

Research Items

Brain Size in Man and the Great Apes

DR. FRANZ WEIDENREICH, who has succeeded the late Dr. Davidson Black as honorary director of the Cenozoic Research Laboratory of the Geological Survey of China, has made the endocranial cast of Peking man the basis of a comparative study of the size of the brain in man and the great apes (*Palaeontologica Sinica*, Ser. D, 7, 4). To the two casts of the original skull and the reconstructed specimen, he has now added a third from a composite reconstruction by himself from material freed from the matrix recently. He points out that previous studies have dealt with the relief of the casts, but the material now available makes it possible to deal more generally with shape and proportions and to show the direction of development. The first feature to strike the observer is the small size of the brain of *Sinanthropus*, even when allowance is made for the fact that the first skull is that of an immature individual. Taking the three together, the cubic capacity may be put at approximately 1,000 c.c., as against 900 c.c. for *Pithecanthropus* and 1,450 c.c. for modern man (male) and 1,300 c.c. (female). Among the anthropoids the gorilla is not quite 600 c.c. and the chimpanzee below 500 c.c. The general average of modern man is below that of Neanderthal man, which works out at 1,425 c.c., so that it would appear that the hominids reached the maximum of skull capacity in that type, and in modern man it is on the decrease. A further point which emerges is that the size of the brain, especially in the hemispheres, increases almost equally in all directions during the development of the hominids, while relative as well as absolute increase is greater in the direction of height, next of length and least of breadth. *Sinanthropus*, *Pithecanthropus*, the Neanderthal group and recent man represent different stages in human evolution which are well marked off one from another.

White Rats and Lamarckism

THE experiments of McDougall, in which he trained rats to discriminate between the light and dark exits from a water tank by giving them a tetanizing electric shock when they chose the lighted exit, are well known. He claimed that the effect was inherited, so that after some generations the descendants of rats which had been trained in every generation learned much more quickly than untrained controls. He neglected, however, to record pedigrees or to keep the individual records of every animal. His work has now been repeated by Prof. F. A. E. Crew (*J. Genetics*, 33, No. 1) using more critical genetical methods. With 18 generations of rats, 1,445 trained and 1,014 controls, the average number of errors in the trained stock did not decrease, and showed no difference whatever from the control stock. Analysis of the pedigrees shows, however, that genetic factors are heavily concerned in determining the scores, quickness to learn being a general dominant to slowness. The parent-offspring correlation for learning was 0.3. A 'quick' strain was developed by selection. Preliminary experiments with each rat, in which the light was constant at both exits and no shock was administered, showed

that many rats chose regularly the right or left hand exit and others were photophobic. The genetic basis of these conditions is being further investigated, but the claim for a Lamarckian effect is found to be without foundation.

Imaginal Buds of the Appendages in *Drosophila*

DR. CHARLOTTE AUERBACH has recently traced the development of the imaginal buds of the legs, wings and halteres in *Drosophila* from the first larval instar onwards (*Trans. Roy. Soc. Edinburgh*, 57, 787; 1935). The basis of the work is genetical, and the problem as to how the mutant genes influence the development of organs and parts cannot be properly answered unless the normal growth of the parts is known. The account given of the formation of the thoracic appendages and their connexions with associated organs is exceptionally complete. This is followed by a preliminary description of the development of certain mutant wing-types. The time in development when such mutants deviate from typical growth is recorded and the deviation followed in some detail. In wing-development there are four recognizable periods of morphogenetic significance, and various external factors, operating at definite periods, induce the manifestation of certain mutants. The paper is very fully illustrated, and forms a useful contribution to the subject concerned.

The Genus *Keramosphaera* Brady

IN December 1935, Mr. E. Heron-Allen read a paper before the Royal Microscopical Society upon this mysterious genus of Foraminifera, lost sight of for forty years, in which he compared it with other almost legendary organisms, such as the flying squirrel (*Eupataurus*) of Kashmir; the emu-like bird *Pesophax*; and the water-rat (*Crossomys*), which was found by Monckton in British Guiana in 1906 and has never been seen or heard of since. Beyond the two original specimens of *Keramosphaera* sent home by Brady in 1874, it was never seen again until 1914 and 1931, when single specimens were recorded from the Antarctic by Pearcey and Wiesner. The original Brady specimens were lost, until Mr. Heron-Allen re-discovered them during the assembling and systematic rearrangement of the scattered collections of Foraminifera at the Natural History Museum. Thus encouraged, he re-examined the Brady (*Challenger*) material and brought three more specimens of *Keramosphaera* to light. These are illustrated in his paper recently published in the *Journal of the Royal Microscopical Society* (56, 113; June 1936). Between the reading and the publication of this paper, two further specimens of *Keramosphaera* were recorded by Mr. A. Earland from some *Scotia* material, which was worked upon, described and illustrated by F. Pearcey many years ago. In his paper, Mr. Heron-Allen directs attention to a partially lost and wholly unpublished paper by his late friend, F. W. Millett, who died in 1915. This paper he found during the sorting, so far as was possible, of the mass of papers and material left behind by Millett on his death in 1915. It deals with the shore sands of Misaki, Japan, and though it was evidently

begun and abandoned in 1904, it contains a fortunately full and complete description, with two drawings, of a further species of the genus *Keramospaera*, to which Millett gave the name *K. densa*. His two beautiful drawings are reproduced in the paper under notice, together with Miss Barbara Hopkins's drawings of the newly discovered specimens, but the type-specimens of *K. densa* have totally disappeared, though Mr. Heron-Allen discovered an empty and damaged slide, which had contained them, among the debris left behind by Millett.

The Trisomic Mutations of *Oenothera Lamarckiana*

Oenothera Lamarckiana is known to have a ring of twelve chromosomes and one free pair. Dr. D. G. Catcheside (*J. Genetics*, 33, No. 1) has determined the various possible primary trisomic mutations which can arise through non-disjunction in these conditions. Thirteen dimorphic forms such as *lata* (giving *Lamarckiana* and *lata* when selfed) will arise from simple non-disjunction. It is shown that double non-disjunction on the same side will produce trisomics which breed true and are therefore called monomorphic. These will number 48 and fall into four categories according to the number of chromosomes between the two non-disjunctions in the ring of twelve chromosomes. A further twelve monomorphic trisomics, called by de Vries 'accessories', correspond with each of the twelve dimorphic trisomics, having an extra chromosome from the ring, thus making a total of 73. The dimorphic trisomics will segregate a monomorphic-I trisomic when selfed, provided it is viable. The latter, pollinated by *O. Lamarckiana*, should produce *Lamarckiana*, the monomorphic and the dimorphic trisomic from which it was derived. This analysis of the possible types of trisomics is confirmed in various cases by the genetical and cytological behaviour of known trisomics, such as *lata*, *albida*, *scintillans*, *oblonga* and *cana*. The whole constitutes a valuable analysis of the possibilities in this type of cytological change.

A New Disease of Mushroom Beds

A SHORT note by Mr. P. H. Williams (*Gard. Chron.*, Aug. 22, 1936) announces the discovery in Britain of a new fungal competitor of the mushroom, previously known only in the United States and Denmark. A truffle, *Pseudobalsamia microspora*, has been found in the casing soil of experimental mushroom beds at the Cheshunt Research Station, and though it does not appear to attack the mushroom themselves, it is a rather serious menace by virtue of its energetic competition for food. This discovery strengthens the plea for sterilizing all casing soil before addition to a mushroom bed.

Solar Temperature

A RECENT article by Messrs. W. W. Coblenz and R. Stair (*Bur. Standards J. Research*, July) sums up the results of their measurements of the energy in the ultra-violet of the solar spectrum within and outside the earth's atmosphere, and the conclusions to be drawn from them. Their measurements are made by means of a standard radio tube and a photoelectric cell, coupled in such a way that, when the cell is illuminated, an audio signal is produced the frequency of which is diminished to one or two per second as the illumination is reduced to zero. The wave-length of the light is restricted by suitable

filters, and the tube is coupled to a radio transmitter the frequency of which it modulates. The arrangement is attached to a sounding balloon and sent aloft, and from the signals received from the balloon at different altitudes, the distribution of energy between wavelengths 2900 and 3400 tenth-metres outside the earth's atmosphere is calculated. The graphs show that this distribution is most nearly represented by that of a black body at 4,000° K., and that it is incorrect to assume that solar radiation is identical with that of a black body at 6,000° K.

Invertase and Dyestuffs

J. H. QUASTEL and E. D. YATES have extended their study of the action of dyestuffs on enzymes to invertase acting on sucrose (*Enzymologia*, 1, 60; 1936). The enzyme is inactivated by both acid and basic dyestuffs, though not all are toxic. It is considered that the basic dyes combine reversibly with an anion of the enzyme, the compound being catalytically inactive, whereas acid dyes combine with the cation. Sucrose competes with both classes of dyestuffs for the enzyme. Glucose competes with basic dyestuffs to a greater extent than with acid dyestuffs for the enzyme, whereas with fructose the reverse is the case. The results cited have led the authors to regard invertase to be acting as a *zwitterion* the oppositely charged groups of which are bridged by sucrose: the glucose section is attached to the anion and the fructose moiety to the cation of the enzyme. Such a theory, however plausible in terms of ionic nomenclature, disregards the effect of stereochemical changes in the sugar molecule in rendering invertase inoperative.

Photographing Meteor Trails

IN *L'Astronomie* of May there is an interesting article entitled "Détermination du Radiant de l'Essaim des Étoiles Filantes du 9 Octobre 1933", by S. Arend and G. Camille Flammarion. It describes the results of photographing 25 meteors between 20^h 03^m and 20^h 55^m at the Observatory of Juvisy. An objective 12.5 cm. in diameter and with focal length 60 cm. was used, and α Lyræ was utilized as the star for guiding purposes. Of 25 recorded trails only 8 were retained, the remainder being either very short or extremely faint. The equations of the great circles for these eight trails were used, and the method of least squares applied to determine the radiant with the greatest accuracy. An interesting comparison is made between the results and those obtained on the same night at the Observatory of Uccle with an exposure of 38 minutes. The computed positions of the radiants were almost exactly the same, at $\alpha = 262.29^\circ$, $\delta = 53.74^\circ$ (referred to the equinox of 1933.0), after making corrections for zenithal attraction and diurnal aberration. These photographic results gave a very accurate determination of the radiant of the Giacobinids on the night of October 9, and show that the radiant was well defined, not a diffuse area, whereas visual observations led to the conclusion that the radiant was diffuse, due to the observational errors which are almost impossible to eliminate in the usual visual work. This conclusion is very important in view of the fact that wherever meteor work is conducted now by competent observers, there is an increasing tendency to treat the results as provisional and approximate, pending more accurate methods of observation.