Research Items.

Giant Crescents: a New Stone Age Industry from South Africa.—Mr. C. van Riet Lowe describes a new stone age industry from South Africa in the *Trans. of the Royal Society of South Africa*, vol. 19, pt. 3. It consists of an assemblage of stone implements hitherto unrecorded from Mazeppa Bay, at the mouth of the Kogha River, halfway between the Great Kei and Bashee rivers on the Transkeian coast of the Cape Province. The implements are all found on the surface, so that there is no actual evidence of date; but their technique suggests a late Middle [Palæolithic] Stone Age. Material, debris, technique, weathering, show that they belong to a single industry practised from Mazeppa to Algoa Bay and as far inland as the south bank of the Orange River, that is over an area of approximately 20,000 sq. miles. This is a new culture. It is a typical blade-industry, including characteristically long blade-like implements, principally more or less isoscelene (acute angled) in shape and variants of these. Associated with the points, scrapers, and gravers, and by far the most characteristic and interesting product of the industry, is a type of implement only one of which had hitherto been found and recorded in the Union. It is an implement shaped like the quarter of an orange. The flat surfaces meet to form a more or less straight cutting-edge, and there is a strongly curved upper surface away from the cutting edge, coarsely flaked and retaining a portion of the original surface untouched in the middle. The implement may be regarded as a giant crescent. The specimen originally described came from the Kasougu River and was unassociated; but similar and finer specimens are now associated with a definite industry, the present collection coming from Mazeppa Bay. The average size for five specimens is 9·65 cm. by 3·35 cm. by 1·73 cm. Probably the industry represents a transition from the Middle to the Later [Palæolithic] Stone Age, and is an integral part of a cultural admixture from a contact between neanthropic and palæanthropic man.

The Vole Cycle in Britain.—Continuing his study of the fluctuations of voles (*Microtus*) in Britain, A. D. Middleton gives the results of a further series of trapping experiments (*Jour. Ecol.*, vol. 19, p. 190, 1931). As an accurate index of the numbers of voles present in a district the trapping system has proved to be somewhat unreliable, and recourse has been made to the field observations of local reporters. They show that 1930 was a year of uncertain fluctuations, for while in some areas the numbers definitely increased, in others they increased less markedly or even decreased. In some places, therefore, 1929 was a peak year, and in others 1930 seems to be on the way to ushering in another peak year. The conclusion is that the comparatively regular four-year cycle which the author has previously described for British voles is considerably modified by local conditions, and in some areas may not appear at all. The author states that the regular cycle may be evident, or may be quite obscured, according to the favourable or unfavourable nature of the local conditions. But this assumption of favourable or unfavourable local conditions requires proof; the suggestion which the author's vole map makes, since it is founded on more particular observations than were available before, is that even the four-year cycle is a little uncertain in its rotation.

Bovine Tuberculosis and the Pasteurisation of Milk.—The Ministry of Health has issued a memorandum on bovine tuberculosis in man with special reference to infection by milk (*Reps. on Pub. Health and Med. Subjects*, No. 63, London: H.M. Stationery Office, 6*d.* net). A large proportion of tuberculous disease in children less than fifteen years of age is caused by the bovine type of the tubercle bacillus, and it is estimated that more than 1000 children less than fifteen years of age die annually in England and Wales from infection of this origin, which is derived mainly from cow's milk. The proportion of milch cows in Great Britain infected with tuberculosis is probably not less than 40 per cent, of which probably between 1 and 2 per cent yield tuberculous milk. But as market milk is usually the mixed milk of several cows, the proportion of samples of milk containing tubercle bacilli varies in different areas from about 5 per cent to 12·5 per cent. Although much may be done by administrative and other measures to diminish bovine tuberculous disease, complete eradication by tuberculin testing and slaughter of reacting animals, the building up of tuberculosis-free herds, and preventive vaccination, is impracticable. Much may be done by the routine clinical examination of cattle, the testing of milk by microscopic and biological methods, and the keeping of the milch cows under hygienic conditions. The campaign in favour of clean raw milk, as by the use of certified and Grade A milks, while of great potential value, has hitherto met with limited success, probably due largely to the increased cost of such milks. So long as this remains the case, the pasteurisation of milk by retaining it at a temperature of 145° C. for 30 minutes constitutes the best safeguard against bovine tuberculosis derived from milk. The opinion is expressed that pasteurisation carried out in a suitable apparatus and under strict scientific control is capable of protecting the consumer from the danger of infection with the tubercle bacillus, and that milk so treated appears to retain its valuable food properties practically unimpaired.

Biological Research in Hawaii.—Nos. 6, 7, and 10 of Volume 9 of the *Occasional Papers* of the Bernice P. Bishop Museum (Honolulu, Hawaii, 1930) consist of papers by C. H. Edmundson, "New Hawaiian Medusæ", "Effect of Ultraviolet Rays in Regeneration of Chelipeds", and "New Hawaiian Crustacea"; whilst No. 11 is by C. Montague Cooke, jun., and H. E. Crampton on "New Species of *Partula*". The medusæ dealt with belong to the genus *Eleutheria*, which is characterised by the branched tentacles bearing groups of nematocysts or suckers, or both, and having a brood pouch dorsal to the stomach. Many of these medusæ, like the common British form *Eleutheria dichotoma*, creep about by means of their tentacles. Four species new to science are here recorded from Hawaii, chiefly differing from one another and from previously known members of the genus in the position of the clusters of nematocysts and in the margin of the umbrella. They represent the first creeping medusæ to be recorded from the North Pacific Ocean. A new species of *Kishinouyea*, one of the *Stauromedusæ*, is also described. Amongst the Hawaiian crustacea, new species of *Processa*, *Jousseaumea*, and *Axiopsis* are described, and a new genus of the Portunidæ. This new genus *Cœlocarcinus*, containing one new species, has very peculiarly modified fifth legs, having the last two joints developed into rounded foliaceous swimming paddles. The gastropod genus *Partula* is always interesting on account of the geographical distribution of the species, which are, as a rule, each characteristic of certain islands or groups of islands. Four new species are here described—*Partula cytherea*

from remote mountain slopes of Tahiti, *Partula lanceolata* from Mango Island in Fiji, 200 to 500 feet, *Partula thurstoni* from Ofu Island, Samoa, and *Partula montana* from the high forest of the Afiamalu region, about 2500 feet, Upolu, Samoa.

A New Parasitic Copepod.—Mr. Isokiti Harada in his paper, "A New Copepod Species Parasitic on Formosan Fresh-water Fishes" ("Studies on the Fresh-water Fauna of Formosa": (1) Contributions from the Zoological Laboratory, Taihoku Imperial University, Formosa, Japan. Journal of the Society of Tropical Agriculture, 2, 71-76, 1930), describes a new ergasilid, which he names *Ergasilus japonicus*, parasitic on the two fishes from Lake Jitsugetasan, Formosa, *Cultriculus kneri* and *Pseudorasbora parva*. All the species of *Ergasilus* hitherto known live upon the gill filaments or within the gill cavities of their hosts, but this one lives on the outside of the body, especially on the mucous membrane at the base of the fins and occasionally on the outer surface of the operculum. None were found on the gill filaments, gill cavities, or elsewhere on the body surface. The cyprinoid fishes *Pararasbora moltrechti* and *Zacco temminckii* were also found to be parasitised by this species. All those on the fishes were females. The males are free-swimming and were collected on several occasions. Free-swimming females were also observed. *Ergasilus japonicus* differs from the other species of the genus in its habitat as well as in the arrangement of the spines and setæ of the legs, in their structure, and in the characteristic flattened swimming plate of the first swimming legs in the female.

A Liverwort as Pioneer on Burnt Forest Land.—Marie Lilienstern has recently attempted to throw some light on the occurrence of *Marchantia polymorpha* as a pioneer plant on burnt-out forest land (*Travaux de la Société des Naturalistes de Léningrad*, vol. 60, livre 3, 1930. Russian with French résumé). Pure culture work shows that *Marchantia* ceases to grow and develops very few gemmæ in the absence of potassium. On the other hand, the cultures show that high concentrations of potassium are not injurious, nor is exposure to guaiacol or pyrogallic acid, which are products of dry distillation of wood and occur in the surface layers of soil in burnt-out forests. *Marchantia* shows a preference for slightly acid conditions, which are also associated with the soil in such localities. It is still a little difficult to gauge the significance of these results without comparative cultures of other liverworts, which do not show any tendency to repopulate burnt forest land. It would be of interest to know whether any similar resistance to relatively high concentrations of potassium and to the presence of distillation products of wood is shown by any of the other plants that one associates with localities where there has been a fire—for example, *Funaria hygrometrica*, *Pyronema confluens*, and *Epilobium angustifolium*.

Irrigation in India.—The review of "Irrigation in India" for 1928-29 (Government of India: Public Works Branch, 2*s*.) gives a statistical and financial summary of the irrigation works in every province of British India. The rainfall in the year under review was on the whole normal, though in the plain areas there was a deficiency of about five per cent, and in the Central Provinces of eleven to twenty-two per cent. The total area irrigated by government works of all kinds was well over thirty million acres, which was nearly three million acres more than in the previous triennium. This total was slightly more than twelve per cent of the total area sown. In Sind it was as high as 90 per cent of the area sown, in the Punjab 30 per cent, and in Bengal as low as 0·3 per cent. Details of the irrigation scheme in project and works in progress are given.

Deep Trench on the North Sea Floor.—In recent surveys of the North Sea the surprising discovery of a trench 130 fathoms deep has been made about 100 miles east of Montrose. The Devil's Pit, as it has been called, is the deepest of a group of depressions found in a floor which was previously supposed to be an undulating plain at 38 to 50 fathoms. Another group of depressions, with a greatest depth of 87 fathoms, occurs farther south, about 65 miles east of Berwick. Prof. J. W. Gregory discusses the nature and significance of these depressions in the *Geographical Journal* for June. He gives reasons for not accepting the suggestion that they have a connexion with the earthquake that was felt in eastern Scotland and southern Norway on January 24, 1927, and he believes that the features are not new but were formerly missed by soundings having been too far apart. Recent soundings in the immediate vicinity of these trenches agree entirely with earlier records of shallow water. Prof. Gregory argues that the trenches are remains of the pre-glacial valley of the Rhine and date from the days when the Rhine and its British tributaries discharged to the North Sea about a hundred miles east of Kinnaird Head. He further points out that the existence of these pre-glacial trenches adds to the improbability of a Scandinavian ice-sheet having reached the British coast, since it would have filled the trenches with moraine matter. In this case floating ice must have been responsible for the transport of Scandinavian boulders to eastern England.

Long-Range α-Particles.—In the June issue of the *Proceedings of the Royal Society*, Lord Rutherford, F. A. B. Ward, and W. B. Lewis have described an investigation of the long-range α-particles from radium C by one of the new methods. Their results are most illuminating, as they show that, in addition to the well-known group with a normal range in air of 9 cm., there are at least eight other homogeneous groups with ranges between 7 cm. and 12 cm. Their numbers are, however, minute; for every million particles of the common 7 cm. group, there are only seventeen of the most frequent of the long-range groups (9 cm.), and between 0·2 and 1·3 of each of the others. No particles of range greater than 12 cm. were found, and if present, there is certainly less than one-tenth of a per cent of the number in the main set of range 9 cm. In discussing these results, it is pointed out that there must be some intimate connexion between the energy of these long-range particles and the energy of the gamma rays emitted by radium C, and the view is taken that the gamma rays arise from a transition of the α-particle within the nucleus between two different energy-levels. The energies of these levels can be found from the energy of the α-particles, and it is shown that the differences in energy between these levels and the normal level are in several cases in good accord with the energies of some of the stronger gamma rays.

Identification of Hydroxylic Compounds.—Phenylcarbimide has been employed in separating and characterising phenols from tar and tar products and also forms solid compounds with alcohols which have definite melting points. In some cases it can also be used to isolate several dihydric phenols from the aqueous liquors of low-temperature carbonisation, but with the less volatile phenols only oily products are formed. Morgan and Pettet, in the May number of the *Journal of the Chemical Society*, describe a more

satisfactory alternative reagent, namely *p*-xenylcarbimide, the compounds of which, $C_6H_5.C_6H_4.NH.CO_2R$, are considerably less fusible than the corresponding phenylcarbamates, so that phenols which yield only oils with phenylcarbimide provide crystalline *p*-xenyl derivatives and, in addition, solubility relationships are modified. The paper includes a table of melting points of *p*-xenylcarbamates and phenylcarbamates, in which compounds formed from several alcohols and phenols appear.

Syntheses of Ethyl Alcohol.—In a paper in the June number of the *Proceedings of the Royal Society*, on ethyl alcohol as a product of high-pressure syntheses, G. T. Morgan and R. Taylor, after reviewing briefly the conflicting results which have been reported in attempts to prepare this substance from carbon monoxide and hydrogen interacting in the presence of catalysts, describe some new experiments which they have performed yielding positive results. The catalyst most used was prepared from cobalt nitrate and zinc permanganate, and the synthesis carried out at 400° and 200 atmospheres, about 75 c.c. of a composite liquid product being obtained per hour. From about four litres of this, the alcohol was separated and identified conclusively by a number of physical and chemical tests. Two acetals have also been separated from the crude products of the catalysis and identified, the more volatile one being ethylidene dimethyl ether, and the less volatile one propylidene dimethyl ether. Six other catalysts are described, each of which was found to induce the formation of appreciable quantities of ethyl alcohol.

Molecular Weight Determinations.—Rast, in 1922, suggested (without reference to the earlier work of Jouniaux in 1912) the use of fused camphor as a cryoscopic solvent, the novelty claimed being that the molecular depression of freezing point for this substance was so large that ordinary melting-point apparatus could be adapted to a micro-method for the determination of molecular weight. The value of the molecular depression constant for camphor was calculated as 400 by Rast from some results on the melting points of mixtures of salol and camphor obtained by Caille, whereas Jouniaux had obtained the higher value 498 from a study of a number of cooling curves of pure substances dissolved in camphor. In the May number of the *Journal of the Chemical Society*, Le Fèvre and Webb show that Caille's results appear to be erroneous, and that the higher value of the constant is to be preferred. They also show that bornyl chloride is a suitable cryoscopic solvent, having the very high constant of about 500. It has a lower melting point than camphor, and is less volatile. The results given are somewhat erratic and great accuracy is not claimed for them, but the method appears to be capable of development.

Astronomical Topics.

Encke's Comet.—Telegrams from Profs. Shapley and Strömgren report the detection of this comet by Mr. Bobone at Cordoba (Argentine), on June 21, at 22h. 23·2m. U.T. in R.A. 7h. 35m. 24s., N. Decl. 8° 22′. The R.A. is 56 s. less and the Decl. 44′ less than the values predicted by Matkiewicz; this implies that the time of perihelion is about 18 hours earlier than the predicted value, which was June 3·85 U.T. For most comets this would not be regarded as an unreasonable amount, but this comet has been so carefully studied ever since 1819 that the predictions are usually accurate to an hour. It is too large to be due to Mercury, though a little of it may be due to that planet, if Matkiewicz did not allow for its effect; it was not very far from the comet at the last perihelion passage. Possibly the accelerative effect, which was noted in the last century, but which had nearly died out, has revived again. This is the first detection of a comet for ten months; the cometary nature of the object reported by Prof. Nakamura last November is doubtful.

Calendar Reform.—A Circular from the International Fixed Calendar League reports that the preparatory committee on calendar reform at Geneva has completed its report, which will soon be issued; it will form the basis of discussion at the international conference on the subject, which has been convened by the League of Nations to meet on Oct. 26. Nearly all the schemes of reform include the suggestion that one day in each year (two in leap years) should lie outside the sequence of weekdays, so that every year should begin with the same weekday. There is widespread opposition to this plan, and it is scarcely likely to obtain the support necessary for its universal adoption. The schemes for making the lengths of the months follow a more orderly plan are less controversial; but the reformers are fairly equally divided between the 12-months and 13-months division of the year. The advantage of the latter is the equality of all the months, except for the one extra day. Its chief drawback is that it does not divide into quarters. But it has been pointed out that the case would not be much worse than the present 'quarter-days', which do not all fall on the same day of the month. The discussions next October are likely to be lively.

Improvement in Time-Recording.—The great improvement in clocks, effected by Shortt, calls for a similar improvement in chronographs. Those in general use are limited to hundredths of a second. A paper by Alfred L. Loomis in *M.N.R.A.S.* for March gives a description of a very accurate form of chronograph. A broad sheet of paper is made to advance at a uniform speed past a comb of 100 teeth. The records on the paper are made by electric sparks from these teeth; the teeth are in electric connexion with a disc having 100 teeth, which rotates 10 times per second, so that each tooth corresponds to one-thousandth of a second. The results enable very accurate clock determinations to be made. These show that the maximum clock rate is attained when the pressure in the clock case is between 15 mm. and 25 mm. of mercury. Lowering the pressure from 15 mm. to 1 mm. caused the clock to lose a second a day; this unexpected result is due to the longer swing that occurs with low pressure. A paper immediately following this, by Prof. E. Brown and D. Brouwer, gives an analysis of the clock records extending over several months. The most interesting result is the detection of a small effect due to the moon. The theoretical amplitude is shown to be 0·000153 second, the period being half a lunar day. This is the direct action of the moon on the pendulum, but there are also indirect effects due to the change in the earth's attraction arising from tidal deformation. The analysis of the clock readings gave amplitudes varying from 0·000106 s. to 0·000150 s.; they are, therefore, of the right order for lunar effects. It is hoped that continuation of the observations, using four Shortt clocks, will make it possible to detect changes in the rate of the earth's rotation. The irregularities in the apparent motion of the moon and planets give grounds for believing that such changes occur.