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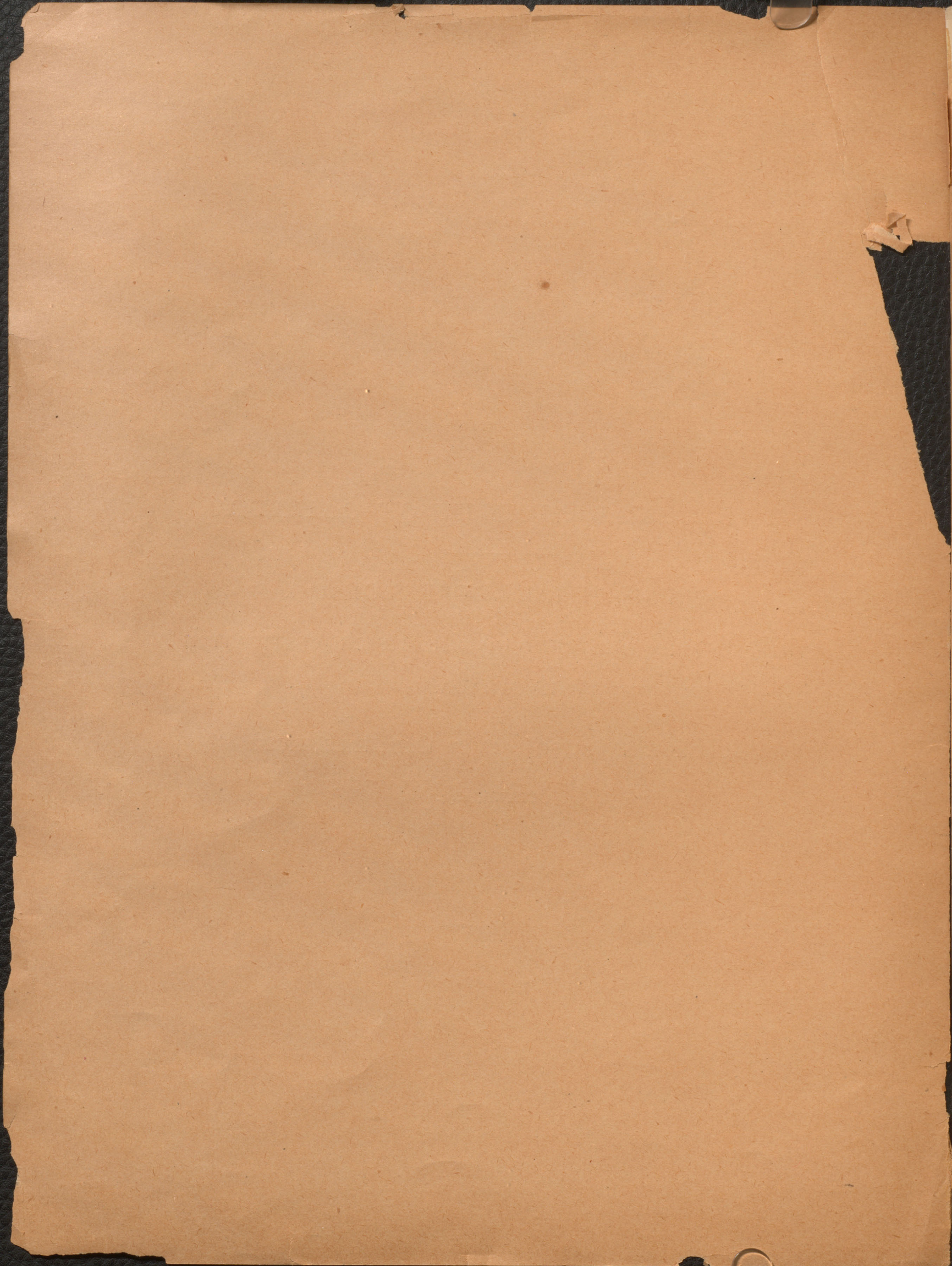
PRESIDENTIAL ADDRESS OF 1894.

THE PROGRESS AND TREND OF SCIENTIFIC INVESTIGATION
IN CANADA.

BY

GEORGE M. DAWSON, C.M.G., LL.D., F.R.S., F.G.S.

OTTAWA, 1894.



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BY

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BEING THE PRESIDENTIAL ADDRESS DELIVERED AT THE ANNUAL MEETING OF THE
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PROGRESS AND TRENDS

SCIENTIFIC INVESTIGATION

BY J. H. HODGSON

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THE PROGRESS AND TREND OF SCIENTIFIC INVESTIGATION IN CANADA.

In a society formed to include as far as possible representatives of all branches of literature and of science, it appears to be most appropriate that the president for the time being should devote the address which it is his privilege to deliver, to some specific topic, or to the consideration of such matters of interest or importance as may lie particularly in his own line of work or thought. At the last meeting of the Society, Dr. Bourinot presented a masterly essay under the title of "Canada's Intellectual Strength and Weakness," dealing principally though not exclusively with the literary, artistic and political development of the country. It may now be of some interest and service to supplement this essay by a very general and very brief review of what has been accomplished, and what remains to be accomplished in Canada, by various scientific agencies working in the investigation of the natural features and towards the development of the natural resources of the country.

We find ourselves possessed in Canada of a country vast in its dimensions, but of which the population is as yet comparatively small. If, therefore, we have good reason to believe that the natural resources of our territory are in any respect commensurate with its area, we may look forward with confidence to a great future. But in order that this may be realized properly and soon, we must devote ourselves to the exploration and definition of our latent wealth, and to the solution of the problems which inevitably arise in the course of its utilization under circumstances which are often more or less entirely novel. For this purpose, we are provided at the present day with methods, appliances and an amount of accumulated knowledge not previously thought of, but which we must be prepared to enlist in our service if our purpose is to be achieved.

It is unsatisfactory to read, as we often may, the statement that Canada is possessed of "unlimited natural resources," for such a statement means little more than that we have been unable to make even a reasonably complete inventory of these resources. In order intelligently to guide the work of those endeavouring to utilize the benefits given to us by nature in the rough, and to attract population and capital for this end, it is necessary to be much more specific. It is true that great regions of Canada still remain very imperfectly or almost altogether unexplored, but we are nevertheless already in a position to form some general estimate of the importance and character of the products which the country as a whole is best capable of yielding. Thus, in respect to mineral wealth, I believe we are justified in assuming that Canada is equally rich with any known area of the earth's surface of comparable dimensions. So, in regard to products of the sea, these, relatively to our length of coast line—and this is very great—are probably at least as valuable as those of any other similar length of coast. Of arable and pastoral land, because of the rigorous climate of the northern portions of the geographical area of Canada, the extent is not commensurate with that of the country, but it is practically so great that we may be pardoned if describing it at present as "unlimited." As to the natural wealth represented by our forests, it is probably correct to state that Canada is still capable of affording more timber than any other country in the northern hemisphere; but of this, with the constant and increasing drafts upon it, we can already begin to see the end, unless some effective measures shall be taken, and that soon, towards its conservation and reproduction. We have, in fact, yet to learn to regard a forest as a special kind of farm, in which, if we do not sow, we cannot hope to reap perennially.

It is not, however, my purpose to enter into any details respecting the natural wealth of the country, but rather to point out as briefly as may be what has been done and what still remains to be accomplished by means of the various scientific organizations and associations of Canada, in aid of the utilization of these resources, in the matter of making them known to the world at large, and toward

the solution of various important questions which lie before us in connection with them. Science is but another and a convenient name for organized knowledge, and as such it has entered so largely into every branch of human effort, that when, at the present time, any one attempts to pose as a "practical" in contradistinction to a scientific worker, he may be known to be a relic of the past age, in which much was done by rule of thumb and without any real knowledge of the principles involved. Neither can we safely make any division between what is sometimes called "practical" or "applied" science and science in general, for the knowledge must be gained before it can be applied, and it is scarcely yet possible to bar any avenue of research with a placard of "no thoroughfare," as an assurance that it cannot lead to any material useful end.

At the same time, there are certain directions in which investigation is very closely wedded to results of immediate and tangible value, and it is practically in such directions that the State may reasonably be expected to exercise its activity. But the line should not be too rigorously drawn, for should the investigator for a time stray into some by-path of research, because of his individual interest in his work, it is not improbable that he may return from his excursion with some unexpected discovery, which may prove to have important bearings on the problems of every-day life. Take, for example, the study of Palæontology which, relating as it does, to extinct forms of life, might appear to be a branch of science wholly removed from any practical object, however interesting it may be to disinter and to reconstruct these remarkable forms. But we all know that this study has become an indispensable one as an aid to the classification of the rock formations and thus to the search for the useful minerals which some of these contain. This is more particularly the case perhaps in the instance of coal beds, which are usually confined in each region to some set of strata, which may be defined with precision only by the aid of the evidence afforded by fossil remains.

Before going further and entering into the principal subject of my remarks, I should make it clearly understood that in endeavouring to give some account of the several agencies of scientific work in Canada, it is my purpose to refer to those only which may be considered as engaged in widening the borders of knowledge by means of original research, tending more or less directly to the development of our natural resources and advantages. Thus the very numerous matters in which science has already been enlisted in every-day service of a routine character will not be alluded to, neither is it intended to allude to the numerous educational institutions in which a scientific training is given; nor is it possible, within the limits by which I must be bounded, to note the results which have accrued from the individual labours of scientific workers throughout the country, though in many cases these have been of the most creditable and important character.

THE GEOLOGICAL SURVEY.¹

This may be said to be the senior or *doyen* among the scientific efforts of the Canadian Government, for although the Magnetic Observatory had been established some years earlier in Toronto, it did not till long afterwards come under the control of the government of Canada.

The first effort made toward the establishment of a Geological Survey in Canada, appears in a petition addressed to the House of Assembly of Upper Canada in 1832, by Dr. Rae. Nothing, however, came of this or of several other attempts of the same kind, till in the first united Parliament of Upper and Lower Canada, in 1841, the Natural History Society of Montreal and the Historical Society of Quebec joined in urging the matter upon the government, with the result that the modest sum of £1,500 sterling was granted for the purpose of beginning such a survey.

The selection of a geologist was referred to the Secretary of State for the Colonies, by Sir Charles Bagot, the governor, and on the recommendation of the best known geologists of the day in England, Logan, afterwards so well known as Sir William Logan, was appointed. Born in Montreal in 1798, he was at the time forty-four years of age, and his admirable work in the survey of the South Wales

¹ Most of the notes here given relating to the early history of the Geological Survey are derived from Dr. B. J. Harrington's life of Sir William Logan, Montreal, 1883.

coal fields, had attracted the attention of Sir Henry De la Beche, under whose auspices the Geological Survey of Great Britain had lately been inaugurated. In 1843, Logan entered upon his new duties, with the greatest possible zeal, and for more than twenty-five years the history of the Survey and that of its director were the same.

It must be remembered that at this time the utility of geological surveys had only begun to be generally recognized, and the Survey of Great Britain, which became the parent and model of so many others, was scarcely twelve years old.

It is not my purpose to follow, even in outline, the story of the progress and results of this Survey; but as it has very recently celebrated the fiftieth anniversary of its foundation, it may be useful to refer to some matters connected with its work which early impressed themselves upon its first director, several of which still retain the importance they had at that time.

In 1854, a select committee of the legislature was appointed to investigate the working of the Survey. Ample evidence was produced of its utility within the limits possible with the small amount of money granted, and so thoroughly were the members of the committee satisfied on this point that they recommended the provision of greatly increased facilities for the enterprise.

When before the committee, Logan was asked what the principal difficulties he had met with were; he replied: "Independently of those unavoidably incident to travelling in canoes up shallow rivers, or on foot through the forest, are those arising from the want of a good topographical map of the country. Accurate topography is the basis of accurate geology." In answer to other questions relating to the connection between the "scientific" and the "practical" results of the Geological Survey, he adduced a number of instances showing this connection which had already occurred in the course of the work then done, and added: "The object of the survey is to ascertain the mineral resources of the country, and this is kept steadily in view. Whatever new scientific facts have resulted from it, have come out in the course of what I conceive to be economic researches carried on in what I conceive to be a scientific way."

Unfortunately the complaint made at this time in regard to the want of trustworthy topographical maps still holds, and this want yet constitutes an important obstacle, even in some parts of the country which have long been inhabited and are thickly peopled. Unfortunately too, there are still to be found, even in these days of popular education, those who call aloud for "practical results" without appreciating the necessary concurrent or antecedent stages of scientific investigation by means of which such results may be attained, or the way of attaining which is thus evidenced and made plain.

To take a very recent instance of what I mean, allusion may be made to the present conditions in the region about Rainy Lake, in western Ontario. It had long been known to geologists that among the Archæan or oldest rocks of the eastern part of Canada, those of the Huronian system are often found to contain metalliferous deposits of value. No such deposits had been found in this particular region, but several years ago its rocks were carefully mapped out. Within the last few months veins of gold-bearing quartz have been discovered in these rocks, and hundreds of prospectors are flocking to the district, while the Geological Survey is besieged for copies of the map, by which the researches of the miner may be guided. Meanwhile, the Survey is at work elsewhere in preparing similar maps, and though it is not always possible to be, as in this instance, in advance of the prospector, he may at least in most cases be followed up pretty closely.

At about the time at which the committee of inquiry above referred to was constituted, Logan had been pressed to accept a geological appointment under the government of India, but fortunately for Canada and for the continuity of its Geological Survey, he declined the appointment. Writing to his friend, De la Beche, on this matter, he says: "Just look at Arrowsmith's little map of British North America, dedicated to the Hudson's Bay Company, published in 1842. * * * You will see that Canada comprises but a small part of it. Then examine the great rivers and lakes which water the interior between that American Baltic, Hudson's Bay, and the Pacific Ocean—some of the rivers as great as

the St. Lawrence, and some of the lakes nearly as large as our Canadian internal seas, with a climate, as I am informed, gradually improving as you go westward, and becoming delightful on the Pacific. It will be a great country hereafter. But who knows anything of its geology? Well, I have a sort of presentiment that I shall yet, if I live long enough, be employed by the British Government, under the Survey you direct, to examine as much of it as I can, and that I am here in Canada only learning my lesson, as it were, in preparation." He then states that he had been informed of the existence of coal in the Saskatchewan territory and Oregon, adding: "In Oregon the value of coal for the supply of steamers protecting and connected with our new Chinese trade will perhaps soon be felt, and it might be an item worthy of the attention of the British Government in any settlement of the Oregon question with the Americans. When the British Government gave up the Michigan territory at the end of the last American war, with as little concern as if it had been so much bare granite, I dare say they were not aware that 12,000 square miles of coal field existed in the heart of it."

This it will be remembered was written as long ago as 1845, and what Logan then foresaw has since come to pass, though not precisely in the manner he anticipated. Some years later (1851) Sir John Richardson, after his journey through the northern part of the continent in search of Franklin, was still able to write thus:

"Beyond Lake Winnipeg no geologist has yet penetrated and the descriptions of the rocks occurring within the space of twenty degrees of latitude that lie to the north of that sheet of water are, with all their imperfections, entirely my own. It would be true economy in the Imperial Government, or in the Hudson's Bay Company, who are the virtual sovereigns of the vast territory which spreads northwards from Lake Superior, to ascertain without delay the mineral treasures it contains. I have little doubt of many of the accessible districts abounding in metallic wealth of far greater value than all the returns which the fur trade will ever yield.¹"

Following Richardson, the first fruits of geological exploration in the western part of the Dominion, were gathered by Dr. (now Sir James) Hector, attached to the British North American Exploring Expedition in 1857 to 1860, by Professor Hind, despatched by the Canadian Government in connection with the Assiniboine and Saskatchewan Exploring Expedition in 1858, and by the North American Boundary Commission, with which I had the honour to be associated, in 1873 and 1874. But at about the same time with the work of the last mentioned expedition, the investigations of the Canadian Geological Survey were extended to the Northwest Territories, and Logan (who had then retired from the directorship of the Survey) had at least the satisfaction of seeing before his death, which occurred soon after, the initiation, under the auspices of the Survey which he may be said to have created, of the work which he had outlined so many years previously and had then hoped to have himself taken part in.

This work has since been continued, with results which may be stated without contradiction to have been of great importance to the settlement of the country and to the development of railways in it.

The extension of the work of the Geological Survey above alluded to, followed naturally from the confederation of the various parts of British North America. It was no longer limited to Upper and Lower Canada, but spread to the maritime provinces in the east and over a truly vast area to the west and north.

The general nature of the objects to be attained by the Geological Survey, as originally contemplated, were set out as follows in Logan's own words, incorporated in the act of 1845: "To make an accurate and complete geological survey of the province, and furnish a full and scientific description of the rocks, soils and minerals, which shall be accompanied with proper maps, diagrams and drawings, together with a collection of specimens to illustrate the same; which maps, diagrams, drawings and specimens shall be deposited in some suitable place, which the Governor-General in Council shall appoint,

¹ Arctic searching expedition; a Journal of a boat voyage through Rupert's Land and the Arctic Sea. London, 1851.

and shall serve as a provincial collection. Any duplicates of the same, after they have served the purposes of the Survey, shall be deposited in such literary and educational institutions of the eastern and western divisions of the province as by the same authority shall be deemed most advantageous."

The later act under which the Geological Survey is now carried on, specifies the nature of its operations in somewhat greater detail, but the general lines thus originally laid down have not changed, although the scope of its operations has, from the very necessities of the case, gradually enlarged. The investigators in the field found themselves everywhere in contact with the flora, the fauna, the climatic conditions and the native races, and, particularly in the less known regions where all these presented new features and where no other scientific agencies were at work, it did not behoove really intelligent observers to omit to record and, in so far as possible, to study these subjects when opportunity offered. Thus, botany and, to some extent also, zoology have become auxiliary branches of the work of the Survey, and in both subjects much useful work has already been done, while facts relating to ethnology, meteorology and other similar subjects are contained in appendices to many of the published reports. The statistical returns of mines and minerals have also of late years been given a prominent place; and from the very first, much geographical and topographical work has been unavoidably assumed by the explorers.

The field work of the Geological Survey necessarily began with exploratory trips in which the main features to be dealt with, in a country almost entirely unknown geologically, were ascertained. In many parts even of the older provinces such explorations are still requisite, but in most of these provinces it became possible after a time to proceed with the more systematic mapping of definite areas, the map-sheets produced forming parts of a connected whole. When the great western regions were added to the field, these could only be attacked by extended exploratory journeys in which geology and geography went hand in hand. As it is now, the field work of the Survey may be divided under three classes:— (1) Reconnaissance surveys. (2) The approximate mapping of large areas on a small scale. (3) Finished map-sheets on a larger scale and forming continuous series. All these three classes of work are in progress concurrently in different districts, while the auxiliary chemical, palæontological and lithological investigations in the office are kept in touch with the field work and render it possible to bring this together in a homogeneous form. Were there in existence any complete topographical maps of Canada, approaching in accuracy to those which have been made in older countries, much more geological work could be accomplished with a given amount of money and in a given time, and thus the construction of such maps must be stated yet to be, as it has been from the beginning of the Survey, one of the principal desiderata. There is, however, one other matter which at the present moment must be regarded as even more urgent, and one which might be attained within a short time and at a relatively small cost. This is the construction of a suitable and safe museum building for the preservation and display of the important collection which has grown up as the result of so many years of investigation. This collection is not merely a matter of record, closely connected with all the publications of the Survey, but it is fitted to become also a great educational—and I may add—a great advertising medium in regard to the mineral resources of the country. With proper accommodation its utility could be vastly increased for all purposes.

Nothing can be adduced which is more creditable to the system of government in Canada, than the quietly persistent and uninterrupted support accorded to the Geological Survey by every political party, but it remains to provide such a museum building and centre for the work as that of which I have spoken, and it may be confidently asserted that nothing would be more favourably received by the general public. This museum should be of a national character, and there is every reason to hope that when it is undertaken, its plan will include provision for all the valuable collections which have been or may be made by the several government departments, so that it may form in effect a representation of the resources, the history and the various lines of activity of the whole country.

It is sometimes asked: When will the work of the Geological Survey be completed? To such a question one can only reply, that so long as mining or industrial operations dependent upon the

minerals and rocks of the country continue, the work of some such department as the Geological Survey will never be quite completed. We may, it is true, look forward to a time when all accessible parts of the country will be geologically examined and mapped, when the expenditure on this work may be relatively diminished; but in a region so vast as the Dominion of Canada, this time lies in the distant future. I have already spoken of "finished maps," but in doing so I employ a relative term. The maps so described vary much in their amount of detail and accuracy, not only as between themselves but also in different parts of a single sheet. As settlement progresses and as new sources of mineral wealth are discovered, it will become possible and necessary to add largely to the detail and accuracy of many of these maps. But apart from this primary condition it will always be requisite to place on record and keep up to date, for public use and reference, the developments made in the mining and utilization of mineral products and to point out in the case of new discoveries, in the light of our knowledge of the geological structure of the country, where and in what manner further developments of the same kind may reasonably be anticipated.

METEOROLOGICAL SERVICE AND MAGNETIC OBSERVATORY.

Although I have stated that the Geological Survey was the first scientific branch of the Government service established by Canada, it must be noted that several years previous to its inception the Magnetic Observatory had been founded at Toronto. This, however, was not at that time under the control of the Canadian Government, but had been originated and was supported for many years by the Imperial Government. It was established as the result of representations made by the British Association for the Advancement of Science, at its meeting in Newcastle in 1838, acting in conjunction with the Royal Society of England, and as a part of a system of magnetic research on sea and in the colonial possessions of Great Britain.

The observations were actually begun, under Lieutenant C. J. B. Riddell of the Royal Artillery, with three non-commissioned officers of the same force, in 1839. Toronto had been selected as the best place for the observatory, and for a time the observations were conducted in a barrack situated in what then represented the city of Toronto; but in the next year, a log building was erected as an observatory on the site still occupied, a grant of two acres and a half of land having been accorded for the purpose by the University of King's College, now the University of Toronto. The first director was succeeded by Lieut. Lefroy, R. A., afterwards so well known as General Sir J. H. Lefroy, for his various scientific researches. From its foundation, up to 1853, the expense of maintenance of this observatory was defrayed by the Imperial Government, after which it was supported by the United Provinces of Canada, till at the time of confederation it passed under the charge of the Dominion Government.

Meteorological observations had been made concurrently with those relating to magnetism, from the time of the establishment of the observatory; but it was not until 1871 that the Canadian Government first made a grant of \$5,000 for a meteorological service. Prof. G. T. Kingston, who had been appointed director of the Magnetic Observatory in 1855, was an enthusiast in meteorology, and in 1869 he had succeeded in establishing a voluntary meteorological association among a number of amateur observers in Canada. In 1871, in conjunction with Dr. Smallwood, who had long maintained weather observations in the vicinity of Montreal, he represented the importance of the work to the Dominion Government with such force, that the initial grant above referred to was made in favour of the work. Communication was then had with the United States Signal Service, which had been established a few years previously, and a system of exchange of telegraphic weather reports was arranged for.

Professor Kingston's first report on the work, published in 1872,—a model of concise statement,—shows how clearly he had, even at that time, the proper constitution and future lines of development of the meteorological service mapped out before him. He then had one hundred and twenty-three stations in Canada and two in Newfoundland in communication with him.

In 1876, the issue of daily weather forecasts and storm warnings was begun, and since that time these have become so much a part of the every-day life of the country, that it is unnecessary to enter into any explanation of their character or to present any plea in their favour. They are equally important and necessary to the farmer as to the navigator, and are, in addition, of value in a hundred other ways.

In 1880, owing to failing health, Professor Kingston retired, and was then succeeded by the present director, Mr. Carpmael, under whose control the service has grown, till there are at the present time over four hundred stations in Canada reporting to the central office, of which twenty-nine make daily telegraphic reports, useful primarily in affording data for the weather forecasts. The meteorological service thus developed naturally from the Magnetic Observatory, and both have become merged in a common organization, the growth of the meteorological work now perhaps overshadowing the original magnetic purpose of the observatory in its immediate interest, though the importance of the magnetic observations has never been lost sight of.

In Professor Kingston's first report, already alluded to, he specifies three matters, which, as he says, though unconnected with the subject of the report, by reason of their importance "justify my introducing them to your notice." These are as follows:

1. Arrangements for giving the correct local time throughout the Dominion.
2. The determination of the latitudes and longitudes of places.
3. The rectification of the magnetic charts of British North America, and more particularly the correct determination of the isogonic lines or lines of equal magnetic declination.

I mention these desiderata here for the purpose of stating in how far they have since been supplied. The first item has now, largely in consequence of the development of telegraphs and railway lines, been pretty satisfactorily covered. It has been greatly facilitated by the system of standard time, which one of our members, Mr. Sandford Fleming, C.M.G., has been so largely connected with bringing into employment.

The determination of latitudes and longitudes yet remains to be fully accomplished. Much accurate work of this kind has been done in connection with the Dominion land surveys in the far west, but many large towns in the eastern provinces, not to mention places of smaller importance, are still laid down on the map only approximately and with large possible errors. The longitude of Montreal has long been that most accurately fixed, this having been done by telegraphic comparisons between the observatories of McGill and Harvard universities; but the methods of effecting such comparisons have, of late years, been so much improved, that it became eminently desirable to effect a new determination based directly upon the initial meridian of Greenwich. The Royal Society of Canada has been largely instrumental in bringing this about, and in securing the co-operation of the Royal Observatory, the Admiralty, and the Department of Marine of Canada for this purpose. The requisite observations have since been carried out, and it remains only to complete the reduction of the observations to establish the result. We have thus now, in the observatory of McGill University in Montreal, an excellent point of reference for the exact determination of all other longitudes in Canada.

Respecting magnetic charts of the Dominion, much also remains to be done, for though scattered observations of precision have been made, particularly in the west, no systematic attempt at a magnetic survey has been undertaken since that accomplished in an extended journey through the northern parts of the country in 1842 and 1843, by Sir J. H. Lefroy. It is well to remember that the magnetic pole itself is situated within the limits of Canada, and that problems of the greatest importance, both from a purely scientific and from a practical point of view call for solution by a systematic study of its secular movement as well as of any changes in intensity and dip by which this may be accompanied. These are all strictly domestic problems and they should not be left for solution to enterprise from abroad.

In regard to further requirements in connection with the meteorological service, it is of course much to be desired that the number of stations, and particularly that of those reporting telegraphi-

cally to the central office, may be increased, for all such increase means greater precision and a longer reach in time for the weather forecasts. There is another matter, however, to which the director of this service has called attention on several occasions, namely, greater facilities for the reduction of the observations and a special appropriation for the production of a climatology of Canada to be based upon such reductions. Such a work would be of essential service from an educational point of view and as a record to date of the great mass of observations on the climate of the country which have now accumulated.

DOMINION LANDS SURVEY.

Next in order in regard to the date of its inception is the Dominion lands survey, with a history not nearly so long as that of the organizations already noticed, but which has already accomplished a great amount of valuable work.

In 1869, it became evident that some convenient and accurate method must be adopted for the subdivision into farm holdings of the great western country, which had then recently come under the control of the Dominion. The late Lieut.-Col. Dennis, was intrusted with the duty of devising a plan of operations, and although the scheme at that time elaborated by him was subsequently considerably modified, the basis upon which it was drawn up has remained substantially unchanged. While the primary objects of this survey may be described as cadastral, it must be classed as a survey of a distinctly scientific character, by reason of the great tract of country over which it has extended, and the accuracy and refinement of the methods employed, as well as because of its later developments in various directions and the great body of trustworthy observations on the general character of the country which have been brought together by its means.

The actual work of surveying can scarcely be said to have begun until 1871, in which year also the first edition of a Manual of Surveys, explaining and affording the requisite data for the methods to be employed, was published. These were primarily, the establishment of a number of "principal meridians," crossed at certain intervals by lines known as "baselines" and "correction-lines,"—the whole forming the skeleton for the division into rectangular townships, sections and quarter-sections. Upon the "correction lines" the "jog" resulting from the convergence of meridians was allowed for, and methods of check were established intended to insure the greatest accuracy in the whole of the work.

In 1874 and 1875, a system of triangulation was undertaken, under the immediate superintendence of Mr. Lindsay Russell, by which it was proposed to establish the ruling points of the entire survey, beginning at an initial point near the Red River; but owing to various causes, this was not continued much beyond the 102nd meridian. Since 1875 the ruling points of the survey have been established astronomically, and telegraphically.

Until 1884, this system of surveys had been confined to Manitoba and the Northwest Territories, where a great extent of country had already been covered, but in that year work was extended to the so-called "Railway belt" in British Columbia. This was continued and telegraphic determinations of longitude were made in British Columbia and in the Northwest Territories in 1885 and 1886.

In 1886, also, topographical surveys of the western mountainous region were begun, which have since covered considerable tracts of country. In the following year, the photo-topographical method of survey was introduced in connection with this branch of the work, and though much has been said for and against this particular method, it must be admitted that under the direction of Capt. Deville, the surveyor-general, it has accomplished excellent results in practice, and has been developed into a method of precision, and upon a scale not heretofore considered possible.

No detailed mention is here called for of the continued progress from year to year of the ordinary work of the Dominion lands survey; although it may be affirmed, that no region comparable in size to that over which its operations have extended has ever before been so expeditiously and so accurately surveyed for purposes of settlement. But the work still to be accomplished and the

requisite expansion of the activity of this survey or some even more comprehensive one which may grow out of it, is still very great. While the methods heretofore employed may be described as next best to those of a trigonometrical survey, it is the experience of other countries that such a survey is essential as a basis for the complete geographical delineation of any great area. The topographical work proper, embracing hypsometric determinations and leading to the production of contoured maps, can only be considered as begun, while the demand for such maps is yearly becoming greater, not only in the Rocky Mountain region, where mining and other operations are extending in advance of the geographer, but also on the great plains and in the foothills, where schemes of irrigation are already being discussed, for which maps of this kind, together with accurate determinations of the volume of water carried by the rivers and streams, are absolutely necessary.

So far, I have spoken only of the western lands which are under the direct control of the Dominion Government. It must not be forgotten that the actual state of the geographical delineation of the older provinces leaves much to be desired. Many parts of these were surveyed during the early history of the country by methods which would now be regarded as extremely primitive, while no such thing as a topographical map, properly so called, exists for any considerable tract in any of these provinces; although some approximations to such maps have had to be attempted in certain districts by the Geological Survey, for its own purposes. It is possible only to form an adequate idea of the complicated inaccuracies of the older land surveys, when an attempt is made to combine them into coherent maps of large areas.

It is therefore now most desirable that some system of survey of a general kind, based upon modern and accurate methods, should be extended throughout the Dominion. Exactly what form such a system should take or under what auspices it should be carried out, I do not venture to suggest; but it is clear that something in the nature of an established geodetic survey must be ranked as among the requirements of the immediate future.

EXPERIMENTAL FARMS.

This branch of the public service was established as the result of the recommendation of a select committee of the House of Commons appointed in 1884 to inquire into the best means of encouraging and developing the agricultural resources of Canada. Mr. G. A. Gigault was chairman of this committee, and in 1886, in consequence of the efforts of Sir John Carling, then minister of agriculture, the "Experimental Farm System Act" was passed, and the organization of the work began in the same year.

It is thus only about seven years since the initial steps in this new scientific enterprise of the government were taken, but in that time, thanks to the energy and ability of the director and staff of the farms, great progress has been made, and the way has been opened in many directions for still further usefulness. Besides the central farm at Ottawa, which was first undertaken, branch farms have been established for the Maritime Provinces, Manitoba and the Northwest Territories and British Columbia.

If any line can be drawn between that which may be described as strictly practical and that which may be called purely scientific work, it will be found to run through the centre of the field of operations of the Experimental Farms. An inspection of the reports already published will show that the work consists largely of submitting actual observations in the field to scientific tests, and in the application in turn of the best results of scientific knowledge to matters of every-day importance on every farm throughout the land.

It is, however, from the side of original scientific investigations, rather than from that of applied science, that I am regarding the work carried on by the government at the present moment, and from this point of view, the following may perhaps be selected for mention from among the many lines of work undertaken in this service:—

One of these is the origination of new crosses or hybrids of cereals, fruits, and other useful plants to meet the requirements of the varied climates and conditions of different parts of Canada. Special attention is drawn to the importance of these experiments by the director of the farms, who states that a large number of such new forms are already under cultivation and observation. Their importance will be obvious to any one who considers, in view of the great area over which any crop may be grown, how great a financial benefit must accrue to the farmer if he is placed in possession of a variety of grain capable of producing any substantial increase of yield to the acre. Even in the case of fodder plants, the introduction of a new variety capable of producing a larger yield of hay or ensilage to a given area, means, in concrete form, that the farmer may be able to keep and to market a proportionally greater number of cattle than may before have been possible.

Other branches of the work involving much original research are:—the investigation, by chemical analysis, of soils, in their relation to fertilizers, and of grains, grasses, fodder plants and other products of the farm, by which a fundamental knowledge of their respective value and of the best and most profitable methods of their treatment may be arrived at and the study of insects and parasitic plants injurious or beneficial to vegetation and to stock, such as to enable the pests of the agriculturist to be combatted either by methods which may be classed as direct or by means which are indirect. The latter implies a study of the life-history of the forms to be dealt with, including not only those which are native to the country, but those also which may be from time to time introduced, such as the Colorado Potato Beetle, the Horn Fly and many others. It includes also the study of the best means of counteracting the attacks by all those lower forms of vegetation, known as rust, smut, mould or mildew, which prey upon the plants which are the special care of the farmer.

Even in connection with the familiar and almost world old operations of butter and cheese making, the results of purely scientific investigations are now being proved to have a great importance. I do not refer merely to the best mechanical methods of dealing with the milk from which these are made, but particularly to the fact that the nature of the vegetable ferments which act upon this milk and upon the cheese, after it has been produced, are now known to give character to the product. That is to say, the effect of inoculation of the mass with some particular species of ferments is favourable, while the presence of others is deleterious. Thus the results obtained in the whole field of bacteriology are being made contributory to the success of the dairy. Already in Denmark "pure cultures" of certain kinds of ferments are beginning to be regarded as necessary to the success of the butter maker, and essays of a similar kind are actually in progress here.

It is not possible to refer in detail to the numerous experiments and tests, completed or in progress, of varieties of plants and animals which may be already well known, but of which it is desirable to ascertain those best suited to the actual circumstances of the country. Nor is it possible to enter into questions such as the tests of fertilizers, the testing of the vitality of seeds, or the propagation of trees suited for planting on the plains of the Northwest. Though a part of the useful work of the farms, these do not imply original research in the same measure with those subjects already alluded to. Neither can I at this time refer to the methods adopted of making the information gained available to the public, such as the publication of special bulletins and reports of progress, the distribution of samples of seed grain (which in 1892 reached the number of 30,000) and of young trees for plantations. All these are obviously the necessary outcome of the work done on the farms. It is in addition most important by such means to make known throughout Canada the results which have already, or may from time to time be reached by experiments conducted by similar institutions in the United States or elsewhere, many of which are equally applicable here.

In his report for 1892, the Secretary of Agriculture of the United States writes with reference to the similar work carried on by his department: "The National Government has taken, as it were, a contract with the farmers, and to carry it out efficiently this department must be prepared to answer all reasonable expectations in bringing into the service of agriculture all that science, whether in this country or in any other country upon the globe, has been able to evolve for its benefit."

This expression may serve as a general indication of the scope of the work lying before the Experimental Farms, but in order to show more clearly into how many branches this work may ultimately divide itself, it may further be noted that in the volume just alluded to reports are contained from the chief of a bureau of animal industry, a chemist, an entomologist, an ornithologist, a mammalogist, a botanist, a chief of division of pathology, a pomologist, a microscopist, a chief of division of forestry, a special agent in charge of fibre investigations and a chief of seed division, besides executive and some other special reports. All these lines of investigation and more, are equally important to the agricultural industry in Canada, and while it may no doubt be some time before the area to be covered can be divided under so many separate heads, it will obviously conduce to the value of the results to place each branch of the work as far as possible in the hands of some trained specialist.

Before concluding this brief review of the several branches of scientific research or work carried on by the government, allusion must be made to several comparatively late undertakings of this nature begun under the auspices of the Department of Marine and Fisheries.

Under the name of the "Georgian Bay Survey," a hydrographic survey of the Canadian portion of the Great Lakes was begun in 1883, and several excellent charts of the northern part of Lake Huron have already been published. The outline of the northern shores of the Great Lakes had up to this time depended on old surveys by Admiral Bayfield, which, though exceedingly good as reconnaissance work, have long ceased to be up to the requirements of the increased and increasing navigation of these waters. As many parts of our sea coasts, both on the Atlantic and Pacific side, should now also be recharted and more accurately laid down, it is to be hoped that this hydrographic survey may be continued and extended. An able plea for the establishment of a regular hydrographic survey was, it will be remembered, laid before this Society by Prof. Johnson at the last meeting.

When the British Association for the Advancement of Science met in Montreal in 1884, a committee of that body which had for many years been engaged on tidal determinations, interested itself in the extension of such observations to Canadian waters, and a joint committee of the Association and of the Royal Society of Canada was formed, by which the importance of such observations, made systematically and with modern appliances of accuracy, was urged upon the government. In 1890, a beginning was made in this work, and provision has since been made for its continuation and extension. The carrying out of such tidal and current observations cannot fail in the near future to produce practical results of the greatest importance to shipping, particularly in the gulf of St. Lawrence, where a want of proper knowledge of the currents has already often led to great loss. The investigation is essentially a scientific one, involving questions of considerable intricacy, but its outcome should be the formulation of plain and definite rules which may serve as a guide to the navigator.

Another promising departure is the initiation of a scientific study of that most important element in the wealth of the country, the fisheries. Much has already been done in Canada in the matter of the propagation of food fishes, but much yet remains to be done in investigating the conditions of the fisheries of both salt and fresh waters, and it may now be anticipated that before many years an important basis of fact will have been built up upon this subject.

So far, I have spoken chiefly of the scientific enterprises under the control of the general government, but it must not be omitted to mention that several at least of the provincial governments have contributed their share towards the encouragement of scientific research. This has been done very often by according annual grants to the local scientific societies, and in Nova Scotia and in British Columbia by the initiation of provincial museums. It is to be hoped that none of the provinces will long remain without such a museum. Again, in several of the provinces mining departments exist, which though chiefly occupied with economic details and statistics, occasionally afford some contribution to the scientific basis upon which all such work must rest.

A few words may now be added respecting the various scientific societies and associations throughout the Dominion. Most, if not all of these have, since the organization of the Royal Society of Canada, entered into affiliation with it, and send each year to our meetings some representative authorized to speak in the name of his society. This fact, with the circumstance that the very interesting annual summaries of progress made on the part of these societies appear in full in our 'Transactions,' render it unnecessary to do much more than mention the names of the several societies, for in these statements each has very well told its own story. In so doing I refer, of course, to those only which interest themselves in natural science, as distinguished from literature and history.

The three oldest Canadian societies of a scientific kind are the Literary and Historical Society of Quebec, the Natural History Society of Montreal and the Canadian Institute of Toronto. It is perhaps not strange that these societies were founded in the order above given, which corresponds with the order in date of origin of the cities in which they are situated.

The Literary and Historical Society of Quebec dates from the year 1823, when it was founded at the instance of Lord Dalhousie, then governor. The name of this society does not indicate the fact that in its transactions are to be found many important scientific papers, a fact which enables me to include it for consideration in the present address. The Natural History Society of Montreal closely follows the last in the date of its organization, having been incorporated in 1833. The Canadian Institute of Toronto comes next, having been incorporated under a royal charter in 1851.

These three veteran societies of Canada have almost from the first published their proceedings or transactions, and the volumes thus accumulated now form a small library by themselves, and are—particularly in the case of the two societies last mentioned—replete with information on the natural history and natural resources of the country, and absolutely indispensable as works of reference to the Canadian investigators of the present day. Each of these societies has accumulated and continues to maintain a valuable museum.

The Entomological Society of Ontario, though much later in origin, dating from 1863 only, may next be alluded to. In 1868, it began the publication of the "Canadian Entomologist," which remained for some years thereafter the only publication in America devoted entirely to the science of entomology. This journal is notable for the amount of original investigation which has appeared in it, both of a purely scientific and of a strictly economic character. Its excellence has been freely acknowledged both in Canada and abroad, and the membership of the society is large and exceptionally active. The Literary and Scientific Society of Ottawa was incorporated in 1869, arising then from the fusion of an older Natural History Society with a Mechanics Institute. Since that time it has had a career of uninterrupted usefulness, although it publishes no account of its proceedings. The Ottawa Field Naturalists' Club was founded in 1880. It at first interested itself in purely local natural history, but has latterly achieved a wider scope, welcoming all scientific papers relating to Canada and publishing a monthly journal. The Hamilton Association for the Promotion of Literature and Science (dating from 1857) and the Murchison Society of Belleville are two other active scientific organizations in the province of Ontario, the first-named issuing a very creditable journal, in connection with which it may be noted that McElwraith's book on the Birds of Ontario found a means of publication. In the province of Quebec, we have in addition to the two societies already named, the Geographical Society of Quebec (incorporated in 1874) and the Montreal Microscopical Society.

In Nova Scotia, we find the Nova Scotian Institute of Natural Science, organized in 1862, as a result of the effort made to represent the province fitly at the London International Exhibition of that year. It has since published a number of volumes of its transactions, well and widely known. In New Brunswick the Natural History Society of New Brunswick, established in 1862, has since 1882 published bulletins, which excel in respect to the proportion of original work represented by them.

The Historical and Scientific Society of Manitoba organized in 1879, has since produced good work, and has published much of interest in the form of bulletins; while in British Columbia, we

find the Natural History Society of that province (founded in 1890) with which several able naturalists are associated, working in conjunction with the provincial museum, and publishing results of exceptional value on the fauna of that comparatively new field.

In concluding this list, which may possibly not be an absolutely complete one, mention must be made of the Botanical Club of Canada, an organization which grew out of a recommendation made by Section IV. of the Royal Society of Canada and which by the compilation and publication of local lists of plants, based upon the collections of its members, is contributing toward a complete knowledge of the geographical distribution of our flora.

I regret that it is not possible on this occasion to mention, even by enumeration, the many individual workers in geology, zoology and botany, who as amateurs and without any public support, have devoted themselves to the study of various branches of natural science in Canada. The names of these private investigators would form a long and very honourable list. They may be found of constant occurrence in the transactions of the learned societies just referred to, as well as in those of the Royal Society of Canada and no inconsiderable part of our actual knowledge has resulted from their efforts.

The Royal Society of Canada at the time of its organization in 1882, at the instance of the Marquess of Lorne, had set before it a number of objects. It was intended to constitute a bond of connection between the heretofore scattered workers in literature and science in Canada and a mode of association between the various societies already existing for the furtherance of those objects. It was intended also to afford a suitable means of publication for scientific, literary, or historical work, not necessarily confined to that accomplished by its members. It was to promote original research in these fields, and it was understood that its advice and assistance would be at all times at the disposal of the government for the solution of problems which might from time to time arise.

The Society has now been in existence twelve years, and has been consistently aided in its work by the government, by means of an annual grant toward publication and in other ways. It may therefore be well to inquire in how far the field of activity originally mapped out for it has now been covered. It has, I believe, been successful in forming a rallying point for scientific and literary workers throughout the country, and in bringing about a spirit of fraternity and of mutual interest and co-operation, not only among individuals but between the various societies and associations, whose representatives form an important element in our annual meetings. In respect to publication, the Society, I conceive, has achieved at least an equal measure of success. The eleven handsome volumes of 'Transactions,' including not only memoirs and special treatises by the members of the Society, but contributions from other workers who have been glad to avail themselves of this medium, contain a great mass of valuable matter, much of which could not otherwise have been published satisfactorily in Canada, and some of which would undoubtedly, under other circumstances, have found publicity through scattered scientific journals abroad. The publications of the Society have now in fact become an indispensable part of every scientific library, and care has been taken that they shall be so distributed as to be generally available. It may, I think, be claimed that they are a credit to the country.

The encouragement of original research has also already followed to some extent from the organization of the Royal Society, but chiefly in an indirect way and largely by means of the facilities afforded by its publications. We have as yet no funds (as the Royal Society of England has, both in the form of government grant and in that of private benefactions) directly at the disposal of the Society for purposes of original research. These, it is to be hoped, will come in time. A valuable and exhaustive report was, it will be remembered, made by a committee of the Society in 1885, which dealt chiefly with the benefit likely to accrue from the establishment of fellowships or foundations in connection with universities, by the aid of which students might be enabled to engage in original investigations.

Respecting that aspect of the functions of the Society in which it is contemplated as an auxiliary to the scientific efforts of the government, much remains to be developed. The Society has from

time to time, by means of deputations or memorials, drawn the attention of the government to matters which appeared to it to possess especial importance. These have generally been of a character such as to require some expenditure on the part of the government, but they have in all cases been favourably received, and in some instances have already been acted upon. This has been the case in respect to the tidal surveys, and the determination of the longitude of Montreal, both already referred to. At least one matter of importance which has constantly been before the Society since its organization has, however, not yet achieved any practical recognition, — this is the establishment of a National Museum to which I have already alluded. But the relations of the Royal Society to the State were not intended to consist merely in petitioning the government in favour of certain lines of action. In a thoughtful essay on the subject read before the Society in 1833, the late Dr. Todd explained in some detail the connection existing between the Imperial Government and the Royal Society of England — upon the general lines of which the Royal Society of Canada is framed — pointing out in what way this had grown up, in consequence of the marvellous flexibility of that complex organism, the British Constitution.

As this appears to me to be a matter of importance and one which should engage our attention, I need make no apology for quoting Dr. Todd's words. He writes: "It is well known to students of political history that one result of the establishment of popular government has been to oblige the ministers of the crown to take the initiative in preparing and submitting for the sanction of parliament whatever measures may be required by the public interest, whether it be to improve our administrative or social system; to amend the operation of existing laws, to aid the progress of an advancing civilization, or to encourage the application of scientific truths to practical beneficial ends. Ministers are expected, not only to forward sound legislation in these directions, but to resist and expose every crude, imperfect, or otherwise objectionable notion of this description which may be propounded by private members. It is impossible that any ministers, however able and enlightened, can be invariably competent to deal intelligently with questions which form no part of an ordinary political education. Neither can they always command in the ranks of the civil service, capable assistance upon such topics. Realizing this deficiency, the Imperial Government have gladly availed themselves of the co-operation of the Royal Society of London, to assist in the disposal of matters requiring a special knowledge of art or science, in regard to which executive or parliamentary interposition may be necessary. In such cases it has been of inestimable public advantage that the executive government could have recourse to the advice and assistance of a body occupying the impartial position of the Royal Society, and could freely avail themselves of their services, — not merely as individuals, but with the acknowledged weight and responsibility attaching to them in their corporate capacity."

I trust that in the review which I have attempted of the various institutions engaged in scientific work and investigation in Canada, I have succeeded in conveying the impression that although something has already been accomplished, much more remains to be done, while the continued expansion of the interests of the country is every year opening up new fields of investigation and new problems which must be undertaken and solved. In each such case I have endeavoured to connect the new work which appears to lie before us with that one of the present organizations to which it seems to be naturally affiliated, but one important line of inquiry must yet be mentioned in which no systematic beginning has been made, either under the auspices of the government or by any society or institution especially devoted to it. This is the field of ethnology, which in Canada is a very extensive one, and which calls for immediate effort, inasmuch as the native races with which this study is concerned, are either rapidly passing away or are changing from their primitive condition. The late Sir Daniel Wilson, by whose death the Society has suffered so great a loss, more than once brought this subject to our notice in eloquent terms.

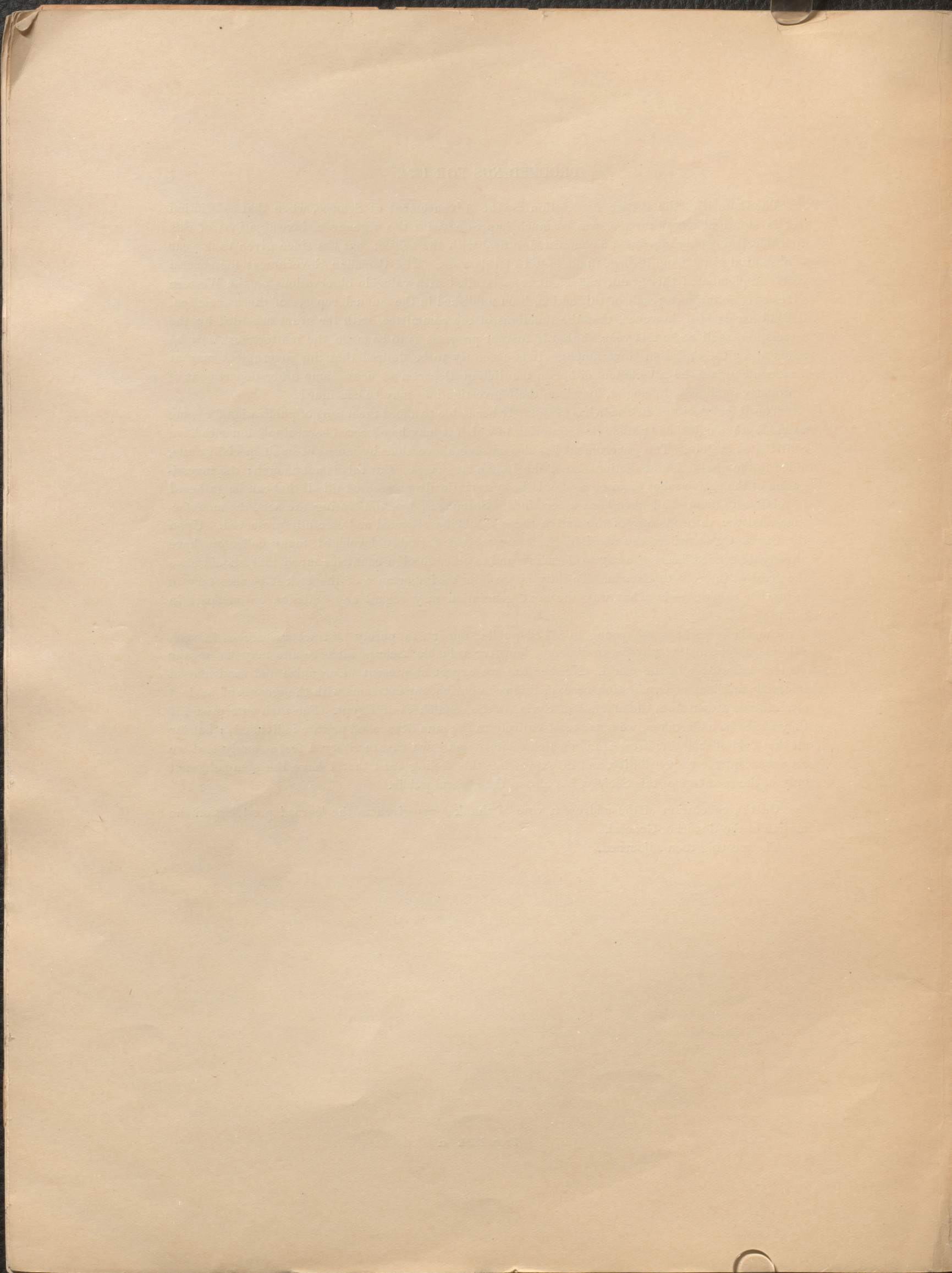
The Council of the British Association for the Advancement of Science, when that association met in Montreal ten years ago, was so much impressed with the urgency of investigations of this kind that it not only appointed a committee to deal with the subject, but has since given each year a substantial grant from its own funds in aid of this work. The Canadian Government for several years supplemented this grant, and eight reports filled with valuable observations on the Western tribes have so far, as a result of this action, been published in the annual reports of the association. It has been decided, however, that the functions of the committee, with the grant accorded by the association, shall cease this year, so that if further progress is to be made, the matter must now be taken up by the Canadian Government. It is earnestly to be desired that the government may at least contemplate the attachment either to the Indian Department or to some other department of a properly qualified ethnologist, by whom these investigations may be continued.

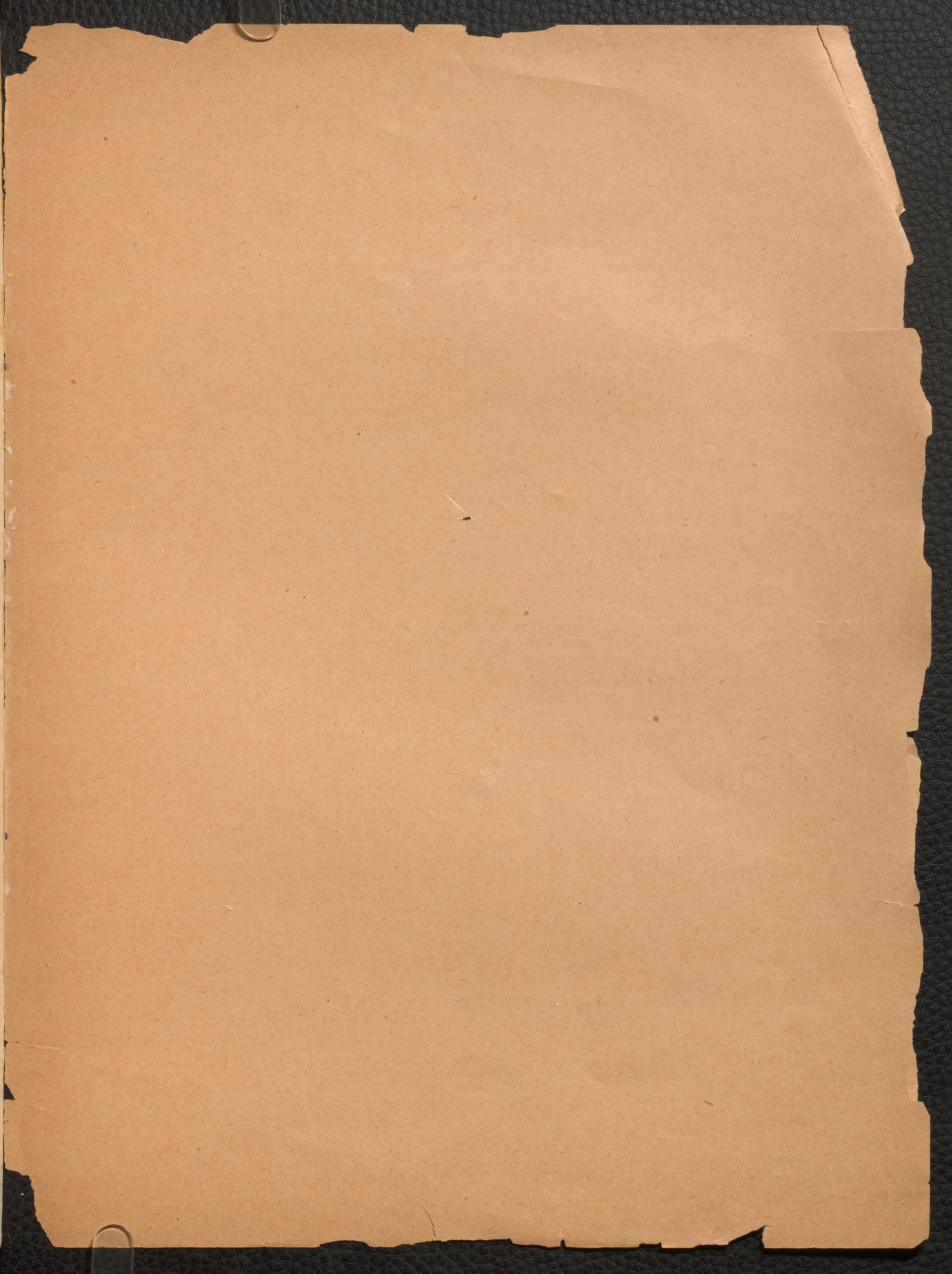
The Royal Society of Canada has fortunately been able to afford the means of publication for some valuable ethnological and philological material, to which it may be observed several missionaries have contributed largely. The government has also on several occasions by means of small special grants, aided in the production of dictionaries of the Indian languages. But this is not enough; the investigation of the native races themselves should be systematically prosecuted till all that can be gathered in relation to them shall have been ascertained. Specimens, too, illustrating the arts, the manufactures and the anthropology of the native races should be collected and carefully preserved. Upon the Pacific Coast, where the aboriginal arts are most remarkably developed, many collectors have already descended, bearing away to Germany and to other foreign countries much that should have the greatest interest to Canada. To fully appreciate the importance of the task it is necessary to endeavour to realize in what way the next generation may regard any omission on our part in fulfilling this duty.

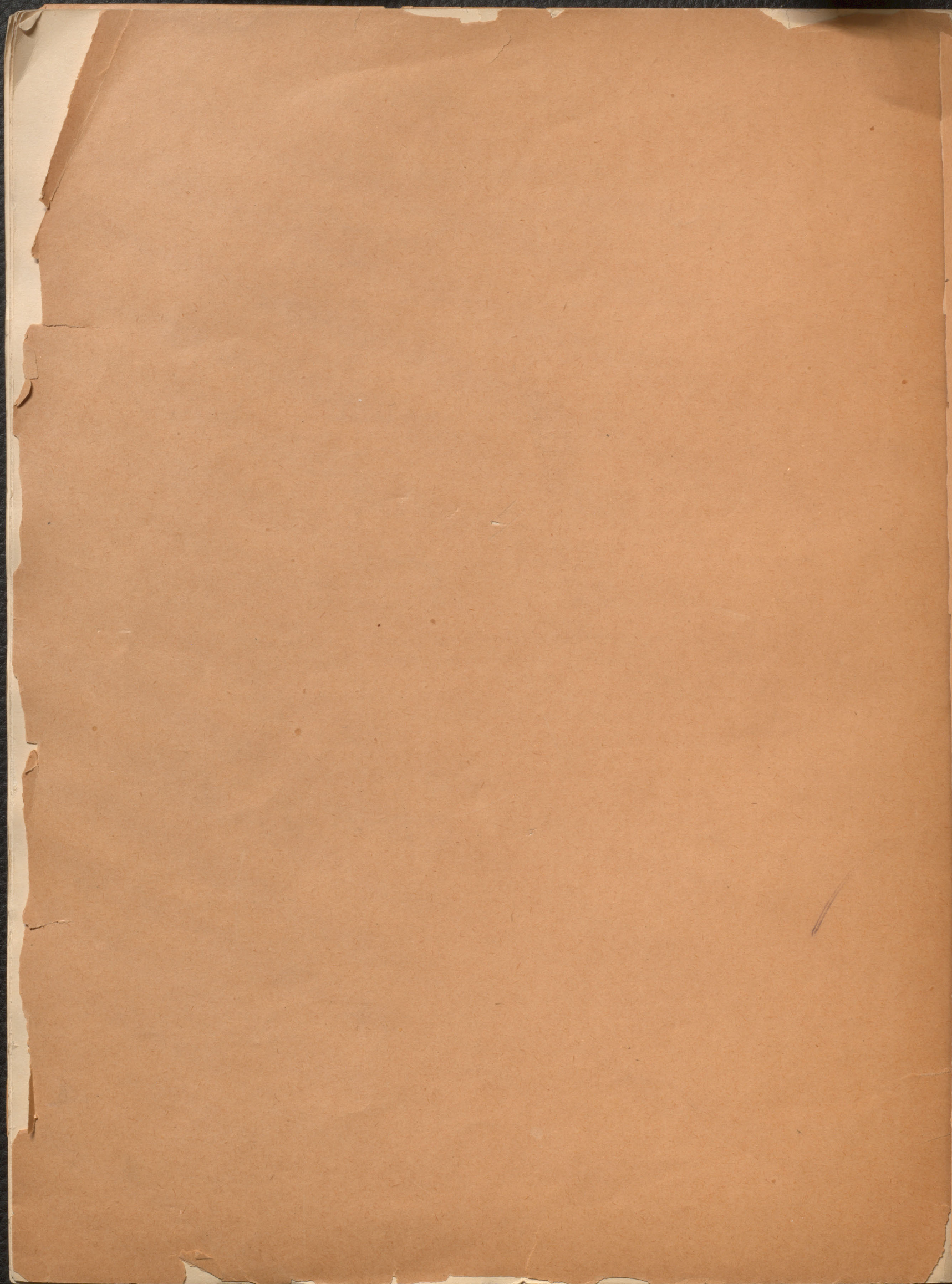
Canada is perhaps too young to afford public support to purely abstract researches in such subjects as chemistry, physics or biology, however valuable their possible results may be to the general knowledge of the world. Neither can we expect at present to organize and send abroad scientific missions of exploration or expeditions to enrich our museums with the records of ancient civilizations drawn from the mounds of Syria or the sepulchres of Egypt. For such enterprises, if they are to be undertaken, we must trust entirely to the munificence of private individuals; but for all that field of scientific investigation which relates to our own vast territory, I feel strongly that we should accept the responsibility, and in expressing this feeling trust that I have the sympathy not only of the members of this Society, but also of the general public.

On the conclusion of the address a vote of thanks was given to the learned president on the motion of the Governor-General.

The meeting then adjourned.







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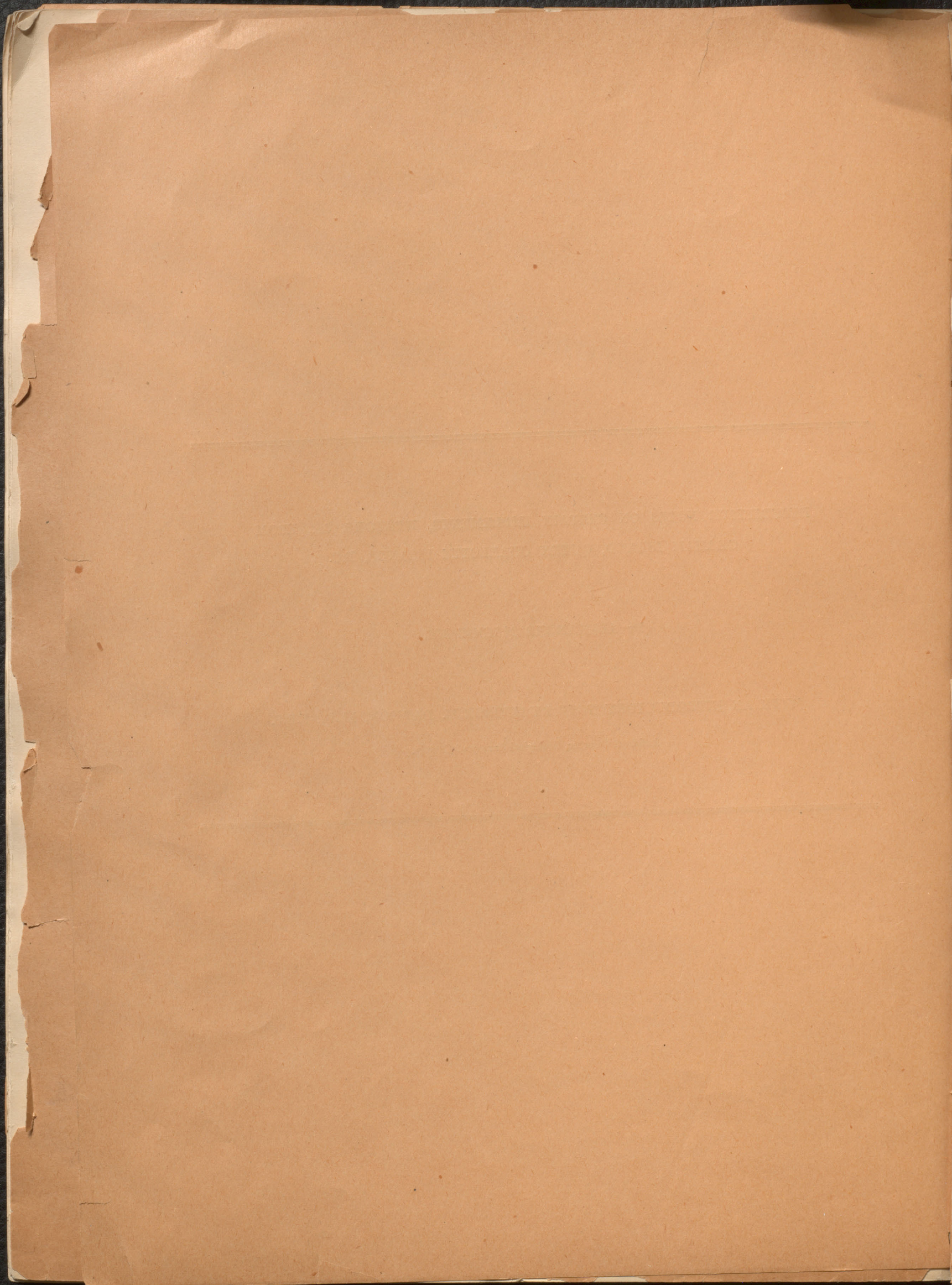
See page 49

DESCRIPTIVE NOTES ON CERTAIN IMPLEMENTS, WEAPONS, &c., FROM
GRAHAM ISLAND, QUEEN CHARLOTTE ISLANDS, B.C.

By ALEXANDER MACKENZIE.

WITH AN INTRODUCTORY NOTE BY GEORGE M. DAWSON, LL.D., F.R.S.

Assistant Director, Geological Survey of Canada.



II.—*Descriptive Notes on Certain Implements, Weapons, etc., from Graham Island,
Queen Charlotte Islands, B.C.*

By Mr. ALEXANDER MACKENZIE,

With an introductory note by Dr. G. M. DAWSON.

(Read May 27, 1891.)

Some years ago a small collection of implements, weapons, etc., from the Queen Charlotte Islands was obtained for the museum of the Geological Survey from Mr. Mackenzie. Most of the objects in this collection are either specially fine examples of the arts of the Haida, or antiques, the value of which is enhanced by some knowledge of their history. The collection had been formed by Mr. Mackenzie under peculiarly advantageous circumstances during his residence at Masset, and was accompanied by a manuscript referring particularly to the various articles, but which includes besides some miscellaneous notes of interest respecting the Haida, their manners, customs and ideas. Mr. Mackenzie states that his notes are the result of original enquiries, and that he has purposely refrained from quoting information from sources already published. His knowledge of the Haida people, together with his habit of close observation, render his notes of special value.

It thus appears to be desirable not only to illustrate a few of the more interesting of the objects in this collection, but also to make this the occasion of publishing the notes referred to, in order that these may be rendered accessible to those interested in the ethnology of the West Coast. By permission of the Director of the Geological Survey, such of the objects as have been chosen for illustration have been drawn for this purpose by Mr. L. M. Lambe. In selecting these objects the writer has endeavoured to choose those which seem to be the most noteworthy, and particularly to exclude such as resemble those which have already appeared in his report on the Queen Charlotte Islands, contained in the Report of Progress of the Geological Survey for 1878-79. The first detailed account of the Haida people was given by the writer in the place just referred to, the material for it having been obtained in the course of a summer spent in exploring the Queen Charlotte Islands for the Geological Survey. Much additional information has, however, since appeared in various publications. Reference may be made particularly in this connection to an elaborate and copiously illustrated memoir by Mr. A. P. Niblack, entitled "The Coast Indians of Southern Alaska and Northern British Columbia," lately published in the annual report of the Smithsonian Institution.

It would appear that the pre-eminent position of the Haida among the various tribes of the West Coast has not yet been sufficiently recognized or appreciated by ethnologists. Twenty years ago little was known about them; the Queen Charlotte Islands were but rudely sketched on the charts, and the reports current as to the treacherous and warlike

character of their inhabitants, with the fact that the islands lay to the west of the main route of communication along the coast, caused them to be but seldom visited. This was even the case in 1878 when the writer undertook his exploration of the islands. Since that time the Tlingit peoples of the southern coast-strip of Alaska have been somewhat fully reported on by various writers, while considerable attention has also been devoted to the littoral of the southern part of British Columbia. As a result of these investigations, the arts and knowledge common to the coast peoples generally have been described and attached by description to various tribes in which both were less fully developed than they are among the Haida. When this difference came to be appreciated, a tendency arose to affirm that the Haida had borrowed and more fully developed the arts and customs of neighbouring tribes. In some cases this is true, but as a general statement it must be accepted with the utmost reserve. Articles formed of copper and blankets woven of the hair of the mountain goat are known to have been obtained by the Haida from the Tlingit to the north; circumstances explained by the fact that the materials employed in both do not occur in the Queen Charlotte Islands. Some customs and dances are also known to have been adopted from the Tshimsian of the adjacent mainland, but further than this the proof does not go.

The fact remains that the arts of the Haida, with those of their neighbours the Tshimsian, had reached a stage of development, tending toward an incipient civilization, higher than that found in any other people of the west coast of North America. To the north, as well as to the south of the Queen Charlotte Islands, and to some extent in correspondence with the distance from these islands, are found ruder and more barbarous people, living in dwellings of inferior construction and surrounded by fewer and less artistically fashioned implements. The comparatively isolated position of the Haida and the relative immunity which this afforded against attack, may have been important in producing this result; while their occupation of a region upon all sides of which (save that of the ocean) different peoples with habits and traditions more or less varied bordered, may have rendered the Haida more Catholic in their beliefs. These, however, are but circumstances which may explain, while they do not detract from the premier position of this tribe; a position which was largely shared by the Tshimsian, though in consequence of the greater accessibility of the Tshimsian country, their primitive condition had suffered more change before it began to be intelligently studied.

Many collections which have been made are now to be found in museums credited vaguely to the Northwest Coast, a designation justified to a certain extent by the similarity of the character of the objects met with on this coast as a whole; but where the means are still available for analysing these miscellaneous collections and assigning them to the various tribes, it is found that a great proportion of the best fashioned and most artistically finished objects come from the Queen Charlotte Islands. The writer is pleased to note that Mr. Niblack, in the remarks made in his memoir above cited, appears fully to appreciate and admit the superior culture and dexterity of the Haida, of which people the Kaigani of the southern part of Alaska are but a modern colony. Speaking from his own somewhat extended opportunities of knowing the tribes of the Pacific Coast, and referring particularly to their mental capacity, the writer has no hesitation in recording his opinion that the Haida and Tshimsian are the most intelligent and capable.

In revising Mr. Mackenzie's notes for publication, his original orthography of nearly all the native names has been retained unchanged, but in a few places some remarks which appear to be unnecessary, because covered by what is already published, have been omitted.

GEORGE M. DAWSON.

Dance Staff (Haida Tusk).—A ceremonial staff of this kind was formerly used at feasts, dances and distributions of property. The principal man concerned in the ceremony, by forcibly tapping the floor with such a staff or baton, called the attention of the audience to the business immediately in hand. At feasts where property or blankets were given, or paid away, a significant tap of this staff intimated that the transaction was closed, resembling much the tap of an auctioneer's hammer on a bargain being concluded. The carved devices of crane, whale, crow, owl, and bear, with which it has been ornamented, refer to tribal legends.

The proprietorship of such a staff of course shewed that the owner was an *Eillahgeet* or chief, who had made the necessary feasts and distributions of property to entitle him to that dignity. The staff was always carefully preserved in a safe place in the owner's lodge. [No. 1339.]¹ Several somewhat similar staffs are figured by Mr. Niblack (plate xvii.)

Woven Hats (Haida Haht-ul-sung-ah).—These are made of spruce roots, and were both plain and painted, the shape being that common along the coast of British Columbia and frequently illustrated. One of these hats [No. 1335] is of more than ordinary dimensions [diameter 23 inches], and is of the kind worn only on the occasion of a distribution of property, the wearer then having on also a "dance blanket," and holding in the hand a staff, of the kind just noted. Such costume was suitable for either male or female. The devices painted on these hats seem to have been a matter of fancy, and to have had no particular significance. The dog-fish, whale, crow or bear were often represented on them. [Nos. 1333 to 1335.]

Large woven and pieced Dance-Blanket (Haida Na-hung)—This is a specimen of the dance-blanket or covering almost universally used at feasts, dances and ceremonials by the native tribes of the coast. Such blankets were made only by the Chilkats of the Alaskan coast, and although often called Haida blankets, the term is erroneous, as the Haida never practised the art of weaving wool or hair. These blankets were, however, highly valued by the Haida, and any one aspiring to the position of chief was expected to possess one such elaborate covering. Now they are rare, having been eagerly sought after by collectors. The devices are similar to those on Haida carvings, indeed the ornamentation of the latter seems by all evidence to have been copied from the tribes of Northern Alaska. The material used in making these blankets is mountain goat's wool and cedar bark. [No. 1374.]

Dance Head-dress (Haida Tsilk).—Ornamental head-dresses of this kind are used in ceremonial dances by the tribes of the Northwest Coast. An excellent illustration in

¹ The numbers thus given throughout, are those under which the objects specially referred to are catalogued in the Museum of the Geological Survey. Some of them are figured in the accompanying plates.

colours of a head-dress of this kind is given among those published by the directors of the Ethnological Department, Berlin Museum, plate I. [No. 1317].

The upper part fits on the wearer's head like a cap. Above the forehead is a carving of some crest or device, beaver, bear, eagle, etc. No rule seems to be followed in selecting the device. In this instance the carving represents the beaver; it being merely a decoration according to the fancy of the carver. On either side of the carving there is a row of feathers of the great wood-pecker. Bound round the circle of the cap at close intervals, are a number of bristles of sea-lion whiskers, while suspended from the back of the head-dress is a train of ermine skins. When the dancer was ready to go through his or her evolutions, a handful of eagle's down was placed on the top of the cap, being loosely held in position by the upstanding bristles. On every contortion of the body and jerk of the head the flexible sea-lion whiskers permitted a small quantity of the down to escape and float round the dancer's vicinity like snow-flakes. The effect of this was certain to ensure the applause of the spectators, according as the dancer's exertions were vigorous or otherwise.

On occasion of an arrival whom it was desirable to honour, the settlement of an individual quarrel, healing a tribal feud, making a treaty of friendship or peace, or celebrating a potlach or "house-warming," an indispensable adjunct to the ceremony was the dance with the *Tsilk* and *Na-hung* and scattering of eagle down. Sometimes a number of persons thus attired performed at once, and the costume was considered quite appropriate for either male or female dancers.

Sea-lion Whiskers (Haida *Kish-kow'-eh*). *Ermine Skin* (Haida *Klick*).—Wooden carved device on forehead (Haida *Tsil-kwull*).

Specimens of Wooden Masks (Haida *Neh-tsung*).—[Nos. 1305, 1306, 1309 to 1311 and 1313 to 1315]. These masks, grotesque and otherwise, were used at merrymakings pertaining to feasts, house inaugurations and dances. Faces of human or mythological beings, of birds or beasts, were represented by such masks, and no rule seems to have been followed in the matter of selection of subjects, that being according to the fancy or taste of the carver. Wooden or bone calls were generally used to imitate the cries of the animal represented by the mask.

Dance Head-dress Carving (Haida *Tsil-kwull*).—[No. 1312]. This represents a spirit-face seen by the doctors in their trance or reverie. The inlaid border of mother-of-pearl is made from the Abalone shell, brought in early days by trading vessels from California and the Sandwich Islands. Probably in still earlier times from the smaller native *Haliotis*.

Two models of carved Heraldic Columns (Haida *Keeang*).—One showing the circular aperture through its base which is used as the entrance to the house. [Nos. 1316, 1340.]

Such poles vary in height from 40 to 60 feet. The object in erecting these poles was to commemorate the event of a chief taking position in the tribe by building a house and making a distribution of all his property, principally blankets, which he had been accumulating and hoarding for years with this view. *Keeang* is the Haida name of such poles or columns in general application, but each pole has besides an individual and distinguishing name. Thus, for instance, one of the poles at Masset is named *Que-tilk-kep-tzoo*, which means "a watcher for arrivals," or "looking," or "watching for arrivals." It was erected by a Haida chief, named *Stultah*, on his decision to build a new lodge. The occasion, as usual, was marked by a large distribution of property, hundreds of

blankets and other valuables being given away to all who assisted at the making of the pole, or who were invited to the ceremony. Stultah was of the eagle crest, and according to custom, the recipients all belonged to other crests, no eagles receiving anything. Not long afterwards Stultah died, before his projected lodge was completed. His brother succeeded him, and assumed his name. He erected another carved pole in commemoration of Stultah's death and his own adoption of his brother's place. This was again accompanied by a feast or distribution of food to the multitude and of blankets to the makers of the pole.

A mortuary pole is called *Sath-lung-hät*, and is altogether different from a pole erected on occasion of lodge-building. *Keeang*, or lodge poles, are hollowed out at the back, whilst *Sath-lung-hät*, or mortuary poles, are solid, being generally a circular column with carving only on base and summit.

When it was decided to erect a *Keeang* and build a lodge, invitations were sent to the tribes in the vicinity to attend, and on arrival the people were received by dancers in costume and hospitably treated and feasted. When all the Indians from adjacent places were assembled, at the appointed time they proceeded to the place selected for the erection of the pole. A hole, seven, eight or ten feet deep having been dug, the pole was moved on rollers till the butt was in a proper position to slip into the hole. Then the process of elevation began. Long ropes were fastened to the pole and gangs of men, women and children took hold of the ends at a considerable distance away. The most able-bodied men advanced to the pole, standing so close all along on each side that they touched each other, and grasping the pole from underneath they raised it up by sheer strength, by a succession of lifts as high as their heads, while, in the meantime, others placed supports under it at each successive lift. Stout poles, tied together like shears, were then brought into play, while the lifters took sharp-pointed poles, about eight feet long, and standing in their former positions, lifted the pole (which was immediately supported by the men who shift the shears) by means of these sticks, until it attained an angle of about forty-five degrees. The butt was then gradually slipped into its place and the gangs at the ropes, who had been inactive all this time, got the signal to haul, when, amidst the most indescribable bellowing, holloaing and yelling, the pole was gradually and surely elevated to the perpendicular position. Great hurrahs, shouting and antics took place as the pole was set plumb and the earth filled into the hole.

The crowd next adjourned to the house of the owner, who feasted the people with Indian food, such as grease, berries, sea-weed, etc. This being completed, the man takes the place of *Eitlahgeet*, great chief, and the next thing he does is to distribute his property, a task requiring great discrimination. Very often on such occasions he adopts a new name, discarding that by which he was hitherto known. When he proclaims to the crowd that he is quite impoverished and has distributed all his effects, they appear to be delighted, and regard him as indeed a great chief.

This distribution of property was often the scene of riot and disorder, sometimes ending in bloodshed. Some of the recipients would consider that their share of the plunder was too small, and that they had been slighted, others who were less deserving having got a larger share. Invariably there was a show of discontent on the part of some of the guests, and if the donor could not reconcile them by fair words or an additional present, a forcible attack was often made on the pile of blankets and goods received by

those who were considered unduly favoured. The body of the lodge was then often the arena of serious disturbance, in which blankets and clothing were torn to shreds by an infuriated mob. Knives were sometimes freely used, and often the ominous report of a gun or pistol would be heard in the crowd, which would cause a panic and frantic rush to the doors and apertures of the house with what goods could be hastily snatched in hand, leaving a small knot of excited men and wailing women surrounding a bleeding corpse on the floor. Such an incident would, of course, lead to another feast and dance with payment of property to the relatives of the deceased. To the guests not implicated in the affair, a murder only meant more feasts and more fun, and to judge from appearances, these good old times were not disliked.

It is worthy of note, as already remarked, that the giver of a feast does not distribute presents to those of his own crest, whether such an one be a relative or not; for instance, an eagle making an occasion of raising a pole, would give nothing to the eagles, but the bears would be the recipients.

An invariable concomitant of these feasts after the arrival of the whites on the coast, was ardent spirits of a vile nature, supplied by rascally traders in sloops and schooners, or a fiery compound distilled by the natives themselves from molasses, sugar, rice, flour, or beans.

As far as the Haida of Masset are concerned, all the above is but a tale of the past, as they now neither erect columns, give potlaches, dance, nor distil liquor, having decided to follow the advice given them by the government and missionaries to live according to law and order.

Daggers (Haida *Kah-oolth*).—[Nos. 1300, 1301, 1304, 1330, 1331]. Such daggers are for the most part very ancient, and many of them have individual histories and traditions appertaining to them. They are formidable weapons in a hand to hand fight, and were always carried round the neck to feasts and similar social gatherings. No. 1331 is of tempered copper, the mode of its manufacture being said to have been possessed by the "ancients," who could hammer out native copper and give it a keen edge.

A legend is connected with No. 1304, in which it is said to have been carved and tempered by a woman who came from northern Alaska. Its history is known for two or three generations, it having passed from one chief to another, but its true origin is lost in obscurity. In former times assassination was by no means uncommon, and slaves were often commanded to perform the deed, generally with these formidable daggers. To the knowledge of several persons still alive, two cowardly murders were perpetrated by a slave at his master's instigation, with this particular weapon.

No. 1300 was procured from a man, now dead, who was for a long time under a tribal ban as a murderer, having deliberately stabbed a woman to death in a canoe in mid-sea, and thrown her body overboard, for the sake of getting her money. Years after, the deed was brought home to him, and he had to pay largely to save his life.

Stone Tomahawk (Haida *Hlth-at-low*).—[No. 1329.] This is a formidable weapon of offence, and was used by the tribes of the Northwest Coast in their forays and fights. Although small and light, one blow from a stout arm, fairly delivered, would pierce the strongest cranium.

Reindeer-antler Tomahawk (Haida *Scoots-hlth-at-low*).—[No. 1302.] This very ancient and interesting relic is made from one of the antlers of a species of reindeer which

inhabits the mountainous interior of Graham Island.¹ In olden times these reindeer were hunted by the Haida and killed with bow and arrow, being highly prized both for meat and skin.² This weapon was the property of the Masset doctor or medicine man, who is still alive but aged. To him it was bequeathed by his predecessor, who died many years ago. It was essentially a weapon of offence, a regular skull-cracker, similar to the last, and is said to have been used with fatal effect more than once. It is undoubtedly a relic of the times before these natives had intercourse with white men.

Bone Club (Haida *Sitz*). [No. 1303.]—This club is made from a rib bone of some species of whale and was used as a fish- or seal-killer like the next.

Carved Wooden Club (Haida *Sitz*). [No. 1277.]—This is one of the characteristic fish-killing clubs of the Haida used for knocking halibut, seals, etc., on the head after hooking or spearing them. No doubt it also proved a handy weapon in a personal tussle over the spoils of the chase. These carved clubs were invested with supernatural properties. Thus the Haida firmly believe, if overtaken by night at sea and reduced to sleep in their canoes, that by allowing such a club to float beside the canoe attached to a line, it has the property of scaring away whales and other monsters of the deep which might otherwise harm them.

Bone Dagger (Haida *Thl-saga-skwoots*.) [No. 1298.]—This was used by the medicine man in one of his imaginary conflicts with some malicious rival spirit doctor. At other times he used it as a skewer or hair-pin to keep up his long hair when rolled in a knot at the back of his head. On the handle is carved the representation of a land otter, an animal held by medicine men to possess supernatural attributes.

Twisted Copper Necklet (Haida *Hull-kuntz-tig-ah*). [No. 1332.]—This rare and valuable relic is the only one of the kind known in the Haida nation. It was prized more highly than any ornament or implement in their possession, and of a certainty was made before the natives were acquainted with white men. Tradition states it was made from native copper brought from Alaska. Capt. Dixon (1788) mentions having seen such a necklet worn by a chief at North Island, and it is believed by old Haida who have been questioned on the subject, that this identical necklet was the one that attracted his attention.³

As a work of art by untutored savages with rude tools it is remarkable. Though it has three strands it is all in one piece, twisted most systematically and tapering with precision from the centre to each end, all the strands being in perfect uniformity one with the other. Its history and former owners are known for two or three generations, but its origin is not known. It was worn by chiefs as a mark of their importance and descended in turn to each successor who was able to make a feast and distribution of property and take the place of the departed.

Carved Copper Armlet or Bracelet. [No. 1308.]—This is very old, and is the only copper armlet known in the Haida nation. It has been preserved in the same family for several generations and worn by the chief's wife. Its origin is unknown, but it certainly was made before the Haida saw white people. The mother-of-pearl inlaid work was renewed

¹ See Trans, Royal Soc. Can., vol. viii, section iv, p. 52.

² See Marchand's Voyage, chap. v, 1791.

³ Dixon writes :—" We frequently saw large circular wreaths of copper both at Norfolk Sound and Queen Charlotte Islands, which did not appear to be of foreign manufacture, but twisted into shape by the natives themselves, to wear as an ornament about the neck." " Voyage to the Northwest Coast of America, p. 237."

lately, the original pieces having been lost. Since they have had opportunity of obtaining silver from the whites, all bracelets, bangles and such like ornaments are made of that metal. Copper is now considered too base a metal for such use, although anciently it was esteemed of high value, next to iron.

Ancient "Coppers" (Haida Taow). [Nos. 1337, 1338.]—These are the only two antique coppers known among the people of Masset, and were made before the natives procured sheet copper from the Russians in Alaska. They have been in the possession of the same family through a long line of chiefs who displayed them on festal occasions. A chief named Edensaw, now long deceased¹, used to wear them bound one to each side of his head-dress (*tsilk*) on occasions of ceremonial dances, etc.

These coppers were formerly of great value among the coast tribes, ten slaves or one thousand blankets being sometimes bartered for one. They were regarded with peculiar veneration, and a chief who could afford to purchase one of these costly articles and cut it in pieces at a feast of property-distribution was highly honoured. The pieces were given away to the principal chiefs who were guests, and were most highly valued by them. Sometimes such a copper was nailed to the carved heraldic column or pole which was erected at the feast, and it then served as a permanent ostentatious mark of the owner's extravagance. Sometimes they were attached to mortuary receptacles in honour of the departed.

The size of these coppers varied from seven or eight inches to four feet long. The original coppers were brought from the northern portion of Alaska, and the tradition runs that they were first made out of lumps of native copper which were found in the bed of a river there, but latterly the Indians bought sheet copper from the Russians at Sitka, and also in Victoria, and several natives along the coast commenced manufacturing spurious coppers from this material, which ultimately produced a fall in the value of coppers, and by glutting the market destroyed the romance of the idea that the copper was one of earth's rarest and choicest treasures, fit only to be purchased by great chiefs who desired to squander away their property for the sake of gratifying their self esteem. The customs appertaining to such coppers were not peculiar to the Haida, but were practiced by all the tribes of the Northwest Coast.

These coppers were not polished, but blackened by a very peculiar process (long kept a secret by the makers) which produced a permanent dull black, on which heraldic devices were scratched or engraved. This blackening effectually prevented corrosion.

Each of the genuine old coppers had an individual name such as :—

Taow-keed-oos—"The copper that steals all the people."

Yen-an-taous—"The copper that is like a cloud."

Taow-kee-ass—"The copper that stands perpendicular."

Len-ah-taous—"The copper that must needs be fathomed."²

These names served to perpetuate the identity of the copper when it changed hands, and were used in referring to it in the traditions of the people.

The name of a copper in Haida is *Taow*, Sitka *Tinnah*, Tshimsean *Hy-y-etsk*.

¹ Edensaw, is a name successively assumed by each chief of a certain district, by virtue of his office.

² Referring to its large size.

Examples of the prices paid for such coppers may be interesting. Thus *Taow-ked-oos* was sold by Edensaw to Legaic, a Tshimsean chief, for ten slaves. *Yen-an-taous* was sold by Edensaw to the same man for ten slaves, two large cedar canoes and one dance head-dress. *Taow-kee-ass* was purchased by a Tshimsean chief named *Nees-thlan-on-oos* from a Haida chief for eight slaves, one large cedar canoe, one hundred elk skins and eighty boxes of grease.¹

The devices graven on the upper part of the copper were according to fancy, and represented the bear, eagle, crow, whale, etc. A conspicuous mark was always on these, the (T) cross, and on the skill with which this was executed depended in a great measure the value of the copper. This T or indentation is called in Haida *Taow-tsoo'-eh*, namely, "back-bone of the taow." It was hammered, when fashioned, on a pattern by a peculiar process known only to skilful workers, with the result that when the taow was finished the indentation of the T was of the same thickness as the rest of the copper plate. If this T proved thinner the value was considerably diminished, in fact the copper was considered not genuine.

Fantastic carving in red stone representing incidents and transformations related in traditions of the doings of Ni-kil-stlass, an evil mischievous spirit, sometimes described as a creator. [No. 1296.]—The inherent love of ornamentation and method of preserving tradition from oblivion by means of imagery in absence of written symbols is well shown by this carving.

As an illustration, one of the traditions regarding the doings of Ni-kil stlass may be here related.

Ni-kil-stlass, who at this time has assumed the form of *Yelth* (the raven) wished to become possessed of the moon, and so determined to steal it from a great spirit-chief who owned it and guarded it with jealous care. In order to gain access to this spirit-chief's lodge, the raven decided to change his form. He therefore transferred his spirit to a small piece of moss which hung above a clear spring of water. A young woman, a chief's daughter and wife of the son of the above spirit-chief, came to the spring to take a drink of water. She used a small basket or vessel made of woven roots. At that time the small piece of moss fell into the spring, and was lifted in this vessel to the lips of the woman, who blew it two or three times from her lips, but eventually swallowed it. In time she bore a son, a remarkably small child. This child incessantly cried for the moon to play with, thus—*koong-ah-ah*, *koong-ah-ah* ("The moon, the moon"). The spirit-chief in order to quiet the child, after carefully closing all apertures of the house, produced the moon and gave it to the child to play with. The child rolled it about for a time, but now kept crying *ah-ah-kineet*, *ah-ah-kineet*. ("open the smoke-hole"). He also put the moon in his mouth, but his mother observing this pulled it from him, but gave it to him again to roll about. The smoke-hole had been opened a little. He still kept crying *ah-ah-kineet*, till to quiet him the smoke-hole was opened a little more. Watching his opportunity he quickly put the moon in his mouth, assumed the form of a raven and flew out. He alighted on the summit of a high tree, where he hid the moon under his wing. A number of people then took stone axes and commenced to fell the tree. When the tree was nearly falling, the raven would fly to another tree. The people then began to fell the second tree, but again the raven would fly to another tree. This was repeated several times, until the people wept over their failure to recover the moon. A great chief

Story of
Moon

¹ O'lachen fish grease; esteemed a delicacy.

then told the people to desist from their efforts, for the probability was that the raven was the great spirit himself who made them all.

With the moon concealed under his wing, the raven flew to the stream where many people were engaged in catching the oolachen (candle-fish), which were running into the river in great numbers at that time. It was dark, for there was no sun, moon or stars to give light.

The raven then asked the people for some oolachens, and promised to give them light if they would supply him. They answered him "You tell lies." Twice they said so. The raven then said, "You do not believe me, but you shall see if I lie." He then pulled the moon out a little way from under his wing, and all the people beholding light were very glad and hastened to give him plenty of oolachens. The raven was so pleased that he took the moon from under his wing, and said, "You shall have abundance of light." He then broke the moon in two. Taking one half he threw it up above him, calling out to the people, "The name of this is *Tsoo-way* (the sun) it will give you light in the day." He then took the other half and threw it up above him, and called out, "The name of this is *Koong* (the moon). Then taking up the fragments which had fallen when he broke the moon, he threw them up above him and called out, "The name of these is *Kah-ilt-ah* (stars). The moon and stars shall give you light at night."¹

Three Jade Adzes (Haida *Qua-hootah*).—[Nos. 1291, 1276, 1293]. The most perfect of these was procured from a Haida medicine-man, to whom it was bequeathed by his predecessor.

Amongst the Haida such adzes were rare and costly, and only the principal chiefs were able to obtain one of them. They were prized for the keen cutting edge which could be given them and for their durability. The place from whence they were originally obtained is not known, but it is certain that the Haida and coast tribes of British Columbia procured some of them from the natives of Alaska.

With such adzes trees were felled for making large columns or lodge poles. It has often been a question in what manner large trees were felled with such a small and insignificant implement, but in fact the method was quite simple, and as the work was performed by slaves, the owner of the adze did not find it at all arduous. First a ring of two or three inches wide and deep was hewn with the adze round the butt of the tree, and then about three or four feet higher up another ring of the same dimensions was hewn out. Next the wood between these rings was split off by means of wedges, driven by heavy stone mauls or hammers. This proceeding was repeated until the heart of the tree was reached when it toppled over.

Pale-green Jade Tomahawk (Haida, *Hlth-at-low*).—[No. 1295.] This resembles No. 1329, but being of jade was much more highly esteemed and of greater value.

Slate Labret (Haida *Skoots-tet-kah*).—[No. 1274.] This, the only known specimen of a stone labret, was found about two feet below the surface of the ground at Masset. Its origin is unknown, but the Haida say that they never before heard of any of the ancients using labrets made of stone. Labrets were invariably made of bone, ivory, wood or shell. Prior to the finding of this labret, an aged Haida chief related that in olden time, when the status of a chieftainess mainly depended on the size of her labret, a

¹ Cf. Report of Progress, Geol. Surv. Can., 1878-79, p. 150 B. It will be observed that this version of the story differs somewhat from that obtained by me. G. M. D.

competition used to take place between wives of prominent chiefs as to which should have the longest protruding under lip and largest labret. The contest often resulted in injury to the lip by forcing into the orifice labrets of undue size. Sometimes the lip split from the orifice to the surface, making it then impossible to button in the labret. It seems, however, that rather than give up wearing the labret, they tied it to the lip by boring a hole in the labret and attaching it to the jagged edges of the wounded lip by threads. This stone labret shows evidence of having been used in this way, as one perfect hole and portion of the edge of another are distinctly seen. When the narrator of the above saw it, he agreed that it had evidently been fastened to the lip in the manner described. He added that he had never seen a pierced one before, or known personally of such a custom, but that any doubt he had entertained as to the truth of the legend was now removed by seeing this pierced labret.

The method of preparing the lip for the reception of these large labrets was as follows:—At a very early age, the under lip of the female child was pierced with a tiny hole,¹ and a small pin of bone or metal with a head on it was inserted in the orifice from the inside. As the child increased in years, these pins were gradually exchanged for ones of larger size, until on attaining womanhood, the pin was generally discarded and a small labret proper was inserted in the hole; this again being exchanged as years passed on for one of a larger size, until on middle age being attained, it became possible to insert labrets of huge size. This is a custom which has now fallen into disuse. It will be understood from what is above stated, that a young woman could never wear a very large labret.

Two Small Dolls or Images (Haida *Kwah-keet*).—[Nos. 1294 and 1289.] These are very old and their origin is unknown. Report says they were highly prized by the ancients, but they are not known to have been used otherwise than as children's toys. They are carved in white marble. One shews a labret, the other a peculiar incision in the lower lip.

Two Carved Mountain-goat Horns (Haida *Nee-sang* or *Nee-sang-ah*).—[Nos. 1286 and 1287.] These peculiar head ornaments were worn only by the sons of chiefs. A lock of hair above each temple was drawn tightly through the hollow of such horns and bound on the outside, which gave the horns an erect position. They were worn on festive occasions.

Two Carved Ivory Mortars (Haida *Qua-kull*).—The ivory of which these mortars are made is walrus tusk, and came from Northern Alaska. [Nos. 1284 and 1285.]

In olden times the Haida cultivated a plant which possessed a sedative-narcotic principle. This principle was contained in the leaves, which when of mature growth, were gathered and dried like tobacco leaves. When wanted for use some of the leaves were pounded in one of the large stone mortars (*tow*). Calcined clam shells were pulverized in the small ivory mortar. The pounded leaves were then mixed with a portion of the calcined clam shell, and the compound was chewed in the same manner in which the betel nut is employed in the east. This plant was called *Win-dah*, but at the present day no trace of it can be discovered. On the introduction of tobacco by white people the cultivation of *windah* was discontinued. The Haida made it an important article of barter with the neighbouring tribes.²

¹ Generally in public, at a distribution-of-property feast.

² Cf. Report of Progress, Geol. Surv. Can., 1878-79, p. 114 B. Mr. R. Cunningham, of Port Essington, informs me that the Tshimsean used to obtain this narcotic weed in early days from the Haida, under the name of *win-dah* or *win-daw*, which is its Haida appellation. *Um-shi-wa'* is 'Tshimsean for "a foreigner," as for instance a white man,

Medicine-man's Ivory Charms (Haida *Kun-si-kah*).—[Nos. 1278, 1278A.] These were worn suspended round the neck by the Medicine man during the ceremony of operating on a patient. When the conjuring and rattling were concluded, the doctor very often detached one of these charms or amulets and suspended it round the sick person's neck. In other instances he sold or lent them as a protection to the wearer against evil influences.

Medicine-man's Rattle (Haida *Sissah*).—[No. 1328.] This rattle belonged to a medicine-man, and was in use for a long time. It was supposed that the sound of the rattle assisted the doctor to draw out the sickness from the patient's body, and when exercised for a considerable time with an uninterrupted monotonous sound, produced by a peculiar motion of the arm and wrist, it had a soothing effect on the sick person, and often caused him to fall into a kind of stupor resembling sleep.

Two Dance Rattles (Haida *Sissah*).—[Nos. 1280 and 1283.] These were used only as an accompaniment in keeping time to songs and dances, and were invariably made after the same pattern, with beak of a raven in front and body ornamented with frogs, etc.¹

Carved Dish of Mountain Sheep's Horn (Haida *Skoots-kā-thlah*).—[No. 1307.]² The horn of which dishes and spoons of this sort were made was brought from the Upper Stikine river.

Bone Spear-heads (Haida *Skoots-kah*).—[Nos. 1297 and 1299.] These were made at a time when iron was a rarity, and were used for spearing seals and other sea animals.

Halibut Hook (Haida *Khain-tow*).—[No. 1281] This kind of hook was universally used by the coast tribes in catching halibut before they procured iron hooks. It is made out of a knot of the spruce tree, cut out of the heart of the log and then steamed into the proper shape.³

Skylt Hook (Haida *Skylt-towl*).—[No. 1282.] This hook is also made out of a spruce knot steamed into form, and is used for catching the skill or black cod; a fish which inhabits very deep water, being sometimes hooked at the depth of 200 fathoms. When the hook is baited, it requires to be set by springing it open and keeping it in that position by means of a small wooden pin about three inches long. When the fish is hooked it pushes the pin out, and the strain on the hook being released it closes on the fish's jaw and thus effectually prevents its ridding itself of the barb and escaping.

Whistles and Calls, named in the Haida tongue variously *Sah-an* and *Hut-teet*.—[Nos. 1318 to 1327.] These were used in dances and merrymakings to imitate the voices of the birds and animals which were often depicted on the carved wooden masks worn on the same occasions.

and the compound *Win-dum-shi-wa'* or "foreigner's tobacco" is now used to denote ordinary tobacco. It is interesting to note, further, that the place called Cumshiwa on the Queen Charlotte Islands was one of the chief localities of cultivation of the native narcotic plant. This name is, however, not the Haida name of the actual place, but that of its hereditary chief. The connection, if any, of the name with that of the tobacco has not been traced. Mr. R. H. Hall states that though the native narcotic weed is not now known, he has found reason to believe that it was a yellow-flowered poppy—*Papaver nudicaule*? G. M. D.

¹ Cf. Report of Progress, Geol. Surv. Can., 1878-79, plate xi, fig. 26.

² This resembles that figured in Report of Progress, Geol. Surv. Can., 1878-79, plate ix, fig. 18.

³ Cf. Report of Progress, Geol. Surv. Can., 1878-79, plate vii, fig. 10.

MISCELLANEOUS NOTES.

The Sun.—The ancient Haida in a manner worshipped the sun. They considered it to be a great spirit, and in times of distress or peril its assistance was invoked. When small-pox visited the Queen Charlotte Islands for the first time, presents of blankets, clothes, dance-dresses, ornaments, etc., were hung outside the lodge to propitiate the sun, while the people cried, "Preserve us sun, do not kill us," etc. Other spirits besides the sun were propitiated or invoked by the Haida.

Origin of some of the Stars.—When the great flood took place which covered the face of the earth, a man had just stretched a sea-otter skin. As the waters rose he took refuge with his effects in his canoe.

The flood rose to the skies, the canoe was swamped and the man was drowned. The sea-otter stretcher had been on top of the canoe and floated. When the waters subsided the sea-otter stretcher remained in the skies, where now it is seen as the group of stars *Koh-eet-ow*, which white people call the Great Bear. *Koh*, a sea otter. *Koh-eet-ow*, a frame for stretching sea-otter skins.

The water-bailer and triangular foot-board of the canoe also remained on high after the waters subsided; the former is now seen as the Pleiades, and the latter as the Hyades. (*Hoot-oo* a water-bailer, Pleiades; *Tulth-uk-thley* or foot-board for a canoe, Hyades). The outline of the Pleiades resembles a water-bailer, and the outline of the Hyades that of the foot-board of a canoe.

The ancient Haida are said to have had names for all the constellations, but most of these are now forgotten.

Festivals—*Lah-out* festival of the dead. *Lag-un-ing* festival of the house-building.

Festivals for the dead were held as soon after the decease as sufficient food could be amassed and guests collected. Festivals were tribal, and all were guests except those of the same crest or totem as the deceased who were non-participants. The ancient Haida are said to have always endeavoured to hold their distribution-of-property feasts at the full of the moon, but the reason for this is not now known.

A Visit to Spirit-land.—A certain young man (name unknown) was mourning for his eldest brother and his sister's son, who had both been murdered shortly before, and he resolved to try and penetrate the mystery of the place where their spirits had gone to in the heavens.

He went to the top of a mountain with his bow and wood to make arrows. He sat down and made fifty arrows, which, one after another he shot up into space, where they disappeared. He then made fifty more, which he shot up with the same result. He then made a third lot of fifty, which he disposed of in the same manner. Then a fourth lot followed, and he noticed that the arrows were now fixed one in another by the point of each entering into the notch of the preceding one.

When he had finished shooting these last fifty arrows they reached nearly to the earth. So, to complete the connection, he stuck one end of his bow in the earth and leant the other against the string of arrows. Seizing the pillar of arrows he put his foot on the bow and commenced to climb aloft. To his surprise he now observed that each arrow was transfixed through a human head, which was strung as it were on this line of arrows, crown of head down and under jaw uppermost. This afforded him good foot-

hold, and each time as he put his foot on a jaw to raise himself up, the jaw closed sharply, making a noise as the upper and lower teeth met.

At length he reached the realms above, where he was hospitably entertained by the chief of the spirit-land. He saw his eldest brother and his sister's son, who told him not to mourn for them, for they were very happy and well off where they were.

When he was ready to descend to earth again, the chief of the spirit-land told him that if he now killed a man on earth the spirit of the deceased could easily find its way to the spirit-land, as he (the young man) had made a path with steps of human heads to reach it. The young man then safely descended to the earth.

Here the story suddenly ceases. Stories such as this were very popular amongst the Haida. They seem to have no moral to inculcate or point to illustrate, but are apparently related merely for pastime and are often most incongruous and contradictory.

Thunder (Eelung) is said to be caused by a large bird "Eelung" flapping its wings. This bird, of immense dimensions, lives on whales, which it catches in its talons made of copper. It flies away with a whale into space, and conceals itself in a dark cloud. Lightning is caused by the eyes of the bird opening and shutting. Eelung is said to have had two helpers, a man and a woman, spirit-people who assisted in whale catching.

The Greek cross (+ *Scalim*) was used to mark the skins of animals, such as bear, otter, etc., after they were stretched and dried, for the purpose of propitiating the spirit of the dead animal. Four crosses were used in a line down the middle of the back on the flesh side, and the color of the crosses was invariably red. The custom is still practised. This symbol was not used in any other way.

Certain clouds occasionally seen in the western horizon are termed *Qyow*. It is said *qyow* clouds indicate good weather. These clouds have the form of a T and the base-line of the T is supposed to represent the horizon. Spirit people are said to inhabit the region of the *qyow*. An old medicine-man saw the place in a vision. These spirit-people's heads were elongated on each side like the upper end of the T. They were called *Qyow* people.

There were no prescribed stages or degrees in the initiation of a medicine-man. (Haida *Sah-gah*.) The aspirant to that office was instructed by another medicine-man, generally his uncle, to whom he succeeded, and on his aptitude to learn the system did the length of his probation depend.

An old doctor says that there are a great many spirit doctors, who assist the medicine man by advice, and whom the medicine-men continually see in visions. There is, however, one spirit doctor pre-eminent above all the rest. He is known by two different names *Kon'-cull-at* and *Yee-kan-eek*.

I can find no meaning attached to these names. Haida doctors never used the drum by way of divination, nor did they employ passes or signs among themselves. Their great aim was to avoid meeting, as they professed to be afraid of each other, and the custom was for each doctor to magnify himself and traduce his rival. They professed to fight in visions. When the doctor exorcised a spirit of divination or conjuration, he uttered words and language which neither he himself nor others understood. This unknown speech was prompted by the spirit medicine-man who attended on him.

The Haida never believed in the transmigration of souls, that is to say, the soul of a

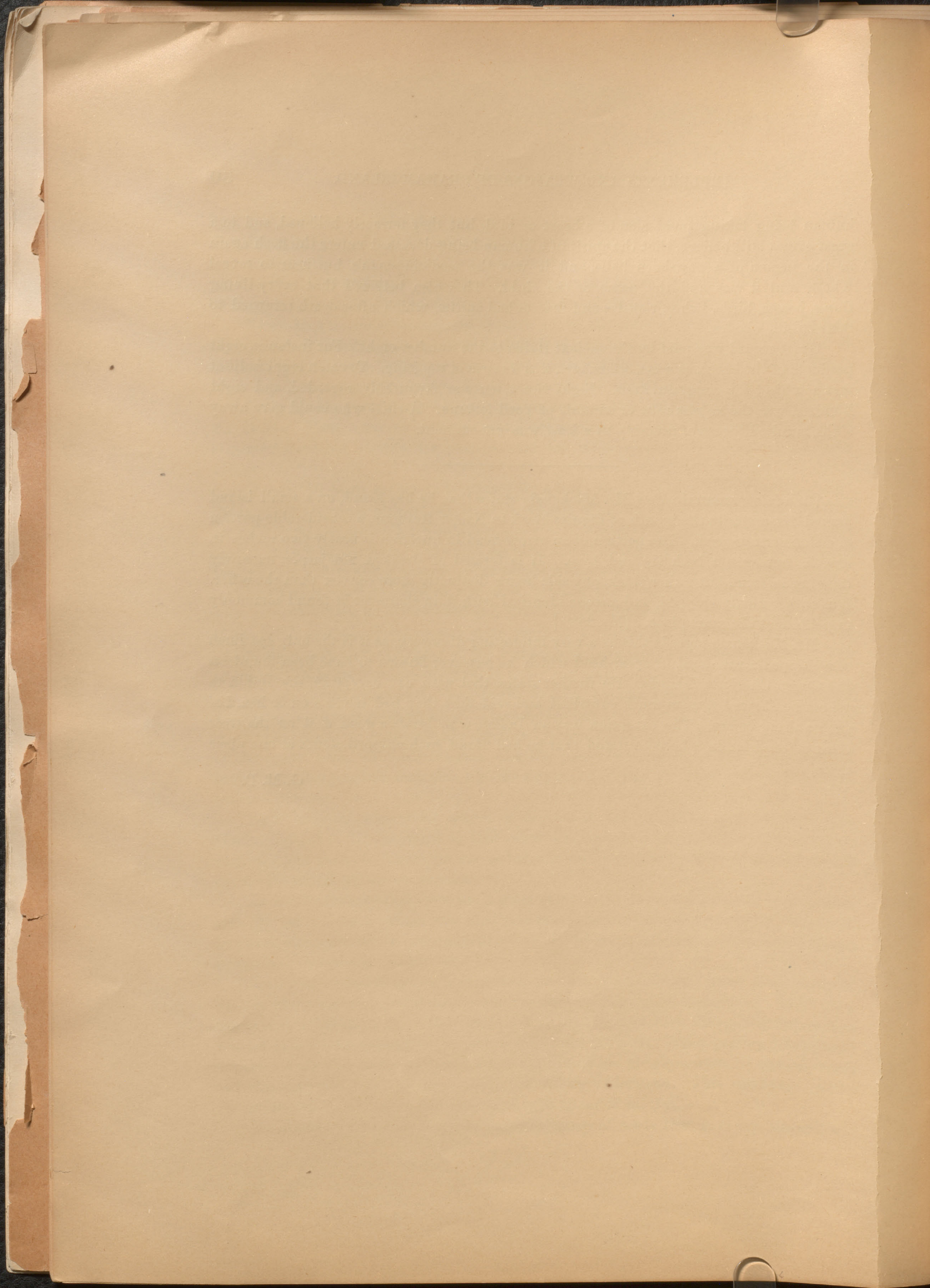
human being taking possession of a beast or bird, but they formerly believed, and to a great extent still believe, that the spirit of a human being deceased enters the flesh again in the person of a new-born babe, and it was the medicine-man's business to reveal whose soul it was and the name of the child. They also believed that every living thing, beasts, birds, fishes, reptiles and insects had spirits, which after death returned to their spirits abodes.

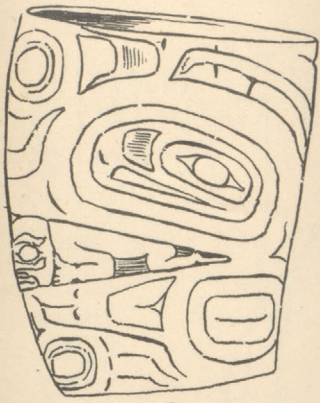
Great regard was paid by the ancient Haida to the number eight. For instance, eight products of the chase, as seals, otters, etc., was a cause of rejoicing. To catch eight halibut was a subject for congratulation. Eight times ten was favourably regarded, and eight hundred was the *ne plus ultra* or summit of good fortune. A chief who could give away eight hundred pieces of property in a feast was pre-eminent.

[In a late communication, Mr. Mackenzie states that he has found, on a small island named *Tee*, opposite the mouth of Lignite brook in Naden Harbour, a considerable portion of a stone arrow-head. The portion of an arrow-head in question is nearly two inches in length, but wants both tip and base. It is formed of streaked red jasper, narrowly tapering in form, but rather thick, one side being distinctly more convex than the other. It is rather neatly chipped, and a stone identical with it in character is found commonly in pebbles at the same place. [No. 2680.]

Mr. Mackenzie regards this as a very interesting discovery, as it is the only specimen of a chipped arrow-head or spear-head which he has ever known to have been found on the Queen Charlotte Islands. He further states, that with one exception, the Haida to whom he showed it were much surprised, and said that they had never seen or heard of such a thing before. The exception was an Indian who hunts a good deal on the west coast of the islands, where he stated that he had found such chipped stones at one place there.]

G. M. D.

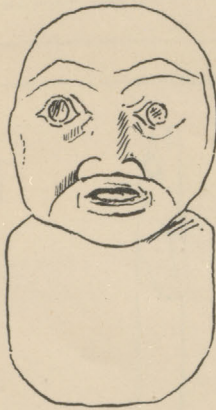




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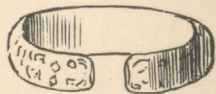
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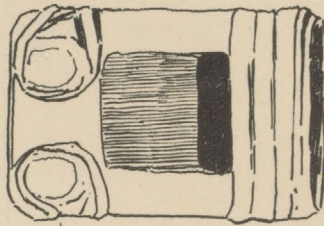
$\frac{1}{2}$ 1289.



$\frac{1}{2}$ 1287.

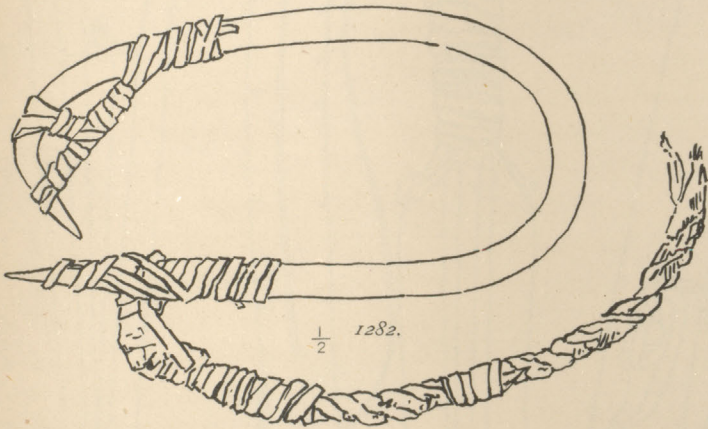


$\frac{1}{3}$ 1308.

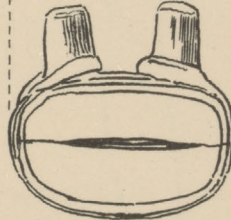


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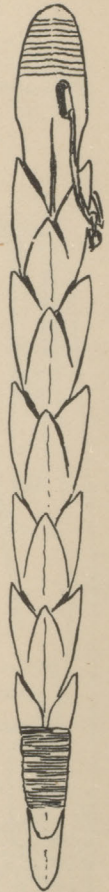


$\frac{1}{2}$ 1282.

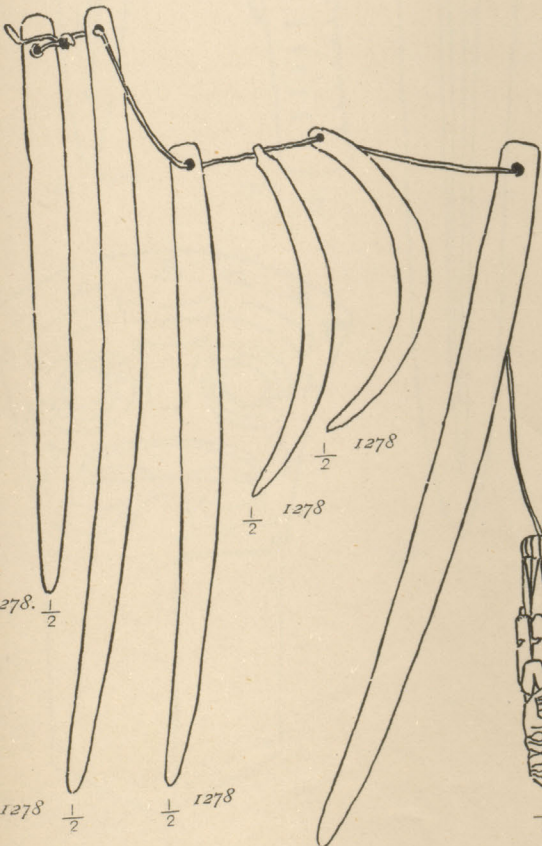


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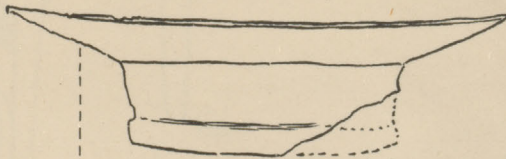
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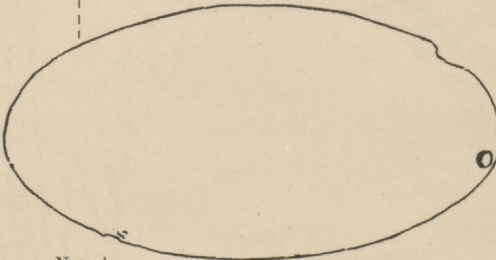
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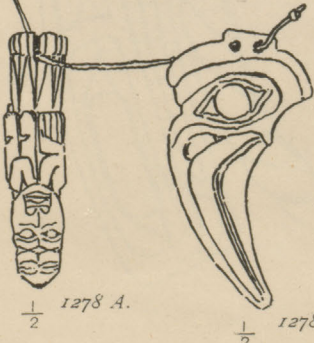
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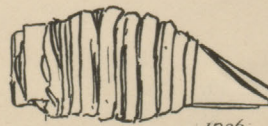
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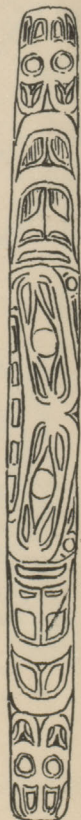
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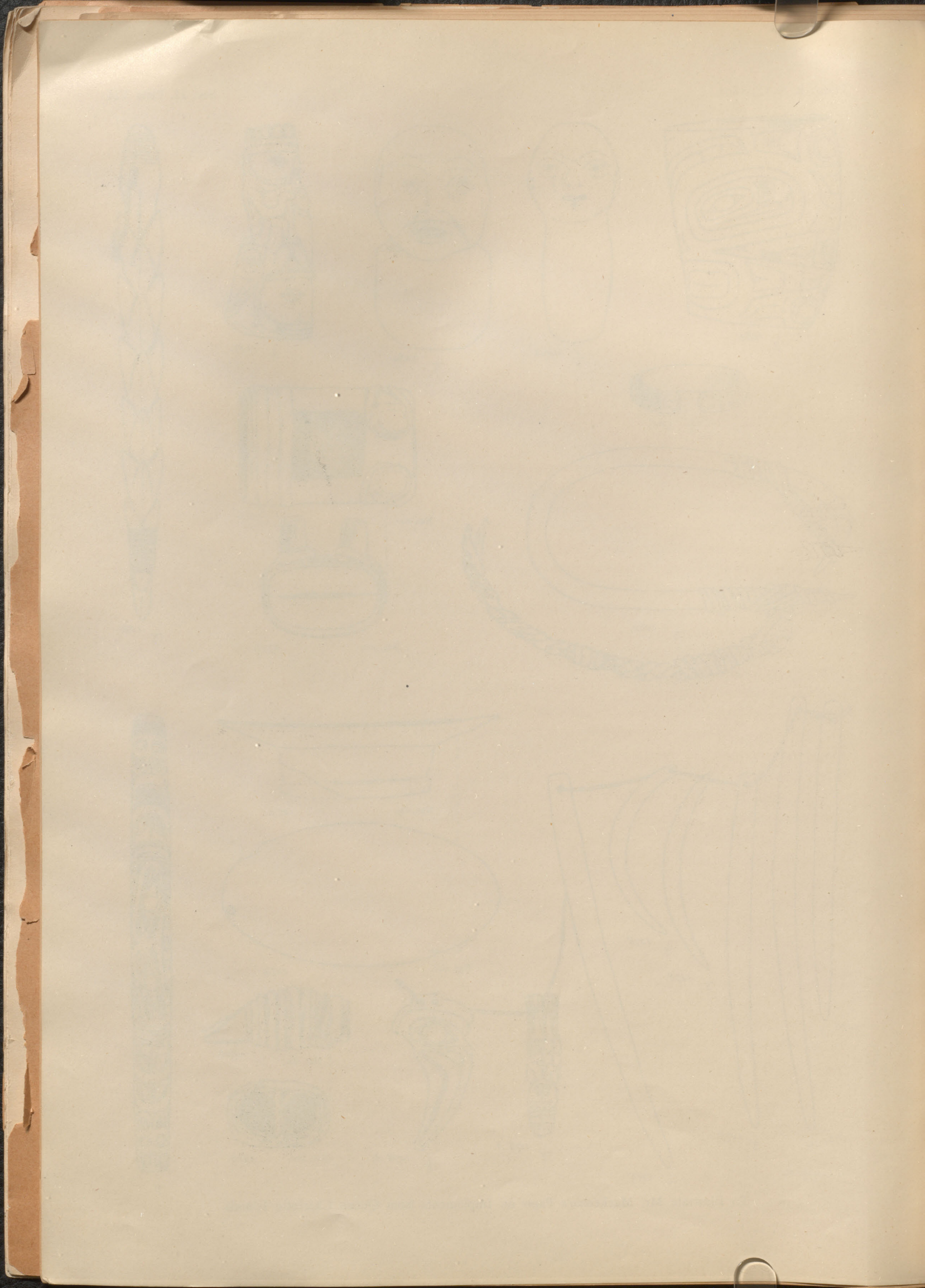
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$\frac{1}{2}$ 1308.

L. M. LAMBE, DEL

To illustrate Mr. Mackenzie's Paper on Implements from Queen Charlotte Islands.





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