

awaiting investigation, and it may be that Rhases' account of Kharṣini refers to mercury as a compound such as corrosive sublimate, which would correspond better with the Sābian account and with the poisonous properties of the material. I-Tsing (A.D. 671-695) seems to know corrosive sublimate, the production of which in China may have been early.

It has been possible only to mention one or two of the numerous interesting matters dealt with in the memoir, and the authors have performed a most useful and valuable service in its publication. Students of this difficult period in the history of chemistry will await with keen interest the further memoirs which Principal Stapleton promises.
J. R. P.

The Empire Mining and Metallurgical Congress.

THE first Empire Mining and Metallurgical Congress was held in 1924 at Wembley, on the occasion of the British Empire Exhibition, and the second will open at Montreal on Aug. 22. These conferences are for the discussion of scientific, technical, and economic problems connected with the mineral industry, and they have in view the development of the mineral resources within the Empire. They are arranged by an Empire Council consisting of delegates from five constituent institutions domiciled in Great Britain and five domiciled overseas.

The convening body for this second Conference is the Canadian Institute of Mining and Metallurgy. Invitations have been widely accepted from Great Britain, South Africa, Australia, and elsewhere within the Empire, while in addition many members of one or other of the institutions resident in the United States will attend. Probably, therefore, including ladies, there will be some 750 participants.

The venue of the conference in Canada is a particularly happy one, not only because this year is the diamond jubilee of the Dominion's Confederation, but also because the mineral industry in Canada has risen so rapidly to a position of great importance that it may be regarded as being on the threshold of further important developments.

The congress will begin by a session at Montreal on Aug. 22, and it will end by return to the same capital city on Sept. 28. Intermediate sessions will be held at Toronto and Winnipeg in succession, the major portion of the conference then proceeding westward to Vancouver to visit Edmonton on the return, at both of which places there will be further sessions, while the remaining participants will turn eastward from Winnipeg to hold a session at Sydney in Nova Scotia. There will be, accordingly, full opportunity to visit all of Canada's important mineral fields from the Atlantic to the Pacific.

With the greatest sympathy, interest, and assistance from the Dominion and Provincial Governments, as well as from the Canadian mineral industry itself, the presentation of Canada's mineral resources to the visitors will undoubtedly be as complete as the best possible auspices can ensure.

The wider question of the Empire's mineral resources will be the feature of the discussions at the opening session at Montreal, when papers dealing with it will be presented, particularly from the Institution of Mining and Metallurgy, London. So important, indeed, does that Institution consider the question to be that it has forwarded to the Conference the following resolution: "Resolved: That the Council of the Institution of Mining and Metallurgy being of opinion that the questions raised in the Paper submitted to the Institution by Sir Thomas Holland on a 'Proposed Review of the Mineral Resources of the Empire' are of vital importance to the British Empire as a whole, and to the Dominions, Dependencies, and Colonies, as units, think it desirable that they should receive serious consideration and discussion by competent authorities within the Empire."

Apart from this outstanding question, the Conference has been presented with an abundance of valuable papers from the other institutions and from prominent individuals, on the closer problems of the industry, scientific, technical, and economic, wherefrom all participants, whether from the homeland or from overseas, are assured of a lively and sustained interest in the proceedings. That interest, the delightful tour, and not least the friendliness promised both in Canada and on the way there, constitute a sum of entertainment which explains the large number who have seen their way clear to attend.

It is understood that the next of these Conferences will take place in South Africa in 1930.

Mycorrhiza.

DR. M. C. RAYNER concludes her series of papers on mycorrhiza in the May issue of the *New Phytologist*. The final chapter is devoted to a consideration of the significance of these structures, and the nutrition of mycorrhiza plants. The author holds a brief for the view that the relationship between fungus and host plant is a reciprocal one beneficial to both symbionts, and implies an exchange of food material with a credit balance on the side of the vascular plant.

Evidence is adduced from experimental work on the relationship in forest trees, orchids, and heaths. In the case of conifers, the fungi concerned show marked stimulation in contact with the roots, due no doubt to the small quantity of exudates, particularly phosphatids, present. The infected root, on the other hand, seems to absorb inorganic salts as well as, or in raw humus soils, better than, the uninfected roots. It is pointed out that the struggle for existence often centres about competition for suitable compounds of nitrogen, and the mycorrhiza habit enables the plant

to draw efficiently on sources of nitrogen in the soil otherwise unavailable for its use.

On the other hand, there is no evidence that any of the known root fungi of trees can assimilate free nitrogen. While conifers can utilise ammonium compounds, more complex organic nitrogenous compounds are more readily utilised by the root fungi, and on acid humus soils, where such compounds constitute the chief source of nitrogen, plants with mycorrhiza are well equipped in competition with other forms. Orchid mycorrhizal fungi differ from those of conifers in retaining the power of autonomous existence. Seedling development is, however, conditional on infection. In the case of chlorophyllous forms, whether or not the mature plant can thrive in the absence of infection is an open question, but with non-chlorophyllous species, complete dependence on fungal symbionts is a condition of existence, as the food material of the plant must come from the humus in the soil.

The structural features of heath mycorrhiza

resemble those of conifers more than of orchids. Calluna grows in humus soil where there is a deficiency of mineral salts, particularly nitrates, and mycorrhiza have been found most profusely developed in soils with abundant humus, more sparsely in dry sandy situations, so it is possible that the beneficial effect upon the host may be directly related to soil conditions. Here again the mycorrhiza probably functions similarly to that of trees, enabling the plant to draw upon organic reserves in the humus.

In its evolutionary aspects the relationship now existing in orchids and heaths is considered to have originated in parasitism on the part of certain soil fungi. For this hypothesis it is necessary to assume that the invading strains were relatively mild in their action, and that the hosts had a relatively high resistance to parasitic attacks. Given this, it is easy to reconstruct the first stages of a symbiotic association.

University and Educational Intelligence.

CAMBRIDGE.—The John Winbolt Prize in engineering has been awarded to G. H. J. on Trinity College, and W. J. Manning, on the University of Sussex College, for a joint dissertation on "Transverse Oscillation of Bridges."

SYDNEY.—Prof. R. S. Wallace, professor of English language and literature in the University of Melbourne, has been appointed vice-chancellor of the University of Sydney. He will succeed Sir Mungo MacCallum, who, at the special request of the Senate of the University, has consented to continue to discharge the duties of the office during the present year.

THE following research scholarships at the Huddersfield Technical College are being offered by the Huddersfield Education Committee: A Drapers' Company's, in dyeing, value £100 with remission of fees; a Joseph Blamires, for research in colour chemistry, value £100 with remission of fees; and a British Dyes, for research in colour chemistry, value £75 with remission of fees. Particulars and forms of application are obtainable from the Technical College, Huddersfield.

IN the seventh issue of "Methods and Problems of Medical Education," recently issued by the Rockefeller Foundation, the School of Medicine and Dentistry of the University of Rochester, Rochester, N.Y., is described, with full details and plans of the buildings and many illustrations. The building embodies many novel features, and efficiency with economical construction has been the aim throughout. Corridors have been kept at a uniform width of 8 ft., and the distance from floor to floor is 11 ft. 2 in. Throughout all parts of the school the inner surface of the building walls are faced with an inexpensive grey 'sand-lime' brick, which reflects the proper amount of light for general laboratory work. Partition walls are constructed of 'sand-lime' brick of single thickness, strengthened by steel door frames anchored to floor and ceiling. No plaster has been used except in toilet rooms, all walls, columns, and ceilings are untouched by paint, and all pipes are exposed. The cost per cubic foot, including everything except equipment, is 39 cents for the school and 62 cents for the hospital, and equipment costs 4 cents for the school and just over 3 cents for the hospital, per cubic foot.

PROF. H. B. FANTHAM, professor of zoology in the University of the Witwatersrand, has published in the

South African Journal (vol. 23, p. 595) the address he delivered in 1926 at a joint meeting of Sections D and F of the South African Association for the Advancement of Science on the question of the teaching of animal biology in the Transvaal. In the course of the address he says, on the authority of Dr. Skaife, that in the Cape Province animal biology is now a compulsory subject in all the secondary and high schools, and that in 1925 no less than 2000 candidates took the subject in the junior certificate examination. In this respect the Transvaal apparently lags behind, and Prof. Fantham gives in his address reasons why biology should be taught in all the high schools throughout South Africa, and some practical suggestions as to the materials that might be used to illustrate the principles of the subject. In the Report of the British Association in 1921 a statement, drawn up by the Zoology Organisation Committee, was published on the teaching of natural history in the schools of Great Britain, in which similar reasons were given for the inclusion of the subject in all schools and a practical course was suggested. There has been some improvement since the date of the Edinburgh meeting, but education authorities in Great Britain are still far behind the Cape Province in their appreciation of the value of animal biology as a school subject. Prof. Fantham's suggestions for courses on animal biology indicate the wealth of material there is in South Africa for teaching purposes and is of interest to zoologists, but the school authorities would probably be more impressed by a shorter and more concise proposal for a course of study. It is obvious that no school could ever cover the ground of his list of possible studies, and the head-masters will look to the professional zoologists for something more limited in scope that it would be practical to carry out in the limited time and equipment at their disposal.

RESEARCH in secondary education in the United States is held to be of such importance to the nation that a national committee has been formed for the purpose of promoting and guiding it. The Federal Bureau of Education, which is represented on the committee by its Commissioner, J. J. Tigert, and by E. E. Windos, who acts as secretary to the committee, has recently issued as Bulletin, No. 24, an outline, sponsored by the committee, of methods of research, intended for the guidance of school principals and teachers who wish to investigate some phase of secondary school work. The bulletin points out that helpful and indispensable as is laboratory research, its experiments are usually performed on selected groups under conditions which often simulate very imperfectly those of actual school life; likewise that much research can be carried out *only* in the classroom. Hence the importance of helping the school principal to develop in himself and his teachers an attitude of scientific research toward the problems that confront them and to acquire the requisite technique for conducting and reporting investigations. Chapters on the conditions essential to scientific research, the qualifications for the research worker, and types of research problems, are followed by a criticism of the questionnaire method of investigation in which wholesome warnings are given as to its many demerits. A useful outline of desirable procedure to be observed in reporting the investigation and its results follows, and there are a descriptive list of established research agencies and a bibliography of fifty recent publications. So many problems connected with secondary education in Great Britain require immediate attention to-day that this bulletin (Government Printing Office, Washington, D.C., 10 cents) should find readers among English secondary school principals.