygen supplied by the ammonia. In search as we were for copper, nothing could look more hopeless than this hideous mass. But we were told by the books that, whilst ammonia threw down the iron as a solid rust, it would continue to hold the copper in solution, when the red sediment was separated by a filter. And so, when this was tested, great was my delight and surprise when a liquid was seen draining through the filter, perfectly clear and of a most exquisite purple-blue. The further processes required for getting this copper again sepa-

rated from its solutions we found more difficult and tedious. We therefore betook ourselves to a process which was shorter in reaching the pure metal, and which illustrated yet another of the mysteries of chemical affinity. Instead of treating the dissolved ore with a view to eliminating first the iron, we applied a method which separated the copper first, by presenting to it an irresistible attraction. Bands of polished iron were dipped into the solution. On the surface of these the copper instantly began to be deposited in the pure metallic form. By prolonged immersion, these iron bands became deeply covered with a deposit of powdery copper, which could be easily collected, and then melted in a crucible. My father made the mould of a miniature ingot, and highly delighted we both were when the first ingot of pure copper was procured, and was stamped with the word 'Craigure,' the name of the farm on which the mine had been discovered.

The saying that 'A little knowledge is a dangerous thing' is far from being a wise proverb, unless the application made of it be very limited indeed. It is true, of course, that very fragmentary knowledge on any subject may lead to erroneous conclusions. But all human knowledge on all subjects whatever is very limited, and it is most untrue that, so far as it goes, if it be well employed, it is an evil rather than a good. My knowledge of chemistry has always been a little knowledge only; but, so far as it goes, it has been of great use to me in later years, not only in practical affairs, but in enabling me to detect in controversy the extravagant pretensions which have been asserted from its discoveries in some modern systems of philosophy. It enabled me to see how absolutely the forces of chemical affinity must be under the control of mind if they are to be used for the making of combinations having any special functions to discharge. It enabled me to see how, if organized matter be a 'concourse of atoms,' it was impossible that the concourse could be 'fortuitous.' It enabled me to see how futile it is to

pretend that, because we can make artificially, by chemical syntheses, a few waste products of the living body, we have gained thereby any clue to the methods by which vital organs have been built up, out of the common elements of matter, for the discharge of their mysterious functions.

But neither natural history nor chemistry had ever put an end to the very miscellaneous character of my reading. When exactly, or how exactly, I do not clearly remember, but at this time I had become awakened to a keen interest in politics—not, however so much in their contemporary as in their historical aspect. As far as I can trust my memory, it had begun in my old familiarity with the writings of Junius. In ranging over the library, I had found the well-known edition of Pitt's speeches, which, imperfect as it is, contains all that later generations can know of that lofty eloquence which so long enchained both Parliament and the people. I took to reading them with avidity, and became a devoted Pittite. His phase of political opinion died out with the glorious conclusion of the great war for the liberties of Europe, of which Pitt had been the life and soul. That great cause was the hinge on which everything turned with him. But as regards the tendency of his opinions on other matters, it is well known that Pitt to his dying day considered himself a Whig. The impression made upon me by his speeches has never been effaced. It armed me against the gross misrepresentations of his conduct and policy, which became the stock inheritance of the degenerate Whigs who followed the banner of Charles James Fox, and who survived in the feeble Governments which succeeded the administration of Earl Grey. From Pitt I passed to Burke, and the groundwork of my political feelings was deeply laid on the speeches of the one and on the writings of the other. In 1839 my enthusiastic admiration of the oratory of Pitt knew no bounds, and I well recollect victimizing the unfortunate Dr. Anderson, who came from Glasgow

to attend my father in an illness, by reading aloud to him some of Pitt's denunciations of Napoleon, in evening hours when the poor man could not escape.

Out of doors at that time I had a somewhat new pursuit, in hand-line fishing in the sea. My father had a severe illness, during which his food was a principal care. He was very fond of fish, but only if it was perfectly fresh. There was at that time a bank of very small whitings some two and a half miles up the Gareloch, and to that spot I used to go in a rowing-boat, for a time every day, to catch enough whitings for my father's dinner. But it has been my habit throughout life to mingle intense delight in beautiful scenery, or in the sports of the field, with whatever intellectual interest was uppermost at the time; and I have no doubt that in 1839, if I could have looked for any sympathy on the part of listeners, I should have been rolling out some favourite sentence of Mr. Pitt when waiting patiently for a bite, and when watching the lovely blues which bathed the knotted surfaces of the Argyllshire mountains. My father's recovery was slow, and those old home days, full of increasing interests, remained uninterrupted till, in the autumn of that year, an event occurred which in a moment changed the whole outward surroundings of my life.

Very early in the morning of the 24th October, 1839, I was fast asleep, when I felt myself suddenly shaken up by someone standing beside my bed. On looking up, I saw my old friend and early host, Lorne Campbell, bending over me with an expression of much trouble on his face. On asking him what was the matter, he replied only in two words, 'Your uncle.' 'What about him?' I asked. 'He's gone,' was the reply. As I had jumped to the conclusion that something had happened to my father, I confess I was greatly relieved. I had never even seen my uncle. He was a mere name to me, and nothing more; and though my father had never spoken to any of us of his brother's faults and follies, I had somehow acquired, to say the least, a very

negative impression of his character. What had happened was this. My uncle had come down to Inveraray to spend a few weeks of the autumn at his early home. My father's illness alone had prevented him from going to visit his brother. The Duke had some symptoms which had alarmed his friends, but he had been riding about his place upon a pony with enjoyment every day. On the evening of October 23rd he sat down to dinner with a very few friends, of whom Lorne Campbell was one, and was sitting opposite. Folding his arms across his breast, a favourite attitude with him, he gave some direction to the servants, and then he was seen to drop his chin on his chest, and so to remain, as if asleep. Lorne Campbell ran round the table to him, and found him to be stone-dead.

As soon as the consternation of the guests had passed off, Lorne Campbell immediately posted all the way to Ardencaple, and came first to me, knowing the delicate state of my father's health at the time. Despite many years of unfortunate differences, the two brothers had been much attached, and I was struck by the shock which my father evidently experienced on hearing of the Duke's very sudden death.

My father's succession to the dukedom of Argyll came upon me as a great surprise, and as the lifting of a curtain on a completely new sphere of life. Somehow, I had never realized the probability beforehand. Of course, it had been a probability for many years, and almost a certainty for several. To the best of my recollection, nobody had ever spoken of the succession to me, and I had certainly never spent upon the prospect of it even one moment's serious thought. I had a happy home, full of very various interests, which wholly occupied my attention. But now when that change of position actually came, it came at a time when my growing interest in politics made me appreciate the wider horizon which was thus opened to my view. This was the real difference it made to

John, 7th Duke of Argyll
c.1800

me. It did not at all alter my pursuits, but it opened to them a larger field of exercise.

My father took the wise step of engaging for me an English tutor, a gentleman destined to take Orders in the Church of England. He had been quite right in choosing Scotsmen during my earlier years, and it has been a real misfortune for Scotland that so many of her sons of the highest classes have had an exclusively Anglican education. It divorced them from sympathy with the people in some of their most national characteristics, and at a critical time it rendered them incapable, as we shall soon see, of even understanding the most fundamental facts and problems of Scottish legislation. But after having been educated hitherto wholly in Scotland, it was high time to place me in nearer contact with ideas and associations of a different order, and for this purpose my father made an excellent selection in the gentleman, J. S. Howson, who ultimately rose to be Dean of Chester, and became well known in literature as the joint-author with Mr. Conybeare of that 'Life of St. Paul' which is a standard work in English schools and colleges.

Mr. Howson was an attached member of his Church. But he was not in any way bigoted or narrow-minded, and always attended the Established Church service in Scotland with me. From him I first heard an objection to extempore prayer in public worship, which at that time puzzled me, and has often interested me in later years. It was in one sense a physical objection—an objection resting on the relation of the hearing and understanding faculties to the laws of space and time. It takes a certain fraction of time, he argued, before the ear can hear any uttered sentence. It takes another fraction of time before the intelligence can translate that sentence into thought. But by that time a new sentence will have been begun, and will be on its way. The result was, he thought, that it is impossible to convert into conscious supplication any sentence except the previous one to that which actually

occupies the ear, so that the worshipper must always be one sentence behind the minister, so far as the possibility of real supplication is concerned. Listening to one sentence whilst we are praying a previous one was an accomplishment he could not understand.

This difficulty was entirely new to me. It struck me as fallacious, but so ingenious that I did not see wherein the fallacy lay. There was nothing absurd in the fundamental assumptions of the argument. It is undoubtedly true that a fraction of time is occupied by sound in reaching the ear. It is less obvious, but it is equally true, that after the sound has reached the ear another fraction of time is occupied in converting it into thought. What I did not then fully understand was that these two fractions of time are so minute that they do not appreciably affect the combined result where the mind and the ear are equally on the alert. The velocity of mere sound, as such, within any distances so small as those which affect this question, is so great that, practically, there is an instantaneous passage between the speaker and the hearer. The velocity, again, of that telegraphic motion along the nerves which converts mere sound into intelligible words is practically so great that it is equally inappreciable—at least, where the language is a familiar tongue. And, then, it is to be remembered that although the quickness of any intelligence in translating into thought the written or the spoken symbols of it must vary with the familiarity of the symbols, yet in the case of all forms of Christian prayer the words and phrases used belong to a very limited cycle of expression, the sequence of which generally suggests itself to the mind as each word is beginning to be heard. The result is that the end of the sentence is foreknown long before it is actually heard, so that practically, if the listening mind is really intent, the theoretical difficulty is never felt. Yet it was certainly so felt by Howson, to whom what is called "free prayer" was a new thing in the regular

services of religion. But although, as a universal objection to such prayer, it was open to an effectual answer, that answer depended on conditions which are certainly not always present. Those conditions are close attention, and a sustained effort to keep it up. Without this, it is impossible to convert into real prayer any words which are not our own. Mere reverent and sympathetic listening to the prayers of other men is not prayer in us. It is not personal supplication. And I am convinced that a large part of every congregation in Scotland are no more than sympathetic listeners to the minister when he engages in free prayer.

A certain number of devout souls, and these only, are capable of that enwrapt attention which can alone enable them to keep up the mental attitude of supplication for every sentence as it reaches them. There may be occasions of great general emotion when people are deeply impressed with a common religious sentiment, and on such occasions the proportion of such devout souls may be indefinitely increased. But in the ordinary course of public worship the number of them is but limited. But when we thus come to trace out exactly wherein the difficulty lies, it becomes obvious that it is not met or obviated by the exclusive use of liturgical forms of prayer. Without close attention, the continual repetition of stereotyped words and phrases is quite sure to become more or less unconscious and automatic. It may be easier, and I think it is, to keep up this sustained attention when the forms of prayer are short, simple, direct, and full of meaning. This is the great beauty of almost all the collects and shorter prayers in the English service. But no one who has listened to the responses of large English congregations can help receiving the impression that they may easily be, and very often are, repeated more or less absently and mechanically. This is a difficulty and a danger which cannot be escaped even when the written prayer

unites all the highest conceivable qualifications of beauty in language and of concentration in religious thought. Of this the Lord's Prayer is the great example. Our very familiarity with it tends to lull us into sleepy and rhythmical repetitions, accompanied by little consciousness of the power and sweep of the few and simple petitions which it seeks of the Heavenly Father. How few of us can repeat the words 'Thy kingdom come' with any adequate understanding of a petition which, if fulfilled, would transform the world.

Looking, then, to these kindred difficulties affecting both free and liturgical prayers, it has always appeared to me to be irrational that either should exclusively be adopted in public worship. Considering the varieties of mental habit which exist in every Christian congregation, it is evident that both may be of great advantage. There is an incomparable beauty and impressiveness in the old liturgical prayers, so combined with brevity that they unquestionably lend themselves more easily than any other to the most genuine spirit of supplication. On the other hand, the great varieties of circumstances by which our lives are surrounded make it unreasonable to debar the Christian minister from spontaneous and adapted prayer. Nothing but the inveterate prejudices of early custom, and of party spirit, can account for the passionate exclusiveness with which the different systems have been advocated or denounced in England and in Scotland. Then, besides all this, it is to be remembered that in Presbyterian and Congregational churches that which is called 'free prayer' is in reality nothing of the kind. The prayers are generally written and learnt by heart, and even where they are not so repeated they are largely composed of stereotyped forms of expression which are perpetually recurring. Nothing is gained in them so far as any expectation of an inspired spontaneity is concerned, whilst considered as devout compositions their merit is terribly unequal.

My new tutor, although not a man of any commanding abilities, and of little originality, was widely read, and introduced me to many new branches of literature. In particular, he led me for the first time to read the Lake poets. Wordsworth soon took a firm hold upon me, and both Coleridge and Southey gave me much pleasure. As regards these last, later years have not confirmed my first impression, except in respect to a few pieces and a few passages, such as 'The Ancient Mariner' and 'They sin who tell us love can die.' But as regards Wordsworth, my first great delight in him has been often renewed. Even the ponderous pages of 'The Excursion' and 'The Prelude' have never, when I have had time to read them, ceased to throw over me a certain spell of calm and poetic contemplation. Not until many years later was my allegiance divided by that other and, as I think, that still greater poet who has 'filled the spacious times of great *Victoria* with sounds that echo still.'

The extravagance and carelessness of my uncle's early life had landed him in embarrassments which led to the estates being put under trust, and to his having led the life of an absentee for many years in England. On my father's succession, the trust lapsed, and he lost no time in establishing that personal intercourse with a numerous tenantry which had been long wanting in his brother's case. His love of country pursuits and a strong hereditary attachment to his people and estates led him to visit them all, and to reside more or less on several, as soon as possible after his succession. He took me with him on all these visits, and we were everywhere received with enthusiasm by the people. Besides re-establishing his early home at Inveraray, he went as soon as possible to the largest and most interesting of his estates—that which embraced a large part of the district of Kintyre. Perhaps no part of the county of Argyll is so full of varied interest even to a stranger. Geologically, geographically, historically, and economically it is

curious—in some respects singular. It is impossible to look at the map of Scotland without being struck by those wide-stretching arms of the sea which run far up into the land, and which all lie in one prevailing direction, from north-east to south-west.

Conspicuous among the intervening blocks of land is that long and narrow promontory called Kintyre, which stretches so far to the south-west that it only terminates within some twelve miles of the Irish coast. The geologist cannot fail to wonder at those deep-seated terrestrial movements which alone can account for such a distribution of sea and land, and which, especially, could alone ridge up such a long, narrow neck from out the bordering hollows of the sea. Geographically it is not less curious. It is a most inconvenient barrier in the way of navigation between the mainland of Scotland and the north-western coast, with all its islands. Historically it was honoured by the first footsteps of Columba and of his followers, one of whom, called Kiaran, made a fine inlet of the sea near its point his headquarters of missionary labour.

Kintyre was the most southern and the most fertile region which was colonized by that Celtic race from Ireland which, through strange passages of history, ultimately imposed its name upon the whole of Scotland. Politically it had been long held during the tumultuous epoch of the clans by the sept of the Macdonalds, whose cousinship with the invaders of the North of Ireland and with the wild Hebridean population, predisposed them to hostility to the Central Scottish monarchy founded by Malcolm Canmore. To the cause of that monarchy my ancestors had been always true, and their active loyalty, ever since its restoration in the days of Robert Bruce, had been rewarded by a commission to conquer the lands, and by a charter of possession.

Economically Kintyre was not less full of interest, by the clear example it afforded of the process by which alone the wretched husbandmen of the old

Celtic clans could be replaced by the substitution of a race more mixed in blood, more civilized, and more accustomed to look for their subsistence to the pursuits of lawful industry. The Macdonalds were compelled to withdraw with all their fighting followers, and my ancestors repeopled the country—partly by such Highlanders as could be reclaimed, and largely by inviting a settlement of the persecuted Covenanters from the opposite coast of Ayrshire, who brought with them the knowledge of that more advanced system of baronry which had even then begun in the Low Country. The disastrous old Highland system of communal holdings, in which the superior intelligence of any one man was kept down under the stupidity of many others, and by the ruinous customs of an hereditary ignorance, gave place gradually, but as speedily as possible, to individual favours, in which every man could be sure of securing the advantages of his own industry and thrift, and of the landlord's help in capital.

For a good many years this fine estate had been under the management of two gentlemen, father and son, of the name of Stewart, with whom agricultural improvement was a passion, and by whose wise advice large sums were yearly expended by the landlord in supplying improved equipments for every farm as it fell out of lease. All this was new to me, and it was an education in itself. It familiarized me with the fundamental facts of economic science, so far as these are exhibited in the most ancient of all industries and under the most favourable conditions of civilized life. A highly intelligent tenantry being gradually supplied with more comfortable houses, great peat mosses becoming yearly more and more restricted in area as improvements encroached upon them round all the borders—such were the scenes among which we lived when we took up our residence in Kintyre on the shores of that magnificent harbour which used to be called Loch Kilchearon, but is now known as Campbeltown

Loch. In olden times it had often been crowded with the fleets of the Kings of Scotland on their way to subdue, if possible, the disloyal Hebridean clans. Now it is often crowded with ships running in for shelter from the storms that vex the North Channel.

Then, to me, there were other attractions. The spacious moors, well stocked with grouse, commanded the most splendid views over sea and land and island. The almost complete absence of trees, except in a few glens and sheltered spots, lent itself to that abundance of light which is so enjoyable on the western coasts. The great flights of plover, like little wandering clouds against the clear sky, and the gannets plunging into green water along the shores, were a perpetual delight.

It was on the occasion of this first visit to Campbeltown, after the succession of my father to the dukedom, that I was called upon to make my first public speech, on the occasion of being presented with the freedom of the burgh by the municipality, early in August, 1840. I have no recollection of what I said, or only just so much of it as to be sure that it was as entirely commonplace as is usual on such occasions. But I have a vivid recollection of the impression made upon the audience, chiefly due to my very youthful appearance combined with a naturally powerful voice. I was then only seventeen years of age, and looked even younger than my years. I was much amused by hearing that a venerable old Highlander, who had been the chief doctor in Campeltown for half a century, and always wore an old-fashioned yellow wig, was so astonished by my speech that, when I sat down, he could only gasp to his next neighbour, 'D'ye hear the boy?'

My father's desire to visit all his estates, and see personally the condition of the people, coincided in 1840 with a special call on his attention which appealed to all his love of mechanical science in the happiest of its applications. The west coast of

Scotland, as is well known, is shielded from the open ocean by a great archipelago of islands, which are arranged, roughly speaking, in two great parallel lines, like battleships at a review. The inner line stretches from the north end of Skye to the southern end of Islay. The outer line, at from twenty to forty miles farther into the ocean, stretches from the butt of Lewis on the north to Barra Head in the south. One part, however, of the wide space of sea which separates these two lines of islands is occupied by an intervening group of two islands, Tiree and Coll, which lie contiguous to each other.

The whole of Tiree and part of Coll belonged to the estates of the Argyll family. The Coll portion had been alienated before my father's succession. But Tiree still remained to us. It is an island unlike any of the other Hebrides. They are all more or less hilly —some of them strongly mountainous. In Tiree the highest elevation is 300 feet, and two other lower elevations are called 'Bens' by the islanders. Eleven miles long by from three to five miles broad, it lies so low in the water that it is like a great raft of sand and rock and meadow anchored in the deep. It was once larger than it is now, since ancient peat mosses extend from the shore under the sea. A very slight depression of the land would submerge a large part of it and convert it into a complicated group of rocky islets. Some such submergence of a once more extended surface is the probable explanation of a great cluster of rocks which breaks the rollers of the Atlantic at a distance of twelve miles to the south-west of Tiree. Facing the ocean as those rocks do, at a point south of Barra Head, and where, consequently, they are open to the full stretch of some 2,000 miles of wave, they cannot be approached by boats without danger, except in the calmest weather. Yet, as they lie right in the fairway of navigation for ships running south from the North of Scotland, between the Outer and the Inner Hebrides, and as it was known that they had been the

scene of many shipwrecks, so disastrous that not a soul ever did, or ever could, survive to tell the tale, the Commissioners of Northern Lights had determined to erect upon them, if possible, a lighthouse on the plan of the Eddystone, only larger and stronger, in proportion to the exposure. This difficult and most dangerous enterprise they entrusted to their own engineer, Mr. Alan Stevenson, by whom, after some years of the most toilsome and anxious labour, it was conducted to a triumphant conclusion. Mr. Stevenson was a member of that distinguished family which in recent years has made a notable contribution to the literature of our time in the writings of R. Louis Stevenson.

My father had taken a deep interest in the work, and had offered to contribute from his estate the whole stone needed for the building. This, together with his well-known scientific interest in all such works, induced the Commissioners to ask him to lay the foundation-stone when, on July 7th, 1840, the preliminary operations had been so far advanced as to admit of such a ceremony being possible. This invitation he eagerly accepted—anxious to visit the estate and people, as well as to see one of the noblest engineering undertakings of his time. Taking his whole family with him, he hired a special steamer to take us to the island of Tiree. The weather was magnificent, the anchorage in the open bay of Gott perfectly calm, and our house on the island fairly comfortable, as well as interesting from its site, surrounded on all sides but one by the waters of a small fresh-water lake.

I can hardly exaggerate the complete novelty to me of the scenery of the Hebrides to which I was thus for the first time introduced. It was far greater even than the contrast between my early home and the wooded lanes of Warwickshire, or the forest dells of Windsor. Everything was new. There was not only no tree, but there was not even a bush upon the island. It was absolutely bare and open to the sky, and to

every wind that blew. On the other hand, there was an abundance and exuberance of the richest meadow grasses, a corresponding abundance of that curious and charming bird the landrail or cornerake, and such a population of skylarks that the air was always ringing with their music. And humanity there had as novel an aspect as external Nature. With the exception of some three or four slated farmhouses and manses, there was not a single human habitation in the island that was like anything I had ever seen before. Some, indeed, were hovels more like the temporary shelters of wandering tinkers than anything else. But all the tenantry and most of the cottagers dwelt in comfortable houses of a type which is almost peculiar to that island. The walls were low, and always double. The roof was of neat straw thatch, somewhat beehive in shape, and resting always on the innermost of the two walls, so that the space between the two walls, being filled with sand, made a sort of broad ledge or bastion round the roof. On this ledge the women and children, and often the men, sat or stood in groups to see us as we passed. We were everywhere received with the greatest enthusiasm, no member of the family having visited them before, although their affairs had occupied much of the attention of my grandfather and of his predecessors, and although they had good reason to know the benevolence of the management. My father's presence among them was therefore hailed with delight, and with a warm-heartedness which was yet totally devoid of the least appearance of servility.

It was a large and teeming population, approaching at that time to nearly 5,000 souls. They were well clad, cheerful, and evidently happy, as yet untainted by the passions of the demagogue and the ignorance of fools. In one respect we were all terribly ignorant, and terribly unconscious of the precarious foundation of all this abounding prosperity and contentment. Nobody then foresaw the potato disease, and the consequent

failure of the main subsistence of the people. It was, indeed, evident enough that their cereal cultivation was very primitive. Many of the corn crops were more yellow than green, from the abundance of the golden daisy. It was noticeable, too, that there were few or no turnips. But a naturally fertile soil, a soft climate, not less wet than the mainland, and an almost complete exemption from frosts in winter, secured such an abundant supply of fodder that the cattle seemed fat and healthy. It was evident that many of the comforts of life were attainable with a minimum of exertion. The sea provided abundant adjuncts, and whole shoals of small saith and other fish, drying in the sun on rocks or boards, testified to the facility with which they were secured.

There were some aspects of Nature which were new to me in this visit to Tiree, and which made upon me a correspondingly strong impression. One was the striking way in which a perfectly familiar object may assume a wholly new appearance when seen under new conditions. There is no object more familiar to us than the moon. I had seen her all my life, as every child does, risen or rising over trees and houses and all the other furniture of earth. But from Tiree for the first time I saw her rising out of the ocean, and moving slowly across the heavenly vault with no earthly object to distract the eye. There for the first time I saw that appearance of a face upon her disc, which, when seen, has an expression so melancholy and severe, as to give a somewhat weird emphasis to that wonderful solemnity which cannot but impress us when we contemplate the apparently slow, but absolutely regulated, movements of the heavenly bodies. In our Northern atmosphere, full of watery vapours, we never do see the moon as it is seen continually in the East, and even in the South of Europe, as visibly a globe or ball hanging in the clear atmosphere, with the eternities of space behind it. In our vaporous air we always see it as a flat disc. But even thus, when it

is seen apart from all terrestrial settings, it is an impressive sight.

A similar lesson on the effects of novelty in surrounding conditions on our senses, or rather on our imaginations, was taught me by a circumstance of scenery in Tiree. One of the little elevations on the island which are dignified with the name of hills happens to be cut or broken into a precipice on one side. That hill is the one presented to the Atlantic, and it consequently forms a precipitous sea-cliff, inhabited by innumerable sea-fowl at the breeding season. It was the first I had ever seen, and both in respect to its physical aspect and to its treasure of winged creatures—guillemots, razorbills, puffins, and gulls—it struck and interested me immensely. It is a curious law of our being by which a space which we consider trifling on the horizontal or on a merely inclined surface becomes invested with an awful majesty when it assumes the perpendicular. The highest mountains in the world are nothing but distances stuck on end, which we should think quite trifling when seen in the plains below. This is a most useful lesson in science. It suggests a good deal when we come to think of the forces by which our mountains may have been formed. They seem to us gigantic, and such as demand for their elevation some tremendous energies, which we find it difficult to conceive; whereas in reality they are quite trifling in the scale of the magnitude of the globe. They scarcely do more than roughen its surface. Our difficulty in realizing this conception is the parent of much extravagant reasoning in all questions of terrestrial physics. If any internal causes are in operation which can produce earth-movements at all, the wonder is, not that our mountains should be so high or our sea so deep, but that the inequalities of the surface of the earth should be so infinitesimally small.

I am not sure that, among the things new to me, the most impressive was not the ground-swell of the

Atlantic Ocean. In the narrow and sheltered arms of the sea to which I had been accustomed this great swell is never felt or seen. The movement is quenched by the resistance of innumerable and complicated shores long before it comes to the inner reaches of estuaries and lochs. My only idea of waves was that of water roughened directly by the winds which might be actually blowing at the moment, and I had no difficulty in conceiving them as of far greater size in the open ocean. But the swell which I first saw at Tiree was something very different. When no wind was blowing at all, or only the gentlest breath of air, when the surface of the ocean was as calm as a surface of glass or oil, I saw vast undulations, in which acres of water were in movement, and which advanced with a silent, majestic motion that arrested all my attention and surprise. A first impression of danger from them was irresistible, and it was noticeable how angrily they seemed to resent the smallest obstacle or resistance. On meeting shallows, still more in encountering rocks, they at once rose in threatening and rapidly advancing crests, and then broke in furious foam and surge. On the other hand, the smallest boat seemed safe upon them, although the hollows into which it fell and the ridges over which it was lifted were so great that it went out of sight from time to time as if it had been sunk and lost. Then, there was no visible cause of motion. Why did it not subside? It seemed like the restless memory of old vexations, in the world of mind. There was to me a wonder, a fascination, about it—a mystery which I could not even define. It was a motion totally different from that of currents. It was, so to speak, a movement on the water, but not a movement of it. The water did not advance with the undulation. It did not even seem to advance at all. A body floating on its surface was simply lifted and again allowed to fall, but otherwise was left undisturbed in place. I did not then know how more than justified my wonder was, and that there are conceptions connected with

the phenomena of undulations in all liquid substances which are among the most difficult to apprehend in all the physical sciences. Like Wordsworth with his daffodils,

> 'I little thought
> What wealth to me that sight had brought'

—wealth in supplying an analogy under which less obvious undulations could be conceived; wealth, too, in suggesting difficulties, such as the question how far it is possible that the particles of matter can be the transmitters of a motion in which they do not themselves partake, even in the least degree?

But if certain agencies in Nature, which bear on the face of them their tremendous power, were brought vividly before me in Tiree, not less were other agencies impressed upon me also, which operate so slowly and gently as to be unperceived, although their aggregate work in time may be enormous. I saw no inconsiderable part of the island turned into a desert by blowing sand. I was told of some whole townships of good arable land which had been thus destroyed. The sand was such as I had never seen, or heard any description of, before. It was nearly pure white—not like the sands of the ocean, nor like what I had always imagined of the sands of Asiatic or African deserts. On examining it, I found it to be composed entirely of shells reduced to powder; moreover, I found these shells not to be sea-shells, but shells of two species of land-snails which lived and died in millions on the natural turf and grass of the island. Like all land-shells, they are thin and fragile in texture. Whilst inhabited by the living snail they are protected by a skin or epidermis, and by apparently some animal matter on the shell itself. But when the snail dies, the dead shells become so brittle that they crumble with the least pressure, and are resolved into a fine dust. In the course of ages this dust or sand has come to form a great part of the soil of the island. It bears,

when undisturbed, a short sward of fine grass thick with trefoils, and affording excellent pasture. But when once the surface is broken and the wind gets hold of this very light material, it is continually blown away, and sometimes is moved in such quantity as to accumulate like deep wreaths of snow, burying and ruining the richer soils which alone can bear the crops of cultivation.

The helplessness of man in the presence of apparently small causes, such as the rapid breeding of two little snails, or, in other countries, of such an insect as the locust, stands sometimes in strange contrast with the power of man to confront successfully some of the most tremendous energies in Nature, when he has become acquainted with her laws, and when his knowledge enables him to turn them to account. We soon had a splendid illustration of this contrast when we came to the ceremony which was the object of our visit. The work of laying the foundation-stone of the Skerryvore Lighthouse in fine weather in the midsummer of 1840 was, of course, mere child's play to the hardy and intrepid men who were engaged in the work. But it seemed formidable to us. The day was not one of perfect calm, but there was nothing more than an ordinary breeze. The steamer, of course, could not approach the rocks nearer than a most respectful distance. The actual landing could only be effected in boats, and a small boat rowing amidst the heavings and swellings of the Atlantic is incompatible with any feeling of security in those who are tried by it for the first time. Mr. Alan Stevenson had made every possible preparation for my father's safe landing, and by activity in taking the right moment when the boat rose to the wave, the whole party secured their footing and landed safely. For the convenience of the workers, iron gangways and steps led easily to the spot where the foundation of the tower was laid. That sight is as fresh in my memory after an interval of fifty-seven years as if I had seen it yesterday. The

natural surfaces of the rock were irregular in the highest degree. Worn, broken, and shattered by the battering of unnumbered ages of the most tremendous surf, and by the splitting of the rock along lines of natural fissures, there did not seem one square foot of rock which was even tolerably level. Yet in the midst of this torn and fissured surface we suddenly came on a magnificent circular floor, 42 feet in diameter, as level as water, and as smooth as a billiard-table. Its containing walls of living rock rose, round every portion of its immense circumference of 126 feet, to varying heights, showing the various depths of cutting that had been needed to reach a perfectly solid level. On this floor the whole weight of the tower was intended to rest. And it was on this weight that the stability of the enormous structure was entirely to depend.

The aim of the engineer was to oppose and resist the perpetual shock of enormous waves by the simple inertia of a still more enormous mass, like that of the living rock. Stevenson had discovered by actual measurement that the blows with which those waves struck opposing surfaces were equal to about 3 tons on every square inch. No reliance could be placed on the mere binding power of lime or of any other cement to resist such a force as this. The tower was to be made as nearly as possible one with the solid rock as a part of the crust of the earth on which it was to stand. For this purpose the tower was to have no cavity till it had attained an elevation of 40 feet. The highest waves in that sea, measuring from crest to hollow, were about 15 feet. Forty feet, therefore, represented a height more than twice the height of the largest wave at the Skerryvore. Up to that height the tower was to be one solid mass of stones, each stone being so hewn and shaped as to be mortised into every other stone in contact with it. Moreover, in his choice of stone, everything was foreseen and provided for by the nicest calculation. The greater

part of the tower was to be of granite. But Alan Stevenson discovered by careful experiment that the rock of which Tiree is entirely composed is a compound of minerals harder, tougher, and sensibly heavier than any granite. Therefore he determined to use it for the lowest courses of the structure. At that time I was no geologist, and I did not know the great interest attaching to that rock. But I was an acute observer of all natural objects, and I could not fail to notice its very peculiar appearance—the large crystalline surfaces which often glanced in the sun, and the curious mixture of yellows, reds, and whites in contrast with lines and masses of a jet black. It has since been called the Lawrentian Gneiss, from the great development of the rock on the banks of the St. Lawrence in Lower Canada. Later it has been called the Lewisian Gneiss, because the Isle of Lewis and the whole of the Outer Hebrides are entirely composed of it. Better than any of these local names is the Hornblendic Gneiss, from the predominance of the mineral called hornblende in its composition. Its enormous geological antiquity has earned for it the additional name of Archæn Gneiss, as it is the most ancient of all the rocks which are, or were supposed to be, of sedimentary origin.

Later investigations have led some geologists to suggest that in reality it is, often at least, a Plutonic rock, on which the appearance of stratification has been imposed by some rearrangement due to heat, pressure, and crystallization. Its enormous weight is largely due to the hornblende, a very heavy mineral which takes various forms, one of the most curious of which is asbestos, the only mineral substance in the world which yields a fibre capable of being woven into a textile stuff. It is a rock, of course, most difficult to dress; but Alan Stevenson established his working yard on the island of Tiree, where the material was at hand in abundance upon the surface. Natural faces of solid rock lent themselves to quarrying operations.

A platform was made of the exact size of the intended tower. Every stone was hewn and dressed precisely as it was to lie in the building. Every one of them was numbered, so that, when transported in lighters to the Skerryvore, no other operations were needed than to lift them, carry them, and then fit them into their places, for which they had already been tried upon the island. This, however, was a work of great difficulty and no little danger, from the heavy seas through which the heavily-laden lighters had to be towed by a steamer, and from the extreme difficulty of bringing the lighters safely alongside the rock and of lifting the stones, one by one, by a powerful crane.

The most wonderful sight on Skerryvore was the temporary shelter for the workmen which Alan Stevenson had erected. Half-gales of wind are continual in those seas, and whole gales not infrequent, even in summer. When these coincided with full tide, there was not a spot on the rocks inaccessible to the breaking billows, and any possible hut or shelter would have been constantly liable to be swept away. On the other hand, if the whole gang of workmen must necessarily be removed by steamer to Tiree, twelve miles off, and back, during all the hours of rest and sleep, and all the other hours when the work had to be suspended for the danger of the surf, a mere fraction of time would have been given to work, and the completion of the lighthouse would have been indefinitely postponed, if not rendered impossible altogether. Stevenson therefore determined to erect a temporary shelter on the top of legs of timber, so high that the highest wave could not reach any part of the structure except the supports, and these, he calculated, could be so constructed as to offer little obstruction to the waves, and so to be able to withstand them. It is needless to say that the construction of the supporting legs was a work of extreme difficulty. They had to be bolted into sockets in the rock with all the strength that iron could supply, and they had to be braced

and tied, and counter-braced and counter-tied, in every conceivable direction which engineering skill and science could devise. With infinite labour the preliminary work was accomplished, and a barrack was erected on the top of the legs, capable of holding thirty men in berths like the cabin of a ship, with a place for cooking. This was in 1838, and when the winter compelled a suspension of work upon the rock, the question was, Would the barrack stand the gales during that season? Meantime all other work went on easily on the island of Tiree; stones were quarried and shaped and fitted, ready for the reopening of the month when work was possible on the rock. Every day Stevenson could see by a telescope that, against the far horizon, his pepper-box barrack was still standing, until at last one night a fearful gale raged, and in the morning—alas!—his telescope could discover no vestige of the barrack. Stevenson now saw with terrible anxiety, but without despair, not only that the whole weary and dangerous work must be done over again, but that he must revise all his calculations as to the plan of the new structure, if it was not to place in imminent jeopardy the lives of all his men. In his battle with the sea he had been totally defeated. Old Ocean had triumphed over the engineer. Until the permanent tower had been raised to the height at which its centres were to begin, a shelter barrack was an absolute necessity, unless the enterprise was to be abandoned altogether. Such a strain of personal responsibility for issues so serious and for dangers so appalling has seldom been laid on one man. But Stevenson faced them, and faced them with success. A new barrack was erected, on amended lines, and the one we saw was the monument of his skill. It stood on the top of immense balks of timber, and rose to the height of about 60 feet above the rock. The legs described the figure of a cone, and another cone, inverted, stood inside of those, with the apex fixed in the rock at the centre of the circle, and radiating

outwards, so as to support the legs against impact from the outside.

This barrack stood the test of the winter of 1839, and Stevenson could now with some confidence trust that the lives of his men and his own would be safe in it during all the months of summer and of the early autumn. But he and his men had occasionally times when the sense of danger was terrible to them, and doubly terrible to him. In one gale, which came on earlier than usual, the furious waves were dashing through the legs to a height which left little room to spare below the bottom of the barrack itself, and he knew only too well that if they encountered any obstruction from a larger surface than the legs, the whole structure would be swept into the breakers. Every wave as it surged below them made the erection tremble like a leaf.

The profession of a civil engineer does not often call for any special gift of personal courage. But, under such rare conditions as these, it did make that call in an eminent degree on Stevenson and his men. There was absolutely nothing to be done but to wait with patience till the gale abated, and to put what reliance they could on paper calculations and on a very short experience. Stevenson told me that one of their few distractions was to watch an example of Nature's engineering in the structure and in the powers of an animal formed to live in the sea and able to defy its terrors. This was the great gray seal—a rare species, but which still survives in a few lonely places in the Hebrides. When full grown this seal is quite 8 feet in length, with an immense body, the size of a large horse. Stevenson and his men used to watch the evolutions of these powerful animals during gales of wind, when they employed the billows of the Atlantic as their hobby-horses on which to play. It was their favourite amusement to ride in upon the crest of a great wave, and then just before it broke they dived into its green and hollow bosom, coming

out behind the crest—ready to repeat the evolution as each new roller was formed and took the place of the one preceding. That the common elements in the skeleton of all quadrupeds should be so modified and adapted to an oceanic life, in its apparently most dangerous forms, is a wonder of far-reaching significance in biology.

I heard much of the great seal from the Tiree people, and I confess that one of my most eager anticipations in our visit to Skerryvore was the hope of seeing this creature. I therefore scrambled over the rocks as soon as I could, to a point overlooking an immense pool of broken water, which occupied a sort of bay in the outer edges of the reef. I had not watched long before I saw a creature, which looked like the end of a log of floating timber, rise in the middle of the foam. I fired a rifle-ball at him, with no other effect than to make him plunge out of sight with an angry flourish of his flippers and an additional churning of the water.

All this was, it is needless to say, an absolutely new experience to me. We left Tiree deeply impressed with the triumph which science enables man to achieve, and which the impulses of our modern civilization urge him to undertake. Nor were we all less impressed by the character of the man on whom the whole burden lay. Alan Stevenson was as gentle and refined as he was brave and strong, and persevering and inflexible in purpose. My father took a deep interest in the progress of his work, and lived to see it well accomplished. On that lonely rock, exposed to all the fury of the ocean, there now rises for the warning of the sailor a stupendous column of gneiss and granite, lighted with a powerful light which flashes its danger-signals from a height of 160 feet, and to a distance of thirty miles. But, alas! the accomplished engineer who built it, through a sustained and tremendous battle with the elements, which lasted several years, suffered from the strain on his nervous system

involved in his anxiety for the lives of so many men entrusted to his skill and knowledge. This told disastrously on his constitution, ending in an attack of paralysis, and he passed away some years later—one of the many men of whom the world hears little, and would be greatly the better of knowing more.