

fuel problem, and came to the conclusion that "the consensus of geological opinion concerning the prospects of flow oil being discovered in commercial quantities in Australia is unfortunately not very favorable." Apart from oils obtainable from coal and shale, power alcohol and related synthetic fuels are recognised in the report under notice as the most likely substitutes for natural petroleum in Australia.

In reviewing possible Australian sources of power alcohol, it is pointed out that the starch-producing cereals are in general too important as foodstuffs to be utilised for other purposes; but in some Australian localities "the fermentation of certain varieties of tubers is by no means commercially unattractive even under present conditions and prices. Cassava, arrowroot, the sweet potato in the warmer climates, and perhaps beet in the milder, are at least worth consideration in this connexion. Some sugar-producing grasses, for example, sorghum, also have prospects." The nipa palm, which has been stated to provide a better source of sugar even than the sugar-cane, is a further raw material of considerable interest, since it grows abundantly in certain regions of Papua and the mandated territory of New Guinea.

Owing to the bulky nature of the raw materials, the conclusion is reached that at present it would be possible at the best to establish distilleries in favoured localities where the production of suitable high-grade materials presents no particular difficulty. In such districts imported petrol might be largely replaced by alcohol, but it appears that a complete replacement is incapable of achievement in the absence of a successful method for producing liquid fuels from raw celluloses. "From the point of view of the producer of power alcohol, Australia may be considered to be a favoured field of operation. . . . On the one hand, the local price of petrol is high, and on the other an ample and cheap supply of cellulosic raw materials is available. In view of the possibilities of ultimate success, and in view of the urgent national need, the chemists and bacteriologists of Australia might well co-operate and interest themselves in the problem,

the former to develop the most suitable methods of producing large quantities of fermentable materials per ton of cellulose, and the latter to discover the organisms best suited for the subsequent fermentation."

As regards synthetic methods for the production of power alcohol, neither ethylene nor acetylene is held to offer promise as the basis of a satisfactory commercial process in Australia; but a comparison of the prices of petrol in the countries concerned makes it conceivable that some other synthetic process might be capable of successful operation in Australia although perhaps economically impracticable in Europe or the United States.

Technologically, the best raw material available in Australia for manufacturing power alcohol is molasses. In the record season of 1925-26, the total production of crude sugar in Australia exceeded 500,000 tons; of the accompanying 120,000 tons of molasses, however, a large proportion was either used as fuel, cattle food, etc., or wasted. If utilised wholly in the manufacture of power alcohol, this by-product would yield only about one-twentieth (7,800,000 gallons) of the current Australian demand for motor fuels.

The Australian investigations on power alcohol include experiments on the cultivation of sorghum, artichokes, sugar beet, cassava, sweet potatoes, arrowroot, etc.; the preparation of alcohol from the carbohydrates of zamia palms, grass-tree cores, and prickly pear; the hydrolysis and fermentation of common Australian hardwoods (*NATURE*, Oct. 8, 1927, p. 522); and the use of alcohol as an engine fuel under various conditions. Coming to actual commercial achievement, a power alcohol distillery with a capacity of about one million gallons per annum started production in February 1927, at the Plane Creek sugar mill, near Mackay, Queensland. The raw materials are molasses and certain starchy crops, including cassava and arrowroot. The fuel, consisting essentially of a mixture of alcohol and ether, is marketed under the name of 'powrac.' As an extension of this enterprise it is proposed to erect other distilleries in the Cairns district of Queensland.

### Obituary.

PROF. C. DIENER.

CARL DIENER, who died in Vienna on Jan. 6, was born in that city on Dec. 11, 1862, there received the whole of his formal education, and there ran his professional career. As a student there was no need for him to go elsewhere, since he had as teachers some of the most eminent men of the age: in geography, F. Simonyi; in geology, E. Suess; and in palæontology, M. Neumayr. But when he had finished his student course in 1883, he at once turned for a wider experience to mountaineering in the Alps, in Dauphiné, and in the Pyrenees. He was among the first to introduce Alpine climbing into Austria itself, and was for seven years president of the Austrian Alpine Club; his membership of the English Alpine Club was, to his deep regret, broken by the War.

Naturally Diener did not leave his scientific interests behind when he sought the high mountains, and on the results he obtained in the Lebanon, Antilebanon, and the region of Palmyra, he habilitated as privat-docent for geography so early as 1886. Geology, however, claimed more and more of his attention, and the turning point of his career came when in 1892 he joined an expedition financed by the Government of India and the Vienna Academy, to examine the Trias of the Central Himalayas. In the first place, the valuable geological results obtained led him to extend his teaching to geology in 1893, and caused him in 1897 to be nominated professor extraordinarius of that science. Secondly, he was associated on the expedition with Griesbach and Middlemiss of the Indian Geological Survey, and this led to an

intimate connexion that ceased only with the War. Thirdly, the rich collections of fossils made by the expedition inevitably involved him more and more in palæontology. Thus in 1903 he became professor extraordinarius, and in 1906 was appointed full professor of palæontology and holder of that chair in the University of Vienna. His academic progress was fitly rounded off by his election as Dean of the philosophical faculty for 1919-20, and as Rector of the University for 1922-23.

Thus, for all his geographical interests and tectonic surveys, it is mainly as a palæontologist that we know and honour Diener. Englishmen are most familiar with the twelve magnificent monographs on Himalayan fossils which he contributed to *Palæontologica Indica* from 1895 to 1915. His most distinctive work in this line was on the Triassic Cephalopoda, where, on the death of Mojsisovics in 1907, he succeeded to the prime authority. The material for his Triassic studies came not only from the neighbouring Alps and the Himalayas, but also from Madagascar, Timor, Tonkin, Siberia, and Japan. His masterly summary, "Die marinen Reiche des Trias Periode" (1915), embodied the results of this work and of his extensive travels to many of the famous Trias exposures of the world. Would that he had given us an equally good summary of his knowledge of the Triassic cephalopods! From this, in his Catalogue (1915), he intentionally refrained, holding that the state of ammonite classification did not permit of it.

As palæontologist Diener was no mere describer, but interested himself in such subjects as the mode of life and distribution of the ammonites, the phenomena of convergence, and more generally in all those relations of fossil faunas to the rocks in which they occur that make up the division of palæontology now known as biostratigraphy. Indeed his "Grundzüge der Biostratigraphie," published in 1925, forms a conspectus of the subject no less admirable for clarity and sanity of treatment than for the wide learning on which it is based. The preparation of this work occupied him during the later years of public distress and of personal suffering from the internal disease to which he has at last succumbed.

Diener had a quiet but attractive personality, and his clear elocution and interesting subject matter made his lectures peculiarly inspiring. He was a member of the Vienna Academy and the recipient of many honours from other learned bodies. In 1913 he was made a corresponding member of the British Association. The Geological Society of London elected him foreign correspondent in 1912 and foreign member in 1926, an honour which he valued highly as a recognition of his long-continued work for the geology of the British Empire.

F. A. B.

MR. E. R. WAITE.

THE death is announced of Edgar Ravenswood Waite at Hobart, Tasmania, during the nineteenth meeting of the Australasian Association for the

Advancement of Science. Mr. Waite was born at Leeds in 1866, and at an early age took a keen interest in natural science; he was eventually appointed curator of the Leeds Philosophical Society, and was joint author with the late W. D. Roebuck of a work on "The Vertebrate Fauna of Yorkshire." He took an active part in the organisation of the Yorkshire Naturalists' Union, and at one time was joint-editor of its well-known organ the *Naturalist*. In 1892 Mr. Waite was appointed zoologist to the Australian Museum, and shortly afterwards accepted the appointment of Curator to the Canterbury Museum, New Zealand. Afterwards he accepted the directorship of the Government Museum at Adelaide, South Australia. Two years ago he returned to Europe, and after seeing the various museums on the continent and America, he visited his native place at Leeds, and was entertained there by many of his former colleagues.

Mr. Waite specialised in the study of mammalia and fishes, and took several expeditions to the Antarctic, where to-day a mountain bears his name. He described the fishes taken on the Shackleton and Mawson Expeditions, and is the author of the standard work dealing with the snakes of Australia. During the War he did good work by visiting various territories in the Pacific. He also collected extensively in the New Ireland and New Britain areas, and his Museum is considerably richer as a result of his work.

Mr. Waite's early experience as editor of the *Naturalist* and in other ways resulted in his being a prolific writer, and more than a hundred monographs and papers are to his credit. T. S.

WE regret to announce the following deaths:

Prof. José Rodríguez Carracido, for many years Rector of the University of Madrid, who worked chiefly on the action of alkaloids upon organisms and was the author of several text-books on biochemistry, aged seventy-two years.

Mr. J. H. Durrant, who was associated for many years with the late Lord Walsingham's collection of Microlepidoptera at Merton Hall, Norfolk, and afterwards at the British Museum (Natural History), on Jan. 20, aged sixty-five years.

Dr. Harry N. Gardiner, emeritus professor of philosophy at Smith College and president in 1907 of the American Philosophical Association, on Dec. 29, aged seventy-two years.

Prof. R. W. Genese, professor of mathematics in the University College of Wales, Aberystwyth, from 1879 until 1919, on Jan. 21, aged seventy-nine years.

Major-General G. W. Goethals, chief engineer for the construction of the Panama Canal and first civil governor of the Canal Zone, on Jan. 21, aged sixty-nine years.

Mr. M. Longridge, C.B.E., president in 1917 of the Institution of Mechanical Engineers, on Jan. 18, aged eighty years.

Count Meredyth de Miremont, author of well-known star charts and of "Practical Methods in Modern Navigation," on Jan. 21.

Dr. George Muirhead, author of "Birds of Berwickshire" and other works on Scottish natural history, on Jan. 29, aged eighty-two years.

Mr. P. D. Warren, C.M.G., formerly Surveyor-General of Ceylon, on Jan. 28, aged seventy-six years.