Upper staff, two chief assistants and five assistants; lower staff, two higher grade established computers and six established computers; temporary staff, non-established computers.

Mr. P. H. Cowell was appointed the additional chief assistant on April 20, and it is hoped that the appointments of the established computers will very shortly be made. Mr. Criswick has retired on pension after a useful and honourable service of forty-one years at the Observatory, and Mr. Hollis has been promoted to fill the vacancy thus occasioned in the staff of first class assistants.

## THE ROYAL SOCIETY OF CANADA.

THE annual meeting of the Royal Society of Canada was held at Ottawa on May 18, and the three following days. In addition to the papers read before the literary sections of the Society, a large number of important papers were presented in the two Science Sections.

In Section III. (Mathematical, Physical and Chemical Sciences), Profs. Cox and Callendar presented the results of recent investigations carried on by them in the physical laboratories of McGill University, in which they have succeeded in demonstrating that Röntgen rays are not unaffected by magnetic attraction, as Röntgen states, but on the contrary are affected in a marked manner when tested experimentally under favourable conditions, the approach of the magnet causing a marked deviation of the kathode rays within the tube in one direction, and at the same time a corresponding deviation of the Röntgen rays without the tube in the opposite direction. These observations are of especial importance as bearing on the question of the relation of Röntgen rays to the kathode-rays, Röntgen having considered the former as differing from the latter in that they were not influenced by magnetism.

In the same Section, papers were also read by Messrs. Alex. R. Mellanby and John T. Farmer, Royal Commissioners' Scholars, on investigations carried out in the laboratories of McGill University; the former, "on an investigation as to the thermal and plant efficiencies of compound, triple and quadruple expansion engines," and the latter, "on the efficiency of $\frac{1}{2}$-inch jets from circular orifices, impinging upon surfaces of different forms."—Prof. Bovey communicated the results of a series of experiments on the strengths of the woods of the hemlock, red pine, and white pine.—Mr. Howard Barnes presented the results of a series of very accurate measurements of the temperature of the waters of the St. Lawrence, opposite Montreal, during the coldest part of last winter. It was shown that the greatest variation in temperature did not exceed $\frac{1}{100}$ of a degree Centigrade. The measurements were carried out with a view to ascertaining whether the formation of frazil ice was accompanied by any considerable changes in temperature, such as have been described by some observers. It was found that as the river does not vary throughout its depth by so much as one-hundredth of a degreee from the freezing point, the formation of frazil does not depend on any considerable lowering of the temperature of the water. The formation of fine needles of ice all through the water of the river is probably aided by fine particles of sand and other suspended material acting as nuclei, since earthy matter is found embedded in the frazil attached to the under side of the surface ice.

In Section IV. (Geological and Biological Sciences), Sir William Dawson read a paper on fossil sponges and other organic remains from the rocks of the Quebec Group at Little Metis.—Prof. D. P. Penhallow read a paper which embodied his final deductions on the generic characters of the North American Coniferæ as exemplified in the microscopic structure of the woods.—Prof. Ramsay Wright gave the results of his studies of a great number of minute forms of life obtained from certain of the Canadian fresh-water lakes by means of a very fine tow-net, among which he describes a number of new species, and compares others with closely allied forms already recognised in the lakes of Scandinavia and other parts of Europe. He also communicated a paper by Mr. E. C. Jeffery, on the morphological nature of the medullate stellar structures of certain plants.—Dr. George M. Dawson, in a communication on secular climatic changes in British Columbia, showed from a study of the rainfall of the Province, as evidenced by the varying height of lakes without outlet, that the last few years have been more humid than any preceding them in a period of about fifty years.

Other papers were read by Prof. Edward E. Prince, Dr. A. R. C. Selwyn, Dr. William Saunders, and others.

The usual public lecture was delivered by Prof. Prince, Dominion Commissioner of Fisheries, on the fishery industries and resources of Canada.

The Society decided to petition the Dominion Government to establish a marine biological station at some point on the Atlantic Coast of Canada, as soon as possible, as recommended in a recent report of the Dominion Commissioner of Fisheries.

Prof. Ruttan and Prof. Adams, of McGill University, and Mr. W. Bell Dawson, of the Hydrographic Service, were elected Fellows of the Society, to fill three vacancies recently caused by death.

The meeting was well attended, and was successful in all respects. At the conclusion of the meeting the Fellows of the Society were entertained at a garden party, by their Excellencies the Earl and Countess of Aberdeen, at Rideau Hall.

## THE CIRCULATION OF ORGANIC MATTER.

AT the evening meeting of the Royal Institution on Friday, April 24, Dr. G. V. Poore gave a discourse on the circulation of organic matter. Without attempting to define "organic matter," Dr. Poore began by saying that all organic matter was combustible, and that all our combustibles were of organic origin. A comparison was made between combustion in a furnace and the combustion of food in the body of an animal, and it was shown that whereas in the furnace the fuel was used up and furnace wore out, in the animal there was increase of size, while its droppings stimulate the soil to an increased production of food. This apparent increase was probably due to the holding in suspension by the extra growth of plants of both water and soluble salts, which otherwise would percolate the soil and find their way to the sea. Recent experiments made it certain, also, that some of the atmospheric nitrogen was appropriated by microbes in the soil. The animal was a true regenerative furnace, and led to the increase of the herbage at the expense of the sea on the one hand, and the atmosphere on the other. It was impossible to imagine an increase in one direction without some compensating decrease in another direction. When organic matter collected under water, fermentations were set up and the organic matter was reduced instead of being oxidised. The tendency of organic matter, when thus treated, to form combustible bodies was very remarkable. The inflammable gases which sometimes formed in cesspools, and the marsh gas evolved by mud in ponds and rivers, were familiar examples, as were also the alcohols formed by the fermentation of carbohydrates. Our immense stores of coal and peat were due to the silting up of marsh plants in past ages and in recent times, and so-called mineral oils were certainly of organic origin, as were also the nitrates which were so much used in the manufacture of explosives. If we were to judge what *has been* by what *is*, it was impossible not to come to the conclusion that life must have preceded combustion in this world. This biological theory of the cosmogony made the world subject, like all other things, to the processes of development, evolution and decay, and he believed that such a theory had fewer drawbacks than might at first sight appear.

Organic matter was our capital in this world, and the more frequently we could make it circulate the greater would be our increase of material wealth. If we burnt it or threw it into the sea, we thereby spent money for dissipating our capital; but if we placed it on the land, we increased our capital and earned frequent dividends. The *rôle* of microbes in the soil, in bringing about the humification and nitrification of organic matter, was next dealt with. It was shown that farming without frequent additions of organic matter to the soil, must end in ultimate failure. We found everywhere that vegetable organisms co-operated with animals in the destruction and circulation of organic matter, and it appeared to be probable that the correlation of the biological forces was not less rigid than the correlation of the physical forces.

Allusion was made to the observations of M. Megnin on the destruction of animal bodies by successive squadrons of insects and microbes, and many facts were brought forward to show that the comparatively new doctrine of symbiosis was probably of universal application. The intestines of every animal swarmed with microbes which were essential for digestion, during life, and at death were active in starting the dead body upon the cycle of events which led to its ultimate circulation and re-