

**GEORGE DOUGLAS EIGHTH DUKE OF
ARGYLL, K. G., K. T., (1823-1900)
AUTOBIOGRAPHY AND MEMOIRS,
Volumes I & II
London: John Murray, Albermarle Street, W. 1906**

TIREE EXCERPTS

AUTOBIOGRAPHY AND MEMOIRS, 1906

Volume I

CHAPTER XIII

1846

ECONOMIC PROBLEMS AFFECTING ARGYLL PROPERTIES
VISITS TO THE HEBRIDES

CHAPTER XV

1849-51

THE RYLAND CASE - EXHIBITION OF 1851- VISIT TO THE
HEBRIDES – WINTER IN EDINBURGH

Volume II

CHAPTER VI

1837-39

ROSENEATH - SCIENTIFIC INTERESTS -
MY FATHER'S SUCCESSION
TO THE DUKEDOM - SKERRYVORE LIGHTHOUSE

CHAPTER XLVI

1860-93

SCIENCE

Excerpts from **GEORGE DOUGLAS EIGHTH DUKE OF ARGYLL, K. G., K. T., (1823-1900)**
AUTOBIOGRAPHY AND MEMOIRS, Volume I.
London: John Murray, Albermarle Street, W. 1906

Pages 282 - 286:

CHAPTER XIII

1846

ECONOMIC PROBLEMS AFFECTING ARGYLL PROPERTIES - VISITS TO THE HEBRIDES

The lessons which came to me in this period of my life were not confined to those connected with politics. The same mysterious calamity which then broke up our political parties told most seriously on the private affairs of my father and myself. As suddenly as the British Parliament found to its dismay that it had in Ireland a population on its hands of 8,000,000 souls, a great number of whom were threatened with starvation, so, not less suddenly, did we find that we had on our hands on our own estates a population of about 7,000 in a like condition. The whole of one Hebridean island, Tiree, and a large portion of another, Mull, formed part of the Argyll estates. Geographical isolation had kept the Hebrides behind the rest of Scotland in the progress of civilization. The inhabitants were steeped in an ancient hereditary ignorance of the very elements of agricultural industry. The whole of Celtic Scotland was bad enough in this way. The people did not even know how to save a little of the abundant summer grass for hay in winter, and the cattle were consequently nearly starved. They did not know the principle of rotation of crops, and the corn was miserably poor. Their system of occupancy was communal, each man changing his wretched patch with his neighbours in the same village or township every year, by lot. The very idea of improvement was impossible. The individual mind, the source of all power, was kept down to the level of the stupidest, who had the right to object to any change. But, bad as the condition of things was on the mainland, it was ten times worse in the Hebrides.

All through the military ages, the epoch of the clans, the insular chiefs were in chronic hostility to the Scottish monarchy; and when not fighting against the Crown, they were perpetually cutting each other's throats, devastating each other's lands, and putting to flight each other's followers. The only chance the poorer classes had of peace and security was to come under the power of some chief who was strong enough to protect them. My family had always taken the side of the Crown in its contests to secure a central and national Government. That was the highest service any subject could then render to his Sovereign and his country. The natural and legitimate reward was grants of the lands of the rebellious and defeated chiefs. Such grants accordingly were given to the Argyll family, in the seventeenth century, of lands in Mull and Tiree and Morvern. The value set upon landed possessions under the anarchy of the clans had been measured by the number of men they could hold for the purposes of war and plunder. And that number was generally greatly in excess of the amount of people that could be supported by merely local produce. Therefore, at the union of the Crowns in 1603, the population was already in many places excessive. The same thing happened in the Border Highlands, where the clan system had been quite as much developed and as mischievous as in the Celtic Highlands. In the Border Highlands the surplus population was speedily dispersed by migration to the rising towns, and by the plantation of Ulster. But in the Celtic highlands no such depletion followed for more than a hundred years.

Between the union of the Crowns in 1603 and the first Jacobite rebellion in 1715, the population was only kept down by pestilence and famine. Periodically the small-pox decimated the people, whilst

Excerpts from **GEORGE DOUGLAS EIGHTH DUKE OF ARGYLL, K. G., K. T., (1823-1900)**
AUTOBIOGRAPHY AND MEMOIRS, Volume I.
London: John Murray, Albermarle Street, W. 1906

seasons of scarcity, from a bad climate and from a most ignorant and barbarous husbandry, were frequent and severe. Even with these checks on population, it did increase beyond the average means of subsistence, because, unfortunately, when fighting ceased, the fighting organization of society remained. The cultivators, if such they could be called, were grouped in 'towships'. They had no individual holdings, so that even the few who might know how to improve land had no inducement or opportunity to do so. They were only tenants at will under the large leaseholders, and they were liable to them for services in labour which were indefinite, and therefore tended to be oppressive and discouraging to individual industry.

The island of Tiree had the natural advantages of good soil and rich pasture. Yet when the attention of my ancestors was first called to the state of the people, it was found to be in a condition we should now describe as barbarous. There was no remedy short of a complete break with the past, and a reconstitution of society. The poorer classes had to be emancipated from their thralldom to the lease-holders, and from their worse thralldom to each other. But all such change, however, beneficent, was opposed by ignorance and the insuperable love of ancient customs. Reform was effected only by the power of the landlord to insist on the necessary changes, or on the departure from the estate of those who refused. But fast as these reforms led to increase of produce, so fast did the population increase.

Then came what seemed a godsend at the time - the discovery that the seaweed cast on an open and stormy shore was full of alkali salts of great commercial value, which could be realized by a very simple process of burning in open kilns. A roaring trade was soon established. My grandfather paid to the people so high a price for their 'kelp' that practically they had no rent to pay for the land. He was an old soldier, and had been busy in his youth raising regiments for the army. He disliked and dreaded the emigration which had begun to set in, and to accommodate more people, he cut up several of the larger farms into smaller possessions, holding about ten or a dozen cows. Unfortunately, he died in 1806, and was followed by my uncle, Duke George, who was what silly people call an excellent landlord, because he let the people do exactly as they liked. And what they did like to do was to allow all their descendents to settle on the land, subdividing again and again their holdings to accommodate their young married sons. The potato had been introduced earlier, and had served well to support the growing multitudes. The population of Tiree had increased more rapidly than the population of Glasgow, so that from 1769 to 1802 it had increased from 1,670 to 2,776, and in 1846 it had mounted up to 5,000.

When the potatoes failed in 1846, of course there was great distress, and there would have been starvation but for the measures taken by my father and myself. His health had by this time so far declined that I was called up to deal with the difficulty as well as I could. What we did was to take advantage of the loans which Sir Robert Peel established to enable land-owners to tide over the difficulties that might arise from the abolition of the Corn Laws. In the meantime we bought cargoes of Indian meal, and gave it out to the people in wages for systematic drainage on the land. But we did also what was even more immediately necessary for a permanent reform. The time had not then come which I call the epoch of the fools, when agitators told the people that an excessive population ought to be 'rooted in the soil,' and that emigration was a device of the great enemy of mankind. The people themselves were intelligent enough to see that their numbers were excessive, if the mainstay of their former food was no longer to be depended on. They therefore petitioned my father to help them to emigrate to Canada. I advised him to comply. Large sums were spent on emigration for several years, and before the operation had been completed we had helped to settle in the New World, under favourable conditions, very nearly 2,000 souls from the overburdened

Excerpts from **GEORGE DOUGLAS EIGHTH DUKE OF ARGYLL, K. G., K. T., (1823-1900)**
AUTOBIOGRAPHY AND MEMOIRS, Volume I.
London: John Murray, Albermarle Street, W. 1906

island of Tiree. In the meantime draining of land went on upon a large scale. Vacated holdings were added to the other crofts, and in the course of a few years the people were beyond the reach of famine from the potato failure. They have remained so ever since. But it was a time of great anxiety, great trouble, and no small embarrassment. The whole rental of these estates affected was absorbed for more than five years, while a sum of £10,000 was borrowed from Peel's Parliamentary Loan Fund, at the rate of 6 ½ per cent., which involved a heavy charge, so long as increased production was inadequate to meet it. By the judicious management, however, of those whom we employed, this great result and test of real improvement - remunerative returns - was ultimately brought about, and I had the satisfaction of seeing the loan entirely paid off at the end of the statutory period - thirty years.

[...]

CHAPTER XV

1849-51

THE RYLAND CASE - EXHIBITION OF 1851- VISIT TO THE HEBRIDES - WINTER IN EDINBURGH

[...]

Pages 320-322:

As there was nothing to interest me much in the session of 1850, my wife and I determined to spend some of the midsummer weeks in visiting my island estates in the Hebrides, and particularly Tiree, which had been the source of so much anxiety ever since 1846, and where the work of reform was still going on to such an extent that the whole rental of the estate was absorbed. Accordingly, we hired a steamer and made our way to that lovely island. The only house we could inhabit was one used by the local factor. It was in the singular position of being built on a promontory projecting into a small and sheltered lake, at some distance from the sea. I do not doubt that this was a traditional site where a crannog or lake-dwelling had once existed, and that its connection with the shores of the lake had been effected by subsequent filling in of the isolating channel.

It is difficult to make others understand the immense enjoyment I have always had in the scenery of the Hebrides. In the last century this scenery was unappreciated by Samuel Johnson, and more recently we have seen, in his 'Monks of the West,' how insensible to its beauties was even the refined and poetic temperament of Montalembert. I suppose that in this case, as in many others, Walter Scott has been the great revealer. And yet much of the Hebridean scenery has every element of lofty grandeur and of beauty. Its precipices are magnificent, its mountains lofty, rugged, and highly suggestive of the most tremendous forces which have made our world. Its sunsets are unequalled in any part of the world, because the rainy climate secures an extraordinary richness and variety in the clouds. A large part of the island of Tiree is not raised 50 feet above the waves. But all the more completely are we delivered over to the two great dominions of the ocean and of the sky, with just enough of earth to indicate the relation of both to its abundance of life and joy. The sea comes in on every variety of beaches, but chiefly on great curved bays of pure white sand, sometimes in the gentlest ripples, sometimes in rollers which are magnificent. The grass pastures are rich in clovers and full of larks. The skies in the evening are often gorgeous beyond

Excerpts from **GEORGE DOUGLAS EIGHTH DUKE OF ARGYLL, K. G., K. T., (1823-1900)**
AUTOBIOGRAPHY AND MEMOIRS, Volume I.
London: John Murray, Albermarle Street, W. 1906

description, the clouds imitating sometimes towers and battlements, and even mountain ranges, so solid, apparently, that I have seen strangers convinced of their substantiality. Much of the glory of the sky and of the long after-glow which succeeds the sunset, and in that latitude 'lies in heaven half the night,' was reflected in the little lake underneath our windows; whilst terns and plovers of various species came to roost on the boulder-stones which were above the water. Coots and water-hens floated among the reeds, busy with their peaceful quest of water-weeds.

My enjoyment in this peculiar scenery was greatly enhanced by seeing the happy effects upon the people of the policy which I had entered upon four years ago. The emigration of several hundred of half-starving tenants, and the annexation of their wretched little possessions to those held by their most capable neighbours, together with systematic draining of large areas of land, were measures which were already bearing most satisfactory fruit. The interest charge-able on capital laid out on these improvements seemed to be met with ease out of increased produce, and other tenants were eager to have their land drained on the same terms. The people throughout the island were most cordial in the reception they gave us, for as yet the 'Epoch of the Fools' was far away, when they were to be taught that every power which had been exercised by me and my ancestors for their benefit was a power which we never ought to have possessed.

[...]

Excerpt from GEORGE DOUGLAS EIGHTH DUKE OF ARGYLL, K. G., K. T., (1823-1900)
AUTOBIOGRAPHY AND MEMOIRS, Volume II.
London: John Murray, Albermarle Street, W. 1906

CHAPTER VI

1837-39

ROSENEATH - SCIENTIFIC INTERESTS - MY FATHER'S SUCCESSION

TO THE DUKEDOM- SKERRYVORE LIGHTHOUSE.

Pages 132-147:

[...]

'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, 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 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 probably 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 the 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 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 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 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, and 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 with the waters of 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 corncrake, 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 island 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 tenants 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 made of neat straw thatch, somewhat beehive in shape, and resting always on the innermost of the two walls, so that the space between the 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, for 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 Tíree 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 vapors, we never do see the moon as it is seen continually in the East, and seen in the South of Europe, as visibly a globe or ball gaining 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 but a circumstance of scenery in Tíree. 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 comes invested with an awful majesty when it assumes the perpendicular. The highest mountains in the world are nothing but distances struck on end, which we should think quite trifling when seen in the plains below. This is 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 seem. 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 Tíree 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 object of 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 not 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, is suggesting difficulties, such as the questions how far it is possible that the particles of matter can be the transmitters of 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 oceans, not like what I had always imagined of the 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 be to 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 get 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, and when he has become acquainted with her laws, and when his knowledge enables him to turn them to account. We soon had a pleasant 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 mid-summer of 1849 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 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 so 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 highest 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 mineral harder, tougher, and sensibly heavier than any granite. Therefore he determined to use it for the lower 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 glared 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 Laurentian Gneiss, from the great development of 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 names of Archaean 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 logs, 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 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 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 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 favorite 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 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 unbroken 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 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 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.

Excerpt from **GEORGE DOUGLAS EIGHTH DUKE OF ARGYLL, K. G., K. T., (1823-1900)**
AUTOBIOGRAPHY AND MEMOIRS, Volume II.
London: John Murray, Albermarle Street, W. 1906

CHAPTER XLVI

1860-93

SCIENCE

Page 508:

To Mr. Harvie Brown (February 8th, 1891).

‘Two friends of mine have been shooting in my island of Tiree, and the account they give of the wildfowl there is wonderful. On one fresh-water loch they counted one hundred and five wild swans, besides packs of fifteen and twenty on other lakelets. They killed three Gadwall ducks, but the geese were unapproachable. Snipes in enormous quantity. They killed six hundred and forty-one in seven days. Turnstones and stints were there, but only one greenshank. This bird is getting rarer.’