

Research Items

Sinanthropus VI

SOME important inferences are drawn by Prof. Franz Weidenreich (*Bull. Geol. Soc. China*, 16; 1936-37) from fragments of a skull of Peking man designated as *Sinanthropus VI*, which have been brought together in the laboratory from material collected in the Choukoutien cave from 1934 onward. These consist of a fragment of a right temporal bone, comprising the ear aperture and adjacent parts (belonging apparently to the same skull as the left temporal bone and adjacent parts found in 1934 and already described), three teeth, two molars and a premolar, as well as two fragments of a skull, of which one is the greater part of a left parietal, while in material from the same level as the three teeth were the right side of a frontal bone and the anterior part of the squama of a right temporal bone. It is considered certain that all these pieces belong to one and the same skull—an adult (old) female. From these fragments it has been possible to form a general idea of the contour of the frontal portion of the skull, which on comparison with *Sinanthropus I* and *Pithecanthropus*, shows much less curvature than Skull I in the saggital planes and approaches very closely to the frontal bone of *Pithecanthropus*. In a frontal direction between the inferior temporal lines of both sides, it is less curved than Skull I and indeed is even flatter than *Pithecanthropus*. On a profile view, Skull VI coincides practically in all its lines with those of *Pithecanthropus*. A further discovery is a very small fragment, in certain respects, however, of very great importance. This is the right moiety of the posterior arch of an atlas. There cannot be any doubt that this is a human first cervical vertebra, and that it belongs to *Sinanthropus*. It does not display any distinct fundamental difference when compared with that of recent man. Its interest lies in the fact that it adds support to the view put forward on the evidence of the absence of long bones from the cave, that the skulls were brought into the cave by man and were there broken at the base or split open in order to get at the brains.

Bull Cults of Ancient Egypt

A DISCOVERY which should be of considerable interest for the study of the bull cult in ancient Egypt, when fuller details are available, is reported from Cairo. Dr. Drioton, director-general of antiquities, it is reported by the correspondent of *The Times* in the issue of December 13, has announced the discovery near Zagazig of twelve large granite sarcophagi, which had formerly contained the mummies of sacred bulls, dating from the fourth century B.C. Although these tombs had suffered, presumably from the activities of grave robbers, the internal decoration of three of the sarcophagi is said to have been sufficiently well preserved for it to be possible to make out that they dealt with the future destinies of the sacred bulls, an aspect of the bull cult which thus becomes known for the first time. According to Dr. Drioton's report, it would appear that the sacred bulls were introduced by their patron divinities into the assembly of all the gods. Further, that the outstanding feature of the posthumous destinies of the sacred bulls was their reunion with

the moon. This is new to Egyptology. Near the sarcophagi of the sacred bulls were found small chambers, in which were mummies of sacred falcons, with their eggs buried beside them in jars. Further excavations are to be carried out on the site.

Temperature and the Growth of *Drosophila* and of *Lymnæa*

THE influence of temperature on the dimensional characteristics of *Drosophila melanogaster* has been investigated by several biologists. These studies concern only the final growth stage, while growth and development of this insect in the larva and pupa form the subject of a recent paper by Mr. Takeo Imai (*Sci. Rep. Tôhoku Imp. Univ.*, 4th Series (Biology), 11, 403-417; 1937). It is shown that temperature influences the larval length, length of mouth armature and pupal length, in that high temperature causes a diminution of their dimensions. Two diverse hypotheses are held in regard to the explanation of thermal effect on size. In one case, it is considered to be dependent on the nutritional condition; diminution of size at high temperature is the result of a deficiency of food. In the other, it is maintained that the thermal effects result in modification of the chemical equilibrium. This latter view is held by the author, who suggests that high temperature produces effects that are connected with modification of the metabolic balance of the growing system; or, in other words, the balance between anabolism and katabolism is suggested as the cause of the morphological differences described. In a second paper in the same journal (pp. 418-432) the author formulates the same explanation with regard to the effects of temperature on larval shell size in the mollusc *Lymnæa*. It appears that growth of the larval shell occurs in two cycles, but while higher temperatures cause acceleration of development, the final shell size is diminished at both growth-cycles.

Associated Growth of Herbage Plants

A SERIES of three very interesting papers upon the physiology of pasture grasses when grown in association with legumes has been received from Australia (*Bull. Council for Sci. Ind. Research*, No. 105. Pp. 40+10 plates. Melbourne, 1937). A first paper by Messrs. H. C. Trumble and T. H. Strong indicates that no evidence has been obtained for the view that grasses are able to derive nitrogen from associated legumes during the vegetative stages of the latter, though the subsequent decay of nodules releases nitrogen to the soil. The other papers are written by Messrs. H. C. Trumble and R. E. Shapter, and discuss the physiology of specific associations of grasses and legumes. Yield of Wimmera rye-grass is increased by manuring with both phosphorus and nitrogen, whilst the yield of subterranean clover is raised by phosphorus only. The mixture gives increased yield with phosphorus at all levels of nitrogen. Many other results are given in detail, and the practical conclusion is that the greatest increase in production from the podsolized soils of southern Australia is to be obtained from liberal dressings of soluble phosphate to an associated crop of grass and suitably inoculated legume. The third paper shows that a perennial grass, namely, *Phalaris tuberosa*, may obtain considerable

nitrogen from an associated annual legume such as *Medicago denticulata*, which grows rapidly, and presumably begins to decay at an early stage. The grass obtains approximately 30 per cent of the nitrogen present in the root system of the legume in this particular combination.

Genetics of Rice

THE genetics of rice is receiving considerable attention in India. Mr. B. S. Kadam crossed a wild Bombay rice, which sheds its grains completely, with a non-shedding Burmese variety (*Proc. Indian Acad. Sci.*, 14, No. 3). He found the shedding character completely dominant and caused by two duplicate genes. Ramiah and Rao, in a similar cross in south India, found the F_1 intermediate, and evidence of more than one gene. Mr. Kadam also found (*J. Indian Bot. Sci.*, 14, No. 2) that in a Burmese variety which develops anthocyanin in its roots when exposed to sunlight, the condition was determined by two complementary genes, A , without which no colour can appear in the plant, and R_0 , a specific gene for root colour. By crossing two Indian varieties (*J. Heredity*, 27, No. 10) he found that one possessed a gene which produces red pigment throughout the plant, while the other contained an inhibitor which prevented anthocyanin developing in the leaf blades. Messrs. Kadam, Patil and Patankar (*Indian J. Agric. Sci.*, 7, No. 1) found from various crosses of rice varieties no hybrid vigour in respect of height, tillering, panicle-length or weight of the plant, but an increased yield in some crosses.

Atomic Weight of Carbon

THE atomic weight of carbon has been changed in the current report of the Committee of Atomic Weights of the International Union of Chemistry from 12.00 to 12.01, largely on the basis of gas density and mass-spectrograph measurements, which were confirmed by Baxter and Hale (1936-37), who obtained the value 12.010 from the combustion of hydrocarbons. A. F. Scott and F. H. Hurley (*J. Amer. Chem. Soc.*, 59, 1905; 1937) have now determined the ratio of benzoyl chloride to silver, the chloride being hydrolysed and precipitated as silver chloride. With the current international values for hydrogen, chlorine and silver, the value $C = 12.0102$ was found. With the value $H = 1.0081$, the value becomes $C = 12.0100$, and the same figure is obtained if 107.879 is used for silver. The same authors (*ibid.*, 2078) have used the value $C = 12.010$ to recalculate the atomic weight of sodium from the ratios involving sodium carbonate. With the current international values for silver, bromine and iodine, three values of 22.993, 22.993 and 22.994 are obtained, about 0.003 lower than the international value for sodium of 22.997, but in agreement with the value 22.994 found by Johnson in 1933 from the ratio $\text{NaCl} : \text{Ag}$. No mass-spectrograph value is available.

Magnetostriction

WHEN magnetic material is placed in a magnetic field, small changes in its physical dimensions take place. This phenomenon is known as magnetostriction, and although studied by Kelvin and Bidwell about seventy years ago, it is only recently that it has attained both theoretical and practical importance. It is applied usefully in practice in connexion with the magnetostriction oscillator and the magneto-

striction echo-depth recorder. There are other physical phenomena connected with it, such as the changes it brings about in the magnetic properties of the material, known as the Villari effect. In soft iron, for example, the permeability is increased in weak fields but in strong fields it is weakened. This is usually referred to as the 'Villari reversal'. In the *Beama Journal* of October, W. Alexander and J. Swaffield describe some of the practical applications of magnetostriction. An important application due to Pierce is to use it for starting and controlling electrical oscillations. A special valve oscillator works on this principle. The magnetostriction echo-depth recorder is used for taking soundings at sea and has now reached the commercial stage. The principle is to transmit through the hull of the vessel a high-frequency sound impulse generated in a special type of magnetostriction oscillator. This is reflected from the sea-bed and recorded by apparatus similar to the transmitter but acting in the inverse way, the sound impulse being converted into an electrical one. After amplification and rectification, the voltage produced is applied to a chemical recorder and produces a mark on paper. The time which elapses between the transmission of the impulse and the marking of the paper is a measure of the depth at any instant. Thus the chain of dots forms a continuous trace giving the configuration of the sea-bed. In the United States a magnetostriction oscillator has been developed which produces intense audible vibrations of frequencies of 8000 cycles per second, capable of fracturing glass and of producing useful bactericidal effects.

An Annual Change in Longitudes

IN *Mon. Not. Roy. Astro. Soc.*, 97, 9, October 1937, Dr. Frank Schlesinger has a paper with the above title, in which he disputes the conclusions of Loomis and Stetson that longitude changes between Washington and Greenwich as well as Paris are correlated with the hour-angle of the moon. Kawasaki showed quite recently that these changes in longitude could be equally well represented by an annual term which is completely independent of the position of the moon, and Schlesinger now treats the whole material as a unit. His results show that the evidence is in favour of the annual hypothesis as against the lunar, and he seeks for some causes for the annual change in longitude. Consideration is given to the wanderings of the earth's pole of rotation with respect to a fixed axis in the earth, and this would give rise to variations in latitude, longitude and also in azimuth. The latitude variations have been well observed at the Cape Observatory, Washington and at other places, and a simple expression is given which connects longitude and latitude changes. Using this for Washington, differences of longitude are computed between this station and Greenwich as well as Paris. On comparing these with the observed differences, the agreement is as close as might be expected between Washington and Paris, but is not so good between Washington and Greenwich. It is suggested that the polar motion is at least a partial explanation, and may be a complete explanation of the longitude changes which have been found to exist between Paris and Washington. Large differences between Paris and Greenwich still exist, and if these could be cleared up the polar motion could practically be accepted as an explanation of the Greenwich-Washington changes in longitude also.