

Research Items.

Monoliths in Assam.—Mr. J. P. Mills, and Mr. J. H. Hutton in vol. 25, No. 1, of the *Journal and Proceedings of the Asiatic Society of Bengal* describe a series of five groups of remarkable monoliths in the Cachar Hills not previously recorded in print. The monoliths are pear-shaped, artificially dressed, and each contains a cavity in the bulbous end. They are now recumbent, though they appear at one time to have been erected on their narrow ends. They fall into two distinct types which may be regarded as male and female. The former constitute the whole of a large group at Kartong, and a smaller group between Kartong and Kobak. Most of the stones are incised with geometric designs and forms of men and animals, such as the pig and the mithun. While the monoliths may be interpreted as embodying the phallic principle, assisting the fertilising of Nature, the hollows seem to have been meant for some specific purpose not easy to discern. It may be that they were intended to hold water to promote rainfall, or they may have been intended to contain offerings on the analogy of holes recently scooped out in ancient monoliths at Kasomari. It is concluded that the North Cachar hollowed monoliths must be regarded as a specialised development of a phallic ancestral cult typical of Assam. It is clear that they were not erected by the Nagas and old Kukis who are the present inhabitants of the area. Local tradition assigns them to the Mikirs. This may be the case, subsequent invasion having overwhelmed the Mikirs and left them in isolated communities too weak to provide the labour requisite to carry on the custom. It is more probable, however, that it is to be associated with the Khasi Synteng group of tribes and that it has disappeared owing to their migration into an unsuitable environment.

Tasmanian Crania.—Dr. W. L. Crowther describes in the *Papers and Proceedings of the Royal Society of Tasmania* for 1929 two crania (immature) of the extinct Tasmanian race. Immature crania of the Tasmanians are comparatively rare. Of these two, Skull A, that of a child of seven years of age, was found in 1908 by the author and Dr. Inglis Clark at Oyster Creek. It was in a cemetery near the Government Station where the last thirty or forty of the race were buried and was at least sixty years old. Skull B, that of a child 7-12 years old, was found by Mrs. Legge on the west coast in 1927. No trace of any other human bones was found with it, and the mandible was missing. Skull A from its fragility was judged to be female. Rings of short bronze-coloured hair still adhered to the scalp. Posthumous distortion of the left side was probably due to the body having been laid on that side. The glabella is not prominent. The orbits are almost equal in height and breadth, markedly contrasting with those of the adult. The mandible is in position and the face shows marked prognathism. The six-year molar is erupted and the twelve-year molars are *in situ*. Skull B, probably male, shows little or no prominence of the glabella and supra-ciliary ridges. The supra-orbital notch is wide and shallow. The nasal bones are not projected forward and upward as is seen in the adult. The orbits again are almost equal in height and breadth. There is no suggestion of the heavy overhanging eyebrows of the adult. The face is not so prognathous as Skull A. The vault of the skull is flattened rather than of the typical carinate form. Generally, both the skulls conform to the adult type and could be distinguished by their Tasmanian characteristics; but in both the typical carination is absent. In early life it appears that the marked width of the face at the

expense of its height is not pronounced. The orbit and nasal apertures appear to expand laterally as the result of growth and mastication, and with the normal heavy development of the glabella and supra-orbital ridges give rise to the facial characteristics of the adult skull.

Growth Rate of Young Gorilla.—Dr. C. V. Noback is reported to have made a study of the development of a young gorilla received at the New York Zoo some time ago (Science Service, Washington, D.C.). He found that it grew more slowly than a boy of the same age, the rate of growth during the first three years of life being measured in terms of adult weight. But the bones and teeth matured more rapidly than those of a human child, for the full set of milk-teeth was developed at approximately eighteen months, and the permanent teeth began to be acquired at the age of two and a half years. The study will be reported in full in the *American Journal of Physical Anthropology*.

The Swallowing of Feathers by Grebes.—It has often been observed that different species of grebes contain quantities of their own feathers in their stomachs, and the frequency of this curious habit suggests that it has some functional significance. Mewes thinks that the purpose is to protect the lining of the stomach from abrasion, Biedermann that the feathers perform a function similar to that of pebbles in granivorous birds. Neither of these suggestions is altogether acceptable, and Dr. Josef Jirsík has made a new attempt to solve the problem (*Bull. de l'école supér. d'agronomie Brno, CSR.*, 1929, Sign. D. 15). He found a young great-crested grebe (*Podiceps cristatus*) only a few hours old to contain 13 feathers, and another of the same brood 93, all the feathers having been plucked from the mother—an instinct apparently present at birth. The young birds began to swallow their own feathers as soon as they appeared amongst the down, and the adults took their own or each other's feathers almost indiscriminately throughout the whole year. Further, when the stomachs contained only small insects feathers were few, when fishes had been devoured they were many; so that the quantity of feathers seems to be regulated by the quantity of food swallowed. Hard and indigestible fragments of food were surrounded in the stomach by feathers, and the actual observation, made by means of a powerful binocular telescope, of vomiting movements on the part of the grebes similar to those of herons, strongly suggests that the feathers enable the birds to reject, in the form of a cast, the indigestible portions of a meal. Here apparently is a close analogy to the swallowing of fur by owls and other birds of prey.

Conditioned Responses in Fishes.—Mr. H. O. Bull (*Jour. Mar. Biol. Assoc.*, N.S., vol. 16, No. 2, 1930) has published the results of his further work on the capacity of fishes to form conditioned responses towards definite stimuli. He found that the wrasse is able to form stable conditioned motor responses to the note of a tuning-fork sounding the note lower *C* or to an electric buzzer giving a note approximately *F* in the second octave, when either was used singly. The fish was, however, unable to discriminate between them as sounds when both were used simultaneously but differentiated them by their position. The author was also able to build up conditioned responses involving visual stimuli in the plaice, cod, and coalfish. Two species of *Blennius* were able to form stable conditioned responses towards gustatory stimuli, such as sea water extracts of natural food substances, but

did not respond to an artificial olfactory stimulus such as artificial musk. The author concludes, as a result of his series of experiments, that the essential similarity between the responses built up in fishes and the conditioned reflexes in dogs becomes more emphasised as the data accumulate.

Young Stages of *Conus*.—The apex of *Conus* is not commonly found in a good state of preservation, while complete immature individuals are rare and that of *Conus adversarius* Conrad has hitherto been unknown. Mr. Burnett Smith is now fortunately able to describe and figure three specimens (*Proc. Acad. Nat. Sci. Philad.*, vol. 81). In the youngest of these a slight yet definite constriction serves to distinguish the whorl proper from the anterior canal, and this the author considers to be a significant suggestion of a pleurotomoid ancestry for the genus *Conus*.

South American Fish Poisons.—Messrs. E. P. Killip, of the U.S. National Museum, and A. C. Smith, of the New York Botanical Garden, in a botanical exploration of Peru and Brazil, paid attention to the plants used by the natives as sources of fish poisons, as such plants are possible sources of new insecticides. The most successful fish poison appears to be prepared from the roots of a plant which was frequently cultivated on this account and, curiously enough, was never seen anywhere in flower or fruit. They identify this plant as *Lonchocarpus nicou* (Aubl.) DC. after comparison with the specimen in the British Museum (Natural History). Two other species of this genus are also described as sources of fish poisons; one species from the lower Amazon River with an exceptionally powerful poison they decide is new and describe under the name of *L. urucu*.

Virus Diseases of Plants.—Henderson Smith summarises the literature on two obscure problems connected with virus diseases of plants in *Biological Reviews*, vol. 5, April 1930. The spread of the virus from the point of inoculation can take place from cell to cell, but the rate of spread seems high for such a process though low for transport in the water stream; Henderson Smith concludes that transport is probably mainly effected by the phloem. He also discusses the abnormal inclusions, the X bodies, characteristic of many virus-infected plants. He points out that some recent observations (F. M. L. Sheffield and Henderson Smith, *NATURE*, Feb. 8, p. 200) support the more commonly accepted view that these bodies are not living organisms, but a reaction product of the cell to the virus irritant.

Soil Formations in the Tropics.—Researches in recent years have shown that in mature stages of soil formation the characteristics of the parent material are obliterated and the soils are expressions of climate irrespective of origin. A low temperature with rainfall greater than evaporation and constant bleaching by cool water leads to a podsolised soil or podsol of a light colour and high silica content. Podsol is typical in Canada and northern Europe. In order to investigate its occurrence in high altitudes in the tropics, Mr. M. W. Senstius explored soils in the Dutch East Indies and the Philippine Islands. His results are given in a paper on weathering and soil formation in *Proceedings of the American Philosophical Society* (Vol. 69, No. 2). Many of the conditions favourable to the development of a podsol occur in the heights of those islands. Analyses of the soil samples showed that podsolisation takes place in much the same way as in the lowlands of middle latitudes, though the bleached layer below the dark humus is much thicker. Nevertheless, the author did

not find in any of the areas visited a true podsol containing little else but silica. The investigation, on the whole, supports the principles of soil classification on a climatic basis.

Helium and the Origin of Petroleum.—M. N. Rogers discusses a "radioactive hypothesis of petroleum formation" in the *N. Zealand Jour. Sci. and Tech.* for April, 1930. He suggests that methane, arising from the decomposition of the organic substances in sedimentary rocks, is condensed as a result of the ionisation due to the radioactive constituents in the same rocks. Lind and Bardwell have already shown that the effect of α -rays on methane is to produce the higher saturated hydrocarbons and liquid olefines. Rogers assumes that the extent to which such a process has operated in a sandstone may be indicated by the content of helium in the latter. Experiment indicates that for each cubic foot of helium generated nearly two tons of liquid hydrocarbons could be formed. In the Eldorado oilfield of Kansas 70 million cubic feet of helium per annum have been produced. In the Sedan field of Kansas several million cubic feet of gas with about one per cent of helium escape daily. The Petrolia gas-field originally contained more than 1000 million cubic feet of helium. It is further pointed out that radon is about fifty times more soluble in petroleum than in water, and that this might lead to a localisation of radioactivity which would bring about partial elimination of hydrogen and the production of solid hydrocarbons.

Apatite Deposits of Chibina Tundra.—In one of the Scientific Chemico-technical Publications of Leningrad (in Russian, 1929) A. E. Fersmann, the leading geo-chemist of Russia, gives a concise summary of the work done during the last ten years in exploring the Chibina Tundra for apatite. The area is a massif of rocks belonging to the nepheline-syenite family situated north of the Polar circle in the Kola Peninsula not far from the Murmansk railway. The intrusions are laccoliths or ring-complexes in the Pre-Cambrian gneisses of the Fennoscandian shield. Apatite-nepheline rock occurs in two bands. The one now being exploited has an apatite-rich upper part (average thickness, 50 metres; P_2O_5 , 30 per cent.) and a lower part poorer in apatite (average thickness, 150-180 metres; P_2O_5 , 10-15 per cent). Parts of the rock range as high as 85 per cent of apatite, and the estimated reserves of the latter amount to more than 500 million tons. The ore was formed at a late stage in the igneous cycle from a residual magma rich in volatile fluxes. It constitutes the greatest of all the Russian phosphate deposits. Preliminary prospecting by borings and construction of roads is now completed and the yield of ore next year is expected to be 200,000 tons. The by-products—nepheline and titanium ore—will be utilised in the ceramic and chemical industries.

Types of Bridges.—An ingenious and original map appears in *Petermann's Mitteilungen*, Heft 5/6, 1930, showing the distribution throughout the world of various kinds of bridges classified first by the material and secondly by the method of construction. The classifications that are mapped include eight types ranging from the simple hanging bridges of lianas and other plants to modern bridges of metal built in spans. Dr. H. Winkler adds a short article to his map. A certain correspondence with forest growth appears in the distribution of all types of wooden bridges, those made of lianas being confined to the region of equatorial rain forests. The Mediterranean forests, how-

ever, do not seem to help bridge construction, for in their area stone bridges in the main predominate. On the whole, the wood bridge in one form or another is found in more than half the land area of the world.

New England Floods.—During the last century, New England has experienced some ten storms resulting in flooding of unusual severity. One of the worst of these was on November 3 and 4, 1927, and it is the subject of a report by Mr. H. B. Kinnison (U.S. Geological Survey, *Water Supply Paper*, 636-C). Torrential rain fell over much of New England, causing very severe floods, and loss of life and destruction of roads, bridges, and houses in Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island. The storm was caused by somewhat exceptional meteorological conditions: A tropical storm appeared on the weather map over Cuba on Oct. 29, and started to move northward three days later, developing unusual severity. By Nov. 3 the storm centre was off the lower end of Chesapeake Bay. It was then expected to continue up the coast with moderately heavy, but not excessive, rains over New England. However, an area of high pressure to the north-east prevented the storm moving in that direction, and at the same time there was another high-pressure area north of New York State. The moving low-pressure area was caught between the two high-pressure areas and was forced upwards. Torrential rain resulted. Over 500 square miles there was a fall of 9 inches, while over another 36,000 square miles more than 5 inches fell. Several power reservoirs in the area were not full at the time and held some of the flood waters, but the ground was saturated by previous heavy rains, and lakes and swamps were almost full, a state of affairs which led to rapid flooding.

Light Rays as null Geodesics.—Einstein's general theory of relativity was based upon several postulates, which subsequent writers have tried to simplify. Thus Whittaker, in vol. 24 (1927) of the *Proceedings of the Cambridge Philosophical Society*, showed that to obtain the equation of light rays as space-time geodesics of zero length, we need only combine the ordinary theory of partial differential equations and of their characteristics (which may be roughly described as loci of singularities) with the simple postulate that a light ray is a line of singularities. Levita-Civita, in vol. 11 (1930) of *Rendiconti della R. Accademia Nazionale dei Lincei*, has carried the simplification a stage farther by eliminating all reference to electromagnetism. He shows that the light rays can be obtained as characteristics directly from the gravitational equations, independently of any electromagnetic theory of light.

Collisions of α -Particles with Nitrogen.—Prof. W. D. Harkins and Mr. A. E. Schuh have contributed a paper to the *Physical Review* for April 1, in which an account is given of some investigations of the production of oxygen from nitrogen, presumably those to which reference was made recently in NATURE (April 19, p. 611). It appears that 39,000 photographs of 390,000 tracks of α -rays from thorium C and C' were taken in a Wilson cloud apparatus containing nitrogen. Two 'disintegration-syntheses' were observed, in which it appeared that oxygen (O^{17}) had been formed by the addition of an α -particle to nitrogen (N^{14}), with simultaneous expulsion of a proton. One of the two photographs has been reproduced. The number of collisions per million α -rays of range 8.6 cm. in which reorganisation of the nuclei took place was only one-quarter of the number previously obtained by Mr. Blackett, but the number of elastic collisions in which the α -particle was deflected through more

than 90° was 100, compared with Mr. Blackett's 32. With such small numbers, no importance can be attached to apparent differences in yield of this order, but the numbers in question are definitely less than would be expected from the researches of Drs. Kirsich and Pettersson.

Melting-Point of Pure Tellurium.—With the view of a closer study of the strange behaviour of fused tellurium dioxide towards platinum, especially under the influence of a direct electric current, Prof. A. Šimek and Dr. B. Stehlik, at the Masaryk University of Brno, have prepared some elementary tellurium in the purest possible state. These authors then made an accurate determination of the melting-point of this 'metallic' tellurium by an electrical method whereby the temperature of a resistance furnace was raised steadily and uniformly by two, three, or four degrees C. each minute. The temperature was measured by means of thermo-elements of 'Heraeus' platinum and a ten per cent rhodium-platinum alloy. The thermo-electric force of the couple was measured by a calibrated double potentiometer connected to an aperiodic mirror galvanometer giving a deflection of 1 mm. for one microvolt, corresponding to 0.1° C. in the temperature range used. The melting-point *in vacuo* was 452.0° C., but was lowered by about $0.15-0.2^\circ$ C. in hydrogen and in carbon dioxide at one atmosphere pressure. This the authors explain as being due to the solubility of the gases in fused tellurium.

Chemistry of Menthone.—In an article on recent progress in the menthone chemistry in *Chemical Review*, vol. 7, No. 1, Prof. J. Read explains how much light has been thrown in recent years upon the constitution of products derived from oil of peppermint by researches upon the ketone *piperitone*, which can be obtained in dextro-rotatory, lævo-rotatory, and racemic forms from *Eucalyptus*. The genus *Eucalyptus* which abounds in Australia embraces about 300 species and is of immense scientific and economic importance on account of its timbers, essential oils, exudations, and dyes. By reduction of piperitone in contact with colloidal palladium one molecular proportion of hydrogen is added and a mixture of menthones of reversed and enhanced optical rotatory power is produced. Thus *l*-piperitone, of which $[\alpha] = -51.5^\circ$, gave on reduction a mixture of *d*-isomenthone and *l*-menthone with $[\alpha]_D = +65.1^\circ$. By the action of heat or of alkalis, racemisation of piperitone is effected through enolisation which destroys the asymmetry, whereas menthone under similar conditions undergoes an apparent 'inversion'. In this case, however, enolisation affects only one of two asymmetric carbon atoms, so that the product remains optically active, though reversed in sign, and the problem is complicated by the superposition of geometrical upon optical isomerism. Thus the actual product is not the enantiomorph of menthone but its geometrical isomer and the term 'inversion' has been erroneously applied. Study of the menthylamines has furnished interesting data for the development of the principle of optical superposition, the main obstacle to the solution of which problem lies in the great difficulty of gaining access to complete stereoisomeric series of suitable substances. The last section deals with speculations upon the biogenetic origin of different natural oils from related species. In this difficult field the author finds that striking relationships centre around piperitone. The very delicate control of molecular transformations which may result in producing dextro-rotatory and lævo-rotatory isomers in different plants appears to be still inseparably associated with the vital process.