Research Items

Homo modjokertensis

DR. E. DUBOIS, in a recent communication to the Koninklijke Akademie van Wetenschappen te Amsterdam (*Proceedings*, **39**, 10), sets out his reasons for regarding this skull, found in February 1936 in the early Pleistocene deposits of Modjokerto, Java, as an infantile form of the same race as that found at Ngandong, to which the specific name *soloensis* has been given. The striking fact about the skulls of Solo man is the low brain capacity, which in the largest male has been calculated at 1,295 c.c., barely equalling the male Australian, while the largest female (probable) is put at 1,095 c.c. The adult of Modjokerto cannot have been more than *Sinanthropus* I, which is 915 c.c. The Modjokerto skull itself probably has a capacity of 650 c.c., agreeing with a Papuan child of two years, which would give a capacity in the adult of 900 c.c., approximating to *Sinanthropus*. This and other facts bring together *pekinensis* and *soloensis*. As to the racial identity of Solo man and Modjokerto man, there can be no doubt. In both there are peculiarities due to the necessity of poising the head on the vertebral column. The similarity in the brain of Peking man and of Solo man is striking. The contour lines in norma lateralis nearly coincide. The conclusive proof, however, is in the unique morphology of the tympanic portion of the temporal bone. The meatus acusticus externus is not directed forward, as in all the modern races, and Neanderthal and Rhodesian man, but transversely and somewhat backward. The tympanic plate is exceedingly thick and strong, the forward part being more or less convex, and not concave as in the modern. The border of the porus acusticus externus shows a peculiar re-entering, which in *Sinanthropus* is continued in a roundly terminating fissure, strikingly resembling such a fissure in a young, probably less than one year old, Papuan child. Finally, if Modjokerto and *pekinensis* are both early Pleistocene, may not Solo man also be early Pleistocene? The evidence for late Pleistocene is unsubstantial.

Fauna of Singapore

THE *Bulletin* of the Raffles Museum, Singapore, Straits Settlements, No. 12, May 1936 (issued December 1936) contains much that is interesting relating to the fauna of Singapore and adjacent waters. A list of the fishes in the collection of the Raffles Museum is given by the curator, Mr. M. W. F. Tweedie, and eleven new species from the Malay Peninsula are described and illustrated by Mr. W. P. T. Hesse. The fishes of this district are of great interest; not only are there many new species to be found, but also it may be considered as a half-way point between the Red Sea and the east coast of Africa, and the isles of Polynesia. The fishes of China and India commingle and, as the author's recent collections show, many fishes hitherto known only in the Philippines also occur on the reefs and in the creeks of Singapore and Johore. The migratory fishes of the Indo-Pacific pass Singapore, and its reefs swarm with a rich and varied fish fauna. There are several papers dealing with the Crustacea, especially freshwater decapods, and with marine crabs of the family Grapsidæ mainly collected in the mangrove swamps. Among the freshwater decapods is *Palæmon* (*Parap.*) *trompi* de Man subsp. *armatus* n. subsp. from Johore, which hitherto was only known from Borneo, and which lives in the same waters as *Palæmon pilimanus* de Man. The eggs are large and few in number, but apparently nothing is known of its life-history. Among the other contributions are two papers on "Nidification of some Javan Birds" by A. Hoogenwerf, and "The Nidification of some Malayan Birds" by G. C. Madoc. Both contain much original observation, and the first is illustrated with very beautiful photographs.

Chemical Carcinogenic Agents

AN extremely valuable summary of the last three years work on chemical compounds as carcinogenic agents by J. W. Cook, G. A. D. Haslewood C. L. Hewett, I. Hieger, E. L. Kennaway and W. V. Mayneord ("Reports of the Second International Congress of Scientific and Social Campaign against Cancer"; Brussels, 1936) shows that there is a large number of pure chemical compounds which produce cancer in animals. The most active compounds, such as methylcholanthrene, cholanthrene and 3 : 4-benzpyrene, produce epitheliomata of the skin when painted on mice and sarcomata when injected subcutaneously in either rats or mice. Reference is made to the discovery by Sasaki and Yoshida of the action of amino-azo-toluene, which produces cancer of the liver and bladder when fed to animals. Amino-azo-toluene is a commercial orange dye used for varnishes, fats, margarine and leather. It has also been recommended for medicinal use to promote the growth of skin on wounds. Carcinogenic hydrocarbons are fat-soluble; but water-soluble carcinogenic compounds have been described. The sodium salt of 1 : 2 : 5 : 6-dibenzanthracene-9 : 10-endo-$\alpha\beta$-succinic acid, produced by combination of 1 : 2 : 5 : 6-dibenzanthracene with maleic anhydride, produces sarcomata on injection in mice, and some of these sarcomata are accompanied by leucocytosis in the blood. A water-soluble quinoline styryl compound which was originally tested for trypanocidal action was found by Prof. C. H. Browning to cause the development of cancer in mice whether the mice are infected with trypanosomes or not. The natural female sex hormone œstrin induces cancer of the mamma and adenoma of the pituitary, although not of the skin when it is painted on mice. The mechanism of carcinogenesis is still not clear, but such work as has been done to increase understanding of the process emphasizes the importance of the species, strain and sex of the animals employed.

The Asparagus Fly

THE asparagus fly (*Platyparea pœciloptera* Schr.) is a native of central and southern Europe, but it appears to be moving slowly westward, and since the beginning of this century has become a serious pest in the valley of the Seine. It was first reported in Holland in 1931, and four years later it appeared in England. In view of the possibility of its further spread, the illustrated account of the life-history of the fly with recommendations for its control given

by A. S. Buckhurst (*J. Min. Agric.*, **43**, No. 10) will be useful to both the private and commercial grower of asparagus. The damage is done by the larvæ which tunnel in the stems, so that either the young edible shoots are spoilt or the later growth weakened according to the time of emergence of the flies. The latter is considerably earlier on the Continent than in England, but the period during which the flies are on the wing extends to about six weeks in both cases. There is only one generation in the year, the pupæ over-wintering in the stems at or below ground-level. So far, no entirely successful method of control has been found, as traps are only partially effective and spraying is not an economic proposition. To remove and burn all distorted stems as early as possible in the autumn, taking care to cut as near the crown as possible, is the best method at present known for reducing the trouble, but even then many of the pupæ escape destruction. Experiments are in progress with the view of finding a soil insecticide which will eradicate the pest more thoroughly, but although small-scale trials are giving promising results, no definite recommendations can as yet be made.

The Cape Crawfish

LITTLE was known of the development of this crustacean, although much has been written on its anatomy. Dr. C. von Bonde in his recent work "The Reproduction, Embryology and Metamorphosis of the Cape Crawfish (*Jasus lalandi*) (Milne Edwards) Ortmann" (Department of Commerce and Industries. Fisheries and Marine Biological Survey Division. Investigational Report. No. 6. Union of South Africa, Government Printer, Pretoria, 1936) now gives us a good account of the reproductive and developmental stages, which are described in detail, and at the same time certain facts relating to the post-ovum stages in the description set forth previously by Gilchrist are substantiated or corrected. Part 1, on reproduction, deals with sexual differences and reproductive organs, sperm cells and ova, period of sexual maturity, frequency of spawning, mating, preparation for egg laying, fertilization of the eggs and attachment of eggs to the abdomen. Part 2, on embryology, deals with the maturation and segmentation of the ovum and later embryological stages. Part 3 deals with metamorphosis and subsequent growth and Part 4 with technique. The author has in preparation a further paper on the phyllosoma stages obtained by artificial hatching and rearing, but in the present work it is shown that the larva hatches at a stage still younger than that described by Gilchrist (1913) as the nauplisoma. Stage III is a true phyllosoma, and numerous stages occur between those of 3·8 mm. and 24 mm. to be described later. At 35 mm. the last phyllosoma changes to the puerulus stage of 22 mm. "which appears in all essentials to be like a small adult and the appendages including the pereipods (but excluding the pleopods) are adult-like in form". The stage immediately following the puerulus resembles the adult still more, and this may be regarded as the youngest stage of the fully-formed crawfish. The paper is illustrated by photographs and by two coloured plates of the developing embryo.

Nerve Fibres in Cephalopods and Crustaceans

THE structure of the nerve fibres in cephalopods and a crustacean, *Maia*, has been investigated by J. Z. Young (*Proc. Roy. Soc.*, B, Dec. 1936). In the former, each axial fibre is furnished with a nucleated sheath of a collagenous nature. Faint longitudinal striation is visible in both living and fixed fibres, but no neurofibrils are present. Indeed, if a giant nerve fibre is cut, the axoplasm flows out from the sheath, showing it to be a viscous fluid. The volume of the sheath is in general only about two thirds that of axoplasm. In *Maia*, each axon is surrounded by a connective tissue sheath which contains a certain amount of fat, but it is not similar histologically to the medullated sheath of the vertebrate nerve, although this has previously been stated to be the case. The sheath is slightly thicker relative to the axon than in the cephalopods.

Endemic Flowering Plants of the British Isles

A CONSIDERABLE number of floral units—mostly sub-specific—are now recognized as endemic to the British Isles. In a discussion of the problems which they present, Wilmott (*South-Eastern Naturalist and Antiquary*, **41**; 1936) suggests that hybridization is a probable cause of the origin of endemism in some groups. Thus, the numerous endemic mossy saxifrages of western Ireland may have arisen through original crosses between the Arctic *S. cæspitosa* and the Atlantic *S. hypnoides*, which were brought together as a result of migrations imposed by the glacial period. Evidence is adduced to show that other Irish endemics are pre-glacial survivors, but in the case of the Hiberno-American *Spiranthes*, it is difficult to believe that whilst the southern Irish plant is a survivor its very close ally in the north is a recent immigrant, as is suggested. As regards British endemics, a correlation is attempted between their distribution in relation to areas of glaciation. It is shown that whilst some occur in areas which were not glaciated, others, for example, *Sorbus* spp. and *Helianthemum Breweri*, grow on cliffs which might be presumed to be free from ice in the summer, and the view is expressed that they also represent relatively ancient elements of the flora.

Production of Polyploid Plants

THE subject of polyploidy in plants has grown so rapidly and has become of such importance in connexion with plant genetics that the recently issued bulletin of the Imperial Bureau of Plant Genetics on "The Experimental Production of Haploids and Polyploids" will be very useful for plant breeders (Imperial Bureau of Plant Genetics for Crops other than Herbage. The Experimental Production of Haploids and Polyploids. Pp. 28. Cambridge: School of Agriculture, 1936. 5*s*.). The production of allo- and autopolyploids is one of the most important methods of producing new basic types of economic plants. The bulletin briefly summarizes the cases of polyploidy in somatic cells and the production of polyploid cells by changes in temperature, the use of X-rays, chemicals, centrifuging, tumours and shoots from callus. Polyploid gametes have been produced by similar methods including fumigants, attack of pests, puncturing the buds and virus mosaic. Polyploidy resulting from hybridization is recorded in a large variety of plants, with a long list of cases especially in wheat and tobacco. It is probable that the experimental production of haploids and polyploids will become a matter simply of selecting the best technique for each case. The bibliography, while merely representative, comprises nearly 300 entries including certain references to non-economic plants.

Resistance of Cotton to the Wilt Fungus

A SHORT paper by Dr. B. B. Mundkur (*Proc. Ind. Acad. Sci.*, **3**, No. 6, Sec. B., 1936) gives the results of some experiments on the resistance of Indo-American and Indian varieties of the cotton plant, *Gossypium hirsutum*, to the fungus causing wilt disease (*Fusarium vasinfectum*). Two forms of the fungus evidently occur, an Indian and an American strain. Indo-American cottons are immune to the American strain in India, but susceptible in America, whilst the Indian form of the fungus parasitizes Indian cottons strongly in India, but only slightly in America. It seems as though the fungus had developed one geographical strain capable of parasitizing the host when grown on the sandy and acid American soils, and another strain to fit the particular physiology of the cotton plant when cultivated upon the heavy alkaline soils of India.

Low Temperature Thermometry

WHILE the practical methods of making measurements of temperature which approximate closely to the standard thermodynamic scale are now quite accurate enough for industrial purposes, it is still necessary for scientific purposes to secure greater accuracy in the region in which helium is liquid. At the Congrès International du Froid held at Amsterdam in June last, Prof. Keesom gave an account of the present position of the problem, which has now appeared as Supplement No. 80 of *Communications from the Kamerlingh Onnes Laboratory* of the University of Leyden. In NATURE of December 5, p. 977, the Leyden value of the pressure coefficient of helium, 0·0036611, and the absolute zero to which it leads, − 273·14° C., were given. Between 0° and − 190° C., the platinum resistance thermometer is correct to 0·05° C., but for greater accuracy it will have to be replaced by some other metal, possibly gold. For the range − 190° C. to − 259° C., a formula of correction secures an accuracy of 0·07° C. Temperatures below this down to about 2° K. are measured by the vapour pressure of liquid helium, and lower still by the resistance of a phosphor bronze wire containing 2 per cent tin and 0·05 per cent lead. This, however, becomes unsuitable in magnetic fields, and further research is necessary to find an alloy less influenced by such fields.

Entropy of Sulphur

THE determination of the heat capacities of rhombic and monoclinic sulphur at low temperatures, leading by graphical integration to the entropies of the two forms, is of interest as a check on the third law of thermodynamics. E. D. Eastman and W. C. McGavock (*J. Amer. Chem. Soc.*, **59**, 145; 1937) have redetermined the heat capacities over the range 15°–375° K. and have calculated the entropies. The values of C_v for rhombic sulphur may be represented approximately up to $C_v = 3{\cdot}0$ by the function $f(T/\theta)^n$, proposed by Lewis and Gibson, if $\log \theta = 1{\cdot}992$ and $n = 0{\cdot}5025$. From previous determinations of the heat of transition the authors select the value $0{\cdot}258 \pm 0{\cdot}027$ e.u. at the transition point. From the entropies now determined, the value $0{\cdot}215 \pm 0{\cdot}05$ at the same temperature is calculated. The conclusion is drawn that the third law is accurately applicable, without complications of the types that sometimes occur, to the sulphur transition. The uncertainty of 0·05–0·10 e.u. in this test of the law is stated to be smaller than that in many others, and it is claimed that the experimental basis of the third law, as supported by the sulphur transition, is strengthened by the new results.

Deuterium Content of Normal Water

THE ratio of deuterium and protium, D/H, in normal water has been given between the rather wide limits of 1 : 5600 and 1 : 8900. J. L. Gabbard and M. Dole (*J. Amer. Chem. Soc.*, **59**, 181; 1937) have prepared deuterium-free hydrogen by electrolysis of water to which sodium peroxide had been added, and combined it with atmospheric oxygen by passing over heated copper with the hydrogen always slightly in excess to prevent fractionation of the oxygen isotopes. The resulting water was 9 p.p.m. lighter than Lake Michigan water. When 6·4 p.p.m. are added to 9 p.p.m. to correct for the difference in atomic weight of atmospheric oxygen and aqueous oxygen, the density of D-free water containing normal oxygen is 15·4 p.p.m. lighter than normal water. From this the ratio D : H (atoms) in Lake Michigan water is calculated as 1 : 6900. The authors conclude that the commonly accepted ratio is too high, and the revision downward should be somewhat more than that recommended by N. F. Hall and T. O. Jones (1936).

Velocities of Meteor Streams

IN a paper published early last year (*Mon. Not. Roy. Astro. Soc.*, **96**, 7; May 1936) Mr. R. A. McIntosh described a method of determining the velocities of meteors by measurement of the displacement of the radiant as observed in northern and southern latitudes. He provided two tables to facilitate the computations, and the method presents certain attractive features. In the November issue of the same journal (**97**, 1; 1936), Dr. M. Davidson shows that there is a serious error in the method of compilation of the first of Mr. McIntosh's tables, and that this renders the whole process useless.

Internal Constitution of Eclipsing Binaries

IN *Mon. Not. Roy. Astro. Soc.*, **96**, 9, Supplementary Number, October 1936, there is a paper with the above title by Zdeněk Kopal, the object of the research being the determination of the density concentration in the interior of stars, starting with eclipsing binaries as material. The ellipticities of the components were used by Walters, but an unfortunate error vitiated some of his quantitative results, as pointed out by Kopal. He deals with the problem very fully, and concludes that the density concentration depends on the age of the system, the components of a new-born binary being nearly homogeneous. The density concentration becomes appreciable in the course of the evolution of the system, until finally both components come close to the model requiring a high density concentration. With advancing spectral type there is an increase in the density concentration, and here we may find something of fundamental physical significance. If it be assumed that stellar energy originates in the formation of heavy elements out of simple ones, we must expect an increase in the number of heavy atoms as the star ages, and these will sink to the centre. If future investigation should confirm this view, there will be some evidence in favour of the theory of the transmutation of elements in stellar interiors. It is suggested that the results may be generalized for spectroscopic binaries.