

Research Items.

THE ETHNOLOGY OF THE FINNO-UGRIANS.—Dr. U. T. Sirelius has published through the Government Printing Office, Helsingfors, a study of the history, culture, linguistic and physical characters of the Finno-Ugrian peoples under the title "The Genealogy of the Finns." Although it is clear from the concluding chapter, which advocates political independence for those members of the group who have not already attained it, that the pamphlet is a piece of political propaganda, it is nevertheless a useful review of the evidence bearing upon Finno-Ugrian affinities and early history. No comprehensive survey of the physical characters of the Finno-Ugrians has been made, but such available data as are comparable indicate considerable divergence and show that they are no longer even approximately a homogeneous race. They fall into two main groups, one short, comprising Lapps, Ostyaks, and Voguls, all living near the Polar Circle, and a tall group to which belong all the other peoples, Hungarians, Baltic Finns, Volga Finns, and Permians. The Samoyeds, whose linguistic kinship to the Finns is now clear, resemble the members of the former group. In culture also there is a division between the Lapps, the Seryenians of Archangel, the Voguls and Ostyaks, belonging to the north, who live by hunting, fishing, or reindeer breeding, and the remainder, who are tillers of the soil.

PERFORMANCE TESTS OF INTELLIGENCE.—Report No. 31 of the Industrial Fatigue Research Board, prepared by Miss Frances Gaw, describes performance tests of intelligence. Most of the well-known intelligence tests have a decided bias towards linguistic ability, and although for many activities of life language is a necessary medium, yet in dealing with some types, e.g. the deaf, the blind, it is necessary to find some other way of measuring intelligence. In the United States, owing to the large population of non-English-speaking foreigners, the study of performance tests has aroused much more interest than in England. This report discusses the need for them, their historical development, the principal scales and uses, and describes a series of performance tests. A comparison of these tests with other estimates of intelligence and with tests of mechanical and constructive ability is given, and there is a useful bibliography. All those interested in intelligence testing will find these tests a useful supplement to the usual ones, and particularly valuable in the case of those children who tend to express themselves in other than linguistic modes.

JAPANESE ALGÆ AND FUNGI.—Dr. Hans Molisch, professor of plant physiology in the University of Vienna, has been travelling for a considerable time in Japan, and Volume 1, No. 2, of the Science Reports of the Tôhoku Imperial University (Fourth Series), Biology, is composed entirely of various notes contributed by him upon his observations whilst in Japan. Dr. Molisch finds the same organism, *Bacterium phosphoreum* (Cohn), responsible for the development of luminosity in butcher's meat in Japan, if this flesh is kept standing in 3 per cent. sodium chloride solution, but not submerged in the solution. He describes curious fusiform bodies in a Japanese species of *Vaucheria*, which from their reactions appeared to be protein in nature. He records the occurrence of a parasitic Alga, *Mycoida parasitica* Cunningham, upon leaves of *Camellia*, and of an epiphyllous Alga, *Phycopeltis epiphyton* Millardet, upon the leaves of various evergreens in Japan. *Pseudoplasmodium aurantiacum* Molisch is described and figured as the

species of a new genus of Acrasieæ. Various fungi are described with the habit of growing in and feeding upon the waxy deposits on the cuticles of many species of grasses, of *Acer*, and of other trees. Some of these fungi were also grown in culture on beeswax. Prof. Molisch also supplies considerable data upon various organisms responsible for the deposition of hydrated oxides of iron in Japan, a subject on which he has already published a monograph based upon his European studies. He also records *Nostoc* colonies living apparently in symbiosis with two different liverworts, *Blasia pusilla*, L., and *Cavicularia densa*, St.

EFFECT OF THYROID FEEDING ON FOWL PLUMAGE.—Torrey and Horning (1922) reported that when dried thyroid was given to growing males these assumed hen-feathering. Crew and Huxley (1923), repeating this work, but with different material and methods, failed to obtain confirmatory results. However, it was noticed during the course of this work that the administration of thyroid was followed by a marked increase in the rate of plumage growth and replacement, and that in the birds used, Rhode Island Red (red ground with black areas) and Light Sussex (white ground with black areas), the birds receiving thyroid exhibited a pronounced tendency towards increased melanism, the black areas being markedly increased in size and intensity at the expense of the other colours. Since it is known that such a parti-coloured bird tends to become lighter as it ages, the suggestion presents itself that in senility the thyroid of the fowl becomes relatively less efficient in its functioning. Moreover, the observation that thyroid administration increased the rate of feathering in the growing chick and moulting adult gained in significance when Serebrowsky (1922), and more recently Warren (1925), showed that quick feathering as contrasted with slow is a typical sex-linked character. One who seeks to interpret genetic action in terms physiological is attracted by the notion that this sex-linked factor in its action determines the time during development when first the thyroid comes into action or the degree of the functioning of this gland. Cole and Reid (*Journ. Agric. Res.*, 29, 6, 285-287, 1924) also have recently repeated the work of Torrey and Horning and have obtained results which show beyond all doubt that thyroid administration does indeed affect the plumage characters of the male. They found that new feathers grown by the birds receiving desiccated thyroid showed distinct modification towards the female type of structure and colour and that the rate of growth of these new feathers was noticeably increased. There was a reduction of red pigment, the distribution of which was irregular, and also a reduction of that area of the feather in which the barbs lack barbules, the feathers of the hackle regions, instead of being pointed and elongate, coming to possess broad rounded ends closely resembling the feathers of these regions in the female.

THE GEOGRAPHICAL RANGE OF THE JURASSIC CRINOID PENTACRINUS.—The imperfection of the geological record is a conception that should constantly be applied to the distribution of extinct creatures no less than to their range in time. Many genera of crinoids, long known from only one country or one quarter of the globe, have of late been found to have a far wider, sometimes indeed a world-wide, distribution. *Uintacrinus*, *Marsupites*, and *Saccocoma* have yielded instances. These, it happens, are all

unstalked forms and if, as some suppose, they were members of the plankton, then their wide distribution is readily explained. The latest case, however, is that of a very much-stalked form. The species *Pentacrinus subangularis*, recorded from the Middle and Upper Lias of Europe, has now been found in Alaska. Dr. Frank Springer (Proc. U.S. National Museum, 67, Art. 5) also regards as very close relations some columnals previously known from Dakota and Utah and some lately described by himself from Roti in the Dutch East Indies. This range, he says, far exceeds that of any crinoid of the present ocean. "The deep and clear seas prevailing in the Jurassic and Cretaceous periods were," he thinks, "favourable to the development and spread of marine faunas over large areas with a minimum of checks and interference, in contrast to those of subsequent periods down to the present, in which owing to the great changes in land form affecting the conditions of marine life, and to increasing competition arising from the multiplication of forms, the tendency has been toward progressively greater restriction of faunal areas." This may be, but in this connexion one may recall the many specimens of *Pentacrinus fossilis* attached to logs of wood, and may surmise that *P. subangularis* also belonged to the pseudo-plankton in its young stages. In spite of its wide distribution and its great abundance of individuals, the genus *Pentacrinus* did not, so far as we know, survive into Cretaceous times.

THE RANGE OF OTHER FOSSIL CRINOIDS.—Another instance of a wider distribution than had been supposed is afforded by the genus *Apiocrinus*. This crinoid, of which the Bradford or pear encrinite is the best-known example, is not uncommon in the Jurassic rocks of Europe, but has not hitherto been recorded from America. In the Proceedings of the United States National Museum (vol. 67, Art. 18, 1925) Dr. Frank Springer now describes some columnals from rocks, probably of Upper Jurassic age, on the isthmus of Tehuantepec, Mexico, and refers them to this genus as a new species, *A. tehuantepec*. It is also a genus long known only from Europe; at least it was not generally recognised that the Cainozoic form of it was represented in New Zealand. Recently, species of this form have been identified from various other regions of the Western Hemisphere, so that it rivals *Pentacrinus* in its distribution although so much later in time. This does not quite substantiate the contrast drawn by Dr. Springer. It is still unsafe to base conclusions upon our ignorance. For example, the fossil comatulids, of which so many species are known from Europe, appear as yet to be represented in America only by the rather obscure *Microcrinus* of Emmons; no doubt they also will be found.

SEISMIC WAVES.—The March issue of the *Journal de Physique* contains the results of the observations of the earth and air waves produced by the destruction of melinite on four dates in May 1924 at the camp of La Courtine in the centre of France. The earth waves were observed by MM. C. Maurain, L. Eble and H. Labrouste by the aid of seismographs recording the vertical, horizontal transverse and horizontal longitudinal movements of the ground at three stations between 5.5 and 25 kilometres from the point of explosion. The waves most rapidly propagated affect the vertical and longitudinal instruments only and travel with a mean speed of 5.52 kilometres per second; the slower or long waves affect all three instruments and travel with a mean speed of 2.80 kilometres per second. At the station nearest to the explosion a further slight transverse wave of speed 4 kilometres per second was observed. At Meudon,

340 kilometres from La Courtine, MM. A. Perot and F. Baldet observed the arrival of the air wave by means of a drum closed by a paper diaphragm and a sensitive flame, and found the mean speed of propagation to be 341.7 metres per second at 16° C., the first effect being a decrease of pressure of 0.6 millimetres of mercury followed by an equal increase.

THE NILE AND ITS FLOODS.—In "A Short Account of the Nile and its Basin," Dr. H. E. Hurst has published a paper he read to the International Congress of Geography (Cairo, 1925), which contains a useful summary of the latest data, accompanied by a large scale map, with regard to the Nile floods. The Nile water supply comes from two sources, first the tributaries rising in Abyssinia, and secondly, the water from the Lake Plateau of East Africa. Very little water from the Sudan reaches the Nile, since it is largely evaporated where it falls. During September, when the water is highest in the main Nile, the Blue Nile contributes 72 per cent., the Atbara 15 per cent., and the White Nile 13 per cent. During the low stage of the main Nile the White Nile supplies 80 per cent. of the water. The White Nile is at its maximum discharge in October, its waters having been held back from July to September by the rapid rise of the Blue Nile. The White Nile water comes from two sources, the Sobat and the Bahr el Gebel and Bahr el Zeraf. Very little is known of the details of the regime of the Sobat, but its maximum discharge is in October and November, while the maximum of the Abyssinian tributaries is in September. The Bahr el Ghazal, in spite of its large basin with a good rainfall, contributes very little water to the Nile. Practically all the discharge of the Gebel and Zeraf comes from the Great Lakes and the plateau, but fully half that enters the swamps of the Gebel is lost. The regime of the lakes is not well known.

SURFACE DAY VISIBILITY.—The Meteorological Office, Air Ministry, in Prof. Notes, Vol. 3, No. 40 (H.M. Stationery Office, Price 3d.), has issued a discussion on the ground day visibility at Cranwell, Lincolnshire, during the period April 1, 1920–December 31, 1923, by Mr. W. H. Pick. The relationship dealt with is that existing between ground visibility and the surface wind direction, the surface wind velocity, the existing pressure type, and the presence or absence of convection currents. For the Cranwell area it is concluded that bad or poor visibility is most frequent with wind calm or from about south-east, while good or very good visibility is most frequent with winds from north-eastward or southward. Winds with a greater velocity than 15 m./hr. are seldom accompanied by bad or poor day visibility. Days with convection, taken as days with cumulus or cumulo-nimbus cloud, are likely to be accompanied by good or very good visibility. It is regrettable that, when referring to weather types, numerals only are given, being those affixed by Col. Gold in his "Aids to Forecasting," Geophysical Memoirs, Vol. 11, No. 16. The communication in this respect is comparatively valueless unless the reader has the M.O. publication referred to. In a discussion on similar lines, Prof. Notes, Vol. 3, No. 37, noticed in NATURE, December 6, 1924, p. 838, dealing with pressure type in relation to fog frequency at Scilly during summer months, specimens were given of the different types of weather with which the author was concerned; economy in printing has possibly caused the omission.

A WIDE-ANGLE (180°) LENS.—A compound lens that enables one to photograph the entire inner surface of a hemisphere at one exposure is described by Mr. Conrad Beck in an article in the

Journal of Scientific Instruments, vol. 2, No. 4, 1925. The principle of the method occurred to Mr. W. N. Bond and to Mr. Robin Hill independently, and is that of the view which is obtained of the sky from under water, the "fish's view." Mr. Hill has devised the apparatus, which consists of a large front lens of $2\frac{1}{4}$ inches diameter, with a curved convex outer surface. At this surface a view angle of 180° is contracted to a cone of about 90° . The inside surface of this lens is very deeply concave, and of such a curve that the central ray from each point of the view passes through it with scarcely any deviation. Close to the apex of the light-cone thus formed is a comparatively small photographic lens. The combination gives an image of the complete hemisphere on a flat disc about $2\frac{1}{4}$ inches diameter, and with an aperture of $f/22$ good definition is obtained over the whole area. The character of the distortion of the image is described, and an undistorted image of any part of the photograph is obtained by reversing the action of the apparatus so that the lens is used to produce the projected image. The description is illustrated by 5 photographs of the sky, one of the nave of Ely Cathedral, and enlargements from a part of the last and one of the skies. The enlargement of the Cathedral clearly demonstrates the elimination of the distortion.

X-RAY ANALYSIS OF SOLID NITROUS OXIDE AND CARBON DIOXIDE.—It is noteworthy that the Laboratory of Physics and Physical Chemistry of the Veterinary College at Utrecht, in which van 't Hoff held his first appointment at the time when he enunciated his new theory of "Chemistry in Space," is now producing, under the direction of Prof. N. H. Kolkmeijer, an important series of investigations of space-structure by the modern method of X-ray analysis. It was natural that one of the first cases studied in a laboratory so close to that of Prof. Cohen should have been that of white and grey tin, with the result that grey tin was shown by Kolkmeijer and Bijl in 1918 to have the familiar lattice-structure of the diamond. A more recent paper, reprinted from the Proceedings of the Amsterdam Academy, describes the crystal structure of solid nitrous oxide and carbon dioxide. Each substance has a cubic symmetry, the side of the cube containing four molecules of N_2O being 5.72 Å.U., whilst that which contains four molecules of CO_2 is 5.63 Å.U. The distance between two neighbouring atoms is given as 1.15 Å.U. in N_2O and 1.05 Å.U. for CO_2 . Another paper records the fact that black precipitated mercuric sulphide, although often described as "amorphous," crystallises in the cubic system and has a structure similar to that of the cubic form of zinc sulphide.

THE SPECTRA OF ISOTOPES.—In the issue of the *Physikalische Zeitschrift* for May 25, Dr. G. Joos, of Jena, summarises the present state of our knowledge of the influence of isotopes on spectra. Up to now trustworthy evidence of such influence has only been furnished in the case of band spectra, in which both the oscillations and rotations of the nucleus are slowed down for the heavier isotopes, as, for example, in the well-known case of the hydrogen chloride doublets. In other cases the observed change of frequency has been used to determine the constitution of the nucleus the movements of which produce the spectral line, and the hydride of the metal concerned has frequently been found to be the effective material. So far, the influence of isotopes on line spectra has only been found in the case of lead, and it appears to be due to some difference of the structure of the nucleus. No direct connexion between

the satellites of spectral lines and the isotopes of the material appears to exist.

THE CONTINUOUS SPECTRA OF THE HALOGENS.—After considering the different conditions under which the continuous spectra of iodine vapour and of bromine and chlorine are observed, Dr. W. Steubing has come to the conclusion that they are not of molecular but of atomic origin, though they are not connected with the normal atomic line spectra of the elements (*Zeitschrift für Physik*, May 5). For the production of line spectra, accurately defined orbits with definite energy values are necessary; monochromatic emission will not occur when electron jumps take place which cannot be ascribed to a definite quantum orbit, but the emission will be governed by the laws of chance. It has been shown by the author that the outer electron layer, in the case of the halogens, is very unstable when acted on by magnetic and electric fields, and it is considered probable that it is also unstable for mechanical shocks; a single electron of a broken-up layer will, at first, have no uniquely defined energy, and will only attain this when the layer is completed. Thus the emission will not be monochromatic, but it will lie between certain limits having a definite boundary on the long wave-length side, as is actually observed in these three spectra. Other gases and vapours which emit a continuous spectrum do not exhibit a definite boundary towards the red.

HYDROGEN-NITROGEN AND LIQUID AMMONIA EQUILIBRIUM.—The volume percentages of ammonia in a compressed hydrogen-nitrogen mixture over liquid ammonia have been measured by A. T. Larson and C. A. Black, who record their results in the April issue of the *Journal of the American Chemical Society*. A true equilibrium appears to exist. The temperature interval used was -22.5° to 18° and the pressure range 50 to 1000 atm. The volume percentages increase with increasing temperature and decreasing pressure; the values are much higher than those calculated from the vapour pressure of liquid ammonia.

QUENCHED CARBON STEELS.—A valuable little paper on "The Structure of Quenched Carbon Steels" was presented at the recent meeting of the Iron and Steel Institute by B. D. Enlund, of Sweden. He has carried out measurements in order to determine the influence of annealing on the electrical resistivity and the specific volume of quenched carbon steels. All the curves show two bends, one appearing at a temperature of 110 – 120° C. and the other at about 250 – 260° C., according as the carbon content of the steel is high or low. These bends are visible in all the curves, thus indicating that the same reactions occur in all the steels. The bends consist in all cases of deviations towards the temperature axis, which indicates that a precipitation of cementite takes place at the temperatures mentioned. As is well known, a reaction of this kind is always accompanied by an increase in electrical conductivity. From a knowledge of the phenomena occurring in high-carbon steels quenched from a high temperature, it may thus be concluded that the break in the curves at about 110° is caused by the transformation of martensite into troostite, and the second by the resolution of austenite into α iron and cementite. Though very slight, the second bend in the curves of the mild steels is quite distinct, and it is thus evident that even such steels contain γ iron representing untransformed austenite. This is a very interesting and valuable conclusion to have established. The formation of troostite at 110° C. is accompanied by a contraction, whereas the precipitation of α iron and cementite at 250° C. causes an expansion.