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AND THE
GEOLOGICAL SURVEY
OF
CANADA

BY

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SIR WILLIAM LOGAN

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By DR. ROBERT BEAL, F.R.S., Ottawa, Ont.

The life of the late Sir William Logan and the history of the Geological Survey of Canada are so intimately connected with one another that a complete account of the one would necessarily comprise that of the other. It is not the intention however, in the present paper to attempt even a brief history of the life of Logan, but rather to give a selection of incidents and anecdotes illustrative of the man from all points of view. These are personal reminiscences, as the writer had the honour of being intimately associated with Sir William from the beginning of 1857, now 50 years ago, till he left this country, or during a period of 17 or 18 years, and of seeing him under a great diversity of circumstances. A correct narrative of a sufficient variety of incidents bearing on all points in a man's life gives one a truer idea of the man himself than the general assertions of a biographer, who pictures his subject only as he himself wishes, or as he thinks he should be described. In referring here to the history of the Geological Survey it is sufficient to say that its origin was due principally to the action of the Natural History Society of Montreal in presenting a petition to the first Parliament of the united provinces of Upper and Lower Canada. This petition, which, by the way, it is understood originated in a suggestion from the late Rev. Dr. Matheson of Montreal, was seconded by a similar one from the Literary and Historical Society of Quebec. The first grant for the Survey was only £1,500 sterling, but after that the amount for some ten years was £2,000 sterling annually. It was not, however, until toward the close of Logan's administration that the amount exceeded \$20,000 a year, and the average annual grant during his time may be said to have been only about \$15,000. This should be remembered in estimating what he accomplished. Mr. Logan was appointed Provincial Geologist in 1842 and began the Survey in the spring of 1843.

At the time work was commenced on the Canadian Survey, field geologists were often subjected to a kind of annoyance from which they are now almost free, thanks to the greater enlightenment of the present time which has given most people some notion of what they are doing. I refer to the fact that a geologist when seen at work was generally mistaken for a lunatic. In case this may be doubted by young geologists who have never been so misunderstood, I will give in the course of my narrative two or three out of a large number of cases of Logan's difficulties which occurred mostly between fifty and sixty-five years ago. Even strangers who were otherwise well enough educated, on noticing Logan pounding rocks, have been known to enquire, "is he all right in the head." Logan's indifference to appearances in the matter of dress often added to his troubles in regard to his supposed insanity, as we shall see.

Logan was born in Montreal of Scotch parents. As a young man he had been engaged in the copper-smelting business at Swansea in South Wales. In connection with the coal supply required at this centre of metallurgical industry he was led to make a geological survey of one of the Welsh coal fields, which was found to be so complete and accurate that it was soon after adopted *in toto* by the official Geological Survey of Great Britain.

Logan's selection as Provincial Geologist of Canada was due partly to the fact just stated and partly to his being a native Canadian. Mr. Alexander Murray from Scotland, a naval officer who had a liking for geology, was chosen by Logan as his chief assistant.

When the Survey was commenced in 1843 that of the State of New York had already made some progress and as the same rock formations extend from that State into Canada, Logan wisely adopted the formational names of the New York geologists in order to secure as much uniformity as possible.

One of his greatest services to geology was his early investigation of the ancient crystalline rocks, his separation of the Huronian from the Laurentian, to which he gave those names, and his working out of some areas of the Laurentian in the Ottawa Valley as well as his cooperating with Murray in defining the Huronian in the Lakes Superior and Huron regions.

While Murray worked principally in Upper Canada, Logan's time was mostly devoted to the rocks of the Lower province south of the St. Lawrence. In connection with this work, the subject of metamorphism played an important part, but in these field investigations Logan had not the advantages he might have derived from the microscopic study of rocks if he had lived a generation later. But even without this most important help he did a marvellous amount of good work in classifying the rocks and in accurately mapping in great detail their structure and distribution over the large area which comprises the Eastern Townships.

Among his discoveries in the course of this work was that of the great fault or dislocation which runs up the valley of the Hudson river, passing through the Eastern Townships and down the course of the lower St. Lawrence river.

At the time the Geological Survey was begun, only a few economic minerals were known to exist in Canada, but Logan rapidly extended the number and since that time the Survey has sent fine collections to every International Exhibition which has been held from that of 1851 to those of the present time. One of the red-letter incidents of Logan's life was the great banquet given him by the citizens of Montreal on his return from the Paris exhibition of 1855, just after he had been knighted by Queen Victoria. On this occasion he was presented with a beautiful silver fountain with several basins, one above another, on which were engraved unusually fine pictures of Carboniferous flora, symbolical of his work in Wales which had contributed largely to his Canadian appointment.

The office and museum were first located in Great St. James Street, Montreal, at the corner of what is called Dollard Street, on the site of Savage and Lymans, afterwards Woods' jewellery store. After three or four years the headquarters were removed to the Natural History Society's rooms, near the east end of Little St. James Street. About 1852, when the Crown Lands Department had finally vacated its building, No. 76 St. Gabriel Street, it was handed over to Logan to be used for the Geological Survey. At the time the writer began work on the Survey, early in 1857, the interior of this building was being fitted up as a museum, out of a government grant obtained by the late Hon. John Young, who was a great friend of Logan. Sir William had often

told him how much he would like to secure two or three hundred pounds for this purpose. In 1855-56, Mr. Young was Commissioner of Public Works and without any special application from Sir William he got £1,000 currency, (\$1,000) passed in the estimates to cover the expense of this work. Sir William was almost overpowered by the liberality of the grant, which was so much larger than he had hoped for.

Sir William's ardent devotion to his duties, both in the office and the field were well calculated to inspire enthusiasm in others. In the office, besides laboring from early in the morning till 6 or 7 in the evening, he always came back to work at night, except on those occasions when he went out to dinner. He paid daily and sometimes more frequent visits to every man in the office and interested himself with everyone's ideas of his work, correcting any erroneous notions and imparting in the most pleasant manner an immense amount of instruction in all branches of known geological science, and also in regard to drawing geological sections and topographical and geological maps, in which arts he was himself very proficient.

His own industry was almost phenomenal. He slept in the museum among his idols as a child likes to sleep with her toys around her. No one seemed to know when he arose and went out in the morning. He appeared to be generally attending to the outside business of the Survey up to half-past seven or eight o'clock, when he breakfasted at Madame Duperry's boarding house, round the corner from the office, in Little St. James Street. When the reports were in press he visited Mr. Lovell's establishment in St. Nicholas Street at 7 o'clock or earlier. Mr. Lovell, who was an intimate and life-long friend of Logan's, informed the writer that on some occasions he came to work as early as 5 o'clock. He never took any luncheon, but indulged in a hearty dinner at 7, after 12 hours of continuous work. This could not fail to be injurious to his health and his medical adviser, the late Dr. Fraser, strongly urged him to eat something in the middle of the day. Sir William tried to do so, but was so absorbed in his work that he almost always forgot about it till too late in the afternoon. If any of us reminded him that it was luncheon time, he would say, "O, bother the lunch" and proceed to swallow a few mouthfuls as if he grudged the requisite time.

To give an idea of the amount of work he accomplished, it may be mentioned that in addition to his daily round of visits of instruction or consultation with every member of the staff, he kept all the accounts with his own hand, carried on an extensive correspondence, without the aid of the type-writer, then unknown, plotted all his own surveys and constructed his own original maps, wrote his reports, edited the reports of his assistants, examined all the fossils, minerals and rock-specimens collected during the year, studied the reports of the geological surveys of the different American States and of any other geological surveys which might be going on, in order to correlate the Canadian work with that of other countries so as to keep up with the times. The interruptions caused by visitors, to whom he was always accessible, occupied a considerable portion of each day.

For a number of years, four MS copies of all reports including the annual Reports of Progress were required—one for the Governor-General, one for the House of Assembly, one for the Legislative Council and one for the printer, and Logan wrote out all of these with his own hand. Even the device of copying by damp paper in a press had not been thought of at that time. Imagine writing a book of geological details four times over! No one but a man of the utmost industry and patience could have endured it.

Another irksome task which he plodded through year after year, almost to the last, was auditing all the detailed accounts of petty expenses and copying every item, including the vouchers, into his books, which he kept with his own hand, by double entry in the most beautiful style. In talking of this matter with him one day, the writer ventured to remark that he might spare himself a great deal of drudgery by employing a book-keeper. He replied that he would rather leave a record in his own handwriting of how he had expended every penny with which the Government had entrusted him. Said he, "After I am dead no one will ever be able to find fault with my books of accounts."

Sir William's room in St. Gabriel Street, was of a good size on the second floor and had but one large window, which looked into the yard. This room served for office and mapping room, reception-room, bed-room, wardrobe, etc. It contained only the most essential articles of furniture and these were but three or four in number. There was no curtain or even screen in the win-

dow, which faced the south and the unbroken rays of the sun shone unheeded on Sir William's head. There was, of course, no carpet—not even a small rug on the floor. A plain table and the cheapest kind of chair stood in the centre of the room, and a common washstand, with piteher and basin in one corner. He slept in this room, but no bedstead was visible. The way he managed was this: He had an ingenuous sort of combination iron bedstead and chair. During the day this occupied a corner and looked like a large easy chair, but Sir William was never known to sit down in it. At night the caretaker of the building folded this out straight and revealed inside of it the same blankets which served him in camp. What forced itself most on the attention of a stranger entering the room for the first time, was the great number of worn boots and shoes which it contained. They stood in a row against the wall around a considerable part of the circumference of the room. A few surveying instruments and a large collecting basket stood about or hung by straps at the back of the door. The clothes he wore in the woods (and which will be presently described) also hung on pegs or nails on the wall.

Such was the room in which Logan worked, but about 1860 a new feature was introduced in the shape of an immense slab of sandstone which entirely covered the wall on one side. This slab was from Perth in Upper Canada, and was traversed by crustacean tracks called *Climactienites Wilsoni*. Every morning Sir William gazed on this slab with fond admiration, first with one eye and then with the other, as he held his towel and dried his face with alternate hands.

Sir William had a singular disregard for appearances. If he happened to come into town from his field-work, he would not always put on his city clothes, only doing so when he returned for the winter. About 1862 he purchased a new coat for city wear. It was a sac or pea-jacket of most durable brownish-gray Irish frieze, and, if I am not mistaken, he wore it every winter till he finally left the country in 1874. During the same period, and probably for some time before, he wore a waistcoat with large squares formed by narrow white lines at right angles. We got so accustomed to these garments that they seemed to form part of the man himself.

The trouble of getting anything new to wear, or the change it made in his appearance, seemed distasteful to him. He walked so much that he wore out more boots than clothes. When he happened to notice that his last pair would hold out no longer, he would suddenly ring his bell and on the care-taker presenting himself, would say, "Michael, go and get me 3 or 4 pairs of new boots. You know the kind I want." This would fit him out for a year or two.

In the city, he wore a beaver hat of the original old pattern and material—a regular shaggy old fellow, of genuine beaver fur—none of the modern kind covered with thin shiny silk. This hat became as familiar as the genial face beneath it. But one day, while some of us were looking out of a window in the wing, (among the number being Dr. Hunt), Sir William passed through the yard on his way out to the street. "I declare," exclaimed the Doctor, "Sir William has got a new hat at last"—and, sure enough, there was Logan with the most gorgeous silk hat, which money could buy. Towards evening, when the Doctor wished to go home for dinner, he came back to enquire if anyone had seen Sir William return; for, said he, "the fine hat he was unconsciously wearing this afternoon is my own and I have no other in the place. I'm a prisoner for want of a hat!" We suggested that as Sir William was wearing his hat, he might fairly take Sir William's. He replied that he "might do so when it got dark enough."

The modesty of Sir William's attire enabled him to preserve a pretty general incognito, even in Montreal. Here is an example. One day the writer was talking with a prominent citizen of the time, in one of the rooms of the Museum, when a well-dressed member of the staff walked through. As soon as he had passed out of the door, my friend, looking after him, said, "What a fine-looking man Sir William is!" "That's not Sir William," I said, "that's Mr. O'Farrell the care-taker." "Well now," said he, "for years I have taken that man for Sir William Logan and I am sure many others in Montreal are doing the same thing at this moment."

It will thus be seen that Sir William's dress in the city was unpretentious, but in the country and in camp, in the bush in particular, it may almost be said to have been a little careless. To avoid a semblance of exaggeration the following description

of himself is copied from one of his note-books : On the occasion referred to, Sir William and his party had entered the house of a settler named Barton and their appearance very much frightened his wife. He wrote in his notes of the day: "We are all pretty-looking figures. I fancy I cut the nearest resemblance to a "scare-crow. 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 trousers patched on one leg in four places and with a burnt "hole in the other leg; 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 colors, a broad brimmed and round- "topped hat, once white but now no color 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 adding, 'but I think he's scared at *you*, Sir.'"

Even when working in settled parts of the country and staying at taverns and farm houses, his attire was not much better. He was so entirely absorbed in his work that he never gave the matter of his personal appearance the least consideration and still less did he seem to care what other people thought of his clothes, although desirous of their good opinion in all other respects.

One day a gentleman and his wife were driving along a main road in the Eastern Townships, when they saw Sir William walking towards them. He appeared to be muttering to himself, for he was counting his steps, as he usually did, in order to note the distances of the various rock exposures. The gentleman knew the great geologist, but the lady would scarcely believe it could be he. However, as she had requested it, he stopped the carriage and when Sir William came up he introduced him to her. The geologist had just come through a fresh *brulé* and his light colored slouched hat, fustian jacket and gray trousers of "*étouffe du pays*" were all streaked and blackened by the charred sticks and logs

he had been scrambling amongst. Notwithstanding the appearance of his dress, the lady was so charmed by his conversation and manner that she immediately forgot all about the clothes, and after an interesting conversation, she gave him her sweetest smile as the carriage drove off and Sir William resumed the counting of his paces.

A good story is related by the late Mr. Andrew Russell, the veteran Surveyor and Deputy Commissioner of Crown Lands of Upper Canada. Mr. Russell was spending a night with a man named Michael Murphy in the Township of Stoneham, on the Jacques Cartier river behind the city of Quebec. In the course of the evening Mrs. Murphy said to her husband: "Till Mr. Russell 'bout the quare little mon that stopped wid us last wake," "Faith an' I will" said he. "It was beginning to git dark whin I sees him cumin out av the wuds at the corner av the clearance beyant, right furnint the house. When he came to the door, 'siz he 'wull yez allow me to stop over night wid yez, sayin' as 'there's no publie house onywhers near?' Yer kindly welcome, 'Sir, siz I, and wid that he steps in. His clothes were purty well 'tore, an that, but still an all he was a civil spoken little man. 'Thur was a wet rain that afternoon an the poor mon was drinehed 'to the skin. So the owld wuman there tuk pity on hum an siz 'she 'take hum up to the loft Mikie and give him a change av 'clothes. I tuck notice he had good elane flannels under his 'owld coat, an thurs nothing like flannels; thur so warum an 'dhy; aven whin they do be wet an cowl'd."

Here Mrs. Murphy interjected. "Well sur ye ought to 'a 'sane the little mon whun he came down the lather wid Murphy's 'clothes on, fur ye say what a size Murphy is. He was the quarest 'luckin' soight ye evur did say when he thried to wak round 'wid the baggy clothes. Ah but he was the fine company " though, sorr, and he made the avnin' pass most beautiful, he 'was so fair spoken. In the mornin' he offered to give us some- 'thin for kapin' hum, but av coarse we wudn't take a pinny from 'a poor stranger the likes av hum. But fur all that he gave two "and six pence to ache av the childer, as he was lavin the house, "His name was Logan—did ye uvir hear tell av hum, Mr. Russell? "Oh, yes," said Mr. Russell, "I know him very well. He lives in "Montreal and owns a great deal of property." "Do ye till me

'he's a mon av substance?' 'Oh, yes—he's considered rich, 'perhaps the richest man in Canada, and besides he has a good 'income from the Government.'" "Will! Will! thin he *is* a "mon av substance. The quarest thing ivir I heered till av. "Logan wid the ragged clothes is raily a mon av substance. Will, Will! It bates all!"

The following incident illustrates the inconvenience which may arise from a shabby outfit: In 1856, Sir William was working in the Township of Chatham, on the north side of the Ottawa, and wishing to go to Montreal, he walked down to Carillon one afternoon and went on board the steamer "Lady Simpson." He had forgotten to put off his camp suit—if, indeed, he had a change of clothing with him. Sitting down in the upper saloon he waited for the steamer to start. Presently he was discovered by an officious cabin boy who marched up to him with a consequential air and said: "Look 'ere, old fellow, I guess you've made a mis-'take." "Not that I am aware of," said Sir William, "what do 'you mean?" "Well, I mean you're in the wrong place. Git "down below just as quick as yer know how." As Sir William did not respond immediately, the boy went for the steward, who took the same view of the situation and was about to enforce compliance with his orders, when another passenger arrived who fortunately knew Sir William and saved him from being ignominiously ejected.

Here is another instance of the effect of neglect in the matter of dress: One Saturday evening in 1870 Sir William and Mr. T. C. Weston of the Survey staff, landed on the shore of the upper end of the Island of Orleans, opposite the city of Quebec. Mr. Weston is always "natty" about his dress, even under adverse circumstances, but on the day in question, Sir William's appearance was pretty shabby, as they had both been roughing it for some time in the back country. Sir William suggested that as Mr. Weston was the more respectably dressed, he should go up to the hotel and try to arrange for something to eat. The latter went accordingly and ordered dinner to be got ready as soon as possible. Returning to Sir William, Mr. Weston reported favourably and in the meantime they examined some fossiliferous rocks nearby. After a while the hotel-keeper came to Mr. Weston, and looking very doubtfully at Sir William's trousers which were tucked into a pair

of rusty long boots, enquired if he would set separate tables, or if Mr. Weston "would allow his man to eat with himself."

Some years before this time, his supposed peculiarities had almost caused him more serious inconvenience. He was trying to get an idea of the thickness of an immense section of the rocks along the sea shore about Peré at the east end of the Gaspe Peninsula. The strata are there well shown when the tide is out. The beds run diagonally across the beach all along and at a same time dip at a considerable angle to the horizon. Sir William was measuring the section by counting his paces, while he walked at right angles to the strike from high tide mark to the water's edge. Then by following the bed he happened to be on, back to high-water mark, he would start out afresh and "pace in" another part of the section. This process he repeated over and over again for a considerable distance along the beach.

He had been in the neighborhood for some days. At that time, the arrival of a stranger was an event in the history of the place, which was a self-sufficient gossiping little village. The present stranger was the subject of much serious discussion and many were the knowing shakes of the head when his sanity was called in question. His conduct certainly appeared very strange in the narrow light of the wisdom of Peré. He had no ostensible business to bring him there. No one knew him and he did not care to take time to make friends or to talk to the inhabitants. Some of them had watched him and found that as he walked along he muttered to himself, counting big numbers, and now and then wrote something in a note-book. It was remarked "he carries a hammer and pounds the rocks, like an idiot," and what proved that he was crazy was the fact that he would take pieces of the broken stone, exactly like all the rest of the rock around, and would actually wrap them up in paper and carry them about with him in a bag, and even store them carefully away in his room at night. When he was out at work, the wisecracks of the place would visit his room and paw over these pieces for the positive proof of his insanity, and with a sympathetic, "poor fellow," they would retire to consult as to what was to be done. They concluded that his insanity was apparently of a harmless type, but that he might next wander off to some other place where the people would not take such a kindly interest in

him and that he might, therefore, come to grief. It was consequently resolved by the petty local authorities that he should be gently secured and sent up to Quebec en route for the Beauport Lunatic Asylum by a schooner which was ready to sail. His long zig-zag walks on the beach convinced them that he was not only hopelessly demented, but was rapidly getting worse, so while he was in the act of making one of his slants across the measures, he was seized by two men. Great was Sir William's surprise, but when they explained their object, he burst into a hearty laugh and for the first time since his arrival at Percé, he condescended to explain all about his visit and the meaning of what they had considered such queer conduct. His captors were astonished at his reasonable and interesting conversation and his affable and gentlemanlike manner, as well as by his knowledge of the French language. From that time the authorities ceased looking after him.

This was not the only time he was mistaken for a lunatic. He used to tell the following story with much glee: One morning while staying at the St. Louis Hotel in Quebec, having finished his preparations for a day's geologizing, he told the clerk to order a calèche to drive him to Beauport, about ten miles off. When Sir William appeared at the door, dressed in his "regimentals," with uncommon and unrecognizable implements dangling from a wide belt, the driver took it for granted that he was one of the pay patients about to return to the lunatic asylum, after having been on a visit to the city, as was permitted to some of the better class patients at Beauport. The calèche man was disappointed with the appearance of his fare even for a lunatic, but as the hotel clerk had hired him, he considered that the house would be responsible for the payment if he should not be able to collect anything from the crazy patient himself when he delivered him at the Asylum. He, therefore, somewhat reluctantly started. After having gone some miles out of the city, Sir William ordered a halt and went off a few yards to break a rock in search of fossils. Having reduced a quantity of it to fragments with a large hammer, he put some of them into his collecting basket. The driver was impatient over this delay, as he concluded he would not be allowed anything for the lost time when he should return to the hotel. Besides his "fare" was proving more crazy than he thought he was at first

and, in fact, he began to consider him dangerous. He mistook the leather cover of his large prismatic compass for the holster of a pistol and that of his clinometer for the sheath of a dirk, while the broken stones were probably intended to throw at the driver.

Having again started, he positively refused to stop to let Sir William off a second time, but made for the Asylum by the shortest road possible. It was in vain for Logan to remonstrate. The man told him he was a dangerous lunatic and that he had orders to drive him straight to the Asylum, "where you bailong, saïr." When they arrived at the gate of the Asylum grounds, it was (unfortunately for the calècheman) closed and locked. By this time Sir William's temper was fairly aroused and he flourished his geological hammer around the driver's head, telling him in tones that were not to be mistaken to "drive on." The calècheman was now really frightened. He had got the most dreadful lunatic that had ever been allowed to go out, and there was no help for it but to humor him for the time being. Sir William then resolved that the only way to make the man useful for the rest of the day was to keep up the terror he had inspired, so he compelled him to drive a long distance beyond the Asylum and only got out of the calèche to examine the rocks at such places as he could keep the driver within what the latter considered pistol-shot. While thus halted, whenever a habitant happened to pass, Sir William's Jehu would stop him and relate (in French) his grievance—that he had the worst fare he ever drove in his life, that he was being compelled by the lunatic to lose his time, as, of course, he would have no money himself and he was sure that the most Mr. Russell, the proprietor of the St. Louis, would allow him was the tariff rate as far as the Asylum and return. He explained to the passers-by how, in the course of the day, his lunatic had attempted to murder him with a long knife, a pistol and a big hammer. Sir William understood French thoroughly and could hardly conceal his laughter during these dreadful recitals.

In the afternoon, by means of one argument or another he persuaded the calècheman to drive him all the way back to Quebec. On arriving at the door of the St. Louis, where he would have the protection of the police, while Sir William was carefully removing his day's collections, the driver waxed very eloquent over his adventures and related to the other calèchemen around how bravely

he had defended himself from this lunatic whom he had just brought back. He then asked to see Mr. Russell himself and demanded from him three dollars which was at that time a full day's hire, totally ignoring the presence of his "fare", whereupon Sir William handed him a five dollar bill. While the man gazed in astonishment at the money, all the calèchemen about the place offered to drive him the next day for the same amount and stand their chance of being murdered.

One more case showing how often geologists, before they were properly understood, were taken for lunatics: When Logan was working at the geology of the country behind the town of Lachute, while calling at the house of Mr. Peter McArthur in the village of Dalesville, he became engaged with that gentleman in an argument on the subject of the creation of the world. Bye and bye, Mrs. McArthur, becoming impatient, said to her husband in Gaelic, "Hoot, don't bother with him any longer, don't you see he is crazy." Sir William understood the Gaelic and told the story at Lachute the next day with great relish.

When making his reconnaissance of the geology in settled districts, Logan did most of his topographical work by counting his ordinary steps while walking along the roads, at the same time noting carefully the bearing of every stretch. While thus engaged, if he was about to meet anyone likely to interrupt him, he halted and marked in his field-book the number of paces from his last note and resumed his count as soon as the person had passed.

One day, while counting his steps as usual, a dog startled him by a sudden rush which made him doubtful of his number. He remembered the odd paces exactly, but was not *quite* sure of the last hundred although he could scarcely have been mistaken. He had run up a score of nearly a mile, but rather than leave the least doubt about it, he trudged all the way back to the point he had last registered and did the work over again. But, it may be asked, how did he know the right spot from which to start again. The way was this, and it is another evidence of his painstaking exactness. He registered not only every natural feature such as the crossings of brooks, the crests of ridges, etc., but when there was nothing of this sort he noted a boulder, the kind of rock it consisted of, a big stump of pine, spruce or whatever wood it

might be, or anything else which would be a local mark to refer to. His field-books contain even sketches of the peculiarities of gates, stables, houses, etc., by the way side, which might be thus identified and used again by himself or any one else for further measurements on the same ground.

Logan's first summer in the thick woods was that of 1844, when he made a complete traverse of the Gaspé peninsula, by ascending the Rivière Ste. Anne des Monts from the St. Lawrence, abandoning his canoes at the head of navigation, crossing over the top of the high range of the Shick Shock Mountains, a distance of fifteen miles, building new canoes on the south side of the watershed and descending the Cascapedia River to the Bay of Chaleurs. At that time, Sir William was new to this kind of work and his outfit, picked up here and there, was scanty and ill adapted for the undertaking, compared with the elaborate equipment which even our junior geologists now take to the field. John Basque, an extraordinarily skillful and intelligent Mic Mac Indian of Gaspé Bay, who was then young, accompanied Logan on this "voyage," as John called it. This Indian figured largely in Sir William's notes, and he subsequently considered himself a regular member of the Geological Survey, having been afterwards employed by Mr. Murray, Mr. Richardson, Mr. Weston and the writer for some years. Many an interesting "yarn" John has spun at our camp-fires about the wonderful doings and sayings of "Mr. Sir Logan", as he called him, and between whom there appears to have been a profound friendship.

On one occasion in coming to a river, when exploring in Gaspé accompanied by John Basque, he wished to have a more correct approximation of its width than a mere guess and he hit upon a rather ingenious method. "John," said he, "bring me some pieces of stone to throw across the river." "Do you want pieces of conglomerate or limestone or slate, Mr. Logan," said the Indian. "Any kind will do," and after throwing repeatedly till he had just gauged the force necessary to land a stone on the opposite edge of the water, he threw with the same force along the side he was on and measured the distance. John Basque was fond of using any new word he learned. Hearing the word "fossils" and noting to what it referred, he would bring Mr. Logan pieces of stone with little marks on them and say "almost fossils here, Mr. Logan."

On the occasion of the long traverse referred to, the appliances, as above mentioned, seem to have been most unsuitable.

For example, the dishes were all of common heavy delf instead of tin. Yet they were carried for months in soft bags which were many times daily put down upon the stony margins of the rivers and the sharp rocks of the mountains, squeezed into the little canoes with the axes, hammers and geological specimens and portaged overland on men's backs; yet not one was broken or even cracked during the whole season. At its close Sir William presented the lot to John Basque as a reward for his share in preserving them intact.

The survey through the country referred to was made by measuring the distances along the rivers with the Rochon micrometer telescope and across the mountains by the chain. Notwithstanding the many turnings and the difficulties in the long distance through an unexplored wilderness, the total length was within a fraction of what it should be according to the Admiralty survey round the coast between the extremities. A few more instances of Sir William's accuracy as a topographer may be noted. It was he who made the first survey of 180 miles of the Ottawa River and this was adopted by the Government for laying out timber limits and for other purposes.

In order to work out a certain area of the Laurentian rocks which, as he used to say, would serve for ever after, as a type of their structure or as a key by which to understand the rest, he selected the Grenville region and began to work there in 1853. His MS geological map of that region, constructed by his own hand, was a perfect marvel of neatness and accuracy.

Logan held that accurate geological mapping was impossible without accurate topography. Otherwise what is really a straight line might appear curved or crooked and a crooked one straight. So accurately did he lay down his geological lines in the wilderness of the Grenville hills, that by their means he checked off the surveyors lines sub-dividing the land and showed that the whole township had been very badly laid out.

No two lots were of the same shape or size as they should be and the concessions all had different widths. In one instance two concessions started from one side of the township and ran together into one line before they reached the other side. Had it

not been for Logan's great accuracy, it would have been a long time before these errors were discovered. As it was, the Government ordered a resurvey of the whole township. He made good topographical surveys of all the rivers, lakes, mountains, etc., within the area he had selected for this typical geological survey. So exceedingly careful was he to secure the greatest degree of accuracy that he was in the habit of sighting from a line transit on a thin knife blade fixed in the top of a staff.

He spent years in working out in the most painstaking way the geology of the townships around Richmond and Melbourne in the province of Quebec, all the time accompanying his geological work with a precise actual topographical survey, plotting the work with his own hand. During these years he made his headquarters and boarded much of the time at Gee's little tavern at the upper village of Melbourne. This small hostelry was well enough for the purpose it was intended to serve, namely, as a little road-side stopping place for farmers, and it is no reflection on Mr. Gee to say that it was no fit home for such a length of time, for a man whose life was so valuable as Logan's. The comparative discomfort and poor coarse, monotonous, and (for Logan) ill-cooked food, no doubt had a very bad effect on his health. He certainly deserved a better fate and would have had it if he had thought his own comfort worthy of serious consideration.

In the single township of Shipton, Logan spent two whole summers in making the same kind of painstaking geological and topographical surveys. It is to be regretted that when Logan died, there was no one to take advantage of the great store of material he had accumulated in his later years even after he had given up the Geological Survey, so that the results of all this admirable work are still lying dormant.

In 1862, when Mr. Jules Marcou called in question the accuracy of the work of some of Sir William's assistants at Point Levis, and the conclusions we had arrived at as to the geological structure, Sir William, instead of bandying words with him, went back to the ground and surveyed it over again to make doubly sure (although he knew already that we were right). He laid down to a scale every band of rock in its exact position and with its true thickness and flexures on the surface. The resulting map, published with his reply to Marcou, is a beautiful production

and would serve as a model from which Sir William's would-be critics might profitably learn. This map was the foundation of his rejoinder, which was short and dignified and to this effect: "Here is an absolutely correct representation of the area in question from actual survey and it cannot be gainsaid. If you assert that the structure is different, you necessarily say what is not true."

Sir William's reply is addressed to Mr. Joachim Barrande, and the opening words are as follows: "I have neither time nor inclination for controversial geology. I have never criticised any of Mr. Marcou's remarks on rocks in Canada or out of it, nor have I suggested any such criticisms to others; but a charge of carelessness on the part of public officers in the discharge of their duties appears to me, on the present occasion, to require a few words of reply, lest you and others might suppose the accusation to have some foundation." Here we have an illustration of one of the chief reasons why Sir William was able to establish such a noted *esprit de corps* on the Survey and why he had such an enthusiastic following.

Examples of Logan's accuracy as a surveyor and draftsman might be greatly multiplied, and he was equally careful in other matters. Thus if there was any doubt at all as to a number or a technical name, which was to appear in one of the reports, he would spend any amount of time and take no end of trouble to enquire or to hunt up all available authorities on the subject in order to have it right. He was a very close proof reader and yet he would never allow the forms to go to press until Mr. John Lovell, the printer, had also read and signed them. Hence very few mistakes are to be found in the reports he supervised.

At one of these final proof readings (Mr. Lovell informed the writer) a question arose as to whether there should be an *e* or an *a* in the spelling of the name of an obscure French Canadian who lived in Terrebonne, and which was casually mentioned in a report. Before Sir William would allow the form to go to press he wrote out to Terrebonne and awaited a reply.

To get through so much painstaking work, of course, required long hours. It has already been mentioned how he started work even in the city, as early as 5 o'clock in the morning and with an interval of about one hour for breakfast, kept it up till seven in

the evening and again after dinner till all hours of the night. The rest of us often worked in the office till about midnight all winter, but at that hour Sir William appeared as little disposed to stop as earlier in the evening. No person seemed to know when he did retire. If one happened to pass the office at 1 or 2 o'clock in the morning he could always see the gas burning brightly through the curtainless windows and Sir William intently at work over a mapping table or standing at his high desk. He could certainly get along with very little sleep and being tough and strong he stood it well. But there is no doubt it told upon him in the end and must have been the means of shortening his life. He was very reluctant to give up the active administration of the Survey, to which his heart was so devoted, and it was only on the urgent advice of Dr. Craik (who was his physician after the death of Dr. Fraser) that he consented to resign.

In the field, Logan did a large share of hard labour. He would never accept any assistance, even from his hired men, for any work he thought he was strong enough to do himself. He appeared to take great pride in carrying home big loads of specimens, and a geologist's specimens are of a heavy kind. Sir William had a fishing basket of the largest size, which he would fill to the top daily. Each rock-specimen was nearly half as large as a brick. If one of the men insisted on relieving him of his load, he would say, rather sharply, "Do you suppose I'm too weak to carry it myself." He would say to members of the staff: "You must never grudge to carry home a good specimen, no matter how heavy, if you can manage it at all."

A friend of Logan's, the late Col. William Osborne Smith, once accompanied Sir William on a geological tramp to the "Back River", north of Montreal. During the day the latter loaded both himself and his friend with fossils. At first they managed to tote them around pretty well; but even before they started back for the city, their burdens felt very heavy and irksome. Sir William had filled his basket with all the smaller specimens so as to keep them together, while two great slabs with some fossil shells upon them had been awarded the Colonel to carry, one on each arm. The latter, who was a large man, not to be outdone by the little geologist, struggled along as best he could, but was

thoroughly "used up" on reaching home and formed a very unfavourable opinion of the pleasures of field geology.

Although the branch of geology at which Logan more especially distinguished himself was the crystalline rocks, he was very fond of palaeontology and could make excellent drawings of fossils. He delighted to collect and study them. "Fossils," he used to say, "are the poetry of geology." A working man belonging to the United States side of Missisquoi Bay and who had been observing Sir William one day, and "taking stock of him," as he expressed it, remarked dryly, "he jest gloats over them putrifications."

Logan was always so completely interested and absorbed in his field work of the day that he never thought of his camp or his boarding house until reminded by the darkness that he could work no longer. Even then, he was often so intent on doing a little more, that he would light matches or get his assistant (if he had one) to light them for him, so that he might read his compass and thus be able to take a few more bearings. He may have begun in the morning miles away from his quarters and perhaps worked gradually further off all day, so that after reluctantly buckling up his instruments, it would frequently take him till all hours of the night to trudge back to his supper and bed. The ordinary government employé might consider that, after he had worked from daylight to dark, with little or nothing to eat, climbing over rocks or scrambling through the woods, and then walking 5 or 10 miles home, he would be entitled to go to bed after eating his frugal supper of bread and pork. Not so, however, with Logan. All the way home he had been considering the results and general interpretation of the day's operations and as soon as he had had something to eat he would get out his field-book and first "ink" over the pencilled notes and figures made during the day, then write up his general impressions, and, if he could possibly steal a little more time from sleep, would get out his plotting sheets and lay down to a scale some or all of the measurements made in the course of the day.

In his camp, far away in the woods, when his stock of candles ran out he would get the cook or any of the party, less tired than the rest, to prepare a lot of birch bark rolls or torches, and when he had spread his mapping sheets on a box at his tent door, would

get the man to hold a blazing torch a short distance above his head, so that he might plot his day's work before rolling himself up in his blanket. As one torch burnt low, the man would light another and another, and so enable the indefatigable geologist to work till far on in the night.

One of the great secrets of Logan's success and the high estimation in which he was universally held, was his fine sense of justice and his real desire to promote the welfare and interest of all with whom he had to do. He took great pleasure in giving the fullest credit to all of his assistants and in aiding them by his wisdom and judicious foresight, no less than by his knowledge of geology and other sciences. His great modesty prevented him from giving any indication of his knowledge until circumstances required him to use it. Many a time he had to listen respectfully to a man displaying his ignorance of a matter with which he himself was well acquainted, but one never heard of him offending the feelings of such a man by making him feel his ignorance. He never appeared impatient of hearing what a man might wish to say on a geological subject, nor was he above learning from the humblest.

In prosecuting the work of the Survey, he tried to surround himself with the best men he could find, and he succeeded wonderfully well, especially when we consider the limited amount of money at his disposal.

But his assistants were only human after all, and like other individuals of our species they might occasionally make a mistake or even get into a little scrape once in a while. On such occasions, Sir William would always interest himself in the case, as much indeed as if it were his own, and would not rest till the matter was rectified and everything going smoothly again.

Sir William, although an undemonstrative man, was very much attached to his assistants, and notwithstanding such failings or shortcomings as might be their misfortune, he took a pride in them simply (as it were) because they were his own men. This was another factor in keeping up the marked *esprit de corps* which existed. The staff of the Canadian Survey appreciated the great interest which Logan took in their welfare and they in return did all they could to carry out his wishes and this aided materially in building up the great reputation he enjoyed.

He availed himself eagerly of every opportunity to speak well—even flatteringly—of us to strangers. As a Canadian, I was much gratified at the meeting of the British Association at Bath in 1864, to notice the great respect and esteem in which *our* geologist was held by those of Great Britain and the Continent of Europe.

In regard to religion, Sir William was supposed to be a Presbyterian like his father before him, but he made no parade of his piety, nor did he claim to belong to any particular sect.

During his early life there was not the same liberality and toleration in religious matters as at the present day, and it is possible that circumstances may have occurred to disgust a man of his broad and generous views, with the narrow bigotry which denies salvation to every man who cannot fall in with the narrow views and the peculiar shade of doctrine which they have formulated for the information and guidance of the Creator. Be this as it may, religious discussion was a thing Logan always avoided. He was not, however, to be considered by any means an irreligious man. He always treated the clergy, and spoke of them, with the greatest respect and among their number he counted many of his best friends.

Sir William himself used to tell a story of the first time he went to a place of public worship. It appears he was taken by his pious parents when a very small boy to St. Gabriel's Presbyterian Church. After he had dangled his legs about as they hung from a high board seat, and yawned and fretted through a tedious service, the collection plate was passed round. Little Logan's interest was at once awakened at the sight of so many "bawbees." He marvelled at the kindness of the old gentleman when he presented, as he thought, the whole plateful to him. He joyfully seized all the coins he could grasp in one of his little hands and was about to grab with the other, when his father caught him by the wrist and whispered to him to drop the treasure. But the boy, believing he was fairly entitled to what the old elder had offered him, refused to surrender, and it was not till his parent had rapped him repeatedly over the knuckles with his other hand, that the little fellow was forced to drop the money.

Sir William did not believe in inconsiderate generosity or indiscriminate charity. He acted as if every one should feel that

he had earned all he got. Still there were cases when he was very liberal. On one occasion he presented a man who had been for a time on the Survey, with a hundred pounds, when he thought he needed it, and other members of the staff have experienced his liberality not only in money but in other considerate acts.

When in the woods or the country he rather sympathized with the youthful frolics of his assistants and of the Indians. The latter got drunk whenever they could and many stories were related of their escapades while enjoying an occasional spree, which in those days society did not regard as so reprehensive an act as it would be considered at the present time.

He was not a time-server nor a respecter of persons, and of course no suspicion of toadyism could ever be laid to his charge. As he scorned to flatter anyone, so no one would be likely to gain anything by attempting to flatter him.

At the International Exhibition of 1855, when the Queen honored the Canadian geological section with a visit, Mr. Logan, as he then was, escorted Her Majesty through the collection and talked to her precisely as he would to any other lady, in his usual genial manner. Her Majesty was delighted, not only with his charming grace and manner, but with his innocent, sincere and independent nature. And it was with a real pleasure that she soon after conferred on him the honor of Knighthood for his great services both to science and his native Canada. On the occasion just referred to, she had personally invited him to pay a visit to Windsor Castle for this purpose.

Sir William, as is well known, was a confirmed bachelor and all his brothers were also unmarried. Being rich, clever, kind and generally eligible, he was often advised by the ladies to marry or asked why he had not taken a wife already. This was a matter he would rather avoid and so would change the subject as soon as possible. To one lady who had attractive daughters he said in reply to her question, "I am already wedded to the rocks." To another he answered: "It would take up too much of my time. I really have not the time to spare. Other rocks than 'rock the cradle' claim my whole attention."

Another story says that he took his stand as a bachelor from his sad experience of the obstinacy with which the fair sex insisted on tidying up his rooms according to their own preconceived

notions, no matter what vexation and inconvenience it caused him. Without dreaming that any one could be so sacrilegious as to disturb the papers, maps and specimens in which his soul was centred, when staying at a country hotel, for example, he would leave his work spread out on the table and the specimens which he had collected and carried home with so much labor, lying round the room. On returning in the evening, his disgust was supreme on finding the table pushed into a corner, covered up with a cloth, his papers gathered into a neat pile and all his specimens gone. The saucy chambermaid said that she "had pitched out those dirty stones and had done up the room as it ought to be, and if the missus was goin' to allow any more of them irregularities about any of her rooms she would pack her trunk and leave the house."

It was said that on one occasion a house-maid, not only threw away a number of fossils which Logan valued very highly, but actually took the trouble to carry them off and hide them in the corner of a fence, so that "that queer little man," as she called him, "would not be likely to bring them back again to mess up the room." Sir William probably reflected that if housemaids and landladies can be such tyrants, what might a wife prove to be.

Logan used to plot his maps on unfolded sheets of foolscap. It is related that at one tavern, at which he stopped for some time, the housemaid took a fancy to him and said to her friends that although his clothes were a little rough he was a "steady" man, hadn't taken a drop since he came to the house and there was something about him she liked; and in fact a girl might do worse than marry such a man. But as the little man did not appear to understand or notice her advances, she resolved to declare her love. So during the day when he was miles away, she quietly wrote a lot of love verses of her own composition, addressed to him, all over the face of his map-sheets, thinking when he read them on his return that such a rough-looking man, at his age, would feel flattered by the endearing sentiments of a young, fresh and good-looking girl. Good-natured as Sir William was, this was altogether too much for him; and great was the disappointment and even astonishment of the maid when he could not conceal his annoyance at the occurrence. It was not the girl's sentiments themselves that annoyed him so much as the spoiling of

the beautiful original maps, on which he had spent many a night's labor. She had used pen and ink in her literary efforts and, of course, Logan did not care to file them among the records of the Department with such permanent ungeological notes scrawled all over them in a woman's hand-writing.

Although Sir William was such a devoté of science, he was by no means unsociable, but would occasionally take an evening to dine with friends in whose society he took pleasure. Among these were the families of the late Judge Gale and the Hon. John Young. On such occasions he was the centre of attention. The whole company listened to the charming stories he told or to the Scotch songs he sang in a voice of rare sweetness.

His stock of capital stories, jokes and *bon mots* seemed inexhaustible, so much so that a lady once said to him, "Sir William, I don't know where you find all those witty things and good stories, unless you geologists do nothing else all day but crack jokes and make up new stories, when you are supposed to be cracking stones and puzzling over theories about rocks." Although this impeachment was not literally true, still without apparently stopping to think of it, jokes and witty sayings, suitable to the occasion, would come to him as readily as to Sir John Macdonald, and his merry, hearty laugh used to echo through the building as sure as he got into conversation with any congenial spirit.

He would also enjoy a little fun in a more homely way, as the following will show. When he and Mr. Richardson were working on the Kemp road towards Lake Temiscouata they slept in the farm houses, but in their own blankets, generally on the floor, near the stove, the favorite resort also of the cats and dogs. The result was that after a time the blankets became alive with fleas. Sir William resolved to be rid of them. So one morning, in a house where there were a lot of smart little children, while breakfast was being prepared he spread his blanket on the floor and offered the children a penny a dozen for all the fleas they could catch and drown in cups of water. At first there was plenty of game for all the little hunters, but after a time, when the stock was reduced the search became keen, and Sir William enjoyed the sport immensely. Near the end of the hunt, when a fresh flea was discovered and two little hands would grab for it at the same moment, the unsuccessful hunter would call out, "Now, Johnny,

that's my flea. I saw him first," and appeal to Sir William to settle the dispute.

When an intelligent man who might appreciate a lesson in geology, called on Logan in the Museum, he took great pains to explain everything. This he had the faculty of doing in such a way as to completely fascinate the listener, and these incidental lectures from such a master, imprinted on the listener an appreciation of the science of geology which he would never otherwise have had. When he was willing to bestow so much trouble upon strangers, it will be understood that he took pleasure in teaching his assistants. His revisions of the reports of the members of the staff were lessons not only in geology, but in English composition.

Sometimes his earnestness and his paternal desire (so to speak) to benefit his student would cause him to talk very plainly, but the mutual good feeling was so thorough that nothing was thought of it. In fact, this was so well understood by every member of the Survey that if he showed a studious politeness instead of the usual unceremonious style, one might be sure there was something wrong and that he was temporarily annoyed.

One day the late Mr. Richard Oatey, the practical miner of the Survey, discussed with Sir William a question connected with a theory of the filling of metalliferous veins, and in the course of discussion, Mr. Oatey remarked, "Sir William, iron is the mother of all the metals." "Oh, it is, eh?" said Sir William. "Then pray tell me which metal is the father."

One point led to another and finally Sir William gave him a short sketch of geological history in general, occupying more than an hour. Oatey listened patiently, but as soon as the lecture was over, he retired to a sort of smoking room in the basement of the building and filled his pipe. When he got it fairly a-light and drawing to his satisfaction, he remarked to two or three of us around: "Sir William was very good to take so much trouble to tell me all these things. He is a fine man, is Sir William, and talks beautifully. But after all's said and done, I believe the world is just as God made it, and what Sir William said won't make me think any different." "I am sure Mr. Oatey," said I, "that Sir William is also of the opinion that God made the world, and he is devoting his life to try to find out just how it was that He did make it."

Logan had a keen sense of humor and would aid in a little fun even at his own expense. In 1858, when he was working in the valley of the River Rouge, in Argenteuil county, he had as one of his assistants a most gentlemanlike and estimable young man, but unfortunately perfectly deaf. One day he got lost in the woods and did not return at the time appointed. The dog belonging to the camp had followed at his heels, but apparently with misgivings that his master did not know where he was going. Sir William, who was a good bush-ranger, went in search and after some time came up with him, although he could not use the ordinary method of shouting for a lost man. Sir William said that when he approached them, the dog started to come to him, but after a few steps, he stopped and turning his head round towards the young man gave him a look which said as plainly as words could utter it: "I'm hanged if I'll ever go with you again."

About 20 years ago, when he was working on the east side of Missisquoi Bay, about Phillipsburgh, Highbate Springs, etc., he was returning to his stopping place late in the evening, very tired and hungry. As he passed the railroad station on the way, he saw the "chore-boy" of a tavern with an express waggon rolling a barrel of whiskey, which had just been landed from a train. He asked if he might drive with him to the village. The boy said, "All right, as soon as I get up this whiskey barrel." When he had rolled the barrel up a plank and fastened the back board of the waggon, he said, "Now, old man, jump up and sit a straddle of the barrel to keep it from rollin' about, and I'll give you a ride up for nothin'." Sir William did as he was ordered and had a grand ride up town, no doubt chuckling to himself all the way; but he said he would as soon not have met any of his city friends, as he was thus trying to make himself useful in steadying the whiskey barrel.

During Sir William's lifetime, Marcou was his chief detractor but since his death his reputation has been assailed by others, but we may well afford to smile at these individuals. Logan's name and fame will flourish long after theirs are forgotten.

His goodness of heart took the form of kindness and consideration rather than of liberality in expenditure. He did not strive for fame or reputation from narrow, selfish and egotistical motives, or, as is often said of others, "to make a name for him-

self." Sir William's object was to do good work and to benefit his native Canada, without apparently a thought of fame. A scientific name and reputation above all other Canadians, he certainly got, but it came incidentally and unsought. Sir William Logan's death was keenly felt by thousands and his memory will be ever green in the hearts of those who knew him and loved him.
