

Research Items.

CALIFORNIAN ANTHROPOMETRY.—A valuable contribution to the physical anthropology of the American-Indian people is made in a comprehensive study of the available measurements on the living and on crania which is published by Mr. Edward Winslow Gifford as Part 2 of vol. 22 of the *University of California Publication in American Archaeology and Ethnology*. The aborigines of California fall into two main groups, one low-faced, the other high-faced. The low-faced group constitutes the Yuki type, with high nasal index, relatively low cephalic index, and short stature. The high-faced group is variable in nasal and cephalic index and medium to tall in stature. This group is divided into a broad-headed sub-group of wide distribution—the Californian type, divisible into narrow-nosed, broad-nosed, and tall; and secondly, a narrow-headed, narrow-nosed sub-group, the Western Mono type. The cranial material is not so representative in distribution as the measurements from the living; but it affords seven types, of which three may be local specialisations of a fundamental type with medium facial, medium to high cephalic, and medium nasal indices. This fundamental type appears to have as its nearest living representative the Californian type. Unfortunately a comparison between living and cranial measurements is impossible, as the two classes of material do not coincide in distribution. In the case of the Yuki, where there is adequate material, there is practically no difference between living and dead. Nowhere is there any indication of stratification of types. In the matter of extra-Californian relations, Boas reports a type from the coast of British Columbia with cephalic index 77-81, which resembles the Yuki, while the Californian type suggests Boas's brachycephalic type, the Tinneh. His Kwakiutl and Shuswap suggest the narrow-nosed sub-type of the Californian. The Athabascans of California do not correspond to this type, such of them as the Wailaki and the Kato being of the Yuki type.

MANIFESTATIONS OF LIFE.—The editor of *Scientia*, Prof. E. Rignano, has written in the February issue and the four preceding issues of his journal a series of articles on "Les manifestations finalistes de la Vie," in which he challenges the mechanistic position. He discusses among other subjects development and regeneration, adaptation, the behaviour of the lower organisms, reflexes and instincts. At the end of the article on the lower organisms he summarises the facts and considerations on their movements, and points out that no physico-chemical process in the inorganic world in the least resembles the avoiding reactions of these organisms, and that no non-living substance exhibits a behaviour influenced by past experiences. In the presence of these facts he writes: Should we not ask if we are not shutting our eyes to the most patent reality if we continue to say that the properties of matter suffice to explain the phenomena of life?

HERRINGS ON THE WELSH COAST.—Volume 1 of a new series of reports on work done in the Zoological Department, University College of Wales, Aberystwyth, issued in December last, has recently been received. The editor, Prof. R. Douglas Laurie, in an introduction gives a list of the researches at present in progress, and expresses a hope that reports will be issued annually. The current volume is largely devoted to an account by Mr. E. Emrys Watkin of some preliminary investigations upon the herring shoals visiting local waters in 1921 and 1922. During

the autumn of 1922, thirteen samples comprising a total of 1989 fishes taken from commercial catches at Borth, Aberystwyth, and Newquay were examined, and data collected on length, sex, degree of maturity, number of rings to scale, and growth observations on the scale. Mr. Watkin concludes that fishes with 3 and 4 rings to the scale formed 68 per cent. of the fishery. A number of distinct schools of herrings visited the fishing-grounds, of which some came to spawn, but others to feed. It is to be noted that measurements of growth increments of the actual scale were directly compared, whereas it is usual first to calculate the length of fish which by theory corresponds to each of the winter rings on the scale, and then compare these lengths. It is to be hoped that in his future reports Mr. Watkin will adopt the customary practice.

A NEW NEMATODE FROM THE RAT.—Eloise B. Cram describes (*Proc. U.S. Nat. Mus.*, vol. 68, Art. 15, 1926) a new nematode, *Protospirura columbiana*, present in large numbers in the stomach and small intestine of wild rats (*Rattus norvegicus*) captured in the National Zoological Park, Washington. Details are given of the characters of both sexes (the males are 23-43 mm. long and the females 45-100 mm.), and a table is given of the known species of *Protospirura*. Embryonated eggs from the uteri of the female worms were fed, with bread, to cockroaches in which the larvæ were afterwards found encysted, chiefly in the loose tissue in the abdomen and in the thorax. Though encysted larvæ are to be found in the cockroach about one month after feeding the latter with the eggs of the worm, the larvæ do not appear to be infective until about the fortieth day. Such larvæ when fed to rats developed into adult examples; after 53 days they were mature but not fully grown, but after 115 days they had attained the size of the majority of examples found in the naturally infected rats. The finding of this nematode in wild rats in the Zoological Park, but not in those from other parts of the city, suggests the possibility that the normal host may be a rodent other than the rat living in the Park. "That rats and cockroaches, pests commonly present around such places, may play a part in the dissemination of parasites formerly absent in a country but brought in by the animals in the Zoological Park is a possibility the recognition of which may have a practical significance."

THE CHLOROSIS OF FRUIT TREES.—Messrs. T. Wallace and C. E. T. Mann present some very interesting if puzzling data as the result of the chemical investigation of the foliage of chlorotic apple trees in the *Journal of Pomology and Horticultural Science* (Vol. 5, No. 2, March 1926). They have been studying examples of chlorotic foliage, occurring in soil rich in calcium carbonate, in which there is every reason to associate chlorosis with the calcium carbonate; in some cases comparison was possible with normal foliage, in other cases with green foliage obtained as the result of spraying the trees with sulphate of iron. In either case the same general types of difference between green and chlorotic foliage were noticed and may be summarised as follows: (1) The percentage of dry matter is higher in the green leaves; (2) ash content is usually higher in the chlorotic leaves; (3) the percentage of calcium is markedly lower in the ash of the chlorotic leaves; (4) the percentages of sodium and especially of potassium are always much higher in the ash of the chlorotic leaves. These conclusions are amply justified by the experimental

data quoted and appear very intriguing. Why, for example, should spraying with sulphate of iron produce this marked reversal in the relative proportions of calcium and potassium in the ash of the foliage leaves?

THE 'FLOWERING' OF LAKES.—The phenomenon termed by the ancients *flos-aquæ* and described by Pliny, who observed it on Lake Bolsena, is not of frequent occurrence on the large sub-alpine lakes, but it appeared during last August on Lake Como. The results of its investigation have now been presented to the Reale Istituto Lombardo di Scienze e Lettere. The 'flowering' was manifested over almost the whole surface of the lake simultaneously and persisted for several days, during which perfect calm prevailed, gradually disappearing when the wind rose. By means of a small net several decilitres of a pea-green gelatinous mass was obtainable in a few minutes, and this proved to be *Microcystis aeruginosa* (Henfrey) Lemm. The asphyxiation of fish sometimes occurring when this 'flowering' takes place on small lakes, is usually the cause, and not an effect, of the phenomenon. In sheltered pools subject to frequent and abundant flowering, the algal mass may, however, favour the growth of bacteria and thus lead to such consumption of oxygen and production of non-respirable gases as to render fish life untenable.

VEGETIN.—In the *Rendiconti* of the Reale Istituto Lombardo di Scienze e Lettere, Prof. Montemartini gives the results of experiments made with a fungicide known as vegetin, which is an impalpable, black powder and has carbon as its fundamental ingredient. The experiments were made with leaves of potato, tomato, mulberry, *Broussonetia*, fig, *Ricinus*, horse chestnut, and *Tropæolum majus*. Although the efficacy of this preparation as a fungicide is left in doubt, in most instances leaves over which it was dusted performed their metabolic functions appreciably more actively than similar leaves not so treated. A further series of experiments is projected with the view of ascertaining the mechanism of this effect.

THE MINERALS OF BENTONITE.—The first fruits of an important investigation of the mineral composition of clays are presented by C. S. Ross and E. V. Shannon in a paper dealing with bentonites and related clays, and published in the *Journ. Amer. Ceramic Soc.* for February 1926. Bentonite is a widely distributed clay-rock that has resulted from the devitrification and alteration of glassy volcanic ash. Its characteristic minerals are completely crystalline and have a micaceous habit, high birefringence, and easy cleavage. The high absorptive power of bentonite is not due, as has been thought, to the presence of gel colloids, for few of the crystal films are so small as to reach colloidal size. The peculiar properties are held to be a consequence of the easy cleavage of the minerals, giving a very great surface area, and of the felt-like texture which facilitates permeability. A large number of analyses of the clay-minerals from bentonite indicates that, like the type montmorillonite from France, the composition of the most abundant mineral is $(\text{Mg}, \text{Ca})\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 5\text{SiO}_2 \cdot n\text{H}_2\text{O}$. This mineral has also been recognised in fuller's earth. Beidellite also occurs in bentonites, and has the formula $\text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2 \cdot n\text{H}_2\text{O}$. A third micaceous mineral has the composition of halloysite, $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot n\text{H}_2\text{O}$, but is visibly crystalline and has a high birefringence.

TROPICAL CYCLONES OF THE PACIFIC.—A description of the storms is given by Dr. S. S. Visher and is published as *Bulletin 20 of the Bernice P. Bishop Museum*, Honolulu, 1925. The general characteristic

of the cyclones is described, with their distribution and frequency. The information has been collated from various sources, and in this way the publication is more complete and of greater value. Most of the storms appear to start between 10° and 20° north and south. On an average more than fifty tropical cyclones are said to develop each year in the Pacific. Lists are given of the number of storms experienced in each year, and their occurrence is also listed for the several months. A majority of the tropical cyclones of the Pacific move westward and poleward until they arrive in about lat. 20° - 30° , and then they recurve and move eastward. Frequently cyclones move more abnormally. Cyclones differ considerably in their speed of travel, the movement of the storm ranging from 1 mile to more than 50 miles an hour; at their initiation they generally move slowly. Tropical cyclones are classified in three types with respect to duration, the short-lived storm lasting a day or two, the common storm lasting three to six days, and the long-lived storm lasting more than a week; some of the long-lived storms are followed for more than three weeks. The storms are classified for intensity. With reference to predicting storms it is stated that the advantage of prediction would be so great that many attempts have been made at forecasting, but it seems likely that it will always be impossible to do more than state the probability of a hurricane occurring somewhere in a rather large region. Much useful information is given on numerous points of interest with regard to cyclones in the Pacific.

EXTINCT AMERICAN CARNIVORES.—A number of the *Bulletin of the American Museum of Natural History* has appeared giving a very full account by Childs Frick of certain Tertiary carnivores (vol. 66, art. 1, 1926: "The Hemicyoninae and an American Tertiary Bear"). The author collects together certain genera, namely, Hemicyon, Dinocyon, Hyænarctos, and Ursavus, into what he terms a 'morphological group,' the Hemicyoninae. A 'morphological group' is explained as a collective term for an assemblage of animals which are united by certain characters but more or less widely separated by others, and is used to avoid the terms 'family or sub-family' with their implication of close relationship. The paper describes in considerable detail the members which form this group, and, as an addendum, a new genus, Plionarctos, of true bears.

A RICH LINE SPECTRUM.—In the March issue of the *Journal of the Franklin Institute*, Dr. Marion Eppley describes a simple means of obtaining a series of closely spaced lines of nearly equal intensities between wave-lengths 6678 and 3990 Å.U. for reference and other purposes. The end of a carbon rod of about 0.6 cm. diameter is heated to redness in a bunsen flame and dipped into a dry powder of vanadic acid, molybdcic acid, and anhydrous titanic oxide in the proportions 8 : 5 : 2 by weight. The end of the rod is again heated to fuse the adhering powder and the process repeated until a thick crust of the mixture has been formed on the end of the rod. Two rods with their ends about 1 cm. apart are used as the electrodes of an ordinary spark arrangement. To identify the lines of this spectrum the spark spectrum of an alloy of cadmium, zinc, lead, and tin in the proportions 35 : 35 : 73 : 30 is photographed upon it. This alloy has several advantages over that used by Hartley.

SOLUBILITY OF CALCIUM SULPHATE.—The solubility of those phases of calcium sulphate existent at the temperature of boiler water has been determined by R. E. Hall, J. A. Robb, and C. E. Colman, and the

results published in the *Journal of the American Chemical Society* for April 1926. The solutions were prepared in an iron autoclave with an internal filter consisting of layers of woven cloth supported on a perforated steel frame. Their results and those of previous workers are in good agreement at higher temperatures, but the difficulty in controlling the lower temperatures renders measurements under the latter conditions less trustworthy.

THE ATOMIC WEIGHT OF METEORIC CHLORINE.—The constancy of the atomic weight of chlorine of marine origin has suggested an investigation of the constancy of the atomic weight of the element from minerals of non-marine origin and of that from meteorites. The determinations were carried out by W. D. Harkins and S. B. Stone, who found the ratio of silver to silver chloride by dissolving pure silver in nitric acid in a long-necked quartz flask and treating it with the different specimens of hydrochloric acid. The constancy of the isotopic composition is shown by the values for meteoric and terrestrial chlorine, given in the *Journal of the American Chemical Society* for April 1926, which are identical within the limits of the very small experimental error.

BENZOLE RESEARCH.—We have received a copy of the Report of the Joint Benzole Research Committee for 1926, giving a detailed account of the work carried out by the Association's chief research chemist, Mr. W. H. Hoffert. The report discusses the relative values of the absorption powers of active carbon, silica gel and ferric oxide gel, in the recovery of benzole, and examines the possibilities of cresol and tetralin as wash oils in place of creosote and gas oil. Most important is the investigation of the tendency of poorly refined benzoles to form resins on storage or when used in internal-combustion engines, with several photographs illustrating the effects of different samples on the production of carbon in a motor-car engine after 100 hours' running on a test bench. The results of the tests indicate that the deposits are due to the presence of unsaturated constituents. The report is completed by the addition of a classified bibliography.

HEATS OF FUSION OF LOW MELTING-POINT ORGANIC SOLVENTS.—The heat of fusion of a solvent can be calculated from the freezing-points of two solutions at two different concentrations. The apparatus, described in the February issue of the *Bulletin of the Chemical Society of Japan*, consists of a small vessel immersed in an ether or pentane bath cooled in liquid air, the temperature being controlled by an electric heater. The heats of fusion were calculated from the values of two points falling on the straight line obtained by plotting against the logarithms of the molar fractions.

ACCURATE HEATS OF VAPORISATION OF LIQUIDS.—A paper by J. H. Mathews appearing in the *Journal of the American Chemical Society* for March 1926 describes the accurate determination of the latent heats of evaporation of fifty-nine liquids. The liquid, contained in a glass vessel surrounded by vapour and suspended from the arm of a balance, is heated electrically by a platinum spiral immersed in it. The method gives values which are more trustworthy than those obtained from vapour pressure measurements, since small errors in the determination of the vapour pressures lead to relatively large errors in the value of the latent heat.

INFLAMMABILITY OF FIREDAMP IN THE PRESENCE OF BLACKDAMP.—The limits of inflammability of

-firedamp in atmospheres which contain blackdamp is the subject of a report by H. F. Coward and F. J. Hartwell of the Safety in Mines Research Board (Mines Department: Safety in Mines Research Board. Paper No. 19: The Limits of Inflammability of Firedamp in Atmospheres which contain Blackdamp. H.M.S.O. Price 6d. net). It was found impossible to explode air-firedamp mixtures containing more than 25 per cent. of carbon dioxide or more than 38.5 per cent. of nitrogen. The minimum amount of blackdamp necessary to prevent explosion in air-firedamp mixtures lies between these limits and depends on the ratio of carbon dioxide to nitrogen in the blackdamp.

CHANGES IN THE GASTRIC SECRETION OF BIRDS.—In his investigations on the stomach of the pigeon, Claude Bernard found that, while the young are being reared, the glands of the first of the three stomachs of the parent birds furnish a lacteal secretion which, while it softens the grains they eat, also modifies this grain so as to render it suitable for the young birds. After a time, however, the stomachs of the parents resume their normal condition and begin again to secrete ordinary gastric juice, which contains from 2.5 to 5 per cent. of gastric acid. Since this acid would be highly injurious to the young, the latter are driven from the nest by their parents and, if incapable of fending for themselves, soon perish of starvation. That this instinctive knowledge of the poisonous character of the normal gastric juice is not shared by all birds is shown by observations by P. J. Kaas, described in the *Atti della Pontificia Accademia delle Scienze (Nuovi Lincei)*. A nest of five goldfinches, transferred to a cage, were fed morning and evening, through the wires, by the parent birds, until one day, two hours after their morning meal, they were all found dead. Evidently, if the young birds are unable to fly and feed themselves before the time when the gastric juices of the parents revert to their normal composition, they perish, not by inanition, as is the case with pigeons, but by poisoning. It is a singular phenomenon, which has been repeatedly confirmed, that this reversion occurs simultaneously with both parents. The elimination by these means of the individual birds incapable of supporting themselves is regarded as one of the processes by which the preservation of specific characters is effected.

MANUFACTURE OF SMOKELESS FUEL.—In a paper recently read before the South Wales Institute of Engineers at Cardiff, Mr. David Brownlie discussed the production of free-burning smokeless fuel by low-temperature carbonisation by processes involving the compression or briquetting of the charge. Such processes may involve mechanical compression of the viscous charge during carbonisation, preliminary briquetting by means of pitch or other binder, or preliminary briquetting without the use of an externally produced binder. Processes of the last class usually necessitate the use of very high pressures, but a new process (*Delkescamp*) of German origin was described in which a portion of the coal ground to a colloidal condition with water is admixed with the use of quite moderate pressures, and the mixture can be briquetted and then carbonised at low or high temperatures. Mr. Brownlie put forward a strong plea for the further study of low-temperature carbonisation. That it is difficult to establish on an industrial scale is clear from Mr. Brownlie's statement that the relevant processes and patents are numbered by hundreds; yet none of these is known to have established itself permanently.