

general and sectional meetings can easily be met in the University, while the adjacent colleges and residences will provide really delightful residence for those who do not prefer to put up at an hotel and are not staying in private houses.

The sectional programmes are taking shape. Without attempting at this stage a full list of papers, reference may be made to a few leading subjects, among which, it will be noted, Canadian interests find an important place. Sir William Bragg, as president of the Section of Mathematics and Physics (A), will give an address on crystal structure. This subject, and that of colloid solutions, will be also discussed jointly with the Chemical Section (B); while the physicists will have a session with the Engineering Section (G) to consider optical stress determination. Among other subjects in Section A, Sir Ernest Rutherford is expected to speak on atomic disintegration; Lord Rayleigh on the scattering of light, and on the luminosity of the night sky; Mr. R. H. Fowler on the quantum theory; Prof. A. S. Eddington on relativity, and on the interior of stars; Mr. E. A. Milne on stellar atmospheres; Mr. J. Jackson on star motions, and Prof. A. Fowler on spectroscopy. A group of meteorological and geophysical papers will include contributions by Mr. F. J. W. Whipple on "The Diurnal Variation of Pressure: an unsolved Riddle" and "The Green Flash"; one on tidal friction by Dr. H. Jeffreys; and one by Sir Napier Shaw, whose title, "If the World went Dry," may possibly attract attention in Toronto for reasons quite other than those offered by the subject-matter.

Sir Robert Robertson, as president of Section B (Chemistry), will speak on "Chemistry and the State." The section will join those of Physiology (I) and Agriculture (M) in a discussion on vitamins, and that of Geology (C) in the consideration of liquid and other fuels; it will itself devote a portion of the meeting to electrochemistry, with special reference to Canadian electrochemical manufactures. Section C, in a discussion on changes of sea-level in relation to gravitation, continental shelves, and coral islands, will be joined by the Geographical Section (E), the president of which, Prof. J. W. Gregory, will give an address on the relation of white and coloured races in reference to white colonisation in the tropics. Prof. G. W. O. Howe's presidential address to the Engineering Section (G) will deal with a hundred years of electrical engineering. The Anthropological Section (H) will join that of Psychology (J) in a discussion on racial mental differences, and will receive, among other contributions, papers from Mr. H. Balfour on anthropology and the administration of the affairs of native races, from Dr. A. C. Haddon on

the distribution of early man, from Dr. T. Ashby on recent discoveries in Italy, from Mr. L. H. Dudley Buxton on ancient crania from the valley of Mexico, and from Dr. R. R. Marett on the cinematograph as an instrument of anthropology. Prof. W. Macdougall, in his presidential address to Section J, will deal with purposive action as a fundamental conception in psychology. The section will join that of Physiology (I) in discussing physiological and psychological factors of muscular efficiency in industry.

The Botanical Section (K) will receive an address from its president, Prof. V. H. Blackman, on the physiological aspects of parasitism; it will also deal with the ascent of sap and the transport of food material in trees, and will join in discussions on Canadian forestry problems with Section M (Agriculture), and on species and chromosomes with Section D (Zoology). Sections D and M will consider soil population. Section M will hear its president, Sir John Russell, on the subject of combination in attacking farmers' problems, and will discuss diminishing returns in agriculture with Section F (Economics). The Education Section (L) will receive an address from its president, Principal E. Barker, on the nature and conditions of academic freedom in universities, and among other items will discuss psychological tests for scholarships and promotions (jointly with Section J) and the training of pupils intended for an overseas life; it will hear Prof. Wrong on the teaching of the history and geography of the British Empire, and Dr. C. W. Kimmins on the sense of humour in children.

In addition to other papers from members of the visiting party, many are already promised by Canadian and American scientific workers, and the subjects referred to above represent perhaps a quarter (certainly not more) of those which the meeting will afford opportunity to touch upon. A large Canadian and American attendance is hoped for and expected, and several important American institutions are offering opportunities for intercourse between their representatives and visiting members. Some surprise may have been felt at the decision of the Association to meet overseas in a year when the Empire Exhibition will draw so large a number of visitors in the reverse direction across the Atlantic, but this circumstance may well react favourably upon the interests of the meeting. Those visitors to Wembley who desire to join the Association on their return may find information as to the objects and work of the Association by research in the reading room of the Canadian pavilion, or even in the ships' libraries.

The meeting will be followed by a transcontinental excursion, particulars of which may be expected shortly.

Obituary.

PROF. J. E. B. WARMING.

THE death on April 2 of Dr. Eugene Warming, emeritus professor of botany of the University of Copenhagen, marked the passing away of a vigorous force in Danish botany, and of a pioneer who influenced botany over the whole world. In the latest edition of Warming's ecological text-book (1918) references are given to about 2000 papers and monographs, and it is safe to say that the larger half of these were inspired

or influenced by him. For about sixty years Warming contributed steadily to the literature of botany, and for nearly half that period he was professor. His life-work involved several aspects of botany, but the part that will probably live longest is the attempt to bring order into the chaos of the world's types of vegetation—forests, grasslands, deserts, etc.—with reference to the groups of environmental factors that determine the existence of a plant in a place, and control its growth there.

Eugene Warming was born on November 3, 1841, at Manö, near the Schleswig-Holstein frontier in Jutland, and passed his earlier life in Denmark. As with so many other northern botanists, inspiration came during a sojourn in tropical lands. Three years at Lagoa Santa, Brazil, gave many opportunities for observations on plant distribution, and one of his earlier papers (1869) was a semi-popular account of excursions over the rolling "campos" into the mountains of Brazil. "Lagoa Santa" (1892) is a classic monograph on biological plant geography, and his account of the mangrove swamps was one of the early descriptions of this type of vegetation.

Quite in another direction was the moulding influence of Warming's voyage to Greenland in 1884. His results were published in that year, and in 1887 he laid the foundation of a geographical botany of the Arctic by grouping and describing the types of vegetation. Many of the more recent papers in the "Meddelelser" (Communications on Greenland) are the work of Warming or his pupils, and include monographs on the structure, pollination, and hibernation of Arctic Heaths (1908), Saxifragæ (1909), Primulacæ (1916), and Caryophyllacæ (1920). He also directed the publishing, in English, of "The Botany of the Færöes," a monograph of more than a thousand pages. The contributions of C. H. Ostenfeld on the land vegetation, and of F. Børgesen on the marine algæ, are the more illustrative of Warming's methods.

Much of Warming's work is comprehensive and geographical, but it is not superficial. One of his earlier contributions—"On the Structure, Hibernation, and Renewal of Shoots" (1884 and 1891)—is pioneer work. The underground structure of herbaceous perennials would appear to have received little attention until systematised by Warming. Yet the mode of over-wintering is fundamental in the existence of a plant, besides being an important factor in distribution and survival. The groups of life-forms of plants, formulated then, have been adjusted in the later editions of his text-book. In another direction his activity included taxonomy, and his "Systematic Botany" (English edition, 1895) is still a text-book. One of his earlier papers (1892) dealt with the primordia of stamens and ovules, and his maturer views, "Sur la valeur systématique de l'ovule," came in 1913. The need for research on vegetative organs appealed most to him. His "Psammophile Vegetation" (1891) and "Halophytstudier" (1897) are classics on coastal vegetation. The work of his later years was a series of monographs—"Dansk Plantevækst"—descriptive accounts of Danish plants and plant communities, including "Strand vegetation" (1906), "Klitterne" or dunes (1909), and "Skovene" completed in 1919. This last is a book of 635 pages, a unique account of plant life in forests and woodlands.

It is well for botany that all this detailed work has become the foundation of a more generalised text-book. In 1895 there was issued in Copenhagen a modest work, "Plantefund," Warming's lectures to his students. In 1896 it appeared in German as the "Lehrbuch der ökologischen Pflanzengeographie: eine Einführung in die Kenntnis der Pflanzenvereine." An edition, fully revised by Warming, is the English text-book, "Oecology of Plants" (1909). The latest,

a book of 760 pages, with 64 pages of bibliography, appeared in Berlin in 1918. The key-note of the work is the grouping of plants into life-forms or growth-forms, determined partly by hereditary factors, partly by what Warming calls epharmony with the habitat and environment. The groups hydrophytes, mesophytes, xerophytes, and others are too familiar to need explanation. To attain a true perspective amongst the world's plant communities, Warming's outlook is absolutely necessary. If one adds the cartographical methods of Flahault of Montpellier, of Clements in America, and of the more recent Swedish school, then the whole field of plant ecology is covered.

The drift of European botany in the latter part of the nineteenth century was not too favourable to works dealing with vegetation and environment. Why this apathetic condition existed need not concern us here, but it is the case that the efforts of pioneers like Warming appealed strongly to the younger botanists with out-of-doors instincts. This has been the case in Britain, where a smaller group, the British Vegetation Committee, became in 1913 the British Ecological Society with its *Journal of Ecology*. So also in America, Warming's influence contributed to the rise of strong schools of ecology, a society, and a periodical. Contemporary schools have grown up at Montpellier and at Zurich.

Many honours were conferred on Eugene Warming. As one of the five trustees of the Carlsberg Foundation for more than twenty-five years, he exerted a great influence on Danish science through grants in aid of research and publication. He retired from his professorship in 1911 when seventy years old, after serving for just over twenty-six years (November 1885-December 1911), being followed by another great botanist, C. Raunkiaer, who was succeeded last year by C. H. Ostenfeld. In 1908 he was a delegate at the Darwin-Wallace jubilee celebration of the Linnean Society of London, of which he was elected a foreign member in 1888.

It was our good fortune to spend a fortnight in 1913 in Denmark under Warming's leadership. His enthusiasm for his native flora and vegetation was that of youth, his kindness excelled even the well-known hospitality of the Danes as a nation, and he conveyed it all with fluency in any one of four languages. Others who knew Eugene Warming personally will agree that he was a true source of inspiration, and they can understand the secret of the power of his pen.

WILLIAM G. SMITH.

MR. R. STRACHAN.

At the ripe age of ninety, Richard Strachan passed away on Easter day, April 20. He was educated at the Nautical School, Royal Hospital, Greenwich, and afterwards entered the Board of Trade. In 1855, when the Meteorological Department of the Board of Trade was initiated under the superintendence of Admiral FitzRoy, he was given charge of the Instruments Division for supplying vessels in the Navy and mercantile marine for purposes of observation in the different oceans.

Mr. Strachan contributed many useful memoirs on the meteorology of the Arctic and Antarctic, compiled