

## Research Items.

**A CHINESE FRESCO OF T'ANG STYLE.**—A second fresco from the Moon Hill Buddhist Monastery near Ch'ing Hua Chên in Honan Province has been acquired by the Museum of the University of Pennsylvania, and is described by Miss Helen E. Fernald in the *Museum Journal*, vol. 19, No. 2. It comes from the wall which faced the first fresco in the monastery, and is nearly perfect, showing greater intensity of colour and greater massiveness than the first in the central Buddha figure. It is eighteen feet in height and twenty-nine feet long. In design the style is that of the T'ang dynasty. The centre is occupied by a huge figure of Sâkyamuni Buddha seated on the lotus throne. On each side is a huge Bodhisattva sitting European fashion turned 'three-quarters' towards the Buddha. In the foreground between the Buddha and the Bodhisattva on each side are two graceful Bodhisattvas. Another Bodhisattva holding a bowl and pomegranate, and a child worshipper, complete a group which is surrounded by a number of military-looking figures in armour and jewelry, probably devas. In colour the whole is magnificent. The painting appears to belong to a convention of grouping which became traditionally established in sculpture and painting early in the T'ang dynasty, representing the Buddha with two attendant Bodhisattvas, and a host of other adoring beings. Although very few early Chinese frescoes exist to-day, it is recorded that enormous numbers of them were painted during the T'ang period and earlier. Probably they were destroyed in the rising against foreign religions in the ninth and tenth centuries.

**AN AZILIAN STATION IN ARIÈGE.**—An account of the recent excavation of a cave at Montardit (Ariège), known as the 'Trou Violet,' by Ida Vaillant-Couturier Treat and Paul Vaillant-Couturier, is given in *L'Anthropologie*, vol. 38, Nos. 3-4. The cave was first identified as an archaeological station some twenty or more years ago, when a superficial examination brought to light neolithic remains. Shortly after, further evidences of occupation were found, as well as a fragment of the pelvis of a child, though in the interval a considerable quantity of cave earth was removed by the peasantry for use as fertiliser. Systematic excavation was begun in 1926, and has been continued regularly since then. It has been carried through a series of five stratifications down to bed-rock. Of these, the fourth is Magdalenian, while the second, immediately below the disturbed area, is Azilian. The conformation of the cave is peculiar. A platform or sill is succeeded by an almost vertical drop, making the remoter part of the cave an almost well-like shaft. By Azilian times, this had been practically completely filled in and provided a floor of considerable area, extending beneath the whole vault. Two interments were found which unquestionably belonged to Azilian times and had not been introduced by later inhumation. In one the remains were practically complete, but the other had been disturbed either by animals or man, and only a skull cap, clavicle, and a few other bones remained. It is concluded that the cave was used occasionally rather than as a place of regular occupation in late Magdalenian times, and similarly in early Azilian times, but that gradually it came to be regularly occupied, even after it had been used for sepulchral purposes. The human remains are comparable with those of Mas d'Azil, Ofnet, and Mugem. The discovery of pebbles showing traces of colour related the site to the lower of Piette's sites at Mas d'Azil, which is only a few kilometres away.

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**VITAMIN CONTENT OF RICE.**—Investigations have been made to determine a satisfactory standard for beriberi-preventing rices (E. B. Veddar and R. T. Feliciano, *Phillipine Jour. Science*, 35). No rice of the series examined produced polyneuritis when fed to pigeons, provided that 50 per cent or more of the external layers of the grain were present. The proportion of these requisite layers was determined with reasonable accuracy by simple inspection after staining with Grams' iodine solution. For practical purposes, human beriberi can also be prevented by selecting rice in this manner, though it cannot be recommended as a legal standard. It is suggested that rices be classified as highly-, medium-, or undermilled according as they retain 0 to 20, 21 to 49, and 50 to 100 per cent of the external layers. From the chemical side, 1.28 per cent fat is the best single index for a beriberi-preventing rice, 0.62 per cent phosphorus pentoxide is fair, 1.05 per cent ash is poor, while amido-nitrogen is useless for the purpose. A definite chemical index is proposed for use as a standard for beriberi-preventing rice. No rice possessing these requirements produced polyneuritis in pigeons, and as pigeons are much more susceptible to the deficiency of anti-neuritic vitamin than is man, this standard will not only protect man, but will also provide a margin of safety. This factor of safety is necessary, as the vitamin content may be reduced by defective storage or preparation for food. Experiments with insect-infected rices indicate the probability that the loss of vitamin during long storage of undermilled rice is caused by the depredation of insects that eat the external layers of the grain.

**SOUND-PRODUCTION IN BOOK-LICE.**—In the *Entomologist's Monthly Magazine*, August 1928, Mr. J. V. Pearman has an interesting communication on this subject. For many years various writers have claimed that certain Psocoptera or book-lice are capable of producing an audible ticking noise (the 'death watch'). Others have denied the capability of sound production by such minute fragile insects. Mr. Pearman, however, has been able to demonstrate that the species *Clothilla pulsatoria* is able to make audible sounds by tapping a slightly thickened knob, near the apex of the ventral side of the abdomen, against the substratum upon which the insect is resting. The sound is most distinct when the creature is placed upon paper, more variable when it is on cardboard or wood, and non-audible on glass. The sound-production appears to be confined to the female, and is considered to be a mating call. In certain other Psocids the inner surface of each hind coxa bears a scale-covered swelling which, in some species, has a kind of tympanum or presumed resonator situated just behind it. It is suggested that these organs are also for sound-production, and that the sound is made by the scaled swellings of the two legs being rubbed together. These organs are more largely developed in the males, and the hypothesis of their sound-producing function is, at present, conjectural.

**BLOOD VASCULAR SYSTEM OF THE SPINY DOGFISH.**—The spiny dogfish, *Squalus acanthias*, is common off the coasts of the British Isles, and is not infrequently used instead of the common dogfish for class purposes. Until now, no adequate description of the blood system has been available, and the account given by Dr. O'Donoghue and Miss Abbott (*Trans. R. Soc. Edin.*, vol. 55, pt. 3, No. 33; 1928) will be specially welcomed by university teachers. The authors find the vascular

system of this dogfish one of the most primitive and least specialised of any Elasmobranch so far described. The presence of six complete branchial arches between the dorsal and ventral aortæ in the embryo, as in the embryo of all the higher vertebrate groups, and their more or less complete retention in the adult, suggest that the higher vertebrata had a remote ancestor the branchial circulation of which is most nearly approached in living forms by the pentanchid selachians. The authors have interpreted the blood system in the light of recent embryological work, and have suggested a terminology for some of the vessels which is more suitable and useful in comparing the conditions in Elasmobranchs with those in other and higher vertebrate groups. The paper is a valuable and much-needed contribution to the comparative anatomy of the vertebrate blood system.

**PHILIPPINE TREMATODES.**—In a paper on the Trematodes of Philippine fish, frogs, birds, and bats, M. A. Tubangui (*Philipp. Jour. Sci.*, 36, No. 3; 1928) describes a dozen new species and a new genus. The most interesting is a new species of *Opeacalus* in which an anus is present. The two branches of the intestine unite not far from the posterior end of the worm, and form a short narrow canal which opens to the exterior through an anus which is not quite terminal but is situated on the ventral surface. This worm occurs in the intestine of two species of *Glossogobius*. In two Japanese species of *Opeacalus* from the intestine of fishes an anus is present (Ozaki, 1926).

**AMPHIBIANS OF WESTERN NORTH AMERICA.**—A recent *Occasional Paper of the California Academy of Sciences* is a detailed account of the amphibians of the western States, illustrated by original photographs from living specimens. Although the amphibian fauna of the area is stated to be not very numerous, the present account (by Joseph R. Slevin) admits 46 species and sub-species, of which 22 are salamanders and 24 are frogs, toads, etc. The specific characters of these are described in detail, and short notices given of distribution and habits. Although many of the islands on the western coast of North America contain one or two species, and Vancouver shelters as many as six, it is a striking fact that no amphibians have been found on the islands in the Gulf of California.

**EXPERIMENTALLY-INDUCED METAMORPHOSIS IN ECHINUS.**—Prof. Julian S. Huxley records observations (*Amer. Naturalist*, 62, 363-376; 1928) on experimentally-induced metamorphosis in *Echinus*. Treatment of advanced larvæ of *Echinus miliaris* with very dilute solutions of mercuric chloride (about  $M/(2 \times 10^6)$ ), rapidly brings about precocious metamorphosis. This appears to be caused through the differential susceptibility of larval tissues and echinus rudiment; the former are more affected by the poison, begin to dedifferentiate, and can then be readily resorbed by the echinus rudiment. When the echinus rudiment is small, metamorphosis is less rapid and may be incomplete, both larval and echinus tissues being dedifferentiated. It is suggested that a similar mechanism is operative in the normal metamorphosis of echinids; the larval tissues dedifferentiating when the weight of the echinus rudiment causes the organism to sink away from the favourable conditions for food and oxygen at the surface of the sea.

**NEW BRITISH FRESHWATER PEARL MUSSEL.**—An extraordinary find has just been made of a new species of freshwater pearl mussel in the British Islands. Mr. R. A. Phillips describes this find, which comes from the River Nore, at Durrow, Queen's County, I.F.S., under the name of *Margaritifera*

*durrovensis* (*Proc. Malac. Soc. Lond.*, vol. 18). It differs from the well-known form, *M. margaritifera* (Linn.), in habitat, for it dwells in deep shady pools in hard water, instead of quick running streams of soft water, so that the umbones are not eroded, and the posterior end of the shell which projects up into the water as the animal crawls along the bottom becomes coated with 'racc.' It differs also in its external form and umbonal rugæ as well as in the teeth and muscle scars, in which points it seems to approximate the *M. auricularia* (Speng.) dredged from the neolithic deposits in the bed of the Thames near London. A note on the anatomical features of the animal by Mr. H. H. Bloomer is appended to Mr. Phillips' paper, which is illustrated by three plates from photographs by Mr. A. E. Salisbury.

**YIELD OF CONIFERS IN GREAT BRITAIN.**—In the Forestry Commission's *Bulletin No. 3* (1920), the "Rate of Growth of Conifers in the British Isles" was dealt with, the information being based on ascertained data and the measurement of sample plots. This Bulletin is now out-of-print and has been revised and re-issued as *Bulletin No. 10*, entitled "Growth and Yield of Conifers in Great Britain." As its title implies, the material here recorded is of a technical character, of interest chiefly to the professional forester, the grower of woods, and the persons who afterwards purchase and make use of the produce. The data of growth are obtained by the periodical and careful measurement of small areas of marked trees termed 'sample plots.' The first selection of such areas requires knowledge and discrimination; since to obtain results of importance areas of different classes of soil at different elevations, exposures, and so forth, require to be selected for each species dealt with. That the considerable amount of investigation work so far carried out has been possible is almost entirely due to the sympathy and cordial assistance extended to the officers of the Commission and others by private land owners, for the majority of the sample plots at present in existence in Great Britain are situated in privately owned woods. A certain amount of new data is included in the revised bulletin, and it may be confidently recommended to the study of all interested in this important matter.

**SEED MIXTURES FOR HAY AND GRAZING LAND.**—Stapledon and Davies (Welsh Plant Breeding Station, Series H, No. 8, Seasons 1921-1928) deal with various problems of seed mixtures for hay and grazing land, especially in connexion with environment and competition. The effects of soil condition and management have been studied in considerable detail, and yield results of much interest and importance. Comparisons are made of the response from various types of seed mixtures under varying cultural conditions, the practical aspect being kept in view throughout. Special attention has been devoted to colonisation by unsown species. It appears that the trend of such colonisation is determined by the earliness of re-entry of bent grass and Yorkshire fog, and the degree of control which is exercised over these species if they appear immediately and abundantly. Within four years, twenty-four species had made a spontaneous appearance in one of the experimental fields, in addition to others introduced as impurities in the seed sown. Further investigations deal with the influence of inter-specific competition in seed mixtures. This competition is largely determined by the reaction of the individual species to the cultural conditions and management, excessive competition having an adverse effect upon yield. Some species are naturally aggressive in type, but the degree of aggression may be modified by appropriate treatment of the sward. On

the whole, the grasses are aggressive compared to the clovers, chiefly because the grasses are the earlier to start into growth in the spring. Practical application of these experimental results is made in the compounding of "Sensible seed mixtures." The various factors which make for a successful mixture are considered, and details are given of type mixtures suitable for various purposes, subject to modification according to local requirements and conditions.

**SYDNEY AND THE BLUE MOUNTAINS.**—Three lectures by Dr. W. H. Woolnough, Advising Geologist to the Government of Australia, on the physical features of Sydney and the Blue Mountains, show the excellent physiographic studies in that area which have been stimulated by its many interesting problems. The lectures show the drift of opinion toward the view that faults have been more effective than folds in the formation of the eastern front of the plateau of New South Wales. Both processes have contributed, and at one time a monoclinical fold was regarded as the main movement and the faulting as subordinate. The claim that the Arctic coal seams indicate former tropical conditions where they occur receives no support from Dr. Woolnough; for he declares emphatically that the rich coal seams of the Sydney area are not due to tropical forests, but were laid down under a climate that may have been frigid in severity. The author is perhaps unfortunately conservative in his retention of the term Permo-Carboniferous for the whole of the Coal Measures and associated beds in New South Wales.

**FORMER GLACIATION OF KASHMIR.**—A recent *Memoir of the Geological Survey of India* is devoted to a study of the glaciation of the East Lidar Valley in Kashmir by Lieut.-Colonel J. L. Grinlinton (vol. 49, part 2, 1928). The greater part of the memoir is devoted to a careful description of phenomena and is illustrated by a fine set of photographs, sketches, and maps. The probable sequence of events is then deduced. Before the main Lidar valley was cut there existed a high, dissected plateau from which the higher peaks of the present day were carved. This area was first glaciated in what is called the *High Level* epoch of glaciation. A period of deep valley cutting followed, after which came the *Low Level* epoch of glaciation. After the first and maximum extension of the ice downstream, there was a recession during which the ice retreated to the vicinity of the snouts of present-day glaciers. A second epoch of advance and retreat was followed in turn by a third and fourth, leading to the stage of recession represented by the restricted glaciers of the present day. It is noteworthy that an investigation of the former glaciation of the upper Indus by Dainelli also led to the recognition of four successive advances of the ice, but so far no correlation of the respective phases of extension and recession has been attempted.

**SURVEY FROM AIRCRAFT.**—In a pamphlet (*Professional Paper No. 20*, price 2s. 6d.) published by the Survey of India, Lieut.-Col. C. A. Beazeley describes the methods of reconnaissance survey from aircraft. The system was used by the author in Mesopotamia during the War, and at a later date in that country in filling gaps in mapping where ground survey and air photography were not feasible. No fixed points are needed on the unmapped area, and about a hundred square miles can be sketched in an hour or an hour and a half. The method does not of course produce accurate surveys, but it is valuable when more accurate methods of work are not possible. The chief difficulties in this form of sketching which differentiate it from ground work of a similar nature are, first, the necessity for keeping a constant air speed, or if changes have to

be made, recording and allowing for the changes; secondly, the maintenance of a uniform height above the ground; and thirdly, the need of keeping the course. The pamphlet is most practical, and indicates material and apparatus, besides discussing the difficulties of the work. Illustrations, including a specimen air route traverse, are added.

**TRANSPARENCY OF FABRICS.**—The August issue of the *Journal of Research*, the new periodical in which the Scientific and Technologic Papers of the Bureau of Standards now appear, contains a paper by Messrs. Coblenz, Stair, and Schoffstall on the transmission of visible and of ultra-violet light through fabrics of silk, cotton, linen, wool, and two forms of 'rayon.' A mercury-in-quartz arc supplied the light, which was filtered through a yellow-green glass to give visible light and through a purple glass to give ultra-violet light. Both bleached and black-dyed samples of the same material were examined, the difference giving the transmission of the material itself, apart from that transmitted through the spaces between the threads. There is practically no difference between the transmission of ultra-violet light through white fabrics of the same weight of cotton, linen, and rayon; silk is a little less transparent, and wool about half as transparent as cotton. The transparency of each material is greatly reduced by dyeing it orange, yellow, green, or tan, but for pink the reduction is less. The feathers of fowls transmit ultra-violet light much better than fabrics of the same colour.

**THE COSMIC RAYS.**—The two points of outstanding interest discussed by Prof. R. A. Millikan and Dr. G. H. Cameron in their paper in the October issue of the *Physical Review* are the place of origin of the cosmic rays, and the kinetics of their production. As has already been mentioned in NATURE (Oct. 6, p. 555), it is believed that the rays are produced in interstellar space; the evidence now adduced in support of this is twofold: first, that there is no marked cosmic radiation from the sun, which is the nearest star, and in many respects a typical one; and secondly, the fact that the energy of the cosmic rays is about one-tenth that of starlight, requires that if the rays were produced in stars they would have to come from their outermost layers, and that the processes responsible for their emission would have to stop rather abruptly at a certain depth, which is extremely unlikely. The kinetic aspect of atom-building is also explained in a very plausible way. It is not necessary to assume, for example, that sixteen protons and eight electrons all meet at one instant and condense into an oxygen nucleus. The protons and electrons can gradually build up into a cluster in which they retain initially their atomic individuality, and then, at a later stage, the cluster can collapse completely to give the new heavy nucleus, with emission of the quantum of radiant energy—the cosmic ray—appropriate to the resulting change in mass. High temperatures must be inimical to the growth of atomic clusters, and it may be that the low temperatures and densities of interstellar space also favour the nuclear condensation, in some way at present unknown. The remainder of the paper is concerned with other aspects of the phenomenon, in particular its thermodynamical significance, the synthesis of the experimental absorption curves, and the question of the bearing of Dr. Aston's accurate determinations of atomic weights upon the possibility of occurrence of radioactive disintegrations. It is noticeable that Prof. Millikan and Dr. Cameron do not consider here why the most favoured condensations of protons and electrons should be those which go to build up the few nuclei which are actually found to constitute the greater part of ponderable matter.