

a theoretical nature, and shows how radio waves which strike at various angles the reflecting layers of the upper atmosphere, situated at heights of 100–400 km., are bent so as to arrive back at the earth's surface at distances which may be hundreds or even thousands of kilometres from the sending station. The results of such calculations are presented in a number of graphs, which indicate to the radio engineer the best wave-length or frequency to use when he desires to transmit a message or programme to a given distance in a particular direction. By sending up radio waves vertically into these reflecting layers, or the ionosphere as it is termed, and by studying the reflexions on their return to earth, one can deduce the properties of these layers and the manner in which they change from day to night, season to season and year to year. Thus by making local measurements in different parts of the world, the practical radio engineer can assess the effectiveness of his sending stations and the range at which adequate signals will be received at various times or seasons. The later sections of the report refer briefly to some experiments, to be described in more detail elsewhere, which have been successfully made to check the accuracy of the theoretical analysis. The work described in the report forms the basis for the design and operation of many of the radio-communication and broadcasting services in use to-day.

#### 56 Feeding Organs of Arachnida

UNDER the foregoing title, Dr. R. E. Snodgrass, of the U.S. Bureau of Entomology and Plant Quarantine, contributes a comprehensive memoir on the mouth-parts and associated structures as displayed in the main divisions of the Arachnida, including mites and ticks (*Smithsonian Mis. Coll.*, 110, No. 10, pp. 93+29 figures; 1948). The Arachnida are believed to have been evolved from an ancestral stock that never acquired jaws for mastication—a feature that marks them off from all other living arthropods. Their most characteristic mouth appendages are the chelicerae, and the possession of these organs forced the ancestral arachnids to feed upon such liquids as they could extract from their prey. The latter are caught by the chelicerae or by means of the pedipalpi, should the latter appendages be chelate. The prey is held by the chelicerae while its body fluids are imbibed because, unlike insects, arachnids have no organs for mastication. Some arachnids practise external digestion, the solvent fluid probably being a product of the salivary glands in some cases and of the enteric diverticula in others. Students of zoology, and particularly those concerned with the Arthropoda, will find in this memoir an admirably clear and well-illustrated account of a subject that seldom meets with adequate treatment in text-books. Beginning with a general discussion of the structure of arachnid feeding organs, the author then goes on to deal with these parts in greater detail in the different orders. The Palpigradi come first for discussion and are followed by the Solpugida, and the memoir concludes with the very diverse assemblage that is included in the Acarina. At the end there is a useful bibliography of the leading papers in the field under consideration.

#### Royal Anthropological Institute: Ancient Mining and Metallurgy Committee

SHORTLY after the end of the War, the Royal Anthropological Institute formed a Committee, with representatives of various branches of science con-

cerned, to investigate problems of ancient mining and metallurgy. This Committee is prepared to advise excavators concerning the technology of metal tools and other artefacts, and in certain cases to carry out complete analyses of such material. One of the most crucial problems in study of the development of technology and applied science is the extent to which native copper was used in prehistoric times, and how far the discoveries of its properties of malleability and fusibility preceded that of the art of extracting copper from its ores. It is generally admitted that native copper was used before smelted copper. Indeed, one school holds that early metal-using cultures were dependent upon native copper for a considerable time, so that there would be two phases in intelligent metallurgy (apart from a supposedly still earlier phase in which, as in pre-Columbian North America, copper was worked cold as a superior kind of stone). Data are badly needed to determine how far cultures using only native copper preceded those using the smelted copper; but this is bound up with a further problem, namely, the best method of distinguishing the native copper from the metal from oxidized ore. The Committee has started to investigate the problem and has issued a preliminary report (see *Man*, Art. 3 and 17; 1948). In order to make further progress, a large body of material must be examined, and therefore archaeologists are asked to advise the secretary of the Committee (Miss S. Benton, c/o Royal Anthropological Institute, 21 Bedford Square, London, W.C.1) of material from early cultures of which they have knowledge, or which they could send for examination and report.

#### Extra-mural Activities in Sheffield

PROBABLY the most interesting account in the first annual Report of the Director of Extra-mural Studies to the University of Sheffield is the way in which lecture courses and single 'popular' lectures have been built up. At one time these were given regularly at the University and attracted large audiences. Of recent years few lectures and courses have been given; but the work of the newly constituted Extra-mural Department during the last session has shown that there is in, and around, Sheffield a large and varied public interested in what the University has to offer. This was strikingly demonstrated when Prof. N. B. Namier delivered the opening lecture of a course on "The Year of Revolutions, 1848". More than two hundred people attended and a further hundred had to be turned away. Another interesting feature of the year's work has been the arranging of three special courses indicating the part an extra-mural department can play in extending the influence of the University in the locality outside its walls. The first was for German prisoners of war in north-east England, the second for graduates of the University and meant to be of a 'refresher' nature, and the third, arranged at the request of the Ministry of Labour, for hospital matrons.

#### International Society of Soil Mechanics and Foundation Engineering

At the Second International Conference on Soil Mechanics and Foundation Engineering held at Rotterdam in June 1948, a Society was established for promoting international co-operation in the sphere of soil mechanics and its practical applications. This Society proposes to encourage the interchange