Research Items.

PRE-SUMERIAN MAN IN ARABIA.—On their return from Kish through the desert lying between Mesopotamia and Palestine in the winter of 1925–26, Mr. L. H. Dudley Buxton and Mr. Henry Field devoted to a search for evidence of the existence of early man in this area such time as was available during the halts of the armoured-car patrol which they accompanied by permission of the Air Marshal. In *Discovery* for April, the former describes the journey and the circumstances in which quite a considerable number of flint implements were found at each stage of the journey. It is interesting to note that the Arab desert police denied the use of flint for any purpose other than strike-a-lights, thus authenticating certain flakes of a somewhat modern appearance. Evidence the most definite in character was obtained at Landing Ground R, a number of implements of Aurignacian type being found. Near Air Force Landing Ground H was found a large lake of perhaps a hundred acres in extent but of not more than a foot deep. On the lower of two surfaces exposed in ancient times, a large number of small tools were found, the other surface showing no evidence of man's handiwork. The implements found on the journey as a whole belong to the middle and late palæolithic age, with one laurel-leaf arrow-head belonging probably to the new stone age. Although the desert conditions are not now such as to support human life, the fact that the implements are found in hollows and little dry valleys suggests that under different climatic conditions, such as probably prevailed in palæolithic times, water flowed down the valley bottoms. This upland divide thus furnishes evidence of man's existence at a period long anterior to that of the material from Mesopotamia itself, where nothing primitive but only the remains of a fairly advanced culture have as yet been found.

SHILLUK BEGGING CUSTOMS.—Among some notes on the customs of the Shilluk, contributed to *Sudan Notes and Records*, vol. 9, No. 1, by the Rev. D. S. Oyler, is an account of begging customs observed especially by women, who seem to derive much pleasure in begging cattle from the richer men of the tribe. The occasion is observed as a holiday for the women of the village, all of whom take part unless there should be too many, when only the women of a certain age go. Women from two villages never unite on these expeditions. The proper time for the begging dances is just before the rains, though they may be held at any time during the dry season. The man from whom the women are to beg is selected before the expedition starts. It is regarded as an honour. As a rule the man selected is not one of their own village, but should he be, the women ask for a sheep only. Although the women usually object to leaving their babies, on these occasions they leave them at home in charge of the men. Before starting a leader is chosen, known as a *bana*, who has the power of a magistrate, is crowned as a village chief is crowned, and deals with any trouble among the women. She acts as chief in any expedition made later by the same party; and in the village she has the right to judge in any dispute strictly between women. In the event of a refusal of an ox, a man's wife may intercede for the visitors, dancing among them; but if the owner persists in his refusal, the party departs cursing him and his family. Any sickness which follows is attributed to this curse, which can only be removed by the return of the party, the gift of an ox, and a petition by the women for the removal of the curse, accompanied by the sprinkling of ashes. A similar custom prevails at the time of threshing corn, when the women sit in silence around the threshing floor holding out their gourds, into which corn is placed when the threshing is finished

THE SPECIES AND SEX-RATIOS OF RAIA.—Augusta Lamont has recorded (*Proc. R. Phys. Soc. Edin.*, 21, pp. 73-82, 1926) the relative frequency of the species of the genus Raia (the skate) and the sex-ratios of 1714 specimens delivered to the Department of Zoology, University of Edinburgh, for class purposes during the years 1920–1925. These fish were probably for the most part caught in the Firth of Forth or in the neighbouring part of the North Sea. Five species were represented—*Raia radiata* 1069, *R. circularis* 381, *R. batis* 227, *R. clavata* 19, and *R. fullonica* 18. The author points out that to some extent artificial selection, *e.g.* of specimens of convenient size for laboratory work, may have operated to bring about a modification in the relative numbers, so that the proportions are not necessarily indicative of the natural frequency, though they are not markedly at variance with the observations of Day. *R. radiata* was the commonest species from October to May, reaching a maximum in February and March; *R. circularis* was the most frequent species in July but was scarce in the winter and spring. The observations on the sexes cover only four years, and for the five species taken together there were 757 males and 727 females. During the first three years *R. radiata* was represented by 347 males and 310 females, but in the fourth year the respective numbers were 102 and 154, a striking reversal of the previously existing ratio.

THE EGGS AND YOUNG OF HALOBATES.—Dr. H. C. Delsman has had exceptional opportunities for studying this interesting marine insect, the habits and young of which he describes in a recent paper ("On the Propagation of Halobates," *Treubia*, vol. 8, Livr. 3-4, 1926). During his cruises with the investigation-steamer *Brak* over the Java Sea and along the east coast of Sumatra, the eggs and adults were frequently found. The author is emphatic in stating, contrary to the opinion of other observers, that Halobates cannot dive, and that, if forced under water, it dies after making futile swimming movements in attempting to regain the surface. He distinguished five different sorts of eggs, all attached by a glue-like substance to various floating objects such as seaweeds, Spirula and Sepia shells, and birds' feathers; also coal slag, wood, or cork. Sometimes thousands of eggs were found on one object, and this must have been the result of the egg-laying of many individuals, as no more than twenty-five eggs have been found inside one female. Clear figures are given of the embryo in its various stages. Directly the larva hatches it moults, leaving its skin behind attached to the egg membrane, and the young Halobates move to the surface, adopting at once the mode of life of the adult, its form scarcely differing at all from that of the adult. These are valuable notes on the life-history of members of a little-known group

A TACHINID PARASITE OF THE LARVÆ OF COCONUT MOTHS.—The larvæ of certain moths of the family Zygænidæ are serious enemies of the coconut, and in the *Malayan Agricultural Journal* for Oct. 1926, Mr. B. A. R. Gater contributes some observations on the life-history of the Malaysian coconut moth

(*Artona catoxantha*). It appears that the larvæ of this insect are parasitised by a tachinid fly, *Ptychomyia remota*. The latter beneficial insect, however, suffers from parasites of its own, which militate to a considerable extent against its utility as a natural controlling agent. In a second paper Mr. Gater gives further details concerning the biology of this tachinid. Its liability to the attacks of hyperparasites is further dilated upon; but in spite of their activities the insect is capable of destroying 30 per cent. to 40 per cent. of its host, and in most cases exceeds that figure. Inquiries were received from Fiji with respect to the possibility of importing into those islands parasites of the Artona moth with the object of testing their effects on an allied zygænid *Levuana iridescens*. The latter insect is an important pest of coconut in Fiji, and the need for attempting its control was urgent. After considerable difficulty, some 300 adult examples of the Ptychomyia reached Suva alive, and it was found that they parasitised the Levuana larvæ as readily as those of their Malayan host. The tachinid has proved its value, and is reported as destroying at times up to 90 per cent. of the Levuana larvæ. It is now well established in Fiji, where its greater efficiency is probably due to its freedom from the hyperparasites that are so prevalent in the Malay States.

GENETICS OF DORMANT MAIZE.—Genetical investigations at the Connecticut Agricultural Experiment Station (Report 49) have shown that the mature and completely developed dormant maize seed is the outcome of a number of processes in which the cumulative action of at least 27 Mendelian factors is essential, and suggest that further work will probably reveal the necessity for several more. Defective seeds may be hereditary or non-hereditary. In the former case the condition frequently arises by mutation in homozygous inbred strains; it is estimated on an average that one plant in every thirty is heterozygous for defective seeds. Fertilisation occurs in these cases, but the development of embryo and endosperm fails or is rudimentary only. Non-hereditary defectives fall into four classes according to the cause of their abnormal condition. *Parthenocarpic* defectives arise from failure of the pollen tube to reach the micropyle, and consequently neither embryo nor endosperm is formed. The age of the silks and pollen, and probably also environmental conditions, influence the production of this type of seed. *Arrested* seeds, however, contain both embryo and endosperm, but owing to competition of physiological dominance of the adjacent normal seeds, their development is retarded. *Germless* seeds result from a single instead of a double fertilisation and lack an embryo, while *miniature* defectives, though normal in form, are reduced in size, due possibly to an abnormal number of chromosomes in the endosperm. Altogether thirteen factors have been found which may cause the formation of defective seeds, and five additional factors which in affecting the endosperm may also prevent normal seed development. On the other hand, nine factors have been found which induce premature germination by inhibiting dormancy and are therefore as fatal to the seed as the retarding factors. Since the hereditary units involved in the short period of the plant's life between fertilisation and the resting stage of the embryo are apparently so complex, knowledge of those concerned with the ontogeny of the entire plant is clearly of a rudimentary nature only.

PALÆONTOLOGY IN SOUTH AFRICA.—Last year, for the first time in the history of the Geological Society of South Africa, the presidential chair was occupied by a palæontologist. The anniversary address by Dr. S. H. Haughton was therefore of exceptional interest, since it passed in review the leading facts of present knowledge with regard to animal remains in South Africa, their relation to similar faunas from other regions, and the many problems that still await further discoveries for their solution. Of 186 marine species from the Bokkeveld Beds, 40 are common to South America and 71 are varieties of, or are closely allied to, South American forms. The fauna contains an almost negligible European element, suggesting that it flourished along the shores of the Devonian land area that has been called Falklandia. The South African Permian fauna is found in Russia and Scotland, but is absent from central Europe. The conclusion is reached that there was no passage across the Tethys by the Iberian land-bridge, but that migration occurred by way of Syria to Persia or the Caucasus and thence north-westwards. It is pointed out that much more work is necessary to determine the geographical changes that have taken place since the Cretaceous, and an appeal is made to the universities and museums to stimulate and encourage further interest in the study of palæontology, which hitherto in South Africa has been regarded as little more than a subsidiary adjunct to geology.

OIL CONTAMINATION AS A CLIMATIC FACTOR.—Mr. L. A. Ramdas, of the Meteorological Office, Karachi, in a letter to the Editor, makes the novel suggestion that the oil which is now being discharged into the sea in appreciable quantities, especially by the wreck of oil-bearing ships, may have a measurable effect on the total rainfall of the globe. It is well known that oil on a water surface spreads out into a very thin film, and it is natural to expect this film to interfere with the free evaporation of the water, a result which has been confirmed by experiment. A decrease of evaporation from the oceans would result in a general decrease of rainfall over the globe. Mr. Ramdas tested this by comparing the mean annual rainfall at 142 stations for the two periods 1880–1900 and 1900–1920, and he found that the mean of the second period was less than that of the first by about one per cent. over the earth as a whole and four per cent. over the tropics. He recognises that this result is not conclusive, but hopes to obtain further evidence, especially by examining the rainfall of individual years in relation to the number of wrecks of oil-bearing ships.

AN ANCIENT THEODOLITE.—The theodolite in its simplest form is due to Leonard Digges of University College, Oxford (about 1550), and was first described in 1571 under the name of the 'Topographical Instrument.' An example of this instrument made by Humphrey Cole in 1586, with the improvements of the theodolite of Bleau of a later date, was discovered in St. John's College library and is now in the Lewis Evans collection of scientific instruments. A reprint of Digges' description in his "Pantometria" of 1571 has been published with a short preface by Dr. R. T. Gunther (Old Ashmolean Reprints No. IV. Oxford: 3*s*.). It consists of seven chapters of Longimetra, which with Planimetra and Stereometra formed the three books of "Pantometria." Copies of the original diagrams and plates are given in the reprint.

MICA.—With the growth of electrical and allied industries, the supply of mica has become a matter of great importance. Its perfect cleavage, transparency, and lack of colour when in thin sheets; its flexibility, toughness, and non-conductivity of heat and elec-

tricity; its resistance to high temperatures, sudden changes of temperature, and to chemical decomposition, constitute an assemblage of properties possessed by no other single mineral and by no artificial products. The mica of commerce is restricted almost entirely to the varieties *muscovite*, potash mica, and *phlogopite*, magnesian mica. Slight differences in the physical properties of these micas give rise to forms particularly suited for special purposes. Thus the Indian ruby mica is the best for condensers; the hard green Carolina mica is the most satisfactory for use in stove fronts and furnace peep-holes; whilst, on account of its extreme flatness, the brown mica of certain parts of Georgia makes the finest gramophone diaphragms. What is known as 'silver amber,' an altered form of phlogopite, is, on account of its softness, employed between the commutator segments of D.C. motors and dynamos. In a short paper on "Mica and its International Relationships," recently presented to the Institution of Mining and Metallurgy, Mr. G. V. Hobson has condensed an extraordinary amount of information on the production, distribution, and marketing of this mineral, leading up to a consideration of the international aspects of the industry, a subject of vital importance in war and becoming one of scarcely less significance in times of peace.

THE SUPPORT OF COAL WORKINGS.—The sub-committee appointed to investigate methods of reducing the number of accidents due to falls of ground in the coal-mines of Great Britain has issued three reports—Papers Nos. 6, 12, and 30—of which the latter is now before us (Safety in Mines Research Board: The Support of Underground Workings in the East Midland Coalfield, Yorkshire, Derbyshire, excluding South Derbyshire, and Nottinghamshire. London: H.M.S.O.; 2*d*.). The committee is commencing by studying the methods of support used in the different coalfields of Great Britain and pointing out any features which they consider might be more generally adopted with advantage. Perhaps the most important recommendation in the present report is that which refers to the tubular steel prop largely adopted by the Butterley Company, Limited. It consists of a steel tube closed at the top, over which passes a sliding sleeve which can be kept in position by a bolt passing through a slot in the sleeve, whilst the upper part of the sleeve carries a wooden plug. When weight comes on, the wooden plug is crushed in the sleeve, which then slides over the tube, the length of slide which the construction admits of being about 6 inches. The prop can, of course, be used over again by inserting a fresh wooden plug. It is stated that where it is in use only one reportable accident, and that not fatal, due to a fall of roof, has occurred during more than a million man-shifts since the prop was introduced more than eight years ago. It is claimed that this prop keeps the roof in better condition, that it maintains roof height better than wooden props, occupies less space, is more durable, more economical, and easier to withdraw. The report emphasises the need of strict supervision and good discipline, and regrets that relatively little is being done in the matter of safety instruction. Finally, a set of model timbering rules is suggested. The modest price at which this paper is published is intended to bring it within the reach of all, and it is to be hoped that coal miners will take advantage of the information thus placed at their disposal.

CONDUCTION OF ELECTRICITY THROUGH GASES.—Prof. Seeliger's recent article in the *Zeitschrift für Physik* (41, p. 535, 1927) illustrates how little is actually known about what takes place in a discharge-tube. His own intensity rule, for example, that the higher the energy required to excite a given line of the spectrum of the contained gas, the nearer does the region where its brightness is a maximum approach the cathode, still awaits an adequate explanation, in spite of its apparent simplicity. The number of electrons which leave the cathode for each positive ion received is uncertain, as well as the mode of conduction across the cathode dark space, and exactly how this is affected when the cathode is raised in temperature in order to lower the cathode fall of potential. It seems likewise impossible at present to reconcile the sharp cathode boundary of the negative glow formed in most cases, with the apparent continuity of the latter and the cathode dark space in pure inert gases. Prof. Seeliger is specially concerned with the origin of the visible radiation, which may be produced either as a result of the recombination of ions, or in the return to their normal state of neutral molecules excited by electron impact. Some conclusions can be drawn about the relative importance of the two processes in different parts of a tube, but even then difficulties arise from our meagre knowledge both of the relative numbers of free electrons and negatively charged molecules which are present, and of the nature of the radiation which results from recombination. Unfortunately, there is no immediate prospect of solution of most of these problems.

MAGNESIUM-COPPER ALLOYS.—A paper on "Magnesium-Copper Alloys rich in Magnesium" was read by Dr. M. Hansen at the recent meeting of the Institution of Metals. It is shown that magnesium is capable of holding copper in solid solution to the extent of about 0·1 per cent. at room temperature and about 0·4-0·5 per cent. at 485° C. It has not, however, been possible to detect any preceptible age-hardening in alloys quenched from 450° C. on standing at room temperatures. This appears to be due to the fact that, even on quenching, the compound is precipitated as microscopical particles, which coagulate as the rate of cooling becomes slower. This coagulation is accompanied by a slight decrease of hardness and a considerable increase of ductility. Ageing at high temperature results in no perceptible change in hardness.

COAL CARBONISATION RETORTS.—The Department of Scientific and Industrial Research has issued Fuel Research Technical Paper No. 17 (H.M.S.O., 6*d*. net) on "Low Temperature Carbonisation." It is of the nature of an interim report on the behaviour of vertical retorts erected at H.M. Fuel Research Station, Greenwich. These retorts are based in design on Scottish shale practice and are of grey cast iron, externally heated to 625° C. in a setting of very simple construction. They are 21 ft. high, of width tapering from 7 in. at the top to 11 in. at the bottom, and provided with mechanical extraction gear. The coal dispute of 1926 restricted the supplies and choice of coal, but results are given for tests on nine different samples. Non-caking nuts were the easiest to work, and gave the highest yield of tar and the greatest throughput. Caking coals received a preheating treatment which reduced trouble due to sticking. Fine coal was dealt with by briquetting. The 'E' retorts, which have been most successful, have been in use for the twelve months ending Dec. 27, 1926, for the carbonisation of 1350 tons of coal, and were then still fit for further service. With the collaboration of the Cast Iron Research Association, a new retort of special metal is under construction and will be tested alongside those referred to above.