Research Items

Hawaiian Feather Cape. In *Man* for January Mr. H. G. Beasley figures in colour and describes a feather-cape from Hawaii, which he acquired for the Cranmore Ethnographical Museum, Chislehurst, in 1932. The cape measures 62 in. round the base and is 25 in. in depth, thus falling into the intermediate series, in which the base-line measurement is that of a full-sized cloak, but the shallow depth that of a cape. The ground-work is of red Iiwi feathers (*Vestiaria coccinea*) and the pattern and border are of yellow Oo (*Acrulocercus nobilis*). The main body of the foundation is somewhat coarse; but the six-inch border is of finer meshed work. The cloak belonged to Sir Joseph Banks and was given by him to his private secretary, Mr. R. K. S. Durham, from whose grandson it was obtained by Mr. Beasley. It is to be presumed that Banks obtained the cloak from one of the officers who sailed with Cook in his later voyages; but the connexion with any one of Cook's voyages cannot be established. In a supplementary note Mr. H. J. Braunholtz adds that the birds from which the feathers were taken were captured alive and often released after they had been plucked. The popular belief that the Oo bird had only two yellow feathers is erroneous: actually the yellow feathers form axilliary tufts containing 15–20 feathers. The feathers are attached to a net of fibre, each separately, by a finer thread of the same material. The use of cotton thread is a sign of modernity. The British Museum now has twenty-six of these feather capes or cloaks, presumably the largest collection in existence. They were first described by Capt. King in his account of Cook's third voyage when the Hawaiian group was discovered in January 1778.

Gods of Maya and Aztec. In an appendix to a study of the calculations of the solar year in Mayan inscriptions on stone stelæ at Quirigua, Guatemala (Field Museum of Natural History, Chicago, Pub. 315, Anthropological Series, vol. 17, No. 4), Mr. J. Eric Thompson considers how far any resemblance may be detected between the Aztec 'Lords of the Night' and the equivalent Maya glyphs of the gods. The sun god is unmistakable. Xiuhtecutli, the fire god of the Aztec, is the Maya glyph in which a flame bracket branches from the god's mouth. In one instance, three balls of flame are shown above the head. Itzli, the second in the Aztec series, has no known Mayan equivalent. Piltzintecutli, the Aztec sun god, in the Maya series is Kinich Ahau, both being associated with a flower or leaves. The fourth Aztec god Centeotl is the maize god, corresponding to the Maya glyph showing a head with the numerical co-efficient of nine and a large human hand, which, the evidence goes to show, denotes an agricultural deity. Mictlantecutli, the Aztec death god, is represented by the Maya glyph with the coefficient of three. Only two examples of the glyph are known and the connexion with death is not clear. The Mayan equivalent for the sixth Aztec 'Lord of the Night', Chalchihuitlicue, goddess of water, through the month sign Mol and day sign Muluc, may also be connected with water. One of the closest parallels is that between Tlazolteotl, the Aztec earth goddess and the Mayan moon goddess, wife of the sun. Both are connected with agriculture, the Aztec through maize, the Mayan through flowers, and both are also concerned with sexual indulgence. The eighth Aztec god, Tepeyollotl, is an obscure earth and mountain deity, who as a jaguar-like animal has a conch shell as symbol. This connects him with a Mayan mountain deity. The ninth and last in the Aztec series is Tlaloc, the rain god. The equivalent Mayan glyph is a young deity with an ear-flap, of which only two examples are known. The association is not clear. Thus in six out of the nine, a remarkable coincidence between Aztec and Maya is apparent.

Making Whole Mounts of Vertebrate Skeletons. Mr. M. Rahimullah and Prof. B. K. Das, of Osmania University College, Hyderabad, have sent a communication describing a method of preparing the whole skeleton, free from soft parts, of a vertebrate, such as a snake or a rat, by a modification of the well known alizarin and caustic potash method. The chloroformed animal is fixed and hardened in strong alcohol (about 92 per cent) for four days, then rinsed in tap water and transferred to a 1 per cent solution of caustic potash. After a period of at least eight days, the bones can be seen through the translucent skin and muscles. The animal is then transferred to a solution of alizarin and caustic potash (made by dissolving 0·1 gm. or less of alizarin *S* in 1,000 c.c. of 1 per cent potash), where it remains for at least twelve days, until the bones take a deep pink hue. The macerated muscles are then dissected away, leaving the skeleton intact. It is not clear from the communication whether the connective tissues uniting the bones have escaped maceration, or whether the articulation of the parts of the skeleton remains to be done in the usual way, but the former claim seems to be made. The hairs of mammals remain opaque, but after a few days in the potash solution they are loose enough to be scraped away with a section lifter or similar instrument. In this way albino rats and young rabbits have been successfully treated.

Early Stages of Hispine Beetles. While there remains still very much to be done in the morphological and anatomical studies of insects in the adult stage, this work is progressing much more rapidly than the study of their immature stages. Researches in the morphology of the latter, however, can be of great interest and value since a number of general biological problems are suggested by them. This is shown very clearly by recent detailed work of S. A. Maulik on the larval and pupal structures in the beetles of the subfamily Hispinæ (*Proc. Zool. Soc. Lond.*, 1932). These larvæ live in tunnels inside leaves and their morphology presents numerous cases of remarkable specialisation due to this mode of life. Thus, the legs show a complete gradation from a well-developed condition to one of great degeneracy, where the claws disappear altogether. The position of the spiracles presents various significant modifications in the larvæ, while their number also varies with the species. In one case the number of larval spiracles was found to vary even within the species and, moreover, there appeared to be a correlation between the number of spiracles in the larva, and the colour pattern of the adult beetle. Some observations point to the possibility of two or more species of the same

genus living together in the same tunnel, and this may lead to interbreeding and hybridisation, which would supply a hypothetical explanation of the great variety of colour-patterns in the adults.

Growth of Corals. T. Tamura and Y. Hada record observations (*Science Reports*, Tôhuku Imp. Univ., vol. 7, No. 3, 1932) on the growth of corals in the Caroline and the Pelew Islands respectively. They found that the average annual growth in *Acropora pulchra* was 226 mm. and in *A. digitifera* 12 mm.; the former has a light skeleton, the latter a dense and heavy one. Massive corals, for example, *Porites*, *Montipora*, *Favia*, showed an average annual increase in length of about 6 mm., and in weight of about 33 per cent. *Fungia* showed an increase in length of about 9 mm. and in weight 23 per cent. The rate of growth in both localities is similar to that recorded for Hawaiian corals. Each species has a characteristic growth rate; after a specimen reaches a certain size growth ceases. In the preceding paper in the same journal, Y. Hada gives an account of the early stages of growth of *Pocillopora cespitosa*, the planulæ of which are extruded probably throughout the year but most actively during December. The youngest colony found was 1·5 mm. in diameter and consisted of three polyps. The next period of growth results in lateral spreading of the colony until about thirty polyps have been formed; then the colony begins to grow vertically and to branch. The number of polyps now increases about three times as fast as in colonies which are still undergoing lateral extension.

Some Noteworthy Irish Plants. Dr. Lloyd Praeger's paper (*Proc. Roy. Irish Acad.*, **41**, Sec. B, No. 7, Dec. 1932) contains much of interest to students of topographical botany, whilst his account of the genus *Cochlearia* in Ireland will be of value to British botanists as ecological observations on the species and notes on hybrids of *C. officinalis* with *anglica*, *danica* and *grœnlandica*, are given. A revised distribution of these species in Ireland is given, the previous confusion with regard to *C. anglica* being attributed to the frequency with which it hybridises with *C. officinalis*. Investigations on the distribution and associates of *Arbutus* at Lough Gill lead to the conclusion that the plant is native in Sligo, thus extending by 160 miles its northernmost Irish and European limit. The occurrence of *Arctostaphylos alpina* in Ireland and the record of *Euphorbia hiberna* from Roscommon are discredited, whilst the status of *Tamus* as an indigenous plant is re-examined, the author inclining to regard it as native in Sligo. *Polypodium Robertianum* is established as a native species new to Ireland whilst many new stations are given for the hybrid *Equisetum litorale*, and *Scrophularia alata* is recorded from Limerick and Londonderry. Other notes deal with introduced species including *Sarracenia purpurea* from Roscommon and Westmeath, *Erica stricta* from Antrim and Londonderry and an unconfirmed record of *Selaginella Kraussiana* from Donegal.

The Ankole Tinfield. Memoir No. II of the Geological Survey of Uganda is devoted to "The Geology of South-west Ankole and Adjacent Territories, with Special Reference to the Tin Deposits". Apart from an appendix on the petrology of the rocks of the region contributed by A. W. Groves, and a postscript by W. C. Simmons, the memoir is the work of A. D. Combe. It contains a well-illustrated, authoritative account of the geology of south-west Uganda and north-west Tanganyika based on ten years' detailed field work. Cassiterite is the only mineral of economic value that occurs in workable quantities in this area, and though production did not begin until 1927, more than a thousand tons have so far been exported. The mineral occurs in quartz-muscovite-pegmatites and in hydrothermal veins associated with them, veins of hydrous micas and muscovite having proved to be the most important producers to date. All the veins are found in the metamorphosed rocks of the Karagwe-Ankolean system adjacent to the margins of various masses of the so-called Younger Granite. Much of the muscovite with which the tin is associated is thought to have been produced by metasomatic alteration of the phyllites. Combe and Simmons suggest that the alkaline liquors responsible for this alteration also acted as carriers for the tin, but Groves believes that fluorine was probably an active agent in the introduction of tin, despite the absence of topaz. This opinion has also been expressed by Stheeman in a recent book on the same area. The memoir contains a wealth of information on one of the most interesting parts of Uganda and is of importance to stratigraphers because of the attention given to the Karagwe-Ankolean formations and their distribution and correlation, as well as to geologists in general because of the wide range of problems that come under discussion. The memoir is obtainable from the Government Printer, Entebbe, Uganda, price 35*s*.

Meteoric Craters. In a paper to the Royal Geographical Society on January 16, Dr. L. J. Spencer discussed the origins of meteoric craters such as that in Arizona, those in Central Australia and in Estonia or the one recently discovered by Mr. H. St. J. Philby on the site of Wabar in the Arabian desert and described by him in the *Geographical Journal* for January 1933. Little is known about the mode of formation of these craters but the suggestion that they are merely holes formed by the projectile force of the meteor is not an adequate explanation. Meteorites of which the fall has been observed have all been small and their velocity, reduced by resistance of the air, has been about seventy metres a second. They have never penetrated far into the ground. The largest discovered meteorites, the fall of which has not been noted, have not formed craters but lie either on the surface or with their tops flush with the surface. Dr. Spencer suggests that meteoric craters are formed by explosions due to the sudden vaporisation of part of the material both of the meteorite and the surface of the earth as a result of the intense heat generated by the impact. He showed how the destruction of material within the crater agrees with this theory, which also explains the formation of silica-glass found in association with the crater (see also NATURE, Jan. 28, p. 117).

Physical Atomic Weights. In the Liversidge lecture to the Chemical Society (*J. Chem. Soc.*, December 1932), Dr. F. W. Aston described some recent results obtained with the mass-spectrograph. In the case of elements which are mixtures of isotopes, a measurement of the relative intensities of the lines in the mass-spectrogram will lead to an average atomic weight of the element which may be compared with the chemical value. This operation is, however,

experimentally very difficult, owing to the circumstances that the source of the positive rays is never reproducible and seldom constant for more than a very short time and also that the relation between relative abundance of isotopes and blackening of the plate is completely different for different elements. Dr. Aston described the experimental procedure adopted in overcoming these difficulties. The results, based on $O^{16} = 16$, require correction by 2 in 10,000 to reduce them to the chemical scale, O = 16, since ordinary oxygen contains the isotopes O^{17} and O^{18}, and a comparison of the two sets of values shows that the agreement is in the great majority of cases exceedingly satisfactory. There is a discrepancy in the case of hydrogen, which cannot be removed by the recent discovery of an isotope of mass number 2, which is present only to the extent of 1 part in 35,000. Scandium, niobium and tantalum, which are simple elements, show discrepancies, their chemical atomic weights being too high, and the same is true, to a less degree, of phosphorus and cæsium. The serious difference in the case of selenium has been removed by Hönigschmid, whose chemical value is identical with the physical one. The physical value for tellurium, which differed from the chemical one, has been corrected by Bainbridge, whose result agrees with the chemical one. The values for osmium and uranium are also abnormal.

Simple Molecules and Elementary Processes. Two lectures by Prof. A. J. Allmand on the above subject have been published by the Institute of Chemistry, and form a very clear and concise introduction to a field of research which has recently been actively studied. In the first lecture the experiments of Stern and his collaborators on molecular rays are briefly considered, and then an account is given of molecular spectra, the text here being illustrated by several useful diagrams. The parts played by the electronic, vibrational and rotational energies of the molecule in producing the spectra are clearly explained, and the importance of Raman spectra in deciding the natural frequency is emphasised. The second lecture dealt with a miscellaneous group of phenomena giving information about the mechanism of individual chemical molecular processes. The evidence for the existence of free radicals such as OH, NH, CH, etc., from spectroscopic results is considered in connexion with the energy of linkage. The chemical reactions of atomic hydrogen and atomic oxygen, the chemical evidence for the existence of free radicals given in the experiments of Paneth and F. O. Rice, chain reactions, predissociation, and three body collisions are topics dealt with in this lecture. Prof. Allmand's lectures will be found to constitute an admirable introductory survey of a highly interesting field of modern physical chemistry.

Astronomical Topics

Comet Peltier-Whipple. This was probably the brightest of the numerous comets that were observed in 1932. It was on the verge of naked-eye visibility at the end of August. *Astr. Nach.*, 5905, contains observations of it made by R. M. Aller of Lalin Observatory on twelve nights between August 25 and September 19; also drawings of the comet on August 27, 28, September 2 and 7. The tail is multiple; the main branch is triple and was traced to the length of a degree on August 28. Its position angle changed from about 300° on August 27 to about 330° on September 7. A short, but bright, tail was inclined at about 45° to the main tail, on the side of greater angle. The sketches show a coma about 3′ in diameter round the nucleus.

Mr. H. Jensen of Copenhagen finds 287·2 years as the period, and Mr. F. Koebcke of Poznan 286·8 years (Copenhagen Circulars 403, 404). Search in the catalogues does not show any previous apparition of the comet.

A determination of the light-curve of the comet has been published by K. Himpel (*Astr. Nach.*, 5913). It was of magnitude 6·7 on August 12, and slowly rose to a maximum of 6·3 on August 24: it then declined rapidly, being 7·7 on September 9. A very thorough investigation of its orbit, by Dr. Allan D. Maxwell (Publ. Univ. Michigan, vol. 5, No. 2) gives the period as 302·5 years. Comparison with other determinations suggests that this is unlikely to be more than some ten years in error.

Galactic Rotation. *Lick Observatory Bulletin* No. 448 contains an investigation on this subject by Miss Phyllis Hayford. It is necessary for this purpose to observe the radial velocities of distant objects. This investigation made use of a large number of spectrograms of stars in the Milky Way clusters, obtained with the 36-inch refractor; Dr. Trumpler took many of the plates, but all were measured by Miss Hayford. The clusters are all within 10° of the galactic plane, and are distributed fairly uniformly from galactic longitude 311° through 0° to 206°. 116 of the stars are of type *O*5 to *B*5, 32 of type *B*6 to *A*2, and 13 of later type. Their magnitudes range from 5·3 to 12·2; their adopted distances range from 940 to 3,680 parsecs.

As is to be expected, the solar motion relatively to these distant stars is higher than that derived from neighbouring stars; it is about 30 km./sec. The longitude of the galactic centre, 333°, agrees well with other determinations. The investigation confirmed the result of Dr. Plaskett and others that the interstellar calcium lines indicate a smaller distance than that of the stars in the spectra of which they are measured.

The distance of the galactic centre is found to be of the order of 1,800 parsecs from the sun, a much smaller distance than that found by Dr. Oort, which was about 6,000 parsecs. But the new distance, being derived from a limited number of objects, does not claim to be final.

Mutual Eclipses and Occultations of Jupiter's Satellites. Every six years the system of Jupiter is turned edgewise to us; at such times, numerous eclipses and occultations of one satellite by another take place. Until recently these phenomena were unpredicted, and in consequence they were very seldom observed. The Computing Section of the British Astronomical Association now makes predictions which are published in the B.A.A. Handbook; very many have been observed during the past twelve months. *L'Astronomie* for September contains an illustrated account of the occultation of IV by I observed by M. Schlumberger at Mulhouse on March 14, 1932; the occultation was very nearly total. The surface of IV is so much darker than that of I that it is easy to distinguish the two bodies when the discs are overlapping; at the maximum phase a very narrow segment of IV remains uncovered.