

OBITUARY NOTICE

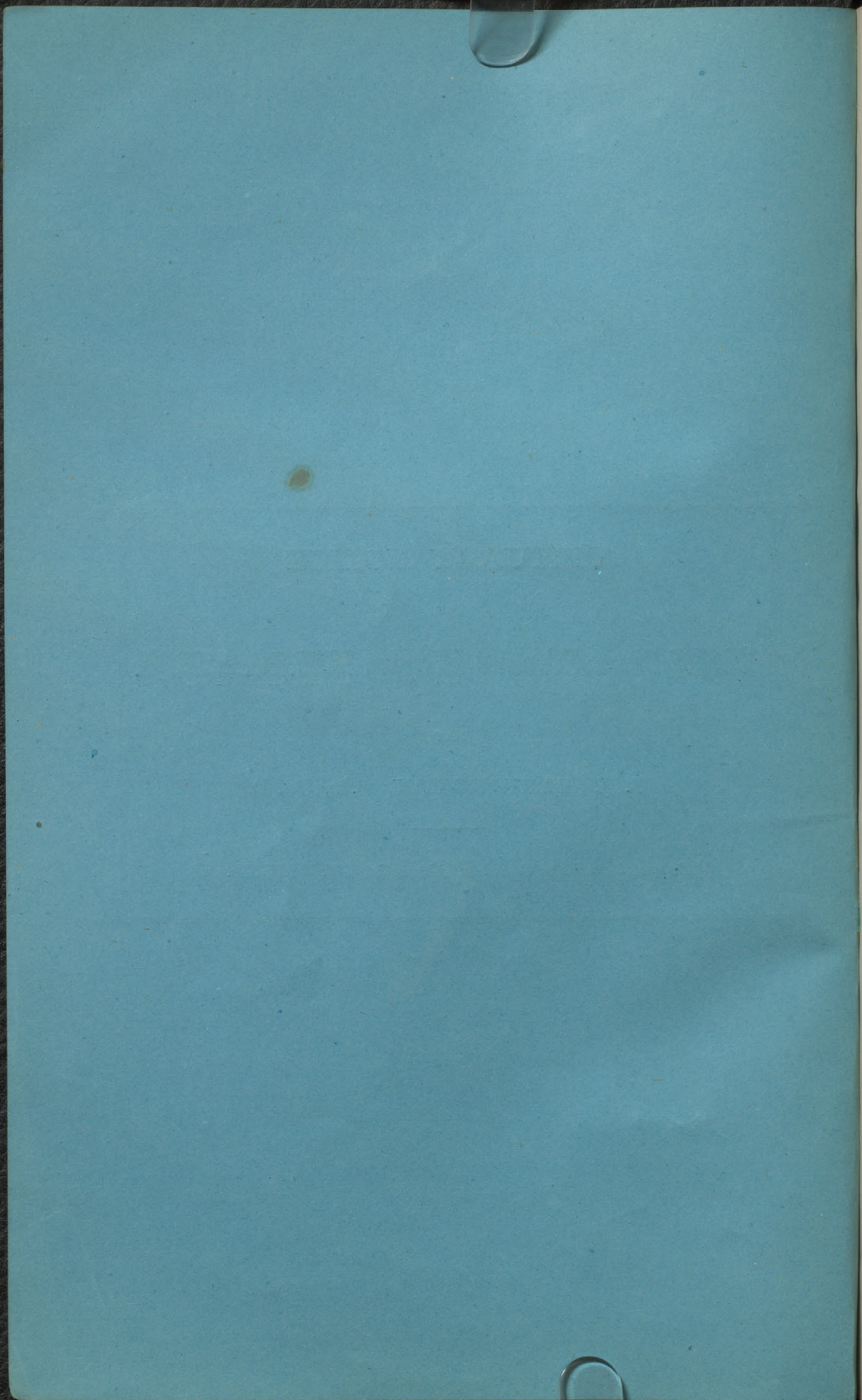
OF

Sir William Edmond Logan, LL.D., F.R.S.

BY

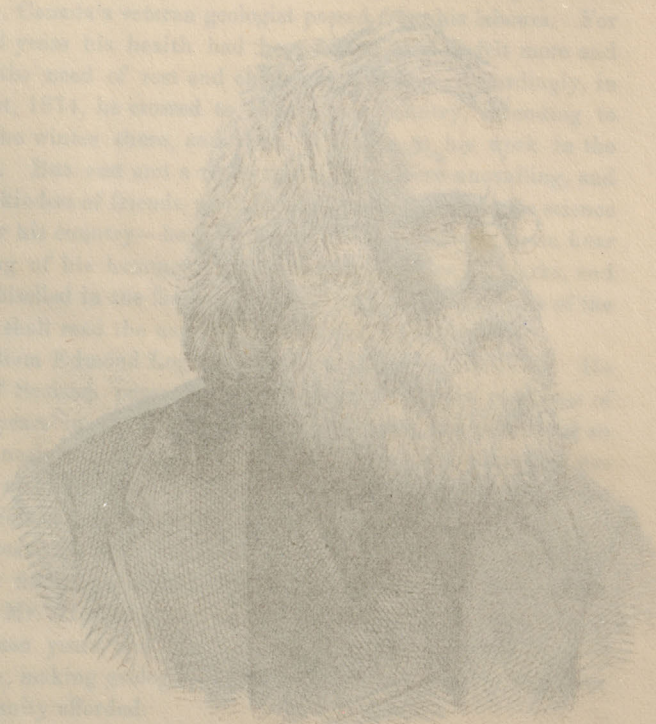
B. J. HARRINGTON, B.A., PH. D.

(Extracted from the Canadian Naturalist, Vol. VIII, No. 1.)



MRS WILLIAM BERNARD LORAN

On the 21st of June at Castle Malvern, London, South
Wales, the late William Bernard Loran, Esq., died
after a long illness, having been confined to his bed
since the month of April, and was buried in the
graveyard at Malvern on the 28th of the same month.
He was born at Malvern on the 10th of May, 1814,
and was educated at Malvern and at the University
of Cambridge, where he took the degree of Bachelor
of Arts in 1836, and that of Master of Arts in 1840.
He was called to the Bar at Lincoln's Inn in 1841,
and was admitted to the Bench in 1845. He was
appointed to the office of Recorder of Malvern in
1846, and held that office until his death.



He was a member of the Council of the Law Society
of England, and of the Council of the Law Society
of Wales. He was also a member of the Council of
the Law Society of the City of London. He was
a very successful lawyer, and was one of the
leading members of the Bar at Malvern. He was
also a very successful writer, and was the author
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Presented by
N. E. Logan

SIR WILLIAM EDMOND LOGAN.*

On the 22nd of June, at Castle Malgwyn, Llechryd, South Wales, Canada's veteran geologist passed from his labours. For several years his health had been failing, and he felt more and more the need of rest and change of climate. Accordingly, in August, 1874, he crossed to the mother country, intending to pass the winter there, and then to return to his work in the spring. But rest and a more genial clime were unavailing, and now—kindest of friends, most indefatigable of workers for science and for his country—he is no more! We shall never again hear the ring of his hammer; but time cannot efface its marks, and deep-etched in the face of Cape Eternity, the generations of the future shall read the names—LOGAN and LAURENTIAN.

William Edmond Logan was born at Montreal, in 1798. He was of Scottish parentage, and his father, after a residence of many years in Canada, returned to Scotland, and purchased an estate near Stirling, known as Clarkstone. His education was begun at Mr. Skakel's school, in this city, and completed at the High School and University of Edinburgh.

On leaving college he betook himself to mercantile pursuits, and we find that in 1818 he entered the counting-house of his uncle, Mr. Hart Logan, of London. Here he remained for about ten years, and here, it is said, he first became fond of geology, making geological excursions into the country whenever opportunity afforded.

In 1829, he paid a visit to Canada; but, returning the same year, took up his residence at Swansea, in South Wales, where he was appointed manager of a copper-smelting establishment, and of coal mines, in which an uncle of his was interested. In 1834, he made a tour through France and Spain, visiting many of the mines in the latter country, and making many observations on the geology of the regions through which he passed. In 1838, his uncle dying, Mr. Logan resigned his position at Swansea. But the nine years he spent here were well-spent years; for not only had he gained a practical knowledge of

* Obituary notice, read before the Natural History Society, October 25th, 1875.

mining and metallurgy, which afterwards proved of the greatest value to him, but had done a large amount of very excellent geological work—work which caused Dr. Buckland, of Oxford, to say of him, "He is the most skilful geological surveyor of a coal-field I have ever known." During his stay at Swansea, he was an active worker for the interests of the Royal Institution of South Wales. He was Honorary Secretary and Curator of the geological department, and the Institution is indebted to him for valuable collections of minerals and metallurgical products, besides books, drawings and laboratory apparatus. The whole of his geological work in South Wales he placed gratuitously at the disposal of the Ordnance Geological Survey of Great Britain, and it was not only gladly accepted, but published "without alteration," and made the basis of future work in that region. Concerning it, Sir H. T. De la Beche afterwards wrote as follows :

"Prior to the appearance of the Geological Survey in that part of the country, Mr. W. E. Logan had carefully investigated it, and at the meeting of the British Association for the Advancement of Science, held at Liverpool in 1837, he exhibited a beautifully executed map of it.

"The work on this District being of an order so greatly superior to that usual with geologists, and corresponding in the minuteness and accuracy of its detail, with the maps and sections executed by the Ordnance Geological Survey, we felt desirous of availing ourselves of it, when Mr. Logan most handsomely placed it at our disposal. Having verified this work with great care, we find it so excellent that we shall adopt it for that part of the country to which it relates, considering it but fair and proper that Mr. Logan should obtain that credit to which his labours so justly entitle him.

"His sections are all levelled and measured carefully with proper instruments, and his maps are executed with a precision only as yet employed, except in his case, on the Ordnance Geological Survey; it being considered essential on that survey, for the right progress of geology, and the applications to the useful purposes of life, that this accuracy and precision should be attained."

In 1840, Logan read a paper before the Geological Society of London, in which he explained, for the first time, the true relation of the *Stigmaria* underclays to the overlying beds of coal,

showing that the underclay was the soil in which the plants grew which were afterwards converted into coal. Of the 100 thick and thin coal-seams in the South Wales coal-field, he found that not a single one was without an underclay, and the inference appeared to be that there was some essential connection between the production of the one and the existence of the other. "To account," said he, "for the unfailing combination by drift, seems an unsatisfactory hypothesis; but whatever may be the mutual dependance of the phenomena, they give us reasonable grounds to suppose that in the *Stigmaria ficoides* we have the plant to which the earth is mainly indebted for those vast stores of fossil fuel which are now so indispensable to the comfort and prosperity of its inhabitants."

So much did he become interested in this subject that in the following year (1841) he crossed to America, and visited the coal-fields of Pennsylvania and Nova Scotia, in order to ascertain whether the same conditions existed there. Such he found to be the case; and in the following Spring he read an interesting paper before the Geological Society, the object of which, to use his own words, "was to state the occurrence immediately below the coal-seams of America of the same *Stigmaria* beds as had been observed below those of South Wales, and to shew the importance of this prevailing fact." Shortly after his return from America, he also visited coal-seams in the neighbourhood of Falkirk, Scotland, there too finding the *Stigmaria* clays beneath the coal.

It was during his visit to Nova Scotia, in 1841, that he discovered in the Lower Coal measures of Horton Bluff the footprints of a reptilian animal—a discovery which perhaps failed to attract as much attention as it deserved, although it was the first instance in which any trace of reptiles had been detected as low down in the geological scale as the Carboniferous. The winter of 1841–42 was also spent in Canada, and the facts obtained for a paper on the packing of ice in the St. Lawrence, which was subsequently read before the Geological Society of London.

Such, briefly, was the career of Logan previous to his appointment as Director of the Geological Survey of Canada. Already he had acquired a reputation in Britain as a geologist, and had given himself the best of trainings for the work upon which he was about to enter on this side of the Atlantic. But what was meantime passing in Canada?

"In January, 1832, a petition from Dr. Rae, praying for pecuniary assistance in prosecution of a geological and statistical survey of the province, was sent down by message to the Legislative Assembly, with a favourable recommendation from his Excellency Sir John Colborne, Lt. Gov. of Upper Canada. It was read and referred to the committee of supply, but not considered.

"In February, 1836, on the motion of Mr. W. L. Mackenzie, seconded by Mr. Durand, Messrs. R. G. Dunlop, Gibson and C. Duncombe were named a select committee to consider and report on a plan for a geological survey of the Province. Three hundred copies of this report were ordered to be printed, and it was referred to the committee of supply, but was not considered.

In November, 1836, on the motion of Mr. R. G. Dunlop, seconded by Col. Prince, the house went into a committee of the whole to consider the expediency of a geological survey, and, on their report being received, it was resolved that an address should be presented to His Excellency the Lieut. Governor (Sir F. B. Head), to ascertain whether there were any means at his disposal to effect a geological survey of the Province. The address was ordered to be drafted, but was not reported.

"In December, 1836, Mr. R. G. Dunlop gave notice that he would move an address to His Majesty for a grant of wild lands to defray the expense of a geological survey of the Province, but no address was presented.

"To Lord Sydenham, who well appreciated the importance of an examination into the mineral resources of Canada, the country is indebted for the commencement of the geological survey which has been instituted.

"In July, 1841, in the first United Parliament, a petition from the Natural History Society of Montreal, praying for aid to carry out a systematic geological survey of the Province, was presented by Mr. B. Holmes. It was referred to a select committee consisting of Messrs. Holmes, Neilson, Quesnel, Merrit, and the Hon. Mr. Killaly, but it was not reported on. A similar petition was presented by Mr. Black, from the Literary and Historical Society of Quebec, which was read. The government took up the matter, and on the motion of the Hon. B. Harrison, the sum of £1500 sterling for the purposes of a survey was introduced into the estimates."*

* From Scobie's Canadian Almanac for 1851.

Lord Sydenham dying in 1841, it fell to his successor, Sir Charles Bagot, to appoint a Provincial Geologist. Sir Charles referred the matter to Lord Stanley, Secretary of State for the Colonies, and His Lordship, on recommendation of Murchison, De la Beeche, Sedgwick, and Buckland, offered the position to Mr. Logan in the spring of 1842.

Logan was now thoroughly in love with geology, and seeing in Canada the grandest of fields for original research, at once accepted. Still he well understood the difficulties which lay before him, and shortly afterwards addressed the following words to De la Beeche: "You are aware that I have been appointed by the Provincial Government of Canada to make a Geological Survey of that Colony. The extent and nature of the territory will render the task a most laborious one; but I am fully prepared to spare no exertion of which I am capable to render the work, when it is completed, satisfactory to those who have instituted the examination and creditable to myself No one knows better than yourself how difficult it would be for one person to work with effect in all the branches of so extensive a subject. To carry out the field-work with vigour, to reduce all the sections with the requisite degree of accuracy, and map the geographical distribution of the rocks, to collect minerals and fossils, and to analyze the one, and by laborious and extensive comparisons, to determine the geological age of the other, is quite impossible without a proper division of labour..... In Canada, all the expensive means of palæontological comparison have yet to be brought together. There is no arranged collection of fossils, and no such thing as a geological library to refer to."

Arriving in Canada late in August, 1842, Logan devoted several months to making a preliminary examination of the country, and to collecting information with regard to the topographical work which had been accomplished. This was done entirely at his own expense. In December, he returned to England to fulfil engagements there, but came out again in the following spring. During his visit to the old country, he was so fortunate as to secure the services of Mr. Alexander Murray, a gentleman who afterwards proved himself an invaluable assistant and friend, and who has contributed largely to our knowledge of the geology of Canada, and, more recently, to that of Newfoundland.

Reaching Halifax on the 20th of May, Logan spent several weeks in examining portions of the coal-fields of Nova Scotia and New Brunswick, and it was at this time that he made his section of the Coal Measures at the South Joggins, which, as has been truly said, is "a remarkable monument of his industry and powers of observation." It gives details of nearly the whole thickness of the Coal formation of Nova Scotia, or 14,570 feet, including 76 beds of coal and 90 distinct *Stigmaria* underclays. Shortly after his visit to the Joggins, he wrote to a friend as follows: "I never before saw such a magnificent section as is there displayed. The rocks along the coast are laid bare for thirty miles, and every stratum can be touched and examined in nearly the whole distance. A considerable portion has a high angle of inclination, and the geological thickness thus brought to view is very great. I measured and registered every bed occurring in a horizontal distance of ten miles, taking the angle of dip all the way along." And again, in a letter to De la Beche written in the spring of 1844, referring to the Joggins section, he says: "Since my return from field-work, I have reduced all the measurements and made out a vertical column. It occupies fifty-four pages of foolscap, closely written, and you will be astonished at the details in it."

Reaching Gaspé early in July, the summer and autumn were spent in making an examination of the coast, while Mr. Murray was at work in the Upper Province, examining the country between Lakes Huron and Erie. The Gaspé peninsula had been selected by Mr. Logan as the field for his first operations, as it was thought that outlying patches of the Carboniferous might be found to exist there, and the government was especially anxious to ascertain whether there was any truth in the reported occurrence of coal.

The following season, the work in Gaspé was continued, the Director being this time accompanied by Mr. Murray, who, in 1845, again carried on the work, while Mr. Logan was engaged in explorations on the Upper Ottawa and Mattawan. Altogether, during the three seasons, 800 miles of the Gaspé coast were examined, and several sections made across the peninsula, from the St. Lawrence to Bay Chaleur. No coal was found, but many geological facts of importance were accumulated, and a large amount of topographical work accomplished in what was previously almost a *terra incognita*.

"Living the life of a savage, sleeping on the beach in a blanket sack with my feet to the fire, seldom taking my clothes off, eating salt pork and ship's biscuit, occasionally tormented by mosquitoes,"—such is the record which Logan has left us of his Gaspé life, the foretaste of what was to be endured for many years. From early dawn till dusk he paced or paddled, and yet his work was not finished, for while his Indians—often his sole companions—smoked their pipes round the evening fire, he wrote his notes and plotted the day's measurements.

To give details of his work during the many remaining years of his life would be to write a book; and all that we can do here is to trace briefly what his movements were, at the same time calling special attention to those of his labours which have given him a world-wide fame.

The summer of 1846 found him studying the copper-bearing rocks of Lake Superior. These he shewed to consist of two groups of strata, the "upper" and the "lower," the latter of which was seen at Thunder Bay to rest unconformably upon chloritic slates belonging to an older series, to which the name of Huronian was subsequently given. This older set of rocks, which he had already observed, in 1845, on Lake Temiscaming, he had ample opportunity of studying in 1848, when he devoted several months to an examination of the Canadian coast and islands of Lake Huron, where the formation attains—as shewn by Murray—a thickness of 18,000 feet.

The seasons of 1847 and 1849, and a portion of that of 1848, were employed in studying the rocks of the Eastern Townships. Part of these were shown to be a prolongation of the Green Mountains of Vermont, and to consist of altered Silurian strata instead of "Primary strata," as was previously supposed by American geologists. In 1849 also, a short time was spent in an examination of the rocks about Bay St. Paul and Murray Bay, where coal had been reported to exist. The member for Saguenay county had previously made application to the Legislature for means to carry on boring operations in the vicinity of Bay St. Paul, but before his request was granted it was deemed advisable to obtain the opinion of the Provincial Geologist. By this means the Government was saved a large and useless expenditure of money.

In 1850 an examination was made of the gold-bearing drift of the Chaudière, and the auriferous district found to extend over

an area of between 3,000 and 4,000 square miles. Most of the year, however, was devoted to the collection of specimens for the London Exhibition of 1851, at which Mr. Logan acted as Juror. His visit to England at this time must have been for him an agreeable change. After a lapse of eight years to meet again with men like De la Beche, Murchison, and Lyell, to hear from their own lips of the strides which science had been making, and in turn to tell of all that he had himself seen and done; surely this was a treat that none but the scientific man can understand who has long been well-nigh deprived of the society of brother scientists. For him, however, there was little relaxation from labour, for he toiled early and late in order that the Canadian minerals might be displayed to the best advantage. And every one knows the result—the collection elicited universal admiration, and Mr. Logan received a highly complimentary letter of thanks from the Prince Consort, and was elected a Fellow of the Royal Society, his name having been proposed by Sir Roderick Murchison.

Returning to Canada in August, before the close of the Exhibition, his explorations were renewed with undiminished vigour, and the remainder of the season devoted to an examination of the rocks in the county of Beauharnois, where the Potsdam sandstones had afforded those curious tracks of crustaceans to which Owen gave the name of Protichnites, and to a further study of the Chaudière gold region. During the winter he again visited England to attend to the distribution of a portion of the Exhibition collection which was to be left there, and see to the return of the remainder.

In 1852 an examination was made of a strip of country on the north side of the St. Lawrence, extending from Montreal to Cape Tourmente below Quebec. The distribution of the fossiliferous rocks was accurately determined, and several excursions made into the hilly "metamorphic country" to the north. In his report on this season's operations, published in 1854, Logan for the first time designated the rocks comprising these hills as the "Laurentian series," substituting this for "metamorphic series," the name which he had previously employed, but which, as he says, is applicable to any series of rocks in an altered condition.

The following season was spent among the Laurentian hills of Grenville and the adjoining townships, a field which proved so attractive that he afterwards returned to it in 1856 and 1858.

Nearly the whole of 1854 was occupied in making preparations for the Exhibition which was to take place at Paris in the following year, and to which Mr. Logan was to go as one of the Canadian Commissioners. It was in the autumn of 1854 also, that a select committee was appointed by the Canadian Government to inquire into the best method of making the information acquired by the Geological Survey more readily accessible to the public. A lengthy report on the subject—indeed on the entire working of the Survey—was published, and the evidence which it contains is of a most flattering character, both as regards the Director and those associated with him.

Then came the Paris Exhibition of 1855, at which the representation of the economic minerals of Canada was so complete and the arrangement so admirable that the collection attracted universal attention. This in itself Logan would have regarded as amply repaying him for his trouble, but greater honour was in store for him. The Imperial Commission presented him with the grand gold medal of honour, and the Emperor of the French made him a Chevalier of the Legion of Honour. Early in the following year (1856) he was knighted by Queen Victoria, and received from the Geological Society of London the Wollaston Palladium Medal in recognition of his distinguished labours in geology. Long previous he had won the confidence and esteem of his fellow-countrymen in Canada, but this seemed to be a fitting time to testify to him their appreciation of his worth. Accordingly, on his return to Montreal, the citizens presented him with a testimonial on which were engraved the words:

“In commemoration of his long and useful services as Provincial Geologist in Canada, and especially his valuable services in connection with the Exhibition of all Nations in London in 1851, and in Paris in 1855, by which he not only obtained for himself higher honor and more extended reputation, but largely contributed in making known the natural resources of his native country.”

The Natural History Society of Montreal presented him with an address, and made him an honorary member, while the members of the Canadian Institute of Toronto, of which Sir William was the first President, had his portrait painted and hung up in their hall. They also presented him with an address expressive of their affectionate esteem and respect. Sir William's reply to this was so full of feeling, and so highly characteristic,

that we give a portion of it: "Whatever distinctions," said he, "may be bestowed on us at a distance, it is upon the respect, esteem, and confidence shewn us at home, that our happiness and satisfaction must chiefly depend. I can assure you with sincerity that the honor conferred upon me when you elected me the first President of the Institute, was one highly prized, although the circumstances of a distant domicile and the intent pursuit of the investigations with which I am charged, rendered it extremely difficult for me to be of much use in your proceedings. . . . It is a fortunate circumstance for me that my name should be connected with an act of grace on the part of Her Majesty, which serves to confirm your feeling in regard to the fact that as Canadians we enjoy a full share in the honors and privileges of British subjects. And I am proud to think that it was perhaps more because I was a Canadian, in whom the inhabitants of the Province had reposed some trust, that the honor which has been conferred upon me by Her Majesty was so easily obtained. That I am proud of the honors which have been bestowed upon me by the Emperor of France, in respect to my geological labors, and also by my brother geologists in England, there can be no doubt. But I have striven for these honors because I have considered they would tend to promote the confidence which the inhabitants of the Province have reposed in me, in my endeavors to develop the truth in regard to the mineral resources of the Province; and in this work none could have been more interested in my success than the members of this Institute." *

In August, 1857, the American Association for the Advancement of Science held its annual meeting in Montreal, and for several months previous Sir William was hard at work getting his museum in readiness to receive his brother geologists. Owing largely to his untiring exertions, the meeting was a most successful one. He himself read two interesting papers, one on the "Huronian and Laurentian Series of Canada," and another on the "Sub-division of the Laurentian Rocks of Canada." After the business of the Association was concluded, accompanied by Professor Ramsay, who had come over to represent the Geological Society of London, and Prof. Hall, he made a Geological tour through New York State. Returning from this

* Can. Journal, New Series, Vol. 1, p. 404.

trip, he spent the autumn months among the Laurentian rocks of Grenville. Here too, as already mentioned, he continued to work during the season of 1858.

For several years after this, his time was much taken up with the preparation and publication of the *Geology of Canada* and its accompanying Atlas, the former of which appeared in 1863, and the latter in 1865. Before these could be completed, however, many facts had to be added to the stock already obtained, and besides a large amount of geological work among the Laurentian rocks of Grenville and the rocks of the Eastern Townships, a personal examination of many parts of the country, as well as of portions of the New England States, was rendered necessary.

In 1862, Sir William was again present, in the capacity of Juror, at the London International Exhibition, and again displayed a large and interesting collection of economic minerals. Another opportunity of seeing his scientific friends in Britain was also afforded him in 1864, when he went to London to superintend the engraving of the Atlas already mentioned. In 1866, a geological collection was again prepared for the Paris Exhibition of 1867, and Sir William worked so closely in getting up a geological map to accompany it that he is said to have nearly ruined his eyesight. 1868 found him once more on this side of the Atlantic, hard at work in the Pictou coal-field, and the results of this season's work constitute the last of his reports. In 1869, he resigned his appointment to Mr. Selwyn, the present Director of the Survey.

The few remaining years of his life were occupied chiefly with a study of the rocks of the Eastern Townships and portions of New England; but, unfortunately, the conclusions at which he arrived concerning them were not published.

No man has done as much as Sir William Logan to bring Canada before the notice of the outside world, and no man is more deserving of being held in remembrance by the people. Just as statesmen or generals have risen up at the moment of greatest need to frame laws or fight battles for their country, so Sir William appeared to reveal to us the hidden treasures of Nature, just at a time when Canada needed to know her wealth in order to appreciate her greatness. For rising nations require to know what their resources are. He possessed rare qualities—qualities, which, combined, eminently fitted him for his work.

He was strong in body, of active mind, industrious and doggedly persevering, painstaking, a lover of truth, generous, possessed of the keenest knowledge of human nature, sound in judgment, but always cautious in expressing an opinion.

He belonged to that school of geologists—unfortunately not so numerously represented as it ought to be—whose motto is, “Facts, then theories,” and was wholly above rasping down facts to make them fit theories. As a consequence, he rarely had to un-say what was once said; and this is why he so thoroughly gained the public confidence. So long as he felt that he was in the right, he held to his own views as tenaciously as did ever any true Scot; but if shewn to be in the wrong, he knew how to surrender gracefully.

Those who have clambered with him over our log-strewn Laurentian hills know well what were his powers of endurance. He never seemed to tire, never found the days long enough. His field-books are models of carefulness, replete with details, and serve as an example of the painstaking way in which he did all his work. They were written in pencil, but regularly inked in at night, when the camp fire was often his only light. In addition to his field-book proper, he frequently kept a diary, and delighted to jot down little every-day occurrences, or sketch objects of interest—for the hand that could so well wield a hammer, could also guide a pencil and produce drawings of no mean artistic skill. His descriptions of his backwoods experiences are often very amusing, and we cannot resist giving a specimen. He had been travelling through the forest for two months and had suddenly come upon the house of a settler called Barton, whose good wife was justly alarmed when Sir William and party entered her dwelling. Sir William describes his appearance, on this occasion, as follows:—“We are all pretty-looking figures. I fancy I cut the nearest resemblance to a scarecrow. What with hair matted with spruce gum, a beard three months old, red, with two patches of white on one side, a pair of cracked spectacles, a red flannel shirt, a waistcoat with patches on the left pocket,—where some sulphuric acid, which I carry in a small vial to try for the presence of lime in the rocks, had leaked through,—a jacket of moleskin, shining with grease, and trowsers patched on one knee in four places, and with a burnt hole in the other; with beef boots—Canada boots, as they are called—torn and roughened all over with scraping on the stumps

and branches of trees, and patched on the legs with sundry pieces of leather of divers colours; a broad-brimmed and round-topped hat, once white, but now no colour, and battered into all shapes. With all these adornments, I am not surprised that Mrs. Barton, speaking of her children, and saying that here was "a little fellow frightened of nothing on earth," should qualify the expression by saying, "but I think he's a little scared at *you*, Sir."

It was not alone in the field that Sir William was busy. His office work was often most arduous, and during the earlier years of his directorship, in addition to preparing his annual report, he even kept the accounts, entering every item of expenditure, so that he could at any time shew exactly how every penny of the public money placed at his disposal had been spent. He also tells us that, with his own hands, he made, at that time, four manuscript copies of the Annual Report of Progress, often reaching more than one hundred printed pages—one copy for the Government, one for the House of Assembly, one for the Legislative Council, and one for the printer.

His manner of living was simple as it was solitary. Like his four brothers, he never married, nor does he seem to have formed many intimate friendships. Still every one who knew him loved him and respected him, and if you go the length and breadth of all the land, you will everywhere hear his praises, alike from rich and poor.

He peculiarly possessed the power of inspiring others with his own enthusiasm; not only those in his employ, but even uneducated farmers and backwoodsmen—men who, as a rule, are rather sceptical about the advantages to be derived from geology.

Though possessed of private means, he spent little upon himself; not that he was parsimonious, but he cared not for fashion or luxury. But with him Science never pleaded her needs in vain. The first grant of the Legislature, to make a geological survey of the Colonies, was £1,500—an amount which, Sir William quaintly remarked, was but a drop of what would be required to float him over twenty-five degrees of longitude and ten of latitude. This was, of course, very soon spent, and not only this, but at the end of the second year the Survey was £800 in his debt, and he had no guarantee whatever that his money would be returned to him. Since then the Survey has been constantly indebted to him for books, instruments, and other aids, and the building on St. James street, now used for office

purposes, was built by him, two years ago, and rented to the Government for about half the amount which he could have obtained from other tenants. To Logan also, McGill University owes much; for, in 1864, he founded and endowed the "Logan Gold Medal" for an honor course in geology and natural science, and, in 1871, gave \$19,000, which, together with \$1,000 given by his brother, the late Mr. Hart Logan, forms the endowment of the "Logan Chair of Geology."

Since resigning his position as Director of the Geological Survey, he has carried on explorations at his own expense, and at the time of his death arrangements had been nearly completed for putting down a bore-hole in the Eastern Townships, at a cost of \$8,000; as he thought that this would enable him to prove the truth of his views with regard to the age of the metamorphic rocks there.

Every one knows how nobly he acted when asked by the East India Company, in 1845, to make an examination of their territory for coal. The inducements were strong, and no one could have blamed him for giving up his Canadian appointment under the circumstances. But listen to what he says about it: "The field of research was new, and India a country attracting much more European attention than this. I felt perfectly certain the investigation would lead to a very extended reputation. The salary offered me was more than double what I have here, an efficient staff was to be provided, with all kinds of those aids which an Indian Government could so readily afford. But, influenced by a rooted attachment to this country, and feeling that perhaps some favor have been extended to me, because I am a Canadian, I did not accept the offer." *

Sir William was the first to give us any definite information about those wondrous old Laurentian rocks which form the backbone of our continent. He shewed us that they were older than the Huronian, and that they consisted of a great series of metamorphosed sedimentary rocks, which are divisible into two unconformable groups, with a combined thickness of not less than 30,000 feet. The great beds of limestone which he found in the lower series, the plumbago, the iron ores, the metallic sulphurets, all seemed to point to the existence of life in the Laurentian days; but the discovery of *Eozoon Canadense* made

* Report of the Select Committee on the Geological Survey, p. 22.

conjecture give place to certainty. Now we *know* that the world of that far-off time was not a lifeless world. Life, whatever that may be, had been joined to matter.

The first specimens of *Eozoon* were found by Dr. James Wilson, of Perth; but at the time of their discovery were regarded merely as minerals. In 1858, however, Mr. J. McMullen, of the Geological Survey, discovered other specimens, the organic origin of which so struck Sir William that in the following year—four years before their true structure and affinities were determined by Dawson and Carpenter—he even exhibited them as fossils at the meeting of the American Association.

In widely extending our knowledge of the early geological history of the earth, Sir William has done a great work; indeed this may be regarded as his greatest work. Its importance has everywhere been recognized, and the name Laurentian, which he chose for the rocks at the bottom of the geological scale in America, has crossed the Atlantic, and is now applied to the homotaxial rocks of Europe. Sir Roderick Murchison, who dedicated the fourth edition of "Siluria" to Sir William Logan, even substituted Laurentian for "Fundamental Gneiss," the name which he had given to the rocks of the West Highlands of Scotland. "I at first," says Murchison, "termed them 'Fundamental Gneiss,' and soon after, following my distinguished friend, Sir William Logan, I applied to them his term, 'Laurentian,' and thus clearly distinguished them from the younger gneissic and micaceous crystalline rocks of the Central and Eastern Highlands, which were classed as metamorphosed Lower Silurian."

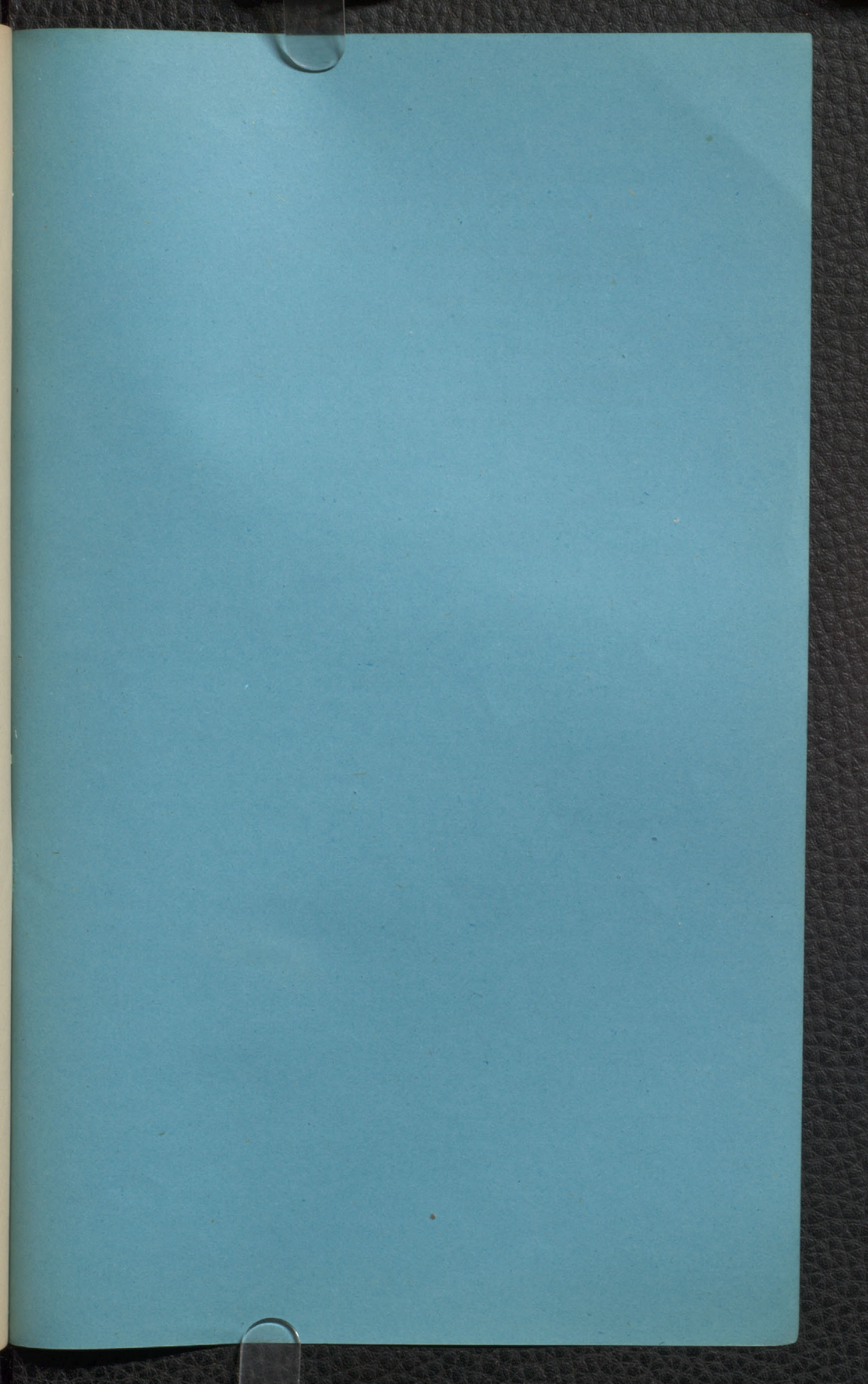
Logan was not a voluminous writer, and during the latter years of his life writing was a great effort to him. Occasional papers from his pen have appeared in the *Transactions of the Geological Society* of London, in the *Canadian Naturalist* and the *Canadian Journal*, and some of these have already been referred to; but most of what he has written is to be found in the *Reports of Progress* annually submitted to the Government, and in that invaluable book, the *Geology of Canada*, which is, to a large extent, a digest of what is contained in the reports published previous to 1863. He sometimes expressed himself quaintly, but everything he wrote is clear and exceedingly concise.

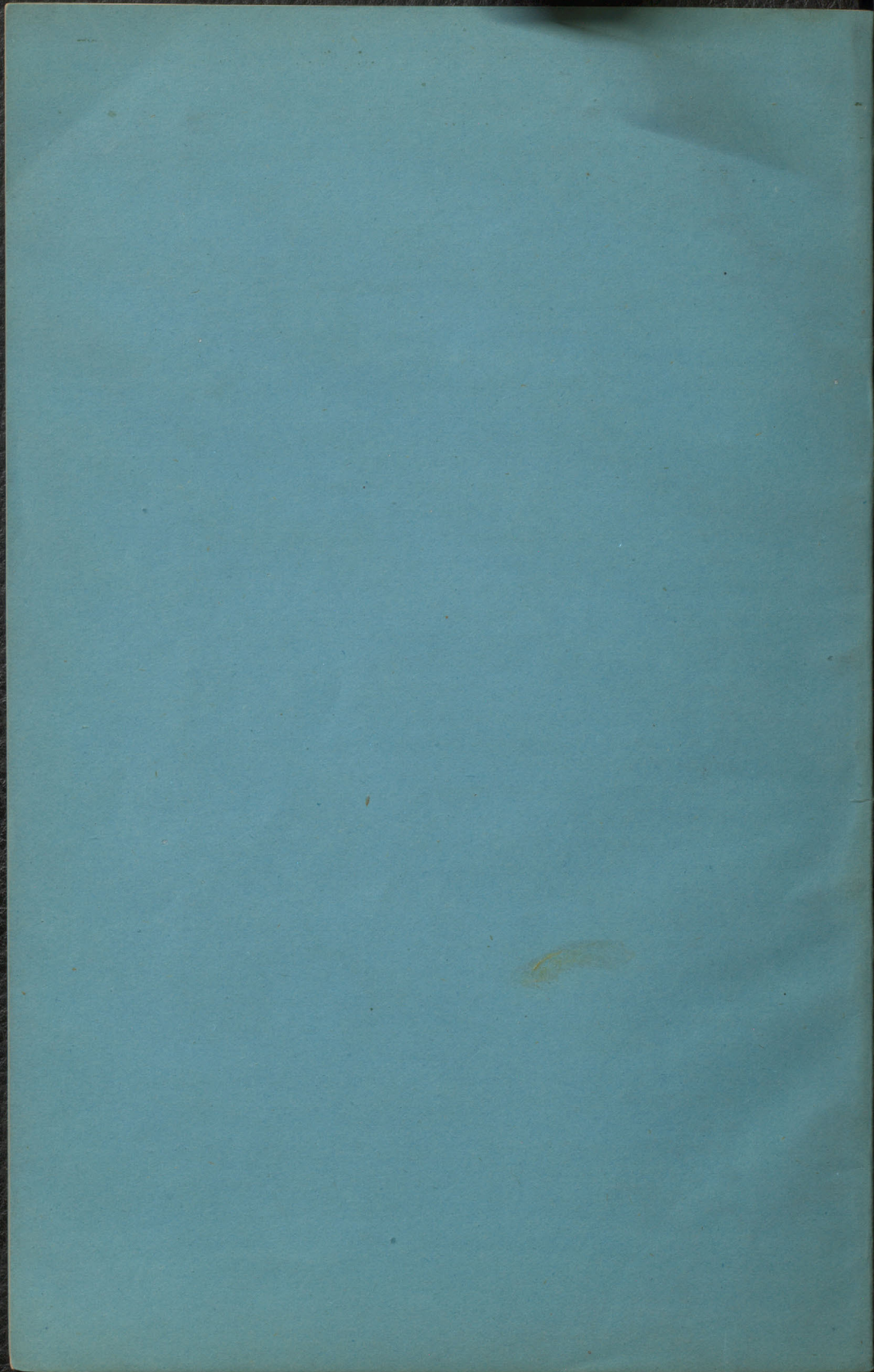
In addition to being a Fellow of the Royal Society and of the Geological Societies of London and Paris, he was a member

of numerous other learned societies both in Europe and America. At the time of his death, and for many years previous, he was one of our Vice-Presidents; but though frequently solicited to accept the office of President, he always declined,—not on account of any lack of interest in the Society, but because he felt his time was too fully occupied to permit of his successfully discharging the Presidential duties. We have already alluded to some of the medals which were awarded to him; but it may be mentioned that altogether he was the recipient of more than twenty, including two from the Royal Society.

And now, in concluding, let me say to you, my friends, if you would do honour to the memory of that noble old man, who fought so long, so bravely, for his country, for science, for you, then honour the cause for which he fought: strive with all your might to advance the interests of that cause, and to raise up a superstructure befitting the solid foundation which Logan has laid. He himself even hoped to build the superstructure; but his anticipations were not realized, for life was not long enough, and we must take up the mantle which he has dropped.

B. J. H.





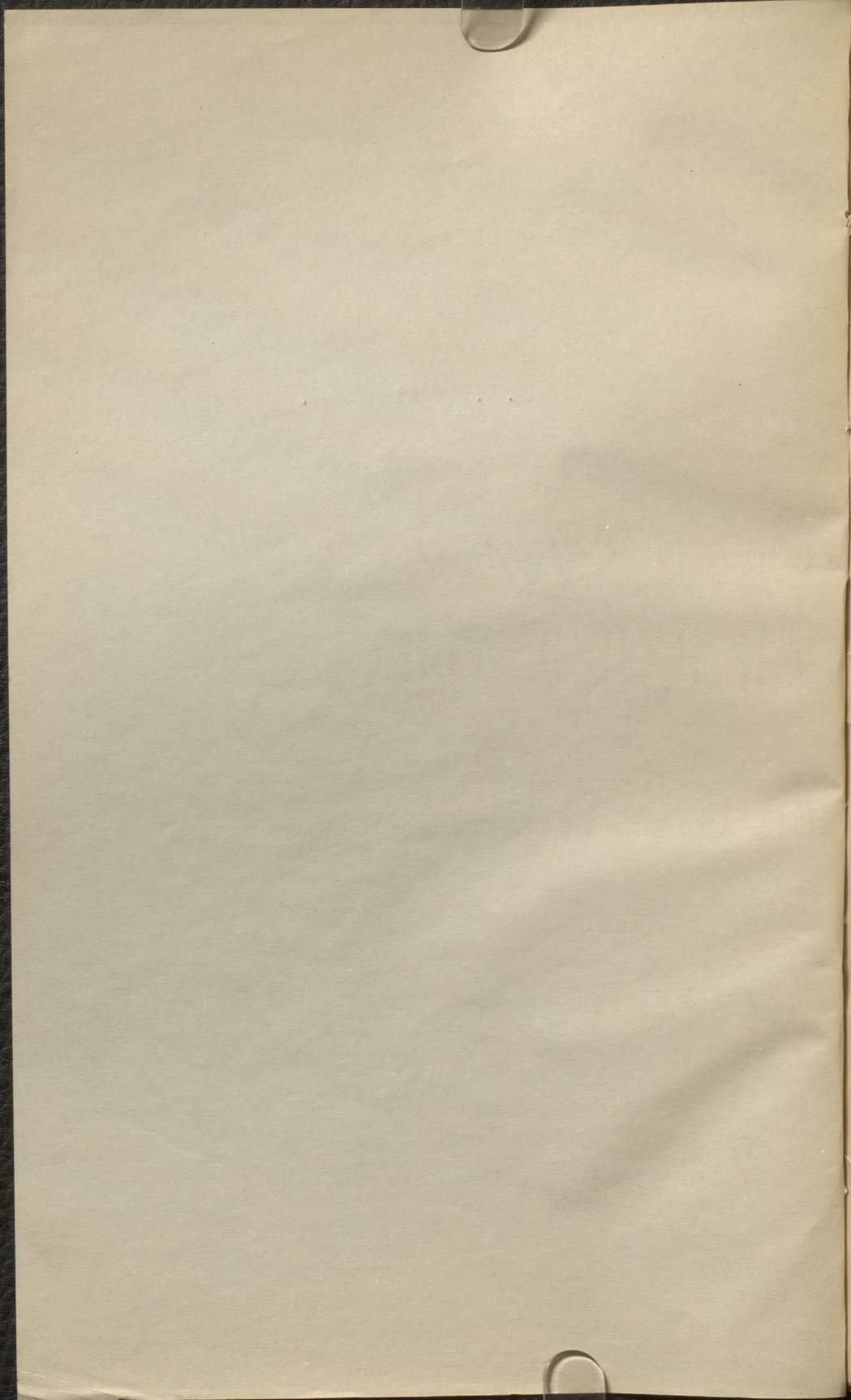
Biographies

(1699)

"SIR WILLIAM EDMOND LOGAN"

by

B.J.Harrington.



McGILL UNIVERSITY
DEPARTMENT OF GEOLOGY

Obituary of W. Logan

B. J. Harcourt

Can Nat. n. s. vol. 8. no. 1.
1875



Yours truly
W. E. Logan

SIR WILLIAM EDMOND LOGAN.*

On the 22nd of June, at Castle Malgwyn, Llechryd, South Wales, Canada's veteran geologist passed from his labours. For several years his health had been failing, and he felt more and more the need of rest and change of climate. Accordingly, in August, 1874, he crossed to the mother country, intending to pass the winter there, and then to return to his work in the spring. But rest and a more genial clime were unavailing, and now—kindest of friends, most indefatigable of workers for science and for his country—he is no more! We shall never again hear the ring of his hammer; but time cannot efface its marks, and deep-chiselled in the face of Cape Eternity, the generations of the future shall read the names—LOGAN and LAURENTIAN.

William Edmond Logan was born at Montreal, in 1798. He was of Scottish parentage, and his father, after a residence of many years in Canada, returned to Scotland, and purchased an estate near Stirling, known as Clarkstone. His education was begun at Mr. Skakel's school, in this city, and completed at the High School and University of Edingburgh.

On leaving college he betook himself to mercantile pursuits, and we find that in 1818 he entered the counting-house of his uncle, Mr. Hart Logan, of London. Here he remained for about ten years, and here, it is said, he first became fond of geology, making geological excursions into the country whenever opportunity afforded.

In 1829, he paid a visit to Canada; but, returning the same year, took up his residence at Swansea, in South Wales, where he was appointed manager of a copper-smelting establishment, and of coal mines, in which an uncle of his was interested. In 1834, he made a tour through France and Spain, visiting many of the mines in the latter country, and making many observations on the geology of the regions through which he passed. In 1838, his uncle dying, Mr. Logan resigned his position at Swansea. But the nine years he spent here were well-spent years; for not only had he gained a practical knowledge of

* Obituary notice read before the Natural History Society, October 25th, 1875.

mining and metallurgy, which afterwards proved of the greatest value to him, but had done a large amount of very excellent geological work—work which caused Dr. Buckland, of Oxford, to say of him, "He is the most skilful geological surveyor of a coal-field I have ever known." During his stay at Swansea, he was an active worker for the interests of the Royal Institution of South Wales. He was Honorary Secretary and Curator of the geological department, and the Institution is indebted to him for valuable collections of minerals and metallurgical products, besides books, drawings and laboratory apparatus. The whole of his geological work in South Wales he placed gratuitously at the disposal of the Ordnance Geological Survey of Great Britain, and it was not only gladly accepted, but published "without alteration," and made the basis of future work in that region. Concerning it, Sir H. T. De la Beche afterwards wrote as follows :

"Prior to the appearance of the Geological Survey in that part of the country, Mr. W. E. Logan had carefully investigated it, and at the meeting of the British Association for the Advancement of Science, held at Liverpool in 1837, he exhibited a beautifully executed map of it.

"The work on this District being of an order so greatly superior to that usual with geologists, and corresponding in the minuteness and accuracy of its detail, with the maps and sections executed by the Ordnance Geological Survey, we felt desirous of availing ourselves of it, when Mr. Logan most handsomely placed it at our disposal. Having verified this work with great care, we find it so excellent that we shall adopt it for that part of the country to which it relates, considering it but fair and proper that Mr. Logan should obtain that credit to which his labours so justly entitle him.

"His sections are all levelled and measured carefully with proper instruments, and his maps are executed with a precision only as yet employed, except in his case, on the Ordnance Geological Survey; it being considered essential on that survey, for the right progress of geology, and the applications to the useful purposes of life, that this accuracy and precision should be attained."

In 1840, Logan read a paper before the Geological Society of London, in which he explained, for the first time, the true relation of the *Stigmaria* underclays to the overlying beds of coal,

showing that the underclay was the soil in which the plants grew which were afterwards converted into coal. Of the 100 thick and thin coal-seams in the South Wales coal-field, he found that not a single one was without an underclay, and the inference appeared to be that there was some essential connection between the production of the one and the existence of the other. "To account," said he, "for the unfailing combination by drift, seems an unsatisfactory hypothesis; but whatever may be the mutual dependance of the phenomena, they give us reasonable grounds to suppose that in the *Stigmaria ficoides* we have the plant to which the earth is mainly indebted for those vast stores of fossil fuel which are now so indispensable to the comfort and prosperity of its inhabitants."

So much did he become interested in this subject that in the following year (1841) he crossed to America, and visited the coal-fields of Pennsylvania and Nova Scotia, in order to ascertain whether the same conditions existed there. Such he found to be the case; and in the following Spring he read an interesting paper before the Geological Society, the object of which, to use his own words, "was to state the occurrence immediately below the coal-seams of America of the same *Stigmaria* beds as had been observed below those of South Wales, and to shew the importance of this prevailing fact." Shortly after his return from America, he also visited coal-seams in the neighbourhood of Falkirk, Scotland, there too finding the *Stigmaria* clays beneath the coal.

It was during his visit to Nova Scotia, in 1841, that he discovered in the Lower Coal measures of Horton Bluff the footprints of a reptilian animal—a discovery which perhaps failed to attract as much attention as it deserved, although it was the first instance in which any trace of reptiles had been detected as low down in the geological scale as the Carboniferous. The winter of 1841-42 was also spent in Canada, and the facts obtained for a paper on the packing of ice in the St. Lawrence, which was subsequently read before the Geological Society of London.

Such, briefly, was the career of Logan previous to his appointment as Director of the Geological Survey of Canada. Already he had acquired a reputation in Britain as a geologist, and had given himself the best of trainings for the work upon which he was about to enter on this side of the Atlantic. But what was meantime passing in Canada?

"In January, 1832, a petition from Dr. Rae, praying for pecuniary assistance in prosecution of a geological and statistical survey of the province, was sent down by message to the Legislative Assembly, with a favourable recommendation from his Excellency Sir John Colborne, Lt. Gov. of Upper Canada. It was read and referred to the committee of supply, but not considered.

"In February, 1836, on the motion of Mr. W. L. Mackenzie, seconded by Mr. Durand, Messrs. R. G. Dunlop, Gibson and C. Duncombe were named a select committee to consider and report on a plan for a geological survey of the Province. Three hundred copies of this report were ordered to be printed, and it was referred to the committee of supply, but was not considered.

In November, 1836, on the motion of Mr. R. G. Dunlop, seconded by Col. Prince, the house went into a committee of the whole to consider the expediency of a geological survey, and, on their report being received, it was resolved that an address should be presented to His Excellency the Lieut. Governor (Sir F. B. Head), to ascertain whether there were any means at his disposal to effect a geological survey of the Province. The address was ordered to be drafted, but was not reported.

"In December, 1836, Mr. R. G. Dunlop gave notice that he would move an address to His Majesty for a grant of wild lands to defray the expense of a geological survey of the Province, but no address was presented.

"To Lord Sydenham, who well appreciated the importance of an examination into the mineral resources of Canada, the country is indebted for the commencement of the geological survey which has been instituted.

"In July, 1841, in the first United Parliament, a petition from the Natural History Society of Montreal, praying for aid to carry out a systematic geological survey of the Province, was presented by Mr. B. Holmes. It was referred to a select committee consisting of Messrs. Holmes, Neilson, Quesnel, Merrit, and the Hon. Mr. Killaly, but it was not reported on. A similar petition was presented by Mr. Black, from the Literary and Historical Society of Quebec, which was read. The government took up the matter, and on the motion of the Hon. B. Harrison, the sum of £1500 sterling for the purposes of a survey was introduced into the estimates."*

* From Scobie's Canadian Almanac for 1851.

Lord Sydenham dying in 1841, it fell to his successor, Sir Charles Bagot, to appoint a Provincial Geologist. Sir Charles referred the matter to Lord Stanley, Secretary of State for the Colonies, and His Lordship, on recommendation of Murchison, De la Beche, Sedgwick, and Buckland, offered the position to Mr. Logan in the spring of 1842.

Logan was now thoroughly in love with geology, and seeing in Canada the grandest of fields for original research, at once accepted. Still he well understood the difficulties which lay before him, and shortly afterwards addressed the following words to De la Beche: "You are aware that I have been appointed by the Provincial Government of Canada to make a Geological Survey of that Colony. The extent and nature of the territory will render the task a most laborious one; but I am fully prepared to spare no exertion of which I am capable to render the work, when it is completed, satisfactory to those who have instituted the examination and creditable to myself No one knows better than yourself how difficult it would be for one person to work with effect in all the branches of so extensive a subject. To carry out the field-work with vigour, to reduce all the sections with the requisite degree of accuracy, and map the geographical distribution of the rocks, to collect minerals and fossils, and to analyze the one, and by laborious and extensive comparisons, to determine the geological age of the other, is quite impossible without a proper division of labour..... In Canada, all the expensive means of palæontological comparison have yet to be brought together. There is no arranged collection of fossils, and no such thing as a geological library to refer to."

Arriving in Canada late in August, 1842, Logan devoted several months to making a preliminary examination of the country, and to collecting information with regard to the topographical work which had been accomplished. This was done entirely at his own expense. In December, he returned to England to fulfil engagements there, but came out again in the following spring. During his visit to the old country, he was so fortunate as to secure the services of Mr. Alexander Murray, a gentleman who afterwards proved himself an invaluable assistant and friend, and who has contributed largely to our knowledge of the geology of Canada, and, more recently, to that of Newfoundland.

Reaching Halifax on the 20th of May, Logan spent several weeks in examining portions of the coal-fields of Nova Scotia and New Brunswick, and it was at this time that he made his section of the Coal Measures at the South Joggins, which, as has been truly said, is "a remarkable monument of his industry and powers of observation." It gives details of nearly the whole thickness of the Coal formation of Nova Scotia, or 14,570 feet, including 76 beds of coal and 90 distinct *Stigmaria* underclays. Shortly after his visit to the Joggins, he wrote to a friend as follows: "I never before saw such a magnificent section as is there displayed. The rocks along the coast are laid bare for thirty miles, and every stratum can be touched and examined in nearly the whole distance. A considerable portion has a high angle of inclination, and the geological thickness thus brought to view is very great. I measured and registered every bed occurring in a horizontal distance of ten miles, taking the angle of dip all the way along." And again, in a letter to De la Beche written in the spring of 1844, referring to the Joggins section, he says: "Since my return from field-work, I have reduced all the measurements and made out a vertical column. It occupies fifty-four pages of foolscap, closely written, and you will be astonished at the details in it."

Reaching Gaspé early in July, the summer and autumn were spent in making an examination of the coast, while Mr. Murray was at work in the Upper Province, examining the country between Lakes Huron and Erie. The Gaspé peninsula had been selected by Mr. Logan as the field for his first operations, as it was thought that outlying patches of the Carboniferous might be found to exist there, and the government was especially anxious to ascertain whether there was any truth in the reported occurrence of coal.

The following season, the work in Gaspé was continued, the Director being this time accompanied by Mr. Murray, who, in 1845, again carried on the work, while Mr. Logan was engaged in explorations on the Upper Ottawa and Mattawan. Altogether, during the three seasons, 800 miles of the Gaspé coast were examined, and several sections made across the peninsula, from the St. Lawrence to Bay Chaleur. No coal was found, but many geological facts of importance were accumulated, and a large amount of topographical work accomplished in what was previously almost a *terra incognita*.

“Living the life of a savage, sleeping on the beach in a blanket sack with my feet to the fire, seldom taking my clothes off, eating salt pork and ship’s biscuit, occasionally tormented by mosquitoes,”—such is the record which Logan has left us of his Gaspé life, the foretaste of what was to be endured for many years. From early dawn till dusk he paced or paddled, and yet his work was not finished, for while his Indians—often his sole companions—smoked their pipes round the evening fire, he wrote his notes and plotted the day’s measurements.

To give details of his work during the many remaining years of his life would be to write a book; and all that we can do here is to trace briefly what his movements were, at the same time calling special attention to those of his labours which have given him a world-wide fame.

The summer of 1846 found him studying the copper-bearing rocks of Lake Superior. These he shewed to consist of two groups of strata, the “upper” and the “lower,” the latter of which was seen at Thunder Bay to rest unconformably upon chloritic slates belonging to an older series, to which the name of Huronian was subsequently given. This older set of rocks, which he had already observed, in 1845, on Lake Temiscamang, he had ample opportunity of studying in 1848, when he devoted several months to an examination of the Canadian coast and islands of Lake Huron, where the formation attains—as shewn by Murray—a thickness of 18,000 feet.

The seasons of 1847 and 1849, and a portion of that of 1848, were employed in studying the rocks of the Eastern Townships. Part of these were shown to be a prolongation of the Green Mountains of Vermont, and to consist of altered Silurian strata instead of “Primary strata,” as was previously supposed by American geologists. In 1849 also, a short time was spent in an examination of the rocks about Bay St. Paul and Murray Bay, where coal had been reported to exist. The member for Saguenay county had previously made application to the Legislature for means to carry on boring operations in the vicinity of Bay St. Paul, but before his request was granted it was deemed advisable to obtain the opinion of the Provincial Geologist. By this means the Government was saved a large and useless expenditure of money.

In 1850 an examination was made of the gold-bearing drift of the Chaudière, and the auriferous district found to extend over

an area of between 3,000 and 4,000 square miles. Most of the year, however, was devoted to the collection of specimens for the London Exhibition of 1851, at which Mr. Logan acted as Juror. His visit to England at this time must have been for him an agreeable change. After a lapse of eight years to meet again with men like De la Beche, Murchison, and Lyell, to hear from their own lips of the strides which science had been making, and in turn to tell of all that he had himself seen and done; surely this was a treat that none but the scientific man can understand who has long been well-nigh deprived of the society of brother scientists. For him, however, there was little relaxation from labour, for he toiled early and late in order that the Canadian minerals might be displayed to the best advantage. And every one knows the result—the collection elicited universal admiration, and Mr. Logan received a highly complimentary letter of thanks from the Prince Consort, and was elected a Fellow of the Royal Society, his name having been proposed by Sir Roderick Murchison.

Returning to Canada in August, before the close of the Exhibition, his explorations were renewed with undiminished vigour, and the remainder of the season devoted to an examination of the rocks in the county of Beauharnois, where the Potsdam sandstones had afforded those curious tracks of crustaceans to which Owen gave the name of Protichnites, and to a further study of the Chaudière gold region. During the winter he again visited England to attend to the distribution of a portion of the Exhibition collection which was to be left there, and see to the return of the remainder.

In 1852 an examination was made of a strip of country on the north side of the St. Lawrence, extending from Montreal to Cape Tourmente below Quebec. The distribution of the fossiliferous rocks was accurately determined, and several excursions made into the hilly "metamorphic country" to the north. In his report on this season's operations, published in 1854, Logan for the first time designated the rocks comprising these hills as the "Laurentian series," substituting this for "metamorphic series," the name which he had previously employed, but which, as he says, is applicable to any series of rocks in an altered condition.

The following season was spent among the Laurentian hills of Grenville and the adjoining townships, a field which proved so attractive that he afterwards returned to it in 1856 and 1858.

Nearly the whole of 1854 was occupied in making preparations for the Exhibition which was to take place at Paris in the following year, and to which Mr. Logan was to go as one of the Canadian Commissioners. It was in the autumn of 1854 also, that a select committee was appointed by the Canadian Government to inquire into the best method of making the information acquired by the Geological Survey more readily accessible to the public. A lengthy report on the subject—indeed on the entire working of the Survey—was published, and the evidence which it contains is of a most flattering character, both as regards the Director and those associated with him.

Then came the Paris Exhibition of 1855, at which the representation of the economic minerals of Canada was so complete and the arrangement so admirable that the collection attracted universal attention. This in itself Logan would have regarded as amply repaying him for his trouble, but greater honour was in store for him. The Imperial Commission presented him with the grand gold medal of honour, and the Emperor of the French made him a Chevalier of the Legion of Honour. Early in the following year (1856) he was knighted by Queen Victoria, and received from the Geological Society of London the Wollaston Palladium Medal in recognition of his distinguished labours in geology. Long previous he had won the confidence and esteem of his fellow-countrymen in Canada, but this seemed to be a fitting time to testify to him their appreciation of his worth. Accordingly, on his return to Montreal, the citizens presented him with a testimonial on which were engraved the words:

“In commemoration of his long and useful services as Provincial Geologist in Canada, and especially his valuable services in connection with the Exhibition of all Nations in London in 1851, and in Paris in 1855, by which he not only obtained for himself higher honor and more extended reputation, but largely contributed in making known the natural resources of his native country.”

The Natural History Society of Montreal presented him with an address, and made him an honorary member, while the members of the Canadian Institute of Toronto, of which Sir William was the first President, had his portrait painted and hung up in their hall. They also presented him with an address expressive of their affectionate esteem and respect. Sir William's reply to this was so full of feeling, and so highly characteristic,

that we give a portion of it: "Whatever distinctions," said he, "may be bestowed on us at a distance, it is upon the respect, esteem, and confidence shewn us at home, that our happiness and satisfaction must chiefly depend. I can assure you with sincerity that the honor conferred upon me when you elected me the first President of the Institute, was one highly prized, although the circumstances of a distant domicile and the intent pursuit of the investigations with which I am charged, rendered it extremely difficult for me to be of much use in your proceedings. . . . It is a fortunate circumstance for me that my name should be connected with an act of grace on the part of Her Majesty, which serves to confirm your feeling in regard to the fact that as Canadians we enjoy a full share in the honors and privileges of British subjects. And I am proud to think that it was perhaps more because I was a Canadian, in whom the inhabitants of the Province had reposed some trust, that the honor which has been conferred upon me by Her Majesty was so easily obtained. That I am proud of the honors which have been bestowed upon me by the Emperor of France, in respect to my geological labors, and also by my brother geologists in England, there can be no doubt. But I have striven for these honors because I have considered they would tend to promote the confidence which the inhabitants of the Province have reposed in me, in my endeavors to develop the truth in regard to the mineral resources of the Province; and in this work none could have been more interested in my success than the members of this Institute." *

In August, 1857, the American Association for the Advancement of Science held its annual meeting in Montreal, and for several months previous Sir William was hard at work getting his museum in readiness to receive his brother geologists. Owing largely to his untiring exertions, the meeting was a most successful one. He himself read two interesting papers, one on the "Huronian and Laurentian Series of Canada," and another on the "Sub-division of the Laurentian Rocks of Canada." After the business of the Association was concluded, accompanied by Professor Ramsay, who had come over to represent the Geological Society of London, and Prof. Hall, he made a Geological tour through New York State. Returning from this

* Can. Journal, New Series, Vol. 1, p. 404.

trip, he spent the autumn months among the Laurentian rocks of Grenville. Here too, as already mentioned, he continued to work during the season of 1858.

For several years after this, his time was much taken up with the preparation and publication of the *Geology of Canada* and its accompanying Atlas, the former of which appeared in 1863, and the latter in 1865. Before these could be completed, however, many facts had to be added to the stock already obtained, and besides a large amount of geological work among the Laurentian rocks of Grenville and the rocks of the Eastern Townships, a personal examination of many parts of the country, as well as of portions of the New England States, was rendered necessary.

In 1862, Sir William was again present, in the capacity of Juror, at the London International Exhibition, and again displayed a large and interesting collection of economic minerals. Another opportunity of seeing his scientific friends in Britain was also afforded him in 1864, when he went to London to superintend the engraving of the Atlas already mentioned. In 1866, a geological collection was again prepared for the Paris Exhibition of 1867, and Sir William worked so closely in getting up a geological map to accompany it that he is said to have nearly ruined his eyesight. 1868 found him once more on this side of the Atlantic, hard at work in the Pictou coal-field, and the results of this season's work constitute the last of his reports. In 1869, he resigned his appointment to Mr. Selwyn, the present Director of the Survey.

The few remaining years of his life were occupied chiefly with a study of the rocks of the Eastern Townships and portions of New England; but, unfortunately, the conclusions at which he arrived concerning them were not published.

No man has done as much as Sir William Logan to bring Canada before the notice of the outside world, and no man is more deserving of being held in remembrance by the people. Just as statesmen or generals have risen up at the moment of greatest need to frame laws or fight battles for their country, so Sir William appeared to reveal to us the hidden treasures of Nature, just at a time when Canada needed to know her wealth in order to appreciate her greatness. For rising nations require to know what their resources are. He possessed rare qualities—qualities, which, combined, eminently fitted him for his work.

He was strong in body, of active mind, industrious and doggedly persevering, painstaking, a lover of truth, generous, possessed of the keenest knowledge of human nature, sound in judgment, but always cautious in expressing an opinion.

He belonged to that school of geologists—unfortunately not so numerously represented as it ought to be—whose motto is, “Facts, then theories,” and was wholly above rasping down facts to make them fit theories. As a consequence, he rarely had to un-say what was once said; and this is why he so thoroughly gained the public confidence. So long as he felt that he was in the right, he held to his own views as tenaciously as did ever any true Scot; but if shewn to be in the wrong, he knew how to surrender gracefully.

Those who have clambered with him over our log-strewn Laurentian hills know well what were his powers of endurance. He never seemed to tire, never found the days long enough. His field-books are models of carefulness, replete with details, and serve as an example of the painstaking way in which he did all his work. They were written in pencil, but regularly inked in at night, when the camp fire was often his only light. In addition to his field-book proper, he frequently kept a diary, and delighted to jot down little every-day occurrences, or sketch objects of interest—for the hand that could so well wield a hammer, could also guide a pencil and produce drawings of no mean artistic skill. His descriptions of his backwoods experiences are often very amusing, and we cannot resist giving a specimen. He had been travelling through the forest for two months and had suddenly come upon the house of a settler called Barton, whose good wife was justly alarmed when Sir William and party entered her dwelling. Sir William describes his appearance, on this occasion, as follows:—“We are all pretty-looking figures. I fancy I cut the nearest resemblance to a scarecrow. What with hair matted with spruce gum, a beard three months old, red, with two patches of white on one side, a pair of cracked spectacles, a red flannel shirt, a waistcoat with patches on the left pocket,—where some sulphuric acid, which I carry in a small vial to try for the presence of lime in the rocks, had leaked through,—a jacket of moleskin, shining with grease, and trowsers patched on one knee in four places, and with a burnt hole in the other; with beef boots—Canada boots, as they are called—torn and roughened all over with scraping on the stumps

and branches of trees, and patched on the legs with sundry pieces of leather of divers colours; a broad-brimmed and round-topped hat, once white, but now no colour, and battered into all shapes. With all these adornments, I am not surprised that Mrs. Barton, speaking of her children, and saying that here was "a little fellow frightened of nothing on earth," should qualify the expression by saying, "but I think he's a little scared at *you*, Sir."

It was not alone in the field that Sir William was busy. His office work was often most arduous, and during the earlier years of his directorship, in addition to preparing his annual report, he even kept the accounts, entering every item of expenditure, so that he could at any time shew exactly how every penny of the public money placed at his disposal had been spent. He also tells us that, with his own hands, he made, at that time, four manuscript copies of the Annual Report of Progress, often reaching more than one hundred printed pages—one copy for the Government, one for the House of Assembly, one for the Legislative Council, and one for the printer.

His manner of living was simple as it was solitary. Like his four brothers, he never married, nor does he seem to have formed many intimate friendships. Still every one who knew him loved him and respected him, and if you go the length and breadth of all the land, you will everywhere hear his praises, alike from rich and poor.

He peculiarly possessed the power of inspiring others with his own enthusiasm; not only those in his employ, but even uneducated farmers and backwoodsmen—men who, as a rule, are rather sceptical about the advantages to be derived from geology.

Though possessed of private means, he spent little upon himself; not that he was parsimonious, but he cared not for fashion or luxury. But with him Science never pleaded her needs in vain. The first grant of the Legislature, to make a geological survey of the Colonies, was £1,500—an amount which, Sir William quaintly remarked, was but a drop of what would be required to float him over twenty-five degrees of longitude and ten of latitude. This was, of course, very soon spent, and not only this, but at the end of the second year the Survey was £800 in his debt, and he had no guarantee whatever that his money would be returned to him. Since then the Survey has been constantly indebted to him for books, instruments, and other aids, and the building on St. James street, now used for office

purposes, was built by him, two years ago, and rented to the Government for about half the amount which he could have obtained from other tenants. To Logan also, McGill University owes much; for, in 1864, he founded and endowed the "Logan Gold Medal" for an honor course in geology and natural science, and, in 1871, gave \$19,000, which, together with \$1,000 given by his brother, the late Mr. Hart Logan, forms the endowment of the "Logan Chair of Geology."

Since resigning his position as Director of the Geological Survey, he has carried on explorations at his own expense, and at the time of his death arrangements had been nearly completed for putting down a bore-hole in the Eastern Townships, at a cost of \$8,000; as he thought that this would enable him to prove the truth of his views with regard to the age of the metamorphic rocks there.

Every one knows how nobly he acted when asked by the East India Company, in 1845, to make an examination of their territory for coal. The inducements were strong, and no one could have blamed him for giving up his Canadian appointment under the circumstances. But listen to what he says about it: "The field of research was new, and India a country attracting much more European attention than this. I felt perfectly certain the investigation would lead to a very extended reputation. The salary offered me was more than double what I have here, an efficient staff was to be provided, with all kinds of those aids which an Indian Government could so readily afford. But, influenced by a rooted attachment to this country, and feeling that perhaps some favor have been extended to me, because I am a Canadian, I did not accept the offer."*

Sir William was the first to give us any definite information about those wondrous old Laurentian rocks which form the backbone of our continent. He shewed us that they were older than the Huronian, and that they consisted of a great series of metamorphosed sedimentary rocks, which are divisible into two unconformable groups, with a combined thickness of not less than 30,000 feet. The great beds of limestone which he found in the lower series, the plumbago, the iron ores, the metallic sulphurets, all seemed to point to the existence of life in the Laurentian days; but the discovery of *Eozoon Canadense* made

* Report of the Select Committee on the Geological Survey, p. 22.

conjecture give place to certainty. Now we *know* that the world of that far-off time was not a lifeless world. Life, whatever that may be, had been joined to matter.

The first specimens of *Eozoon* were found by Dr. James Wilson, of Perth; but at the time of their discovery were regarded merely as minerals. In 1858, however, Mr. J. McMullen, of the Geological Survey, discovered other specimens, the organic origin of which so struck Sir William that in the following year—four years before their true structure and affinities were determined by Dawson and Carpenter—he even exhibited them as fossils at the meeting of the American Association.

In widely extending our knowledge of the early geological history of the earth, Sir William has done a great work; indeed this may be regarded as his greatest work. Its importance has everywhere been recognized, and the name Laurentian, which he chose for the rocks at the bottom of the geological scale in America, has crossed the Atlantic, and is now applied to the homotaxial rocks of Europe. Sir Roderick Murchison, who dedicated the fourth edition of "*Siluria*" to Sir William Logan, even substituted Laurentian for "Fundamental Gneiss," the name which he had given to the rocks of the West Highlands of Scotland. "I at first," says Murchison, "termed them 'Fundamental Gneiss,' and soon after, following my distinguished friend, Sir William Logan, I applied to them his term, 'Laurentian,' and thus clearly distinguished them from the younger gneissic and micaceous crystalline rocks of the Central and Eastern Highlands, which were classed as metamorphosed Lower Silurian."

Logan was not a voluminous writer, and during the latter years of his life writing was a great effort to him. Occasional papers from his pen have appeared in the *Transactions of the Geological Society* of London, in the *Canadian Naturalist* and the *Canadian Journal*, and some of these have already been referred to; but most of what he has written is to be found in the *Reports of Progress* annually submitted to the Government, and in that invaluable book, the *Geology of Canada*, which is, to a large extent, a digest of what is contained in the reports published previous to 1863. He sometimes expressed himself quaintly, but everything he wrote is clear and exceedingly concise.

In addition to being a Fellow of the Royal Society and of the Geological Societies of London and Paris, he was a member

of numerous other learned societies both in Europe and America. At the time of his death, and for many years previous, he was one of our Vice-Presidents; but though frequently solicited to accept the office of President, he always declined,—not on account of any lack of interest in the Society, but because he felt his time was too fully occupied to permit of his successfully discharging the Presidential duties. We have already alluded to some of the medals which were awarded to him; but it may be mentioned that altogether he was the recipient of more than twenty, including two from the Royal Society.

And now, in concluding, let me say to you, my friends, if you would do honour to the memory of that noble old man, who fought so long, so bravely, for his country, for science, for you, then honour the cause for which he fought: strive with all your might to advance the interests of that cause, and to raise up a superstructure befitting the solid foundation which Logan has laid. He himself even hoped to build the superstructure; but his anticipations were not realized, for life was not long enough, and we must take up the mantle which he has dropped.

B. J. H.

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