

followed for the case of the horizontal rhombic aerial. The methods described may easily be applied to other types of long-wire aerial, or to linear arrays of aeriels having constant input amplitude in each aerial, and constant relative phase shift between aeriels.

The approximate methods described are particularly useful when calculating coverage areas obtained by reflexion from the *E*- or *F*-regions in the ionosphere. It is unnecessary to know the polar diagram shapes exactly as the movements of the reflecting layers from day to day cause appreciable changes in the exact zone covered, and the approximate results are therefore of great practical value.

1946

MIDDLE DEVONIAN OSTEOLEPID FISHES OF SCOTLAND

FOR more than a century, since the days of the pioneer workers on the Old Red Sandstone, the osteolepid fishes have proved a source of difficulty to vertebrate palaeontologists, and even more so to stratigraphers. One has only to glance at the restorations of the whole fishes on p. 103 of Dr. E. Jarvik's recent monograph* and of the heads of the various forms dealt with to understand why. For so uniform in general are their characters that unless the bodies are well enough preserved to show the details and the disposition of the fins it is almost impossible to be certain even of the genus, and if the skull-roof is not clearly shown then the species is more often than not in doubt; and finely preserved bodies and clearly detailed heads are not so very common in these ancient strata, laid down 300 million years ago. The long historical accounts of each of the three genera and seven species described clearly indicate the confusion that has arisen in the past, and even Dr. Jarvik's exhaustive investigations leave some loose ends for future workers to tie up.

The group is a most important one, anatomically by reason of its close relationship to the fishes from which the land vertebrates sprang, and geologically as one of the dominant types present in these complicated stratal series. This fine volume is a worthy addition to the classical series of exhaustive and luxuriant memoirs on the early fossil Vertebrata that have issued in an endless stream from the Stockholm school under the guiding genius of Prof. Stensjö, and in it Dr. Jarvik gives a full account of the external anatomy of this difficult group and of its systematics, which will long remain a standard on the subject, even if one cannot accept all his conclusions. The long-fought controversy regarding the identity of the external bones of the skull, upon which their nomenclature, of course, depends, is again gone over, and Dr. Jarvik has decided definitely in favour of the 'Fusionist' or Swedish school of thought as against the 'Replacement' or Anglo-American school. Yet Dr. Jarvik himself makes some admissions and expresses some doubts, though of a minor nature, as to the completely universal application of his conclusions—much depends on analogies with similar structures in modern fishes; and the evidence of analogies is not always conclusive, especially as no living fishes are closely related to the archaic osteo-

lepis. We may perhaps be pardoned, therefore, for hesitating to believe that the final word on the subject has been written.

The stratigraphical results are important, but before full advantage can be taken much new collecting would be necessary—and that, unfortunately will not be possible in all cases. The early collectors of fossils, and not only of Old Red fishes, either did not appreciate the need for exact localization, or deliberately omitted details from labels in order to keep to themselves the whereabouts of 'rich strikes', and so the source of many of the specimens is uncertain.

Finally, Dr. Jarvik is not quite clear on the rules of systematic nomenclature. In naming a group of the genus *Osteolepis* which Pander had apparently wrongly referred to Agassiz's uncertain species *O. microlepidotus*, he calls it *O. panderi* (Pander). Pander may have properly defined this group for the first time, but a name cannot be attributed to a man who died decades before it was invented (and anyway, why in brackets? Pander at least put it in the right genus); and the species, if valid, must be known as *Osteolepis panderi* Jarvik. This is a minor point, and it is, perhaps, ungrateful to mention it in reviewing a work of this importance; but whatever one may think about the subject of systematic nomenclature, it has a proper function and should be used correctly, especially when the author makes some show of taking the matter seriously by quoting rules and opinions, and particularly in a volume that is likely to remain the standard work of reference on the subject for some time to come. ERROL WHITE

FORTHCOMING EVENTS 271

(Meetings marked with an asterisk * are open to the public)

Monday, March 14

ROYAL GEOGRAPHICAL SOCIETY (at Kensington Gore, London, S.W.7), at 5 p.m.—Mr. G. S. Crawford: "Some Mediaeval Theories about the Nile".

UNIVERSITY OF LONDON (in the Assembly Hall, Institute of Education, Malet Street, London, W.C.1), at 5.30 p.m.—Mr. T. G. Ridling: "The Translation of Technical Education".*

CHEMICAL SOCIETY, EIRE SECTION (joint meeting with the UNIVERSITY COLLEGE OF DUBLIN CHEMICAL SOCIETY and the WERNER SOCIETY, in the Department of Chemistry, Trinity College, Dublin), at 7.45 p.m.—Prof. T. S. Wheeler: "The Development of the Periodic Table".*

Tuesday, March 15

CHEMICAL SOCIETY, LEEDS SECTION (joint meeting with the UNIVERSITY CHEMICAL SOCIETY, in the Chemistry Lecture Theatre, The University, Leeds), at 5 p.m.—Display of Scientific Films; at 6.30 p.m.—Prof. E. L. Hirst, F.R.S.: "Structural Relationships amongst the Polysaccharides".

ROYAL INSTITUTION (at 21 Albemarle Street, London, W.1), at 5.15 p.m.—Prof. H. J. Emeléus, F.R.S.: "Some Recent Advances in Radiochemistry". (Further Lectures on March 22 and March 29.)

SOCIETY OF CHEMICAL INDUSTRY, CHEMICAL ENGINEERING GROUP (at the Geological Society, Burlington House, Piccadilly, London, W.1), at 5.30 p.m.—Mr. H. G. P. Tyrer: "Outline of the History and Development of the Beet Sugar Industry in Great Britain".

UNIVERSITY OF LONDON (at the Institute of Archaeology, Inner Circle, Regent's Park, London, N.W.1), at 5.30 p.m.—Prof. K. de B. Codrington: "Cultivated Cereals and Early Civilizations".* (Further Lecture on March 22.)

SOCIETY OF CHEMICAL INDUSTRY, PLASTICS GROUP (at the Royal Society of Tropical Medicine, Manson House, 26 Portland Place, London, W.1), at 6.30 p.m.—Mr. D. L. Clarkson and Mr. N. D. MacLeod: "Polyvinyl Chloride Pastes".

INSTITUTION OF THE RUBBER INDUSTRY, LONDON AND DISTRICT SECTION (at Caxton Hall, Caxton Street, London, S.W.1), at 7 p.m.—Mr. W. H. Reece: "Continuous Vulcanisation Processes".

INSTITUTION OF THE RUBBER INDUSTRY, SCOTTISH SECTION (at the Institution of Engineers and Shipbuilders, 39 Elmbank Crescent Glasgow), at 7.30 p.m.—Annual General Meeting; Dr. W. J. S. Naunton and Mr. J. M. Buist: "Rubber to Metal Bonding".

Wednesday, March 16

ASSOCIATION OF APPLIED BIOLOGISTS (in the large Physics Theatre, Imperial College of Science and Technology, Imperial Institute Road (morning session), and the Metallurgy Lecture Theatre, Prince Consort Road (afternoon session), London, S.W.7), at 11.45 a.m. and 2.15 p.m.—Papers on "Growth-promoting Substances in Agriculture and Horticulture".

*On the Morphology and Taxonomy of the Middle Devonian Osteolepid Fishes of Scotland. By E. Jarvik. Kungl. Svenska Vetenskapsakademiens Handlingar, Serien 3. Band 25, No. 1. Pp. 301 + 37 plates (Stockholm: Almqvist and Wiksells Boktryckeri A.-B., 1948.)