

## Research Items.

**Polynesian Anthropometry.**—Prof. Wood Jones prefaces a discussion of the anthropometry of the Polynesians in *Man* for April with certain preliminary considerations which he commends to the attention of anthropologists: First, that the question of the origin of the race has been obscured by a tendency to confuse the point of their mixed origin with that of a tendency to hybridisation shown in the aelong toleration of admixture with alien blood; secondly, that anthropologists have neglected the methods of their fellow-workers in other branches of zoology, though recently Sir Arthur Keith has brought the study into line by regarding human races as variously perfected stages of human evolution; thirdly, correlation of growth must not be overlooked; for example, the correlation in length of vertebral column, base of skull, and maximum head-length. Turning more specifically to Polynesia, can anthropometric methods demonstrate, aside from recent admixture, the original blending of separate racial elements in the formation of a Polynesian type? Sullivan's observations were summed up by him as demonstrating two races in Polynesia. This was based on a method of selecting one characteristic and noting the status in a series in regard to other features; thus from an examination of "23 tallest men", "21 shortest men", and so forth. But in view of the zoological principle mentioned above, the results probably denote no more than that they represent the tallest and shortest individuals with the usual correlations of head and face. The same distinctive classification is obtainable from Burton's tables of Australian aborigines, but no one would suggest that this homogeneous group is derived from the crossing of two racial strains. The same criticism applies to the frequently repeated classification of the bones and skulls found in English Church crypts into 'conquerors' and 'conquered'—'Romans' and 'British', 'Saxons' and 'Danes'.

**Origin of the Caste System in India.**—In the *Indian Antiquary* for March is published the first instalment of a discussion of the origin of the caste system in India by the late Mr. Charles Hill. The civilisation of India is utterly different from any other type in the world. The word 'caste', of Portuguese origin, means 'purity'. The system is aristocratic in that birth is considered essential to the possession of certain qualities, yet it is democratic in the fact that theoretically the members of all the groups are on an equal footing. Expulsion, which follows on any cause, however slight or accidental, leads to the formation of a new caste when the breach is great or intentional, or a sub-caste when it is slight and accidental. The result is that there are now more than 2000 castes and sub-castes. According to tradition, the Hindus were originally divided into four castes only—Brahmans, a spiritual priesthood, Kshatriyas, warriors sprung from the arms and shoulders of Brahma; the Vaisyas, who provide the food, clothing, and other necessities of man, born of the belly of the god; and the Sudras, whose lot is servitude and issue from his feet. The first three are 'twice born' and wear the sacred thread, though the Vaisyas receive it only on marriage. All Hindus belong to one or other of these four original castes or classes. Though similar to classes which once existed in Persia, Egypt, and Arabia, they survived in India only. It is suggested that the caste system was inaugurated as a method of securing stability at a time of social upheaval, such as would have occurred when the rulers of the Aryans entered India after being expelled by force from their earlier home. That the caste system did achieve such

stability is shown by the tenacity with which Hindus clung to it while exhibiting apathy to all forms of government and changes in it. The formation of new castes strengthens the bonds of caste, for all are equally a manifestation of Brahma, though of different qualities.

**Manchurian Rodents and Disease.**—In the steppes of Asia rodents play a significant part in the web of Nature, mainly on account of their enormous powers of multiplication. The tunnelling of underground burrows, the destruction of vegetation, and the tilling of the soil are all important activities, but for man their most vital part is that of possible disease carriers. It is undoubted that the sudden vanishing of many rodent plagues is due to epizootics, and many substantial reasons suggest that the epizootics occurring among the rodents of the steppes are associated with the spread of bubonic plague, which visits the region almost every year. With this possible association in view, Dr. Wu Lien-Teh, chief of the Manchurian Plague Prevention Service, Harbin, has published a useful account of the biology and pathology of the wild rodents found in Manchuria and Mongolia (*Bull. Peking Soc. Nat. Hist.*, vol. 4, No. 2, p. 95, December 1929). Several of the rodents, such as the tarabagan (*Arctomys bobac*), the spring hares (*Alactaga* and *Dipodipus*), various voles, rats, and mice, have already been found to be susceptible to plague under natural conditions. Moreover, by harbouring plague during hibernation, some carry over infection from one plague season to another. It has been shown that domestic rats play an important part in the spread of the plague outbreaks, and attention is now being turned to the investigation of the source of the domestic rat infection, whether or not it may be connected with wild rodents.

**Fluctuations of Manitoban Grouse.**—For several species of animals it has now been shown that numbers fluctuate with a fairly regular rhythm, although the periodicity appears not to be identical for all species. To the growing list of regular fluctuations Norman Criddle would add the sharp-tailed grouse and ruffed grouse in Manitoba (*Canadian Naturalist*, April, p. 77; 1930). The years of plenty of these he associates with abundant locust years, and traces the relationship through the fact that grasshoppers are apparently necessary food for the young of the grouse. The reduction in numbers which follows years of abundance he suspects may be due partly to disease and perhaps partly to the activities of enemies, such as goshawks. But has the author proved his point about periodicity at all? His observations from 1914 to 1929 on the numbers of ruffed grouse nesting upon a 26-acre wood-lot clearly do not establish a rhythm, for if a rhythm exists, it approaches a ten-yearly period, and the observations cover only sixteen years. On the other hand, the graph showing the annual fluctuations of grasshoppers, sharp-tailed and ruffed grouse from 1895 to 1929 at Aweme, Manitoba, looks convincing with its three series of peaks occurring at intervals of ten years. But the figures upon which this interesting graph is based are not stated, and we are left to understand that it represents no more than an ideal representation of the general notes in a series of journals, and therefore, that its details and fine agreements have no numerical sanction. More should have been said about the character of the information upon which the graph and consequently the conclusions are based.

**Rooting of Woody Cuttings.**—Very contrary reports have been given by different investigators as to the effect of the buds upon the production of roots on hardwood cuttings. Van der Lek has recently described experiments which suggest that in willow, currant, and vine the production of roots is more rapid upon such cuttings when the buds are left upon them. He suggested that 'hormones' released from the developing buds might be responsible for this effect. W. A. Sledge points out, in a paper in the *Journal of Pomology*, Vol. 8, No. 1, January 1930, that root production in such cuttings is closely connected with cambial activity. He re-examines root production in cuttings from this point of view and confirms an early observation of Hartig that cambial activity begins on the shoots at the base of the buds and works from thence down the stem. In these cuttings, however, cambial activity is also resumed at the base of the cutting as the result of the wound, such cambial activity being quite independent of the presence of buds, as is shown by an examination of internodal cuttings, in which also cambial activity occurs at the proximal end of the isolated internode. Root production seems certainly associated with this renewal of cambial activity and the effect of the buds in enhancing root production in Van der Lek's experiments may be associated with the renewed activity of the cambium throughout the length of the cutting as the result of the early development of the buds.

**Radioactivity of Granites and Granodiorites.**—Dr. H. Hirschi has recently published in the *Schweiz. Min. und Pet. Mitt.* determinations of the radioactive elements in three important groups of plutonic igneous rocks. The results are summarised in the table below, the detailed references being as follows: (1) "Radioaktivität der wichtigsten Granitmassen des Gotthardmassivs." Bd. 8, Heft 2, 318-320; 1928. (2) "Radioaktivität des Albtal- und Schlossberg-Granits des südlichen Schwarzwaldes." Bd. 8, Heft 2, 321-322; 1928. (3) "Radioaktivität einiger Tiefengesteine vom nördlichen Baja California" (Mexico). Bd. 9, Heft 1, 1-2; 1929.

| Ref. | Rocks and Localities.                           | Per gm. of Rock.        |                          |                         |
|------|---|-------------------------|--------------------------|-------------------------|
|      |   | U ( $\times 10^{-5}$ ). | Th ( $\times 10^{-5}$ ). | K ( $\times 10^{-5}$ ). |
| 1    | <i>St. Gotthard Massif.</i>                     |                         |                          |                         |
|      | Gamsboden Granitegneiss . . . . .               | 1.77                    | 4.1                      | 4.68                    |
|      | Rotondo Granite . . . . .                       | 1.41                    | 6.5                      | 5.29                    |
|      | Fibbia Granite . . . . .                        | 0.92                    | ..                       | 4.84                    |
|      | Kristallina Granite . . . . .                   | 1.20                    | 4.3                      | 4.78                    |
| 2    | <i>Medelser Granite</i> . . . . .               | 0.74                    | 3.4                      | 5.18                    |
|      | <i>Southern Black Forest.</i>                   |                         |                          |                         |
|      | Albtal Granite . . . . .                        | 1.32                    | 4.4                      | 5.03                    |
| 3    | Schlossberg Granite . . . . .                   | 1.32                    | 4.2                      | 6.10                    |
|      | <i>Northern Lower California (Mexico).</i>      |                         |                          |                         |
|      | Granodiorite . . . . .                          | 0.28                    | 2.5                      | 1.91                    |
|      | Granodiorite . . . . .                          | 0.24                    | 1.7                      | 2.32                    |
|      | Granodiorite (border facies) . . . . .          | 0.41                    | 1.5                      | 2.75                    |
|      | Biotite - hornblende - quartz-diorite . . . . . | 0.25                    | ..                       | 2.95                    |
|      | Granodiorite . . . . .                          | 0.37                    | 2.2                      | ..                      |
|      | Biotite-granite . . . . .                       | 0.63                    | 1.5                      | 4.96                    |
|      | Granodiorite . . . . .                          | 0.60                    | 1.7                      | 2.92                    |
|      | Hornblende-granite . . . . .                    | 0.64                    | 7.0                      | 3.05                    |
|      | Norite-gabbro . . . . .                         | 0.30                    | 3.2                      | 0.25                    |
|      | Biotite - hornblende - granite . . . . .        | 0.78                    | 4.8                      | 3.88                    |
|      | Granodiorite-quartz-diorite . . . . .           | 0.31                    | 4.4                      | 2.41                    |
|      | Granodiorite . . . . .                          | 1.23                    | 4.5                      | 2.06                    |

**The Golconda Diamond Mines.**—The first issue of the newly established *Journal of the Hyderabad Geological Survey* contains the annual report of the Survey, but is mainly devoted to a geological and

historical account by Capt. L. Munn of the ancient diamond mines of Hyderabad; Golconda was formerly the capital of this State. Capt. Munn's compilation is supplemented, through the courtesy of the Royal Society, by a reprint of a paper on the subject read before the Society by the Earl Marshal of England in 1677. Up to the year 1728, this region was the sole source of the world's supply of diamonds, the Great Mogul or Koh-i-noor being among the more famous of the later finds. The earlier wealth has become proverbial and was responsible for the fabulous tales of Sindbad the Sailor and Marco Polo. The diamonds are found in the Pre-Cambrian Banaganpilly Group of quartzites and pebble-beds occupying a low position in the Vindhyan system, and it is noteworthy that at Wajra Karur "an igneous pipe, or neck, of bluish tuff-like rock exists". No gems have been extracted from this pipe and the real source is probably hidden beneath the Deccan traps. In 1890 a modern attempt to exploit the 'mines' was made, and 3444 stones were extracted before the enterprise was closed down in 1894 as being unprofitable.

**Silica Glass at Meteor Crater.**—A remarkable occurrence of lechatelierite or silica glass produced by the fusion of a saccharoidal sandstone at the bottom of the depression of Meteor Crater in Arizona is described by A. F. Rogers in the *Am. Jour. Science*, March, 1930. The only rocks in the immediate neighbourhood are sandstones, shales, and limestones, the nearest exposed igneous rocks being ten miles away. A temperature of between 1400° and 1800° C. was required to transform the quartz into silica glass. The latter occurs in comparatively large masses up to 15 cm. in thickness and could not have been formed, like fulgurites, by lightning. It is equally impossible that silica glass could be produced by a steam explosion. Barringer's well-known hypothesis that the crater was formed by the impact of a huge meteorite thus receives strong support, for no other explanation has been advanced that would equally well account for the melting of some parts of the sandstone floor and the shattering of other parts into a finely comminuted rock-flour.

**A 100-Ton Testing Machine.**—In the *Engineer* for April 4 is an illustrated description of a new 100-ton electrically-operated testing machine, which has been supplied by W. and T. Avery, Ltd., to the City of Leicester Colleges of Art and Technology. The machine is of the compound lever type. For tension tests it will take specimens up to 10 ft. in length and 3 in. in diameter; for compression tests, specimens 10 ft. in length and up to 12 in. square; and for bending tests specimens from 4 ft. to 14 ft. can be accommodated with a maximum width of 16 in. The straining crosshead is moved by three straining screws on the end of each of which is a spur wheel driven by a main worm reduction gear which in turn is coupled to a gear box driven by a reversible variable speed electric motor. The crosshead can be moved at speeds varying from  $\frac{1}{10}$  in. to 8 in. per minute. The scale on the steelyard is machine-engraved from zero to 100 tons by divisions of 1 ton, and a micrometer screw dial subdivides these readings into  $\frac{1}{100}$ th ton divisions. Mounted on the top of the steelyard column is an autographic recorder.

**Quantitative Analysis by X-Rays.**—The April number of the *Proceedings of the Royal Society* contains a paper by C. E. Eddy and T. H. Laby on the quantitative analysis of alloys by means of their X-ray emission spectra (see also NATURE, April 5, p. 524). The fundamental assumption made is that the ratio of the number of atoms of two elements in an alloy

is equal to the ratio of the intensities of corresponding lines in the X-ray spectra of the elements, provided that the lines are excited under equivalent conditions, and that the elements are nearly equal in atomic number. The experimental determination of the relative intensities of the lines is made by making the alloy the target of an X-ray bulb, and analysing its emission spectrum by a rotating crystal spectrometer with photographic registration, the blackening of the X-ray film, as measured by a Moll recording microphotometer, being correlated with the corresponding intensity of the X-rays by the usual methods. In general, Prof. Laby and Mr. Eddy's results are more satisfactory than those of earlier workers in this field. They have paid some special attention to alloys in which the element to be estimated is present to the extent of less than one per cent, to which it is often difficult to apply other methods of analysis, especially when only small samples of material are available, and have also obtained good results for traces of lead in zinc, a case in which the elements differ widely in atomic number, and for which a modified method had to be devised.

**Measurements at High Voltages.**—The amount of power absorbed by the dielectric in an electric cable when working under various conditions is considered by many manufacturers to give valuable information as to the quality of the cable. In a paper on low power factor measurements at high voltages, which was read to the Institution of Electrical Engineers on April 4, Dr. E. H. Rayner, W. G. Standing, and R. Davis, of the National Physical Laboratory, give a critical study of the various methods adopted in practice for measuring these dielectric losses. When a high voltage is applied to unloaded mains, the ratio of the power absorbed to the product of the volts and amperes, that is, the power factor, is generally very minute. In this case the measurement of power presents many difficulties, as a small difference in the phase angle between the current and the pressure may make a large difference in the power measured. A standard air condenser, the difference between the plates of which is variable, has been constructed. It is suitable for use with 100 kilovolts. When the distance between the plates is 10 cm., the capacity, or, as it is now called, the capacitance, is 500 c.g.s. units. This condenser, when used with a Schering bridge, is found to give very accurate results. When using wattmeter methods of measurement, it was found that the non-inductive resistances or 'resistors' were often affected by stray capacitance currents. These errors could be eliminated if the resistor were shielded at every point by an electric field maintained at its own potential. The resistor used consisted of water flowing in tubes, and these were surrounded by others at the same potential. It was found possible by this compensation to keep the electric current in the water in phase with the applied voltage. Compared, however, with the air condenser, a resistor using a closed water circuit was relatively a troublesome piece of apparatus to use. During the experiments, the resistivity of the water was well maintained at 30,000 ohms for four months.

**Carbonisation Tests.**—It is frequently important to be able to estimate the value of a coal for carbonisation purposes by tests which can be carried out in the laboratory. All such tests exhibit the defect that large scale results cannot be exactly reproduced, and certain factors are necessary to correlate these with laboratory results. The Gray-King assay was devised at the Fuel Research Station for the evaluation of coal for purposes of carbonisation at low temperatures

—600°—and the appropriate correlation has already been made. In *Fuel Research Technical Paper*, 24 (H.M.S.O. 1930, 9d. net), an account is given of a modification of the assay whereby higher temperatures are used and conditions conducive to secondary decomposition in the retort are provided. Factors which enable the results obtained with this new apparatus to be interpreted in terms of gas works carbonisation have been determined.

**Fires in Bunkers and Cargo Coal.**—The transport of coal by sea is fraught with a serious hazard of fire which continues to take a heavy toll in spite of generations of experience, and although radio communication has removed the worst terrors. The hazard has been the subject of repeated inquiry, and again, recently, by the Fuel Research Board, which has investigated 336 fires in bunkers and cargo coal in 272 ships (*Fuel Research Special Report*, No. 5, London: H. M. Stationery Office. 2s.). The net result of this inquiry is that 86 per cent of these fires could be assigned to definite and ascertainable causes, avoidable by suitable precautions. Only 14 per cent of the accidents were so unaccountable as to leave unavoidable spontaneous combustion as the only assignable cause. All fuel is liable to spontaneous combustion under certain conditions which coal chemistry has brought to light, and it seems that this fire loss is one which could almost be avoided by the application of existing knowledge. Shipbuilders might remove hot pipes and other sources of heat from bunkers or holds, and design ventilation systems so as to avoid leading air into large masses of coal in confined spaces. Shipowners might maintain bulkheads sound and tight. Certain precautions might be taken at coal staites in the loading and trimming of coal. In short, a little scientific knowledge might lighten the practice of coal handling and, to judge from this report, a handsome dividend should accrue to both shipowners and underwriters.

**Utilisation of Salt-Lake Deposits.**—The great mineral wealth which is available in the form of salt-lake deposits in various lands has, up to the present, been very incompletely utilised, except for the extraction of ordinary salt. Prof. B. Panteleymonoff, of the Academy of Sciences in the Ukraine, contributes an article to the *Chemiker-Zeitung* of Feb. 22 on the progress which has been made since 1923 in the exploitation of Russian salt-lake deposits at the Rapa works. The article is written exclusively from the industrial point of view, and is not concerned with the great mass of purely scientific work which has already been carried out there. Among the problems investigated on the technical side is the production of compounds of magnesium and halogens. The magnesia obtained is of a high degree of purity. Iodine appears to be confined to those lakes which are in the neighbourhood of petroleum deposits, and the problem of its satisfactory extraction has not been completely solved. The possibility of the early exhaustion of the iodate deposits in Chile lends interest to this problem. Magnesium chloride is perhaps the most important of the products obtained, owing to the fact that its extraction leads up to the production of potassium chloride and magnesium sulphate from the mother liquors. The extraction of magnesium chloride from salt-lake deposits is a more difficult problem than that of its production as a by-product of the Stassfurt deposits. Bromine is either extracted with a solvent or recovered by distillation. The systematic design and development of undertakings for the utilisation of these deposits is of exceptional interest not only in Russia but also in America, France, Italy, and other countries which possess salt-mines.