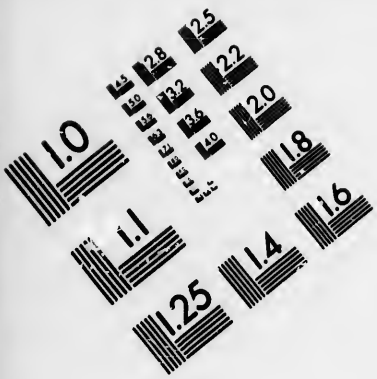

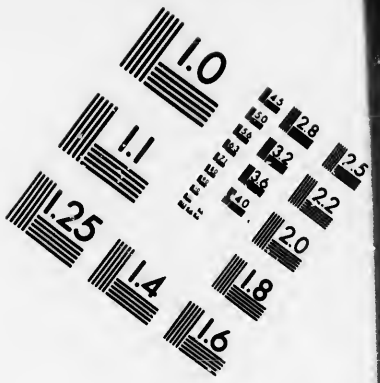

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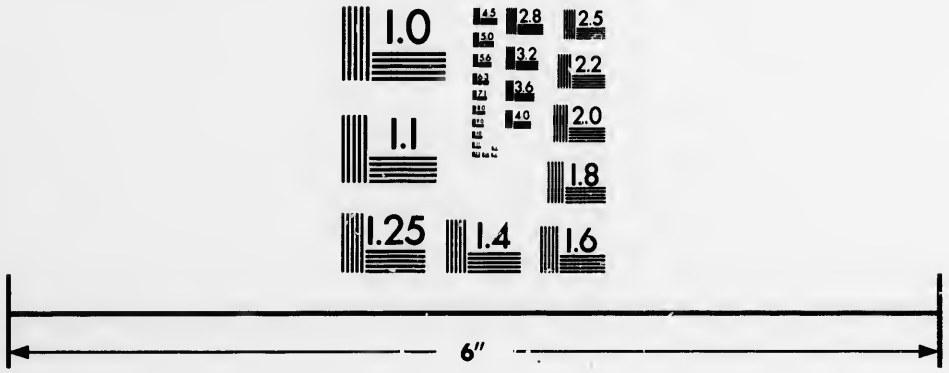

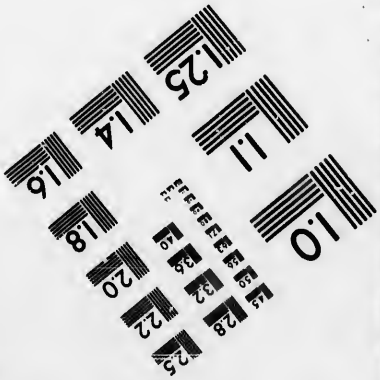

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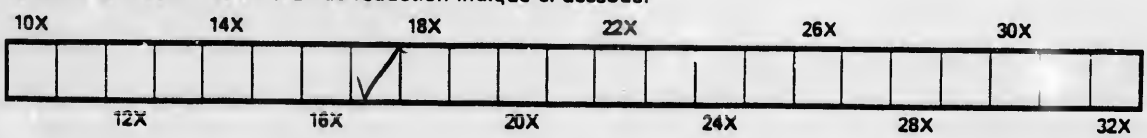

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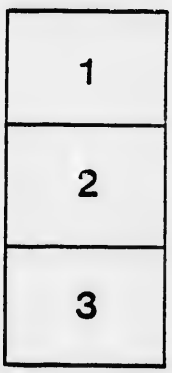

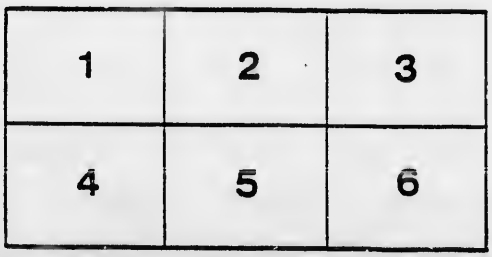

39

WITH THE BRITISH ASSOCIATION IN CANADA, AND THE UNITED STATES.

A PAPER

READ BEFORE THE HASTINGS & ST. LEONARDS

Philosophical Society.

BY

JOHN E. H. PEYTON, F.R.A.S., F.G.S.,

(PRESIDENT,)

MARCH 10TH, 1885.

HASTINGS

PRINTED BY F. J. PARSONS, "OBSERVER" OFFICE.

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American Notes.

By "B. A. C. 923."

The meeting of the British Association in Canada (August, 1884), offered such inducements to its members to undertake the voyage to the New World, that I determined, if possible, to take advantage of such a splendid opportunity, which was not likely to occur again in one's lifetime. It was not, however, till the beginning of July that I was able to apply for my travelling ticket, which was numbered 923; showing that a good many members had responded to the cordial invitation of the Canadians.

There had been some misgivings as to the result, when it was finally determined to make a fresh departure in the history of the British Association, and cross the Atlantic to one of our Colonies; but in the end it turned out a magnificent success, and the meeting at Montreal will, no doubt, be an event long remembered in the history of the Dominion, and also in the annals of science. There is already a talk of paying a visit to Australia next.

Special advantages were offered to us by the different steamship and railway companies, in the way of reduced fares, return tickets, special trains, &c. I arranged to go out by Canada, and return home by New York, and sailed from Liverpool on the 31st of July, on board the Allan line s. "Sardinian," 4,600 tons, commanded by Captain W. Smith, who belongs to the Royal Naval Reserve, and, therefore, we were entitled to fly the Blue Ensign.

Our first adventure was a thick fog in the Irish Channel, which kept us more than an hour finding the light on the Isle of Man, though it is such a well-known place. We arrived at Moville (port of Londonderry) early next morning, and stayed all day in the splendid harbour of Lough Foyle, waiting for the mails. Starting late in the afternoon we had a glorious but very wild sunset off Inishtrahull Island,—the last point of land on the extreme north coast of Ireland—exposed to the full fury of the Atlantic Ocean.

During the night we ran into a cyclonic storm—a regular "sou'-wester"—near the tail of the Rockall Bank: there was a heavy sea, and general discomfort, but the next evening the weather cleared up, and the rest of the voyage was pleasant.

There were 120 saloon passengers on board (including about 10 of the British Association), and we enjoyed ourselves in the usual manner of board-ship life. There were over 300 emigrants in the steerage, amongst whom were 40 of Dr. Barnardo's boys (from 18, Stepney Causeway, London), the little fellows seemed very happy and well cared for, and wonderfully well trained. Some of our fellow-passengers got up a concert for them, which was very successful, and realised £14, part of which was given to them in prizes for races, games, &c., which afforded great amusement to all hands for a couple of days. It may be interesting to state that, according to a circular lately issued by Dr. Barnardo, out of the *many hundreds* of boys and girls placed out in life in Canada, during the last 15 years, *only 4 boys* have failed, and *not one girl!*

I was much struck by the great kindness and patience shown by the steerage passengers, especially the men, to their children, even when very sick themselves—and find that the same thing was noticed by Charles Dickens in his "American Notes," published more than 40 years ago.

We got a great deal of valuable information from the Canadian passengers on board; and what with guide-books and hints, our party was fairly well "posted-up" on arrival at Quebec.

The great circle course, which all steamers take in crossing the Atlantic, brought us within 180 miles of Cape Farewell, the southern point of Greenland, on the fifth day of our voyage, and soon after, when about 130 miles from the coast of North America, we ran into fogs, and the temperature sank to 38°, showing that ice was near. We saw our first iceberg (always an exciting event) on the 7th August, and a very beautiful sight it was:—much finer than I expected. In the Marquis of Lorne's very interesting book, "Canadian Pictures," there is an engraving showing "the 'Sardinian' in the ice, off Newfoundland," very like what we saw, only our berg was not quite such a large one.

We entered the Straits of Belle Isle on the morning of the 8th: they were studded with small icebergs, and looked very beautiful. We soon ran into a thick fog, and there we remained for 16 hours, with the fog-horn going all the time; the captain was 32 hours on the bridge, and told me it was the most trying time he had had for years, as there was more ice than usual; one or two ships and a steamer passed us while we were at anchor, but it is very risky work, and our captain was much praised for his caution. He told me that when the fog lifted, there were two icebergs right ahead of us, within 200 yards of our bows.

It was very interesting to watch the soundings taken by Sir Wm. Thomson's apparatus: once whilst going 13 knots an hour, they found bottom at 80 fathoms (formerly it was necessary to

almost stop the ship); it is done by the pressure of the water forcing up some coloured fluid in a glass tube, which is marked off on a scale, showing the depth in fathoms, and attached to the lead sinker.

Professor Moseley, of Oxford, found a very pretty specimen of a bryazoa, and an arctic bivalve shell, in the stuff brought up by the sounding-lead in the Straits of Belle Isle. There were also some interesting specimens in the mud on the anchor.

There was a very successful concert got up by the passengers for the Liverpool Seamen's Orphanage, and the fog-horn accompaniment to some of the songs was very curious!

In the Gulf of St. Lawrence we saw a wonderful mirage, and the absorption bands in the red of the spectrum were very extraordinary, as seen in my pocket spectroscope.

The coasts of Labrador and Newfoundland looked very bleak and desolate, with patches of snow still lying on some of the hills. The [illegible]bitants about these parts seemed to be a few fishermen [illegible] shown what is supposed to be the finest salmon river [illegible]d. When we entered the noble St. Lawrence River [illegible]ning of 10th) all was changed, and the scenery became [illegible], the temperature rose to 74°, and every one thoroughly [illegible]ed the trip up that splendid river—it was the perfection of yachting. We landed the mails and some passengers at Rimouski that evening, and got our first view of a steamer with beam engines working overhead, on deck—very common in America.

The approach to Quebec is very fine, and we were all early on deck next morning (11th). The Laurentian mountains are grand, and very interesting to me as a geologist, as they are the oldest rocks in the world, and contain the celebrated fossil, "Eozoon Canadense" (the Dawn of Life), supposed to be the oldest known animal.

The view of the famous Montmorenci Falls from the river is very fine, and the first sight of Quebec was most beautiful; we passed close under the Citadel and got alongside our wharf, on the opposite side of the river, about 8 a.m., after a very pleasant voyage of 10 days.

I happened to land with one of our passengers (also a member of the B.A.), who stands 6 feet 10½ inches in his stockings, and the astonishment of the natives was amusing! We told them we had plenty more of them at home! Through the kindness of the custom-house authorities all our baggage was passed free—a boon for which we were very grateful. The steerage passengers went at once to the Emigration Office, adjoining the wharf, near the railway "dēpot" (as all stations are called in America), and we were told that almost all of them had found employment

before the day was over. Our little friends, the Barnardo boys, marched off to their cars in fine style, and we exchanged hearty cheers and good wishes for them in their new home, at Peterborough, Ontario.

Quebec is an interesting old town, chiefly French, very picturesque, but dirty; some of the new buildings are fine, especially the House of Parliament, which has since been damaged by dynamite. The view from the Citadel hill is justly famous; it includes a splendid sweep of the beautiful St. Lawrence and several ranges of the Laurentian hills; the sunset I saw from there was something magnificent.

After a couple of days at Quebec, I went by steamer up the river to Montreal—a very pleasant trip of 150 miles. The boats are fine, and the cabins (or "state-rooms" as they are called) clean and comfortable. We had a glorious sunset on the river, and the colours in the sky and on the water were something marvellous.

Montreal is a beautiful city, and the newer streets are well shaded by trees, which give them a pleasant appearance, especially in summer, as we saw them. The Windsor Hotel is justly said to be one of the best in the world; it certainly is the finest I was ever in, and most comfortable. There is a capital system at hotels in America, you pay so much a day (4 dollars at Montreal, and 5 at New York), which includes everything but drink and washing; so there is no trouble with the bill when leaving; it is simply "so many days, so many dollars," and away you go!

One of the "lions" at Montreal is the view from Mount Royal—from which the city takes its name—and very beautiful it is, indeed, on a fine summer's afternoon. The city lies at one's feet, and the view includes a large stretch of the river, with the celebrated Victoria Bridge (built by Sir Thomas Brassey's father for Robert Stephenson, the great engineer), the rapids, and the country for miles round, as far as the Adirondacks and Green Mountains, in the United States.

The geology of the district is very interesting. Mount Royal itself is an ancient volcano, supposed to be of palæozoic age, composed of diabase,* and, in some parts on the western side, of syenite;† this has pushed up and penetrated the limestones (Chazy and Trenton, of lower Silurian age), converting them in some places into a crystalline marble; there are beautiful sections on the road up, showing a most interesting series of dykes and

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* *Diabase* is a crystalline granular trap rock of labradorite and augite, with chlorite and olivine.

† *Syenite* is a granitic rock, composed of felspar, hornblende, mica, and quartz: in this case mixed with nepheline (an alkaline aluminous silicate). *Jukes and Geikie, Manual of Geology.*

veins of syenite, basalt, and other rocks, traversing not only the stratified limestones, but also the diabase and syenite masses themselves. Ice-marks, grooved, polished, and striated rocks, are very distinct, right up to the top of the mountain (700 feet), where there are some erratic boulders of Laurentian rocks. There are also three or four well-marked terraces, or ancient sea beaches.

Through the kindness and liberality of the Canadian Government, I got a *free pass* on the Canadian Pacific Railway to Winnipeg, in Manitoba, and back; and might have gone to the Rocky Mountains, or British Columbia, over 2,000 miles—as some of our members did—but I had not sufficient time. A new route had been opened to Toronto, by Ottawa, and I went by one of the first trains (Aug. 14th). We had a splendid sleeping-car, brand new—cost 12,000 dollars, we were told!—and the one belonging to the Directors, called the "Saskatchewan," was really magnificent. There was quite a crowd at the Depot to see the train. There are no "buffers" to the cars (they said there were lots of "old buffers" inside on our trip!) so occasionally one gets rather a shaking, but it was very comfortable travelling.

I stayed a day at Toronto, a fine city on Lake Ontario, and had my first trip on one of those large inland fresh-water seas, which are such a marvellous feature of the North American continent. I crossed the lake on board the famous steamer "Chichora"; she was an old blockade-runner, called the "Let her B," and has the name on the old bell, which still hangs outside the pilot-house. We went up the Niagara River to Lewiston, where I first set foot on American soil. There is a fine view of the gorge made by the Falls in pre-historic times. On the voyage back we had a lovely sunset on the lake, and a lot of passengers sang Scotch and English songs on deck, "Auld lang syne," "Home, sweet home," and "God save the Queen," &c., till I could scarcely realise the fact that we were thousands of miles away from Old England!

Next day we went by train, through a very wild country, to Owen Sound (a town on the shores of Georgian Bay—part of Lake Huron), and were disappointed to find that one of the large steamers of the C.P.R., by which we should have travelled, had come to grief, and we were obliged to go in a small one belonging to another Company. We had to lay-to half the night in a fog, and next morning nearly ran on to the shoals off Duck Island—on Lake Huron, to the south of Manitoulin Island. It was a curious sight to see the rocks so clearly under our steamer; luckily, the weather was fine and quite calm. In the evening we entered the St. Marie River, which joins Lake Huron to Lake Superior, and found the scenery very beautiful. There were

some splendid specimens of ice-worn rocks—*roches moutonnées*—one side steep and broken, the other smooth and gently sloping; showing very clearly which way the ice had passed over them,—viz., *from* the smooth *towards* the steep side.

On arriving at Sault St. Marie (pronounced "Soo"), a town near the rapids at the head of the river, which we soon christened "Susan and Mary," I left the steamer with two gentlemen and two ladies of our party,—as we thought there was not sufficient time to go on to Port Arthur or Winnipeg—and we put up at a nice little hotel in the Canadian town, where they don't often see many English, as it is rather an out-of-the-way place. Curiously enough, I had met one of the ladies the year before at Baveno, on Lago Maggiore, in Italy, and little thought that we should meet again on a Candian river, in longitude 85° west, 4,000 miles from home!

We engaged two Indians and a canoe, and shot the rapids, which was most exciting—and, I hope, not dangerous. The view *down* the immense slope of raging waters, as we entered the rapids, was very grand and extraordinary, quite unlike anything we had ever seen before. We, of course, got wet; but the way the men managed their paddles, and guided the canoe away from various dangers, was very clever. The canoe jumped about like a cork, and sometimes seemed to be smothered in the waves, which broke all round us in every direction; but we emerged safe and sound at the end of the rapids, which are about a mile long, having thoroughly enjoyed our novel and exciting adventure. We divided into two parties; one stood on the rocks whilst the other shot by, and it was a curious sight to watch the canoe rushing by, *down-hill*, at a tremendous pace, half smothered now-and-then in the waves. The weather was gloriously bright, and, altogether, it was a delightful Canadian experience that we shall never forget. We had to *pole up* some of the rapids first, which I thought was quite as wonderful a performance as shooting down them. One of my friends took a photograph of the canoe and its crew, and has kindly sent me a copy, which is a very interesting souvenir of our expedition. In the afternoon we had a delightful sail amongst the islands two or three miles down the river, and afterwards paid a visit to the American town on the opposite shore, where there is a very fine lock on the canal, through which all the traffic between the large lakes passes. It is lit by the electric light, and ships pass through all day and all night. We determined to take the first steamer going eastward, no matter where it went to; it might be to Owen Sound, Chicago, or Sarnia. I was in favour of a place I had found on the map (we were none of us very well up in the geography of the district) called Penetanguishene, which seemed so well placed for getting

on to Muskoka and Simcoe lakes. We noticed that very few steamers seemed to call there, but I couldn't understand the joke there was for a long time, till it came out that it is only a *prison establishment!* Eventually we started at 5 a.m. (August 19th), on a north-shore boat, and had a very pleasant tour round the north shore of Georgian Bay, calling at several stations on Manitoulin Island, and Killarney on the main land, where the scenery is lovely—more ice-marks very distinct. Here we saw an Indian encampment, wigwams, &c., all complete. There were lots of Indians about; they looked something like Japanese I thought,—olive colour,—not a bit like what I had imagined an Indian ought to be! There are some splendid boats here, used for fishing, something like whalers, with two masts and lug sails; they are very fast, and stand any amount of "sea" on the lake. Most of the passengers went ashore and bought Indian curiosities —the toy canoes were the prettiest.

The last place we stopped at was Club Island, a fishing station, very desolate, and out of the world. They told us of a dreadful wreck of a steamer near here, a few years ago—200 lives lost; only one man and a woman washed ashore, and kept by the Indians till rescued the next spring. We stopped the night at Owen Sound, and suffered much from the heat; the forest was on fire somewhere near, which made it worse. Next morning, at 6, my friend, the mathematical professor, persuaded me to go down to the lake with him to bathe. It was more than a mile, but we had a refreshing swim. They said we must be English to do such a thing!

Toronto was reached in time to take the boat to Queenstown, and at seven o'clock that evening (August 21st) I got my first view of the Falls of Niagara. It is quite impossible, of course, for me to describe them; but they were very much finer than I expected. I knew they were only 160 feet high, so was not disappointed, as so many people are at first. They were so much broader and farther apart, and altogether grander than I had imagined them to be, and the surrounding scenery is so lovely, that I was delighted. The three days I spent there were indeed a treat never to be forgotten. Most people make a mistake in "rushing" the Falls—"doing" them in one day, or even sometimes in a couple of hours "cheap tripping!" They must carry away quite a wrong impression; it was only on the third day of my visit that I saw the Horseshoe (Canadian) Fall properly. It depends so much on the wind, which only clears off the spray occasionally. The American Fall, which was just in front of our windows at the Clifton House Hotel, is white and feathery, and looked very like a steep glacier or snow-slope. The Horseshoe Fall, which I like most, is a glorious emerald green, a

solid wall of water, and is supposed to be twenty feet deep at the edge, where it goes thundering down into the raging turmoil of waters in a fearful looking abyss of foam and spray. One of the best views of the Falls is from the ferry just above the new Suspension Bridge, and near the American Falls.

The whirlpool rapids are very grand and fearful-looking, much wilder than the first cataract on the Nile, down which I have seen the Arabs swim on logs of wood. No wonder poor Captain Webb was killed, he must have been crushed by the mere weight of the water where it is suddenly jerked up a dozen feet in the air, just opposite the platform made for visitors. Some of the natives say that he might have got through all right if he had not dived; but I very much doubt it, though I noticed on the Nile that the Arabs always kept right on the top of the waves.

I was delighted to find some beautiful ice-marks on the cliff above the gorge near the rapids, and there are glacial, river, and lake deposits on Goat Island, and on the top of the cliff opposite the Horseshoe Fall, on the Canadian shore. The gorge itself is cut in the Niagara limestone and its associated shales, which correspond to the Wenlock beds of our upper Silurian, and it has been computed by Sir Charles Lyell that it must have taken 35,000 years to wear its way from Lewiston to its present position, about seven miles. In the somewhat hasty view I had of the country, it seemed to me that there was evidence of the Lake (Ontario) having formerly extended to the foot of the cliffs at Lewiston, near the entrance to the gorge. If this were so, and the land has since risen, the rate of erosion in former times may have been much more rapid than it is at present.

The Whirlpool is very interesting, but smoother and larger than I had expected. I was much amused on my way there at being suddenly accosted with "Say, Boss! where's this whirlpool?" Whilst going down in the "elevator" (a car on an inclined plane, worked by a wire rope), it suddenly stuck fast about two-thirds of the way down, and we had to get out and walk. The man asked me afterwards if I had felt the *jerk?*—but I thought it was all part of the performance!

The new Cantilever Bridge, near the old Suspension Bridge, is a most wonderful engineering work, and was finished in seven months. One day I saw a goods train on it, which reached from Canada to the United States; it had 62 cars, which is equal to 124 of our railway trucks.

It was very amusing to see the way in which most of the members of the B.A., who had arrived in the country before the meeting, had planned their tours so as to finish at Niagara. There were more than 150 of us started on Monday, August 25th, by train to Queenstown and boat to Toronto. A great many

took the steamer from there to go direct to Montreal, and never shall we forget that voyage in the "Algerian"—it became proverbial. She was overcrowded (though that was our own fault), there was a strong gale on the Lake, with a nasty "sea," so when we arrived at Port Hope, about 30 of us landed and took the train to Kingston, where we arrived about 2 a.m., and spent a couple of hours in a siding in a tremendous thunderstorm. One crash was so terrific that we all thought the train had been struck by lightning. We got to the hotel about 5 a.m., and had a little sleep. Our steamer turned up about noon; the weather had by that time quite cleared up, and we had a delightful trip through the Thousand Islands, where the scenery is most beautiful. There are several good hotels, and heaps of villas like Swiss chalets, and I think that one of the great advantages the Canadians seem to have, is the number of very pleasant places for their summer outing. I should give the palm to "camping out" on the river or lakes. Nearly every island had its camp, and we passed several very jolly-looking parties. The custom is for the steamer to whistle, and the people on shore cheer and wave flags, etc. They all have canoes and hammocks; and, of course, any amount of boats of all sorts and sizes, and seem to enjoy themselves vastly. I noticed that they write up "Boat Livery," instead of "Boats to Let," as we do. There was a sad accident two days before we passed, near the Thousand Islands Hotel, a lady and gentleman had been run down by a steamer and both drowned. It is supposed they were trying to pass too near.

As we were very late, they took us through the Long Sault Rapids (nine miles long, with a fall of 48 feet) in the dark, which is seldom done, and rather risky I should think, and we pushed on to Coteau Landing for the night. About 100 of us had to sleep on chairs, sofas, or on the floor of the saloon. By way of improving our night's rest, they were engaged overhead on deck for a couple of hours in "coaling" another steamer with "wood," across ours!

We were off at daybreak next morning, and enjoyed a glorious sunrise. Shooting the Cedar rapids was very interesting and enjoyable, and soon after we reached Caughnawaga, where the celebrated Indian pilot, Baptiste, came on board and took the helm, whilst we shot the famous Lachine rapids. They didn't look so bad to me from our steamer, as the Sault St. Marie rapids did from our canoe, but I believe they are more dangerous. There is a big rock on the left of the narrow passage, which the steamer steers straight for till within a few yards, when she suddenly shoots her bow round to the right, and you distinctly feel the boat drop three or four feet, while she rushes in a few moments into the smooth water beyond. There was a wrecked steamer on the

rocks quite close to where we passed, which didn't look cheerful; but I believe there is scarcely any danger, as the rapids are shot several times every day, and it is a favourite morning's excursion from Montreal. The man who first took a steamer down must have been very plucky. I believe a couple of our members shot this rapid in a canoe during the meeting.

The approach to Montreal from this side, under the Victoria Bridge, is very fine. I was soon back at my old quarters, at the Windsor Hotel, having had a delightful tour of a fortnight as a "dead-head,"—as anyone with a free pass is called,—during which I had travelled about 1,400 miles, and it only cost me £10. I had by this time gained a good idea of the size of the Dominion, as I had gone across Canada *by water for 1,600 miles*, and even then had not reached the centre!

We found Montreal in the full swing of the excitement of the opening day of the British Association meeting (Wednesday, August 27th, 1884), a day long to be remembered in the annals of science; and, as Sir Lyon Playfair, M.P., said:—"a day marking a distinct point in the advance of civilization. . . . What Canada wanted was not pure science only, but applied science; and, knowing that the latter only came through the former, she had the wisdom and forethought to welcome that pure science to the dominion." The success of the meeting was assured from the first, as it was found that *over 800* members had crossed the Atlantic—of whom about 150 came in the special steamer "Parisian"—and the total attendance by the end of the week had reached 1,770.

Our welcome by our Canadian fellow-countrymen was indeed most hearty; all classes seemed to vie with each other in their many acts of kindness and hospitality, and I am sure we cannot possibly thank them sufficiently. I may mention that, besides entertainments, excursions, cheap return tickets, free passes on Government Railways, reduced fares by rail and steamer, cricket, lawn-tennis, and lacrosse matches arranged for us, we each received a gift of $40 (£8) from the Government grant, which in most cases paid for all our living expenses during the week that the meeting lasted. Each member was also allowed, through the kindness of the Atlantic Telegraph Company, to send and receive two cable messages to and from England, *free*; and we found this a great boon. Our agents, Messrs. Cook and Son (of "Tourist" reputation) had arranged a code for us, and my first message home looked very funny. It was as follows:—"*623* (that's me!) *to Coupon*, (that's Cook!) *London. Package—Paganism—Painful—Fogs and Icebergs!*" which meant, "Arrived safe—all well—had a bad voyage—have been delayed by fogs and icebergs." I think most of us sent a "*Package*" across the Atlantic by cable.

One of the great points dwelt on at all the meetings, from first to last, was, that we were all of us *British*; and the same thing was done afterwards at Philadelphia, by constantly referring to the fact that we and our American hosts were all *Anglo-Saxons*.

There was nothing particularly startling in the way of scientific discovery during the meeting. There were, of course, a great many valuable colonial details given in the different sections, and one great event in Section E. (Geography) was the hearty welcome given to Lieutenant Greely, the Arctic traveller, who had recently arrived home after his escape and rescue. He looked very ill, but managed to read a most interesting paper on his voyage and discoveries, in which he paid a graceful tribute of admiration of the work done by the English explorers under Sir Charles Nares, and thanked us for sending the "Alert" to help in his rescue.

The most important scientific news at the meeting was, no doubt, the following brief but suggestive message telegraphed from Australia to Professor Moseley, President of Section D. (Biology): — "Caldwell finds Monotremes oviparous; ovum meroblastic!" Monotremes are two curious groups of animals, exclusively Australian; *Ornithorhyncus* (Duck-billed Platypus) and *Echidna* (Ant-eater). The following is Mr. W. Baldwin Spencer's explanation of "ovum meroblastic" in *Nature* (No. 789):—"The ovum of a monotreme contains, relatively to the pure protoplasm out of which the tissues of the animal will be formed, so much food-yelk that, when segmentation takes place, it is impossible for the egg to segment as a whole; and therefore the two kinds of protoplasm separate, and we find that the Monotreme embryo possesses a yelk-sac, by the gradual absorption of the contained material of which it is nourished during the early stages of development. . . . We can trace the line of descent through the *Sauropsida*, directly to the *Monotremes*, from these to *Marsupials*, and from these to the *higher Mammals*."

Professor Moseley told us a capital joke at one of the meetings. He had received a telegram from home about some domestic affairs, and when this telegram arrived, he sent it to his Wife, thinking that it also probably contained home news, which would no doubt please her; imagine her feelings on opening the envelope to find "ovum meroblastic, &c!"

In my section, C (Geology), there were several valuable papers on Canadian and American geology. Just imagine a country where the outcrop of a particular bed can be traced for 300 or 400 *miles!* A nice place for a geological ramble! I was much pleased at being able to give the McGill College Museum—through Sir Wm. Dawson, the Principal, who was

Knighted during the meeting—a small collection of fossils and rocks from our local Wealden strata, of which they have no representatives in Canada or the United States, and they proved to be very welcome.

The College authorities gave us an evening reception, at which we were all presented to the Governor-General, Lord Lansdowne, and his Wife. I thought how tired they must have been of shaking hands with over 1,000 people!

The citizens of Montreal gave us a soirée in the Skating Rink, and there were several garden parties, and excursions to various points of interest in the city and neighbourhood. I went to see the national game of Lacrosse, which has become familiar in England lately; one of the Montreal clubs had arranged a match with some of the Caughnawaga Indians, and there were three very fine closely contested games, during which I was much amused at seeing a couple of fights, when half the spectators jumped over the fence in their eagerness to join in! On Saturday there were large excursions to Ottawa, Toronto and Niagara, and Quebec.

The final meeting took place on September 3rd, when the honorary degree of D.C.L. was conferred on several of our leading men, and graceful speeches and tender farewells were spoken on both sides, and we parted from our kind hosts with universal regret.

The kind and brotherly feeling shown by the Canadians to us, as representatives of an English Scientific Society, has lately been extended to the whole British Nation, by the magnificent and patriotic offers of help, in the shape of men, money and arms, which have come pouring in by telegraph from all parts of the Dominion, and have found an echo in the most distant of our Colonies—Australia and New Zealand—on the opposite side of the globe.

Surely a Nation has just cause to be proud of such Children as ours!

On Thursday morning, Sept. 4th, a number of members started for the Rocky Mountains, and about 150 of us left Montreal in a special train for the meeting of the American Association at Philadelphia. Two of the Directors of the Grand Trunk Railway travelled with us, and told us how disappointed they were at not being able to "fix us up" properly with a train of Pulman cars right through to Philadelphia, but some agreement with other lines prevented it. Our route was across the Victoria Bridge, in the centre of which you can see the *gold rivet* driven by the Prince of Wales when he opened the bridge in 1860. Near Rouse's Point, at the head of Lake Champlain, is the frontier line between Canada and the United States. Through the kindness

of the American authorities, all our baggage was passed free through the Custom-house--a great boon, as all travellers well know. We ran all along the west shore of Lake Champlain, where the scenery is beautiful, past Fort Ticonderoga, where we got beaten by the French in 1757. We passed through Saratoga, the most fashionable inland watering-place in America, and towards evening we reached the west shore of the famous Hudson River. The scenery was very lovely, and especially at one noble curve of the River, near West Point, where we got a charming moonlight view of St. Anthony's Nose, which reminded me of the Lurline Rock on the Rhine.

When about a dozen miles from New York, we were delayed half-an-hour by the breaking of the engine coupling (a fine chance for section G !) it was eventually mended with a bit of telegraph wire, which they took from the line alongside. On arrival at Jersey City (New York), we had to change trains, and did not arrive at Philadelphia till 1.15 a.m. I had been provided with quarters at the St. George's Hotel, and found them very comfortable, and the officials were most kind and attentive. The Citizen's Committee had sent two or three of their members to meet our train at Jersey City, and they went round to every one of us "on board the cars," and arranged that each person had a room to go to on arrival at Philadelphia.

This was a foretaste of American kindness and hospitality, and they certainly did their best to vie with the Canadians in their efforts to see who could spoil us the most.

The American Association had put off their meeting till Friday evening, Sept. 5th, when they gave us a right royal reception, and hearty welcome, in the theatre of the Academy of Music, where we occupied the post of honour near the President, on the stage. There were altogether nearly 300 of the British Association at Philadelphia, most of whom were present that evening. I don't suppose that such a lot of Britishers had ever been seen there before !

The next day three or four excursions had been arranged, and I made one of 500 who went by special train of the Pennsylvania and Reading Railway, to the Anthracite coal regions. We had a train of 12 cars, and were each lowered one by one, down the Mahoney Plane, by a huge wire rope. It was a very interesting experience, as it is generally used for coal waggons only. We were much amused whilst a lot of us were watching one of the cars being lowered, to find we were all standing under a notice board, on which was written "LOAFERS *not allowed here !*" On arriving at the Indian Ridge coal mine, we were all taken down the pit, about 300 feet deep, in parties of nine; it was a wonderful sight as the whole mine was lit by the electric light,

and there was a chamber at the end 30ft. wide, 210ft. long, and 25ft, high, without any props, and we were told that it was just as it is usually worked. The seam of coal called the "Mammoth Bed," is over 50 feet thick.

The next excitement was going up Summit Hill in gondŏla cars (it was no use my talking of gondŏlas, they wouldn't have it at any price), they are open trucks fitted with benches, and are pushed up by an engine behind. The view from the top was very fine on that glorious summer evening. The coal seams used to crop out on the surface, but have all been worked out. We then got on board the cars of the Switchback Gravity Road, and had a very exciting and delightful ride, most of the way through lovely woods, down that celebrated railway on which no engine is ever seen. Each car went alone entirely by gravity, and at one place we went three miles in three minutes! The next place we arrived at was Mauch Chunk (pronounced Muk), which means "Bear Mountain," in Indian "Machk Tschunk." This is called the Switzerland of America, and certainly the scenery is very beautiful, but it is more like Wales to my mind, as there are no snow mountains. We got back at 11 p.m., having had a most enjoyable day, notwithstanding the heat—over 90° in the shade—and thoroughly appreciated the extreme kindness and attention of our hosts, who had given us this treat: a special train for 15 hours, dinner, supper, and beer and cigars all day, for 500 people. Truly they do things on a grand scale in the New World!

The American Association allows more latitude to its members in the papers read at their meetings, than the B. A. does, and they seem to have more "cranks" and "fads" than we have. I saw one gentleman lecturing on the Pyramids, that they were built from the top, but I couldn't make out how! This beats the "British inch" and "Millenium" theories.

Philadelphia possesses a splendid park, called Fairmount, said to be the largest in the world—3000 acres—it is on the banks of the Schuylkill River, and the scenery is beautiful; it was a very pleasant drive of an evening in that hot weather. The great heat—over 95° in the shade—made many of us ill; even the darkies felt it very much. I think it must have been the damp, or some electric condition in the air, a never felt more done up even in India with the thermometer over 100; it was like the "Sirocco" at Algiers, the "Khamseen" in Egypt, or the "hot wind" in India. I went off to Atlantic City, on the coast, on the 10th, and found it only 74° there. The cool sea-breeze was delightful; next day I had a splendid bathe for an hour in the surf—the sea was 70° and the air 72°.

They have capital arrangements for bathing in America, like

those on the Continent, nice-looking houses along the shore, with comfortable dressing rooms, and tubs of fresh water—a great luxury. All wear costumes and bathe together, and I often wish that we could have something of that sort here, but the habits of the people being different, I suppose it would never do. There were no organs or nigger minstrels—another great advantage.

I arrived at Washington on the 16th, and stayed at the Arlington Hotel—most comfortable, but the mosquitos were a great nuisance. The streets are the widest in the world and miles long! The Capitol is a very fine building and splendidly situated. The view from the top of the Dome is beautiful. The Washington Monument is an immense obelisk, 555 feet high, the tallest building in the world. It was finished last December, and I was much interested in watching them put up the scaffolding for the apex-stone; it must have been dizzy work up there. There was an amusing notice written up in the works near, "We pay a man to ring this bell." In one of the streets, on a corner house, we saw the following curious notice:—"Wanted, another loafer to sit on this rail."

I paid a visit to the Naval Observatory, and was delighted at seeing the big telescope—a 26-inch refractor—which discovered the two satellites of Mars. It is, indeed, a wonderful instrument, and, though over 30 feet long, can be moved about with one finger, so beautifully is it mounted. They have one bigger than mine, (4 inch) on it as a "finder!" I went up on the roof and saw the time-ball dropped at noon, which sends the time by telegraph all over America. It was rather singular that of the three employés I spoke to, one was English, one Scotch, and the other Irish.

One of the chief excursions is to Mount Vernon, General Washington's Home and Tomb. The scenery on the way down the River Potōmac is very beautiful (most English visitors think it is Potŏmac from the Greek for river, but I was told that this is *Indian* not *Greek!*) The house and grounds are just like an old-fashioned English country home, the bricks came from England, and the verandah is paved with stones from the Isle of Wight—they looked like Bembridge limestone, and probably came from the old quarries at Binstead, near Ryde. The whole trip was most enjoyable and very interesting; it was curious to notice, in Lady Washington's bedroom, the hole in the door which had been made to let her favourite cat go in and out, without disturbing her! There is a very touching custom for every ship passing up or down the river to toll their bells whilst approaching Mount Vernon, as a tribute to Washington's memory. The first to set this good example was an English man-of-war, at the beginning of this century.

I left Washington by the express on the Pennsylvania Rail-

way, and believe it is considered the best train in America; they are all Pulman cars, and the speed is about 40 miles an hour, lunch is served on board, and it is very pleasant travelling. The cars are all on "bogies," and have 12 wheels each, so they run very smoothly, but seem to lurch more than our carriages do. There is no doubt that the long open cars, with communication from one end of the train to the other, are a great advantage on a long journey; but the continual banging of doors, the passing of people to and fro, who are constantly treading on one's toes, or pushing against one's shoulders, and the worry of boys who are always wanting you to buy something, is a great nuisance. They seldom use whistles on an American locomotive (as the engines are called), and theirs are of a much deeper tone than our screamers, and more pleasant to the ears. They always ring a bell when passing through a station, but this does not convey any idea of warning to a stranger's mind. The first time I heard one was at Toronto, on the wharf, and I thought it was the workmen's bell! The way the trains run through the towns is rather alarming—there is no fence, and we went through the main street of a small town between Washington and Philadelphia at over 30 miles an hour! People were walking and driving about, children playing at the side of the line, and one youth was riding a bicycle within a couple of yards of us! At the railway crossings there is a notice put up, "Look out for the cars," or "locomotive." The rails are laid without chairs, on sleepers—which are placed closer together than ours—and fastened down with spikes. They have supports on the outside of some curves, but I did not notice any guard-rails like we use.

The station for New York is at Jersey City, and you have to cross the ferry over the Hudson River. An old-fashioned chariot on "C" springs took me to my hotel, and I got a real good bumping, as the streets are very badly paved.

The Fifth Avenue Hotel is a magnificent house, and most comfortable, with everything first-class and without stint. A good room with gas and water laid on (a most convenient arrangement), and three "square" meals a day, for $5 (£1), is not dear. There was great excitement in the hotel at the time of my visit as Mr. Blaine, the Republican Candidate for the Presidency, was staying in the house, and there was a continual mob interviewing him, or demonstrating in the street in front.

There is one noticeable feature in American and Canadian life at hotels, and that is, the temperance shown at meals—nearly everyone drinks iced water or milk. Each hotel has a bar, where every imaginable mixture of alcohol can be obtained. "Straight" or "perpendicular" drinks (as they are called) must, I think, be very unwholesome. They swallow a glass of spirits, and some-

times wash it down with a little water; they never seem to sit down with a glass of beer or grog, and have a quiet smoke, like we do—they haven't time, I suppose, and can't sit still! Of course, we tried all the different Yankee drinks—"cocktails," "smashes," "slings," &c. The ones voted best, as the weather was so hot, were "John Collins," "whiskey sour," and "lemon squashes."

The elevated railway is one of the sights of New York, and I found it a great convenience in getting about the city; but it must be a great nuisance to those who live in the streets through which it passes—the trains run all through the night. There are three lines running through the town, and plenty of tramways crossing them at right angles, so it is very easy to get about.

Brooklyn Bridge is one of the most wonderful engineering works I ever saw. It is 6,000 feet long and 85 feet wide, the two towers are 268 feet high, and the central span is 1,600 feet; height above high-water mark 135 feet. The view from it over the city, both rivers, harbour, bay, and surrounding country, is beautiful.

Central Park is another great attraction, 840 acres in extent. It is well laid out, and nature has not been "improved" too much. There are several very fine examples of ice-worn rocks polished and grooved, with large erratic boulders *in situ*. There, too, is the American Cleopatra's Needle—the companion to ours—given by the Khedive of Egypt in 1881, and brought over by Mr. Vanderbilt. The last time I had seen it was at Alexandria, a few months after our Obelisk had been taken away to its new home on the Thames Embankment.

The Museum of Natural History is on the borders of the Park, and contains a fine Indian collection, including an enormous war canoe; also a good national geological collection. There are some erratic blocks, *roches moutonnées*, and glacial drift deposits in the grounds attached to the Museum. "Hands off!" is the notice put up in America for the "Visitors are requested not to touch," or "*Ne touchez pas. S.V.P.*," of England and France.

I went to see a match at Base-ball—the national game—between two good clubs. It is something like our rounders, but one difference is that the ball is thrown *to the fielder* and not *at the runner*. It seems a fine game, but is spoilt by betting; the crowd are always yelling at the umpire, and frequently "go for" him!

I went to Coney Island, of course. It is the great seaside summer resort of New Yorker's, but the season was over, and it looked rather deserted. However, I had a bathe, and saw the "Elephant," an immense wooden image used for a restaurant, and a prominent object to all visitors arriving at New

York by sea. There is another near Atlantic City used for an hotel.

The trip up the Hudson River was a most delightful excursion, and I was fortunate in having a very fine day, Sept. 27th. We went up in the "Albany" as far as Newburgh, General Washington's head-quarters, and came back in the "Vibbard." They are both magnificent paddle-wheel steamers, beautifully furnished, and very fast; they have beam engines, working overhead on deck, with a stroke of twelve feet. The "Vibbard" is said to have done the fastest voyage on record, from New York to Tarrytown, *27 miles in one hour!* Also from West Point to Newburgh, 10 miles in 20½ minutes, which is at the rate of *over 29 miles an hour*! Each boat has three funnels ("smoke stacks" they call them) abreast, which look peculiar. There were notices printed up in the saloons "*Gentlemen* will not smoke, *others* musn't!"

The scenery on the Hudson River is very lovely, especially at the Palisades, a vast trap-dike, forming a range of cliffs 20 miles long, and 300 or 400 feet high; they are beautifully wooded, and the autumn tints were just beginning to look glorious. Nearly opposite the highest point we passed a town called *Hastings*, where the treaty for the evacuation of New York by the British, was signed by Washington, 1783. Near West Point, celebrated for its Military Academy — "the Sandhurst of America"—the river winds amidst beautiful mountains, from 1,200 to 1,500 feet high, covered with lovely woods to their very summits, and nothing can exceed the glorious views on either bank.

I left New York on October 1st, in the Cunard s. "Servia," a magnificent vessel of 7500 tons, commanded by Captain Cook, Commodore of the Cunard Fleet, and had a most delightful voyage. We had 250 saloon and over 300 steerage passengers; most of the latter were returning emigrants, which showed, I fear, that trade is as bad in America as it is at home. It was a glorious day, and we had a fine view of New York City, the harbour, Staten Island and the bay, not forgetting the Elephant on Coney Island! Our pilot left us about 4 p.m. off Sandy Hook Lightship, and we started across the Atlantic, on our way home, in a dead calm.

We had a few days roughish weather, and heavy seas, but altogether the passage was a very fair one. The "Servia" is the finest ship I was ever on; she is over 550 feet long, and we had a clear run of 120 yards on deck for our walks. Her speed was 17 knots (= 20 miles) an hour, and best run 385 knots (but she has done 410). We had not been on board more than a few hours before some one confided to me that "he guessed she was a beastly old tub!"

We luckily only had a few hours' fog—that greatest enemy to navigation; when the fog-horn had to be kept going every minute or two. It is about the size of a small beer-barrel, and has a fearfully loud deep note, which makes a dreadful "buzzing," and shakes the ship. It was just over my berth, which made it lively for me whilst below! On the 4th we had a fine view of the total eclipse of the moon—lat. 44, N., long. 50, W.—just off the banks of Newfoundland; the stars came out very bright, and the moon nearly disappeared, not turning a copper colour as usual. Several passengers were astonished at the darkness, and I was much amused by the Captain telling me that he too had forgotten all about the eclipse, and wondered what had become of the moon! Next evening, off the Flemish Cap—a bank about 200 miles outside the great Newfoundland Banks—the weather looked very threatening: S.E. scud flying over the moon, which looked "greasy," and as we were in the "roaring forties" I thought we were in for a sou'-wester. However, the Captain told us the barometer was rising a little, and it would be fine. He said that the fact of our travelling so fast was constantly overlooked.

In Sir Thomas Brassey's lecture on the "Sunbeam's" voyage to the West Indies, which he gave to this Society last year, he described the law of storms, and gave an illustration of the cyclone they were caught in off the Bermudas. It has been found that the *average* rate of travel of a storm-centre is 18 miles an hour, so when a steamer is going 17 or 18 knots, she runs ahead out of the storm, as we did (which no sailing ship could do, of course), and the barometer rises. If we had been hove-to, the barometer would probably have fallen, and the gale passed over us. Sometimes, of course, a steamer runs into a storm.

It has been observed that when a storm-centre travels very fast, it produces a terrible hurricane always at its worst about an hour before, and an hour or two after, the passage of either the centre or "trough" of the storm (a line at right angles to the path of the centre). The centre of the great storm of December 28th, 1879, travelled over 60 miles an hour, and the Tay Bridge was destroyed during a squall of immense wind-velocity (probably over 100 miles an hour), about half-an-hour *before* the trough of the storm passed.

It appears that when two depressions travel nearly at the same time in a parallel direction, 300 or 400 miles apart, they produce most destructive gales. A curve in the direction of the centre's path, and a loop in the barometrical depression, also produce extra-violent wind squalls in their neighbourhood.

When near the coast of Ireland we had a heavy north-west gale with big following seas, and didn't we just roll—over 30 degrees, I should think! Half the things rolled off the tables at

dinner. My experiences at sea in steamers and sailing ships lead me to agree entirely with Lady Brassey's opinion, expressed in her last book* ("In the Tropics, the Trades, and the Roaring Forties") that "a good sailing ship of 500 tons is more comfortable (I should suggest '*less un-comfortable*'!) than a 5,000 ton steamer driven full-speed ahead, irrespective of wind or sea." Of course, if we had been "hove-to" in the "Servia," she would have been as steady as a rock.

It shows what confidence there is in ship, officers, and crew, that we were able to go 17 knots an hour in a gale, heavy sea, and thick drizzle, straight towards the Irish coast, and that the Fastnet Light was seen on the port bow exactly at the calculated time! We arrived at Queenstown at 5 a.m. (9th), seven days eight hours from New York. The weather became much finer towards mid-day, as the gale which had passed down the Irish Channel during the night, had taken a curve (of more than a right angle) to the north-eastward, and gone away across England—a most unusual path for storms to take. We got to the bar off Liverpool about ten that night, just eight days from New York, which is a very good passage, considering that we had so many head seas. We had to wait for the tide to cross the bar, and I stayed on deck till half-past 2 a.m. watching the ship being docked, by the electric light—a very interesting operation with such a long ship as ours. We landed about 8 a.m. (October 10th), and as passengers seldom land at the docks, there were very few cabs, and much confusion, most of the baggage having been taken to Prince's landing stage. However, I got to London in time to catch the afternoon express at Charing Cross, and arrived home about 6 o'clock, having had a most delightful tour of 10 weeks, during which I had travelled over 9,000 miles.

"B. R. D."

* With regard to the St. John Ambulance Association (mentioned in this book), whose work Lady Brassey has done so much to further in different parts of the world, I should like to note here how very important it is that *all travellers*, especially *emigrants*, should be taught the elements of surgery and medicine, particularly the first help to the wounded, according to the Society's lectures and instructions.