SCIENCE IN CANADA.

THE CANADIAN ROYAL SOCIETY'S ANNUAL MEETING.

THE annual meeting of the Royal Society of Canada opened at Ottawa on the 14th ult. and closed on the 17th. Mr. J. M. Le Moine, the well known historian and friend of Parkman, presided. This institution, which was founded in 1882 by the Marquis of Lorne, then Governor-General of Canada, consists of four sections, of which two are entirely scientific—the third being devoted to the mathematical, physical and chemical sciences; the fourth to the geological and biological sciences. The first and second have also a scientific element, for though nominally set apart for English and French literature, respectively, they admit, under the head of archæology a class of subjects that are not unrelated to important branches of science. During the recent session, for instance, three papers of a scientific character were presented in the second section: 'The present position of American Anthropology,' by Professor John Campbell, LL. D., of Montreal; 'Religion and Aerolites,' by Mr. Arthur Harvey; and 'An Iroquois Condoling Council,' by the venerable ethnologist, Mr. Horatio Hale. Those who are acquainted with Mr. Hale's excellent monograph, 'The Iroquois Book of Rites,' in Dr. Brinton's 'Library of Aboriginal American Literature,' will not be entire strangers to the subject of Mr. Hale's paper.

Of the papers of the scientific sections, the first read in Section 3 was the presidential address of Dr. Harrington (McGill College), which dealt with a subject of considerable interest. Professor Harrington urged the necessity of using absolutely pure materials in chemical operations where the object was to establish formulæ. The address, which was illustrated by abundant examples, gave rise to an interesting discussion, in which Mr. T. Macfarlane, chief analyst of the Dominion; Professor Goodwin, of Kingston, Ont., and Dr. Ells, of Toronto, took part. Professor Harrington also read a paper on 'The Chemical Composition of Andradite from two localities in Ontario.' It gave the results of the examination of a black garnet, occurring in association with the magnetic iron ore of the Paxton mine, Lutterworth, Ont., and of a brown andradite present in the nepheline syenite of Dungannon, Ont. Of these andradites the former was found to be free from titanium, the latter to be titaniferous.

Other papers read in Section 3 were the following: 'A short essay on an attempt to measure the relative easterly and westerly transmission lines through an Atlantic cable,' by Professor C. H. McLeod (McGill College); 'On the estimation of Starch,' by Mr. Thos. Macfarlane, Ottawa; 'Viscosity in Liquids and Instruments for its Measurment,' by Mr. Anthony McGill; 'Periodicity of Aerolites,' by Mr. Arthur Harvey, Toronto; 'On Some Applications of De Moivre's Formulæ,' by Professor F. N. Dupuis, Queen's College, Kingston, Ont.; 'On the Hypotheses of Dynamics,' by Professor McGregor, of Dalhousie College, Halifax. In a former paper Professor McGregor had tried to express the ordinary hypotheses employed in dynamics in a form suited to the conception of bodies as consisting of particles acting upon one another at a distance. In the later paper he endeavors to express those hypotheses in a form suited to the conception of bodies and intervening media, as consisting of parts which act directly on one another only across surfaces of contact.

In the 4th Section Sir J. William Dawson, of Montreal, read a 'Note on Tertiary Fossil Plants from the vicinity of the City of Vancouver, B. C.' This important paper related to a series of beds holding lignite and vegetable fossils and estimated at 3,000 feet or more in thickness and oc-

curring in the southern part of British Columbia, between Burrard Inlet and the United States boundary. These beds, which have been noticed in the Reports of the Geological Survey by Dr. G. M. Dawson and the late Mr. Richardson, are believed to be newer than the Cretaceous coal-measures of Nanaimo and Comox, and probably equivalent to the 'Puget group' of the United States geologists in the State of Washington. Collections of the fossil plants have been made at various times by officers of the Geological Survey, and more recently by Mr. G. F. Monckton, of Vancouver, who placed his material in the hands of the author, along with that previously entrusted to him by the Geological Survey. The species contained in the several collections are mentioned in the paper, and are compared with those of the Puget group, as described by Newberry and Lesquereux, and with those of other localities in British Columbia and the United States. The conclusion as to the age of the flora is similar to that arrived at by Newberry for the Puget flora, making it equivalent to the Upper Laramie or Fort Union group. It thus intervenes in date between the Upper Cretaceous of Nanaimo and the Oligocene or Lower Miocene of the Similkameen district, and is therefore of Eocene age, filling a gap hitherto existing in the mesozoic flora of the West coast. Much, according to Sir W. Dawson, still remains to be known of this interesting flora, and as the formation containing it, which seems to be estuarine in character, extends over a wide area in British Columbia and Washington, and is of considerable thickness, more especially in its extension south of the Canadian boundary, it may ultimately be shown to include several sub-divisions representing the long interval between the Cretaceous and the Middle Tertiary.

Mr. J. F. Whiteaves, paleontologist of the Geological Survey, Ottawa, read an interesting 'Note on the occurrence of Primnoa Reseda on the coast of British Columbia.' The main value of Mr. Whiteaves' paper lies in the fact that *Primnoa Reseda* (a tree-like Alcyonarian coral), though known for over a century as occurring in the Atlantic, has not hitherto been with certainty assigned a Pacific habitat. Dr. R. W. Ells and Mr. A. E. Barlow presented a joint paper on 'The Geology of the proposed Ottawa Ship Canal,' the route of which is of unusual interest from a geological, as well as historical and commercial, point of view. A contribution to the history of botanical research on this continent was offered by Prof. (Mgr.) Laflamme, of Laval University, who seeks an answer to the question, 'Where did J. Cornut, who published his *Canadensium Plantarum Historia* in 1635, obtain the specimens from which he wrote his descriptions, and by whom were they transported to Europe?' Mr. G. U. Hay discussed 'some variations in *Epigæa repens*.' Dr. G. F. Matthew, of St. John, New Brunswick, continued a series of studies on the organic remains of the Little River Group in that province. Dr. Wesley Mills (McGill College) presented a series of papers embracing results of investigations into the psychology of the dog, the cat, the rabbit, the guinea pig and certain birds, with corresponding physical indications. The papers also compared the mongrel with the pure-bred dog; the dog with the cat, the rabbit with the guinea pig, etc. These inquiries were conducted with extreme care with the aid of the best equipment for observation and experiment.

One of most important of the scientific papers contributed to the Society was presented, not in section, but before a public audience. Prof. John Cox, M. A. (Cantab), late fellow of Trinity College, Cambridge, and William C. McDonald Professor of Experimental Physics in McGill University, Montreal, had been asked to give a

public lecture on Thursday evening the 16th inst., in connection with the Royal Society's meeting. Prof. Cox has a gift too rare with men of science, and most precious to him whose chosen path of research leads him into *selve oscure* of abstruse problems where for the many no light shines—the gift of clear and eloquent exposition. His subject was 'Unsolved Problems in The Manufacture of Light,' and, in order to illustrate it worthily, he had brought with him from Montreal the admirable apparatus of his laboratory necessary for a series of experiments and lantern views. He was assisted by Messrs Barnes and Pitcher, and the large and cultivated audience gathered in the hall of the Normal School listened enraptured as he made plain mysteries that most of them had regarded as impenetrable. After referring to the time-honored sources of light—the candle, oil lamp, gas, Auer light, and the lime light—and showing that each consisted in heating something till it was incandescent, the lecturer pointed out that none of these gave an efficiency of more than one per cent., the only scientific systems of combustion being the Auer light and lime light. The modern method of electric lighting dated from Sir Humphrey Davy's first production of the arc, with a battery of 2,000 cells. The current thus produced was still ample to heat refractory substances to incandescence, but as zinc and acid were many times as expensive as coal and air the light could not come into practical use until the invention of the dynamo forty years afterward. With the dynamo the modern system was completed, and consisted of three stages—the steam-engine, the dynamo and the lamp. The purpose of the lecture was to show that in the steam-engine and the lamp there is still an enormous waste. After pointing out that light was not created but was produced by the conversion of energy, and explaining the nature of energy as stored up in coal, Prof. Cox dealt with the three stages in detail. "The conversion of the coal-energy into the mechanical energy," he said, "is of course effected by the steam-engine, but in practice not more than from 7 to 16 per cent. of the energy stored in the coal can be extracted by the steam-engine, and theoretical considerations fix an absolute limit to the perfection of the steam-engine, showing that we can never hope to convert so much as 30 per cent. of the energy of coal by any form of heat-engine. This is one unsolved problem in the manufacture of light—unsolved but still capable of solution if some means of extracting energy from coal otherwise than by heat, and more like the methods used in burning zinc in a battery, can be discovered. At present we are recklessly wasting our coal supplies, and posterity will have a serious grievance against us for squandering these priceless stores."

In the second stage of the process, the dynamo, though so recently invented, is already nearly perfect, and scarcely any energy is lost in its conversion by the dynamo into an electrical current. We reach the third stage, that is, the lamp, with some 7 per cent. of the original energy still available. The lecturer here showed a number of interesting experiments to prove that the only form of energy useful in producing vision consisted of a short series of very minute waves, ranging from the forty-thousandth to the sixty-thousandth of an inch in length, and that to produce these our only means at present was to heat the molecules of some substance, whereby we were compelled to waste the greater part of our efforts in producing heat, which was worse than useless, before we obtained the luminous rays. "Here then," said Professor Cox, "is the second unsolved problem, since even in the incandescent lamp and the arc lamp not more than from three to five per cent. of the energy supplied is converted into light. Thus, of the original

store in the coal less than three parts in a thousand ultimately become useful. In the last six years, however, some hint of means to overcome this difficulty has been obtained from the proof by Maxwell and Hertz that light is only an electric radiation. Could we produce electric oscillations of a sufficient rapidity we might discard the molecules of matter and directly manufacture light without their intervention. To effect this we must be able to produce oscillations at the rate of five hundred billions per second. Tesla has produced them in thousands and millions per second, and Crookes has shown how by means of high vacua to raise many bodies to brilliant fluorescence at a small expense of energy." Illustrations of these processes having been given, the lecturer concluded: "These are hints toward a solution of the problem, but give no solution as yet. Professor Langley states that the Cuban firefly spends the whole of its energy upon the visual rays without wasting any upon heat, and is some four hundred times more efficient as a light producer than the electric arc, and even ten times more efficient than the sun in this respect. Thus while at present we have no solution of these important problems we have reason to hope that in the not distant future one may be obtained, and the human inventor may not be put to shame by his insect rival."

At the general final meeting on Friday (17th inst) it was moved by Dr. Sandford Fleming, C. M. G., of Ottawa, and seconded by Sir William Dawson, F. R. S., that the Royal Society of Canada was of opinion that it is in the interests of science and seamen in all parts of the world that a final determination be speedily reached regarding the unification of the nautical, astronomical and civil days, so that all may begin everywhere at midnight, and that as the proposal can with least difficulty be carried into effect on January 1st, 1901, the Council be requested in the name and on behalf of the Society to adopt such measures as may be considered expedient to bring about the desired result. This is a subject to which Dr. Sandford Fleming has devoted much and fruitful attention.

The following officers were elected for the ensuing year: President, Dr. R. S. C. Selwyn, C. M. G., F. R. S., ex-Director of the Geological and Natural History Survey; Vice-President, the Archbishop of Halifax, Dr. O'Brien; Secretary, Dr. J. G. Bourinot, C. M. G.; Treasurer, Prof. J. Fletcher. Prof. Bovey, Dean of the Faculty of Applied Science, McGill University, was chosen president of the third section; Prof. Dupuis, of Queen's College, Kingston, Ont., Vice-President, and Capt. E. Deville, Surveyor-General of the Dominion, Secretary. In the fourth section, the following choice was made: President, Prof. Wesley Mills, M. A., M. D., McGill University; Vice-President, Prof. Penhallow, B. Sc., of the same institution; Secretary, Dr. Burgess, Superintendent of the Protestant Insane Asylum, Verdun, near Montreal. J. T. C.

CORRESPONDENCE.

VOLCANIC DUST IN UTAH AND COLORADO.

Science of April 26th contains an article by H. W. Turner, of Washington, D. C., upon '*Volcanic Dust in Texas.*' It may perhaps be of interest to some of the readers of Science to learn that large deposits of volcanic dust occur in Utah, and also in the extreme northwestern portion of Colorado. In the year 1890, while I was a professor in the University of Utah, my attention was called to an extensive deposit of a grayish-white substance near Stockton in the Oquirrh range of mountains, some sixty miles southwest of Salt Lake City, by Mr. Ben Johnson of that place. Upon examination I found it to consist almost wholly of microscopic, transparent, siliceous flakes of various, irregular forms, one of the most common be-