Research Items.

HUMAN REMAINS FROM ANCIENT GOLD MINES IN RHODESIA.—In view of the conflicting interpretations of archæological evidence in Rhodesia, any human remains to which any degree of antiquity can be attributed are likely to be of importance for the early racial history of that area. Considerable interest therefore attaches to a report by Sir Arthur Keith on two skeletons from ancient gold mines which appears in Vol. xxiii. of the Proceedings of the Rhodesian Scientific Association. The Que-que skeleton was found 4½ ft. below the surface in a filled-in working. It is represented by numerous fragments, all weathered, partly dissolved and fallen into pieces. They are only lightly mineralised, yet have the appearance of having been buried for a considerable time, possibly a thousand years or more. Such characters as can be recognised indicate a young female of about 18 years of age, of an estimated height of 5 ft. 1 in., and belonging to the negro race. The second specimen, from Belingwe, is a pure negro type, male, between 20 and 30 years of age. The skull is small, length 182 mm., breadth 124 mm., index 68, cranial capacity 1220 cc. A remarkable feature is the projection of the alveolar bone 9 mm. beyond the nasal spine and its wide simian nasal grooves. The skull is mineralised to a certain extent, and somewhat more ancient than the Gwanda woman (described in the Proceedings of the Rhodesian Scientific Association, Vol. xxi.) whose stature has now been calculated as 4 ft. 9 in. These measurements are comparable with those of two skeletons of ancient man from Rhodesia described by Dr. F. C. Shrubsall in *Man* in 1909. Thus all the remains we have from ancient ruins or mines in Rhodesia are of the Negro or Bantu type, and show no trace of Arab, Egyptian, Bushman, or Hottentot strain.

PALÆOLITHIC INDUSTRY IN NORTHERN CHINA.—T. de Chadin and F. Licent (Bull. Geol. Soc. China, iii. 1924, p. 45) record the discovery of palæolithic floors at three different places in Inner Mongolia. The floors are found at the base of the Loess and in the Loess itself, and the associated mammals include rhinoceros, hyena, gazelle, antelope, horse, bison, elephas, etc. The implements are made of quartzite, psammite and silicified limestone, and appear to be of Mousterian or early Aurignacian type. In the same regions in which palæolithic implements are found in the Loess, evidence of neolithic man is shown by the presence on the surface of the earth of polished axes, arrow-heads, knives and borers.

VITALITY OF JELLY-FISH.—It is a remarkable fact that many of the lower animals are able to live for a long time without food, maintaining themselves during the period of starvation at the expense of their own tissues and not merely by means of reserve stores of fat or other substances. A very interesting case of this kind is described by Messrs. de Beer and Huxley in the *Quarterly Journal of Microscopical Science* (vol. 68, part 3). They found that the common jelly-fish, *Aurelia aurita*, can be kept alive without food in laboratory aquaria for as much as thirty-eight days, during which time they undergo a progressive decrease in size, accompanied by loss of morphological and histological differentiation. The bell begins to shrink first, the oral arms later. Tentacles and thread-cells disappear and the gastro-vascular cavity closes up, the final result being a very small, shapeless mass. The bell continues its pulsations until an advanced stage of the process has been reached. It will come as a surprise to many naturalists that such a delicate organism as Aurelia can remain alive for so long under such unfavourable conditions.

THE BORING MECHANISM OF TEREDO.—The manner in which the ship-worm bores into timber has been a matter of conjecture and dispute among naturalists for at least two centuries. Some have supposed the soft fleshy foot to be capable of rubbing away the fibres of the wood, perhaps with the help of a solvent or softening secretion; others have regarded the valves of the shell, with their file-like rows of teeth, as the instruments of boring. It has been reserved for Mr. R. C. Miller (Univ. California Publ. Zool., xxvi., No. 4, pp. 41-80, 4 pls.) to give what appears to be a conclusive answer to the question. After a detailed account of the structure of the shell, the foot and the muscles connected with them, he discusses the possible methods of boring that have been suggested. He points out that the foot is covered with columnar epithelium, becoming glandular and ciliated near the edges and obviously unfitted for abrasive action. The possibility that some solvent enzyme may be secreted is not altogether excluded, although an analysis of shavings from the inside of the burrow showed no significant difference in composition from sound portions of the same block. The presence of "tool-marks"—scratches corresponding with the serrations of the shell—on the inside of the burrow, which has often been denied, is admirably demonstrated by a series of photographs. Finally, by laying bare the inner end of the burrow and sealing a cover-glass over the opening, the author succeeded in watching the Teredo at work. It was found that the movements of the animal in the burrow were effected chiefly by means of the suctorial and surprisingly mobile foot. Boring was seen to be accomplished by rhythmical movements of the valves of the shell, which were "held in position by the combined action of the foot attached to one wall of the burrow and the dorsal fold of the mantle pushing against the opposite wall."

THE CHANGING COLOUR OF THE MINNOW.—The minnow (*Leuciscus phoxinus* sive *Phoxinus lævis*) is one of those species of fish in which the male in the breeding season assumes brighter colours. Mr. Leo Abolin's communications (Beeinflussung des Fischfarbwechsels durch Chemikalien, Pt. I. Infundin- und Adrenalinwirkung der Melano- und Xanthophoren der Elritze; Pt. II. Annahme mannlicher Erythrophorenfarbung durch das infundinisierte Weibchen der Elritze, Nos. 119 and 120 *Mitteilungen aus der Biologischen Versuchsanstalt in Wien, Zool. Abt.*, under the direction of H. Przibram) give a most interesting explanation of the mechanism by which this is brought about. From the first paper we learn that the colour of the fish is mainly due to black and yellow pigments contained in cells termed melanophores and xanthophores respectively. These cells are situated in two layers of the skin, a deeper and a more superficial. Injections of minute doses of weak solutions of adrenalin contract the melanophores and cause the fish to assume a pale yellow colour; the effect passes off in about two hours. Injections of similar doses of post-pituitary extract cause expansion of the melanophores of the under layer and of all the xanthophores. The grey colour of the fish becomes greenish and the belly, which is normally silver, becomes golden yellow. If the fish is blinded the injection causes intense expansion of the melanophores in the sensitive regions of the body (the lips, gill-covers and the sub-branchial region of the head), but the xanthophores do not expand. The same

result is obtained if the sympathetic system is destroyed; only in this case both layers of melanophores are expanded and the xanthophores are contracted; in fish which lie on a dark surface the same result follows under normal conditions. From the second paper it appears that in the superficial layer of the skin on the lips, the bases of the fins, and on the belly, there is contained a certain amount of red pigment embedded in cells termed erythrophores. When the male becomes ripe, these erythrophores become widely expanded, as do the melanophores and xanthophores. This same result can be obtained in ripe females and in small unripe males and females in which no trace of red is externally visible, by the injection of somewhat strong doses of post-pituitary extract (one-tenth per cent.). It is therefore obvious that the bodies of males and females, so far as pigment is concerned, have the same structure, and that the secondary sexual characters of the male are due to the action of the distinctively male hormone on this common groundwork.

YEASTS, FATS, AND ALCOHOL FROM SEAWEED.—We have recently received from Prof. Nadson, of the Principal Botanical Garden, Leningrad, a short typewritten communication from which it appears that the possibility of the commercial utilisation of seaweeds is at the present moment occupying the attention of Russian chemists. The paper in question is entitled "Seaweeds as a Source of obtaining Yeast, Fat and Alcohol," and contains a brief summary of the results obtained by Prof. Nadson working in collaboration with Messrs. A. G. Konokotina and G. K. Burgvitz. The authors claim to have succeeded in growing both bakers' and brewers' yeasts (of the type of *Saccharomyces cerevisiæ* I., Saatz, Frohberg, etc.) upon autoclave extracts of *Laminaria saccharina*, and from the results obtained they conclude that it should be profitable to produce compressed bakers' yeast and dry "Nährhefe" of high protein content in this way. They have, moreover, apparently succeeded in producing an abundant growth of "fat" yeast, *Endomyces vernalis* Ludw., upon minced and boiled *Laminaria saccharina*; cultures kept at 6-8° C. for sixteen days are stated to have produced a yield of 6·22 per cent. of fat upon the medium as compared with a normal content of only 0·3 to 1 per cent. of fat in the untreated weed. On the strength of these results, the authors recommend the use of seaweed as a substrate for the production of fat for technical purposes. The authors further state that they have produced alcohol from a decoction of *Laminaria saccharina* prepared by soaking 5 per cent. of finely ground material in water for 12-14 hours and sterilising at 110°; on this they have grown three different kinds of yeast: (1) Strains of *Saccharomyces ellipsoideus*, Saatz and Frohberg; (2) yeasts isolated from fermenting sugar-beets—*Saccharomyces betæ*; and (3) torula isolated from the surface of the living *Laminaria saccharina* of Murman. No data are given as to the yields of alcohol obtained, but it is claimed that the distillation of alcohol from algæ gives several valuable by-products. The information supplied in this communication is scarcely sufficient to carry very much conviction. The object of the publication may be best stated by quoting the authors' own words: "We are giving the results obtained by us in order once more to direct attention to the seaweeds of Russia as one of her natural riches awaiting their utilisation."

CRETACEOUS FAUNA AND FLORA OF SHANTUNG.—An extensive series of freshwater deposits formed in a continental basin in Shantung is described by H. C. Tan (Bull. Geol. Survey of China, No. 5, pt. 2, 1923), and is believed to be mainly of Cretaceous age. Numerous fossils have been found in the deposits, and furnish interesting evidence of the plants and animals which, during a long period of time, lived on land or in fresh water. They include dinosaurs, fishes, freshwater molluscs such as Unio, Leptesthes, Cyrena, Bithinia and Valvata; insects belonging to the orders Orthoptera, Blattoidea, Coleoptera, Odonata, Lepidoptera, Diptera, etc. The plants are mainly conifers and cycads. Descriptions and figures of some of the molluscs and insects are given by A. W. Grabau.

SOMERSET OIL-SHALES.—Messrs. H. G. Shatwell, A. W. Nash, and J. I. Graham recently communicated an account of the Somersetshire oil-shales to the Institution of Petroleum Technologists. These shales outcrop for about ten miles along the coast in the vicinity of Blue Anchor, and extend inland for a distance of one to three miles. They form part of an argillaceous and calcareous group of sediments which have been assigned to Lower Lias and Rhætic horizons, and their mode of occurrence is in two basins lying on either side of the Devonian Quantock Hills, the larger basin (Lilstock Basin) being situated on the east, the smaller (Doniford Basin) on the west. Bituminous shales of Lower Lias age have long been known from the opposite South Wales coast, and the authors conclude that the Somerset shales are a continuation of these. The Somerset shales occur in beds varying from 1 to 20 feet in thickness, those of South Wales being much thinner, 6 inches to 5 feet. Proximate analyses of the Somerset shales show that they have an average specific gravity of 2·4, from 70 to 73 per cent. of ash, 3·5 per cent. of moisture, 23 to 28 per cent. of volatile matter (less water), 1·70 to 4·52 per cent. of sulphur, and 13 to 17 per cent. of carbon dioxide. The specific gravity is higher than the Scottish oil-shale, which averages 2·0, while the high carbonate content is unusual. Results of assays and steam distillations carried out by the authors show that the yield of oil from one ton of shale is about half that of the average yield from the same quantity of Scottish shale; the total amount obtained from the Somerset shales varied from 5·00 gallons to 10·4 gallons, ammonium sulphate from 4 to 6 lb., and gas from 1200 to 1900 cubic feet per ton. The crude shale oil has an average specific gravity of 0·939 and sulphur content up to 3·12 per cent.; it is dark brown in colour and has a less sweet odour than that distilled from Scottish shale. On fractionation, naphtha (specific gravity 0·807 to 0·852), kerosene (0·888 to 0·925), and heavy distillate (0·973) are obtained; distillate above 300° C. failed to yield more than a trace of paraffin wax. From the above details it will be gathered that the Somerset oil-shales, notwithstanding the comparatively low sulphur content of the oil obtained from them, do not inspire confidence from a commercial point of view.

RAINFALL IN MYSORE.—The Meteorological Department of the Mysore Government has issued a Report on Rainfall Registration for 1923, prepared under the supervision of Mr. C. Seshachar, the Meteorological Reporter. There were 226 stations gauging rainfall during the year. The greatest rainfall on any one day was 17·90 inches at Agumbi in the Shamoga District on August 7; the heaviest record in 1922 was 22·16 inches at the same station. In the Kadur District the heaviest fall in 24 hours was 16·85 inches at Byrapur Estate on July 24, and in the Hassan District, at Marnhalli toll-gate, the fall in 24 hours on August 14 was 11·43 inches. In no other District did the fall in 24 hours amount to 5 inches. July was the wettest month on record since 1893, the year in which the

Meteorological Department was organised; the monsoon was unusually active in the western parts of the State. A monthly total of 202 inches was recorded at Byrapur Coffee Estate against a normal of 106 inches. The south-west monsoon period, June to September, was generally wet, the total rain over the State being 26 per cent. above the normal. The north-east monsoon period, October to December, was the driest on record since 1893. The deficiency varied from 66 per cent. in the Mysore District to 89 per cent. in the Chitaldrug District. The seasonal aggregate for the State was 1·95 inches against a normal of 8·04 inches, which is 76 per cent. in defect of the normal. The largest annual total for a single station was 393·64 inches at Agumbi in the Shamoga District, and the smallest was 4·36 inches at Dharmapur in the Chitaldrug District. Rainfall maps are given, which help much to a complete understanding of the work.

A SHUNTED GRASSOT FLUXMETER.—A Grassot fluxmeter may be described as an over-damped moving-coil ballistic galvanometer having practically no controlling force. This instrument is of great value for measuring magnetic flux. Gisbert Kapp, in his book on "The Principles of Electrical Engineering," suggests the possibility of increasing the range of the instrument by using a shunt, but he gives neither the theory of how it would work nor the formulæ that would have to be used with it. In April 1924 Masamiti Sase read a paper to the Physico-Mathematical Society of Japan in which he gives the complete theory of the multiplier, and gives experimental results confirming it. In the instrument he used, the highest permissible value of the shunt was about 8 ohms, which was about one-third of the resistance of the fluxmeter. He shows that it is desirable to use a shunt of manganin wire having the highest allowable resistance. His results prove conclusively that the particular Grassot fluxmeter with which he experimented could be used with a shunt of 8 ohms even when the highest accuracy is required. This greatly increases the range of the instrument.

THE EVIDENCE OF THE PROOF PLANE.—Mr. J. Clark, writing from Kewanna, Manitoba, directs attention to a method of dealing with observations made with the proof plane. When such a plane, without electrical charge, is introduced into the electrostatic field surrounding one or more conductors, one at least of which is charged, it will have, at each point in space, a definite potential V_p, depending on the external charges and the equal charges of opposite signs induced upon it. This potential Mr. Clark calls the potential of the free charge of the proof plane. If, then, the plane is brought up to a large insulated conductor, the total charge of which is zero, without actually making contact with it, the potential V_p will, in general, differ from the uniform potential V_c of the conductor, being greater than V_c on one side of the conductor and less on the other. If now the plane is made to touch the conductor, electricity will flow from the plane to the conductor in the first position, and from the conductor to the plane in the second, so that when the plane is removed from the field, and brought to an electroscope, it will be found to have a negative charge in the first case and a positive charge in the second. It is not always possible to regard the proof plane as temporarily forming a part of the surface which is being tested, since this is often curved, and the method suggested will often prove valuable.

A NEW DIAMAGNETIC PHENOMENON IN GASES.—An investigation of the diamagnetism of hydrogen, nitrogen and carbon dioxide, at different pressures, is described by Dr. A. Glaser in the *Annalen der Physik* for October. A rod of diamagnetic lead glass was suspended inside the experimental tube containing the gas, by a 2-5μ quartz thread attached to a torsion head. Thin threads of paramagnetic cobalt glass were melted on to the rod, so that the whole became slightly paramagnetic. The tube was surrounded by a water jacket by means of which the temperature was kept constant to within 0·01° C. In each observation the torsion head was twisted to bring the light spot to zero. As the pressure was diminished the susceptibility at first diminished in proportion; but in each of the gases this ceased to be the case at a pressure which depended on the nature of the gas and the intensity of the field. Thereafter the rate of diminution of susceptibility with pressure diminished greatly for some time, and in the end, at low pressures, the susceptibility was three times as great as it would have been if the original rate of diminution had been maintained throughout. It is suggested that, at low pressures, the distance between the molecules is such that there is time between collisions for them to become oriented with respect to the field. At higher pressures the collisions are constantly destroying any tendency to orientation which may be produced, so that all the molecules are practically unoriented.

A NEW LEAD ACCUMULATOR.—In the *C.R. Acad. Sci. Paris*, November 24, M. C. Féry describes a lead accumulator which does not sulphate, even if discharged and left uncharged for two years, at the end of which time it can be recharged in the ordinary manner. The author has previously shown that the true reaction taking place in the Planté cell is given by the reversible equation,

$$Pb_2 + H_2SO_4 + Pb_2O_5 = Pb_2SO_4 + 2PbO_2 + H_2O,$$

and that $PbSO_4$ is only formed accidentally when the cell becomes "sulphated." Pb_2O_5 is a black peroxide, and Pb_2SO_4 is greyish black in colour. The spontaneous discharge of the Planté cell is due to the combined action of the electrolyte and of oxygen on the negative plate, according to the equation

$$Pb_2 + H_2SO_4 + O = Pb_2SO_4 + H_2O,$$

and this action may develop into

$$Pb_2SO_4 + H_2SO_4 + O = 2PbSO_4 + H_2O$$

if the cell is left undischarged too long. To avoid this, the author places the negative plate at the bottom of a deep glass jar, and separates it from the positive, and from the air, by a porous material containing the electrolyte. A figure in the original paper shows the cell as it appears when partly discharged, with a layer of black plumbous sulphate on the upper surface of the negative plate. A cell left without recharge for twenty-six months only lost 66 per cent. of its original charge, the loss in the first month being 4 per cent., 83 per cent. of the original charge remaining after four months, while an ordinary cell would have lost the whole of its charge in this time.

ERRATUM.—In NATURE of December 20, p. 909, in a paragraph on the "Cytology of Cotton," referring to the work of Mr. H. J. Denham, it is suggested that the reason for the appearance of Mr. Denham's papers in the Journal of the Textile Institute as well as in the *Annals of Botany* is the importance of the work to the cotton-growing industry of the British Empire. We learn that the work referred to was carried out at the laboratories of the British Cotton Industry Research Association, and permission to publish it in the *Annals of Botany* was given on the understanding that, in common with all papers from the Association's laboratories, it would be published in the Journal of the Textile Institute.