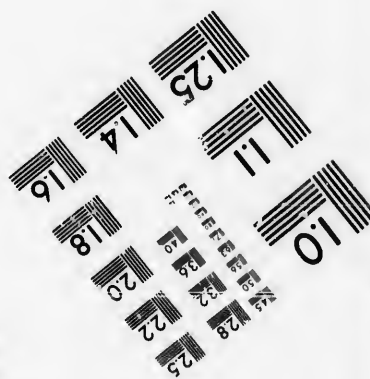
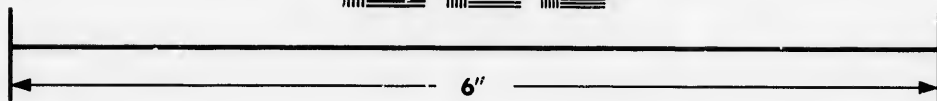
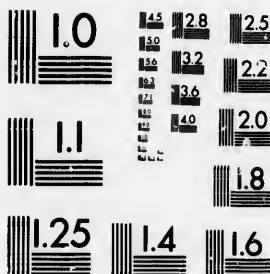


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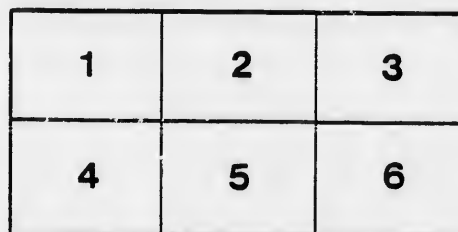
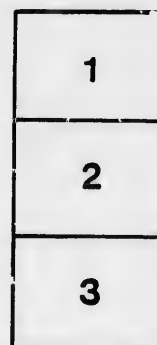
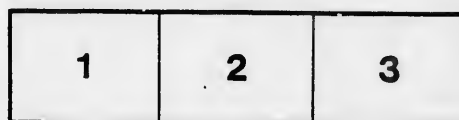
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ANNUAL MEETING
OF THE
NATURAL HISTORY SOCIETY OF MONTREAL.

ADDRESS OF THE PRESIDENT: 56

PRINCIPAL DAWSON, LL.D., F.R.S.,

May 18, 1877.

In closing another Session of this Society, we naturally turn to the work of the past year, and in this address it is more especially our scientific labours that claim attention. What have we done in the past year for the advancement of science, and for the credit of our country as one of the civilized nations of the world? I would not underrate what we have accomplished for the popular diffusion of knowledge, by means of our museum, our excursions and our popular lectures, but the original investigations which we have given to the world constitute our best title to regard as a scientific association.

In the course of the winter nine original communications have been laid before this Society; and of these the greater number have appeared or will appear in our Journal. Of these communications two; namely, that on Inscriptions from Easter Island presented by Mr. D. Robertson, and Notes on Animals of India, did not refer to the natural history of this country. With respect to the former, however, I may say that it has a connection with America in the circumstance that so many indications point to a migration of civilized or semi-civilized men into America by way of the Pacific, and to the probability that Easter Island was one of the stations in this migration. Mr. Hyde Clarke and Dr. Wilson have both directed attention to this subject, and have shown that in languages and physical features there are links of connection between the Polynesian and the Peruvian races, and that the ruins of large stone buildings found in so many of the Polynesian Islands, as well as the arts practised in those islands, point to similar conclusions. The possession of a sort of picture writing for the keeping of family and tribal records in Easter Island, and the not very remote resemblance of this to some familiar American contrivances of the same kind, furnishes an additional link of connection. On the often disputed question of the source or sources of the aboriginal American population, it now seems to be the settled conclusion of archaeology that we have good evidence of prehistoric migrations of man into America by Behring's Straits from Northern Asia; by the Pacific Islands from Southern Asia; and by the Equatorial Atlantic, by way of the Canaries and West India Islands.

To these we have to add the probability of Chinese and Japanese ships having at various times been drifted upon the Pacific coast, and the discovery of Greenland and part of the mainland of America by the Norsemen in the tenth century. Thus there seems to be not one way merely but several in which America may have received its early population, and by which we may account for the native races of America with their languages and customs merely as derivatives from the old world, and without supposing these tribes to be true Autochthones.

Two very interesting communications of a geological character were those of Prof. Hind on the Geology of Labrador, and of Mr. G. M. Dawson on Recent Elevations and Subsidence of the Land in British Columbia. Remote though these regions are from each other, they present some remarkable points of similarity, especially in relation to their more recent geological history. In both we have the evidence of the great glacial age. In both the surface glaciation and transport of boulders seem to have been caused by the joint or successive action of water-borne ice, and glaciers. In both there are the most remarkable evidences of submergence to a great depth in the Post-pliocene age. It is a remarkable illustration of the vastness of the geological changes which have occurred in comparatively modern times, that we should find on the mountains of the Pacific Coast and those of the North Atlantic seaboard the indications of a common submergence, and this of very great amount. Such vicissitudes are not to be accounted for by merely local causes, but by grand agencies effecting at once a whole hemisphere or the whole earth.

In British Columbia there seems to be good evidence of the submergence of the land to such an extent that sea margins occur 5270 feet above the level of the sea, and at various elevations between this and the present sea level. In the Rocky Mountains Mr. Dawson had previously measured the height of similar terraces 4400 feet above the sea. While those great depressions occurred in the Post-pliocene period, there is evidence to show that in the preceding Pliocene age the land in British Columbia may have been 900 feet higher than at present. On the other hand, in modern times the coast would seem to have been going down at a rate in some cases of as much as ten to fifteen feet in a century; while there are Indian traditions of sudden waves overflowing the land, and perhaps occasioned by earthquake movements. With reference to these modern changes, it should be observed that British Columbia forms a part of that great band of volcanic and seismic activity which extends along the west coast of America, and which presents in our own time and in the more recent geological periods, evidences of agencies which have long slumbered on the eastern margin of the continent.

On our own side of America, the numerous terraces so well developed on the Lower St. Lawrence, mark the stages of recession of the Post-pliocene ocean. Mr. Richardson informs me

that he has found one of these terraces on the west coast of Newfoundland, at a height of 1225 feet above the sea. On Belœil Mountain, in our own neighbourhood, we find travelled Laurentian stones which must have been water-borne, at a height of nearly 1200 feet, and if the travelled stones found by Prof. Hitchcock on Mount Washington have been deposited by floating ice, then the highest summits of our mountains must have been under water at the time of the greatest Post-pliocene submergence. Mr. Milne Home has recently directed attention to many facts of similar import which are being accumulated in Great Britain and in Norway. Geologists are thus beginning to realize the evidence of a prevalence of the sea over the Northern hemisphere in the most recent of the geological periods; which at one time they would have regarded with the utmost scepticism.

While noticing these papers, I would also direct attention to the evidence which they afford as to the action of sea-borne ice as distinguished from that of glaciers; and in connection with this it is important to note the influence attributed to floating pack ice and "pan ice" by the officers of the late Arctic expedition, as well as by Prof. Hind and by Prof. Milne in recent papers in the Geological Magazine. On the other hand the observations of Hellond on the glaciers of Greenland, published in the Geological Magazine, state the interesting fact that one of the great glaciers of that country flows seaward at the surprising rate of 20 metres in a day, and gives off a vast abundance of bergs, more or less laden with earthy matter and boulders. A fact like this helps us to understand the gigantic furrows ploughed by some of the old local glaciers of the Laurentian hills, and of which the sluggish glaciers of the modern Alps afford no adequate explanation.

All these new facts tend to strengthen the conclusion that general submergence and the action of floating ice and of local glaciers afford the causes at work in the so-called glacial age.

In the department of Zoology we have reason to congratulate ourselves on the communication of Dr. Osler on the Fresh-water Polyzoa of Canada. These remarkable and interesting animals, though abundant in our canals and ponds and slower streams, have as yet received little attention. The contribution of Dr. Osler brought under our notice several species; some of them forming communities of considerable size, and all of them of very great interest and beauty.

Our attention was called by Dr. Carpenter to the subject of Zoological nomenclature, in connection with a circular issued by Mr. Dalle on behalf of the American Association for the Advancement of Science. With the replies prepared by Dr. Carpenter most of us I think in the main agree; and while we regard as very reprehensible many of the eccentricities of genus-makers and species-makers, more concerned to gain credit to themselves than to advance the interests of science, we equally reprobate the over-scrupulous antiquarianism which would revive uncertain

and forgotten names to the exclusion of those sanctioned by long use. There is perhaps little hope that these evils can be wholly remedied in the present state of science, when there is in this respect no king in Israel, and every man does what is right in his own eyes. We believe however that the old rules sanctioned by the British Association, with a moderate amount of self-abnegation and common sense, will be sufficient to secure all that is really necessary.

The lamented death of Mr. Billings is a heavy blow to this Society, as well as to the cause of science in Canada; and one of our meetings was appropriately occupied with an obituary notice by his successor, Mr. Whiteaves. It is not necessary for me to refer to the details contained in that notice. I may remark however that Mr. Billings may be considered as the creator of Canadian Palæontology, in so far as the Invertebrate fossils of the Palæozoic rocks are concerned. This department he built up from its foundations, and built so extensively and so well, that it will be long before his work can be hidden from view by any additions to be made by his successors. As a worker he was painstaking and cautious rather than rapid, and his results were always regarded with respect and confidence by those engaged in similar pursuits elsewhere. He was not a mere describer of species, but a geologist of sound and broad views, and his earlier works show a power of lucid and popular presentation of his subject which it is perhaps to be regretted he did not follow up in his later years. One of his greatest failings was a certain shrinking from publicity, which rendered him indisposed to take a prominent position even in the work of our own Society, and still more tended to prevent him from entering into any presentation of his favourite studies to the general public in any other form than that of official reports and scientific papers. Such men as Mr. Billings are produced in small numbers in any country, and it may be long before Canada possesses as one of her own sons a second Billings. It is however a remarkable coincidence that such a man should have been preparing himself to second the work of Sir William Logan just at the time when Palæontological work had become a prime necessity for the Canadian Survey.

I have reserved to the last some remarks connected with the subject of my own paper on the Geology of the Intercolonial Railway, and which subject I desire here to refer to in a somewhat broad and discursive manner, demanded I think by the present condition of science and the industrial arts in this country. I would in this connection desire to direct your attention to the immense importance of that great public work, and to the effects which would flow from a further extension of similar enterprise in the west. I can remember a time when the isolation of the Maritime provinces from Canada proper was almost absolute. There was a nearly impassable wilderness between, and no steamers on the waters, and the few whom business or

adventure caused to travel from Halifax or St. John to Quebec or Montreal, had to undertake a costly and circuitous journey through the United States, or to submit to almost interminable staging through a wilderness, or to the delays of some sailing craft on the St. Lawrence. In later times steamboats have supplied a less tedious mode of communication, and now we see placards informing us that the Intercolonial carries passengers from Quebec to Halifax in twenty-six hours. But it has done more than this. The traveller may now see the coal of Nova Scotia travelling upward to Quebec, and the fresh fish of the Atlantic coast abundantly supplied in our markets, while the agricultural products of the interior travel seawards in return. This is however but the beginning of a great change. A delegation of coal owners was in Ottawa last month endeavouring to attract the attention of members of the Legislature to the fact that Ontario might be cheaply supplied with coal from Nova Scotia in return for her farm products. The representation led to no immediate practical results, but it foreshadows a great future change. Living as we do on the borders of that great nation without any name, except that of America, which does not belong to it, and which builds an almost impassable wall of commercial restriction along its frontier, we cannot long endure the one-sided exchange of commodities which takes place at present so much to our disadvantage. The Nova Scotian cannot buy flour and manufactured goods from a people who refuse to take his coal and iron in exchange; and the Ontarian or Quebecker cannot afford to have the commercial connection with the mother country severed in favour of a nation which will not take the products of our fields, our forests, our mines or our granaries in exchange. We shall have in self-defence to cultivate our own internal trade, and even if we must bring the products of the Pacific and Atlantic Coasts across a whole continent to meet each other, this will be cheaper in the end than to sacrifice our own interests and those of the empire to the Chinese policy of our neighbours in the South.

The diversities of products in countries depends much on differences in latitude, but there are also diversities depending on longitude, and, fortunately our country possesses these in no small degree. On our Atlantic coast we have rich fisheries and minerals not possessed by the interior regions. In these last, through all the great regions extending from Quebec to the Rocky Mountains, we have vast breadths of fertile soil besides many of the elements of mineral wealth, and varied kinds of manufactures are growing up both on the coast and inland. What is to hinder a direct exchange of commodities within ourselves instead of an indirect exchange under the most serious disadvantages with the United States. Further, such direct exchange would increase our trade with Great Britain and the West Indies, and bind together the somewhat divergent sections of our own population. The opening up of railway communica-

tion across the great western plain might do for us what a similar process has done for New York. But from a railway terminus on the Pacific shore we could stretch our commercial relations over that great ocean, and bring all the treasures of the Orient to enrich our markets. Further, in establishing communication with British Columbia, we are not merely establishing a landing place on the Pacific, though this would be an inestimable advantage. British Columbia is in the mining point of view, one of the richest portions of the earth's surface. It is of more value acre for acre than any portion of the Eastern States or of Canada proper. In an appendix attached to a recent report on the Pacific railway, Mr. G. M. Dawson has collected some details as to the mineral wealth of this region. He mentions gold-fields yielding now more than a million and a half of dollars annually. In eighteen years British Columbia with only 10,000 inhabitants has exported gold to the amount of 40,000,000 of dollars; and it is no exaggeration to say that with a larger population and better means of conveyance this yield might be increased twenty fold.

Coal exists on Vancouver's Island and the neighbouring mainland in inexhaustible abundance, and of excellent quality, and represents the sole supplies of that mineral on the Pacific coast of North America. British Columbia might supply the whole Pacific coast and a vast interior region, and might produce many millions of tons annually.

Iron, silver and copper are known to exist in productive quantities, and there is reason to believe that mercury, lead, and platinum might be added.

In short, British Columbia possesses all that mineral wealth which has enriched California and the States adjoining it; and the opening up of communication between it and other parts of the Dominion would be the beginning of a series of events that would build up great and wealthy cities and populous seats of industry in a region now scarcely inhabited, and cut off from direct intercourse with the other provinces politically connected with it.

What the Intercolonial has begun to do for our relations with the Atlantic provinces, the Canada Pacific must do for our relations with the Pacific province; and if I could present before you in a prophetic picture all that would follow from the establishment of such a connection, and the trade of the great sea and lands beyond, which might flow through our country, you as citizens of a commercial city, as well as in the capacity of votaries of science and scientific art, would at once say that at almost any sacrifice this great work should be executed. The difficulties in the way are undoubtedly great—so great that this generation of Canadians should scarcely be called upon to overcome them unaided, but they are probably not insurmountable, and the mode of meeting them is certainly at present the greatest public problem that our statesmen have to solve. It is further

undoubtedly the duty of those whose scientific studies show them the grandeur of this great question and the nature of the practical results of its solution, to aid in every way that they can the progress towards an unobstructed highway through our territory from the Atlantic to the Pacific.

If it is in our power thus to bring together the resources of the whole breadth of the Continent, we may hope to consolidate our connection with the Mother Country by making ourselves indispensable to her interests, to relieve ourselves from the galling commercial yoke laid upon us by our neighbors, to provide homes and work for the surplus population of our older provinces, to build up the wealth of great trading centres, and to render vast and naturally wealthy regions productive of subsistence for millions of men.

When I look forward to the future of this country and base my anticipations, not on the merely human elements of to-day, but on the geologic treasures laid up in past ages, I see the Dominion of Canada with a population as great as that of the United States, and with some of the greatest and wealthiest cities of this continent in Nova Scotia and British Columbia. Geologists are not merely prophets of the past, they know something of the future as well. It might perhaps be well if we could inoculate our statesmen with a healthy belief in the geological future of Canada, or even with some faint idea of the billions of dollars of accessible treasures that lie beneath the soil of British Columbia and Nova Scotia. We might then see them put forth some effort to realize this El Dorado within the time of those now living, rather than content themselves to wait for the action of men wiser and more energetic than ourselves.

Of the future of our own Society I should like to say much. It must depend on a judicious selection of our members, on the liberality which the public may extend to us, and on the earnest efforts which our working members may put forth. It is not merely in the pursuit of new truths, but in cultivating in others a desire for that knowledge which we know from our own experience to be in itself one of the richest treasures which the world affords.

It is a matter of deep regret to us on this occasion that a recent Act of the Dominion Parliament renders it possible that the Geological Survey of Canada, which has since its commencement had its domicile in this city as the centre of commerce and practical science in the Dominion, may within one or two years be removed to Ottawa. That this, should it be carried into effect, would be a serious loss to this Society, the large number of papers and lectures contributed by members of the Survey, and the active part they have taken in the management of its affairs as officers and members testify. The removal of the Survey would also have its effect on the University, and on the interests of the numerous students who resort to this city for education, as well as on those of gentlemen connected with the numerous min-

ing and similar enterprises which have their centre here. Nor would such removal be without injurious influence on the Survey itself. This Society was the first public body to urge on the Government the undertaking of a scientific survey. The Natural History Society, the University and the citizens generally, have always supported the interests and aided the work of the Survey, and have in many ways promoted its efficiency. Nor can an institution possessing a Museum and Laboratories which are the growth of so many years, be hastily removed without serious loss, only to be repaired by renewed effort and the lapse of time.

But to my mind these local considerations are overborne by the change in the constitution of the Survey which has been made, rather, I fear, in the spirit of a narrow bureaucracy than of an enlightened regard for science. Hitherto the Survey, while nominally under the control of an Ottawa Department, has been in reality an independent institution, recognized as such abroad. Its directors and principal officers have been men whose reputation has far transcended that of the gentlemen who temporarily occupy departmental offices at the seat of government. It is now to be a branch of the Civil Service, a mere appendage to the Department of the Interior. The effect of this may not be felt for a time, but it must eventually tend to deprive the Survey of its independent scientific action, to diminish its importance and consideration abroad, and perhaps in the end to reduce it to a mere industrial bureau, or to place it in the uneasy position of that American Survey of the Territories, which is in like manner attached to the Department of the Interior: but which is there supplemented by the military surveys, and by the surveys of the several states, some of which in their scientific results have far surpassed it. There can be no doubt that considerations of this kind weighed with the eminent and sagacious Canadian who founded the Survey and raised it to its present position of importance, in inducing him so strenuously to oppose its removal to Ottawa. It is to be wished that his fears may not be realised; but I cannot refrain from expressing my own strong conviction that these fears were well founded. The clause providing for the removal of the Survey is, however, not mandatory but only permissive. The carrying it into effect would involve a large expenditure and most serious loss, and would certainly contribute something to the cry beginning to arise, not only in this Province but in those of the Atlantic and Pacific Coasts, that this country is governed, not in the interests of the Empire or of the Dominion in its whole extent, but in those of a section of the people of Ontario. Let us hope that wiser counsels may prevail, or that some turn of the political wheel may suggest other measures or bring in other men.

