

Research Items

Ethnology and Linguistics in New Caledonia

THE first attempt to record in writing the language of Houaïllou was made some thirty-five years ago by a Loyalty islander, who wished to convert the New Caledonians to Christianity, and introduced the notation current in his own islands. The language has now been recorded and studied by M. Maurice Leenhardt ("Voculaires et Grammaire de la Langue Houaïllou", *Trans. et Mém. de l'Inst. d'Ethnologie, Univ. Paris*, 10, 1935, pp. 412. 125 fr.). Methods of speech have some interesting peculiarities. Tone as a rule shows little variation in pitch, this tendency being accentuated by the method of delivery. In formal oration the speaker endeavours to utter as many words as possible without taking a fresh breath. Not only does this cause a low monotonous pitch, but both in speaking, and more markedly in singing, leads to a concentration of syllables on one note. In singing, syllables and notes do not correspond; while any system of scansion becomes difficult. In conversation, on the other hand, great use is made of mimetic gesture, especially with the eyes and lips, and the words tend to follow the gesture. Thus in superlatives, the words are long drawn out, while a rising whistling sound, as it were expressing a 'parabola', is half-way between speech and gesture. To express both direction and distance the eyes and lips are brought into play. Sometimes, the words even are suppressed when the muscles of the mouth alone are used to express direction. Hands, feet and limbs are used to enforce a multitude of details. The vocabulary has been recorded very fully, not merely as a word-list but with a multitude of details relating to the sociology, religious beliefs and culture of the people. For example, *Asēcui*, "to mention in terms of respect", is used, it is explained, when a sister speaks to someone of her brother, in order that his name may not be profaned; while *Koawana*, the gift to an uncle, means "the end of a journey", because every social relation ends in a gift to the maternal uncle.

Fish Hooks from Dogs' Jaws and Teeth

THE skill with which the Maori fashioned apparently unsuitable bones into barbed fish-hooks is well shown in the Oruarangi collection in the Auckland Museum. In his description of the collection, V. F. Fisher describes and illustrates the processes by which the lower jaw of the native dog was carved to form a long point, the coronal process becoming the barbed tip (*Rec. Auckland Inst. and Mus.*, 1, 287; 1935). Shanks as well as points were made from the lower jaw-bone. The adaptation of individual teeth as points would appear to be a simpler process, and dog-tooth hooks are three times as numerous as dog-jaw hooks in the collection. The majority of these are carved from canine teeth, but there is a clever example of one worked from a pre-molar tooth, the two roots of which become the tip and the shaft of the hook. Remains of few other animals were used in making these Oruarangi fish-hooks; one was from the tooth of a whale, one from the margin of a shell (*Cookia sulcata*), but there was no trace of the use of the bones of Moas, although in other districts these were often made into one-piece fish-hooks.

Birds of Malaysia

THE Raffles Museum at Singapore, which is adding consistently to the knowledge of the fauna of a region of great zoological interest, has published a hand-list of Malaysian birds (Bull. No. 11, Dec. 1936, 389. 21s.). This systematic list, compiled by F. N. Chasen, director of the Museum, includes the birds of the Malay Peninsula, Sumatra, Borneo, Java, and the adjacent small islands, and gives scientific and English names, and, in the case of each species or variety, such synonyms as were known, and a summary of the distribution. In addition to the list, the author, in an introduction of twenty pages, gives an account of the zoogeographical relationships of the bird fauna, and suggests that instead of the usual explanation of the peculiar affinity between Java and the Indo-Chinese sub-region, namely, that it is due to complicated changes in land-surfaces, a simpler explanation should be sought in the tendency of many migratory birds to become differentiated as resident species in the southern parts of their range.

Food of Fossil Fish

THE delicacy with which fossil structures may be preserved when the preserving material and other conditions are favourable is well shown in a fossil fish in the Geology Museum of the University of Melbourne. It is a specimen of *Spaniodon elongatus*, a herring-like fish from the Upper Cretaceous chalk of Mount Lebanon. But clupeoids of the sub-family to which *Spaniodon* has been attached feed upon plankton, whereas this fossil fish has a few large teeth in the front of the mouth, and within its body (to all appearance) lie a small undigested fish and other contents of the food canal (E. S. Hills, *Proc. Roy. Soc. Victoria*, 48 (N.S.), 50, Dec. 1935). The stomach seems to have been a simple sac, the intestine relatively small and straight with only a few small loops. If the interpretation of the fossil is correct, the difference in feeding habit is sufficient to exclude *Spaniodon* from the sub-family to which Boulenger in 1907 attributed it.

Regeneration in *Sabella pavonina*

THE polychæte worm *Sabella pavonina* is fast being established as a favourite experimental animal that is likely to prove of much assistance in the elucidation of several fundamental problems of development. The comparative readiness with which it will regenerate head and tail ends from practically all levels, with often concomitant reorganisation of parapodia from abdominal to thoracic type, renders it excellent material for the investigation of regeneration phenomena. Work by Prof. N. J. Berrill had directed attention to what appeared to be a manifestation of a definite organiser action of the regenerated head end, that acting on original abdominal segments caused a change over in the form of the parapodia so that they came to resemble those of the thorax. F. Gross and J. S. Huxley have followed up this interesting observation and in an important paper (*Archiv Entw. Organ.*, 133, 582-620; 1935)

record the manner in which numerous pieces of *Sabella*, cut from all parts of the body in a variety of ways, have developed new tissue. They describe several cases of regeneration that are of a kind not previously obtained, but which are of much importance in that they seem definitely to render the organiser theory untenable, at any rate so far as it concerns *Sabella*. They go further than this, however, and suggest that it is now advisable to reinvestigate those cases of reorganisation in invertebrates, especially planarians and coelenterates, that have hitherto been attributed to the action of a 'distance organiser'. For *Sabella* they put forward a hypothesis based on the knowledge that in polychaete regeneration extensive migration of tissues—especially epidermis—from neighbouring segments, towards and into the regenerate, occurs. They suggest that this migration changes the physiological condition of abdominal parapodia, leading to their degeneration and initiating a process of 'alternative differentiation' whereby they are replaced by new parapodia of thoracic type.

Influence of Season on Photosynthesis

BOTH ecological and physiological considerations are raised by the investigations of Dr. B. N. Singh and Mr. K. Kumar, of the Institute of Agricultural Research, Benares Hindu University (*Proc. Indian Acad. Sci.*, 2, No. 5, November 1935). Radish plants of one selected strain were used, and the photosynthetic activity of leaves of comparable age was measured on plants of successive crops, resulting from fortnightly sowings of carefully selected seeds of standard weight. The general result was to show photosynthetic activity under these tropical Indian conditions, at a maximum during the winter conditions (April), then declining as the summer season commences, the lowest ebb of activity being in June. With the onset of the rains, the assimilatory activity rises once more to a second maximum in September–October, as the winter sets in. These interesting results are fully analysed; features of interest are a correlation of the lower summer activity with a lower water and chlorophyll content. Dry matter and total leaf area are greater in winter; possibly another factor contributing to greater carbon assimilation then may be a wider stomatal aperture associated with the higher water content.

Frequency of Cutting and Yield with an Australian Grass

BULLETIN No. 66 of the Council for Scientific and Industrial Research of the Commonwealth of Australia, by Messrs. A. E. V. Richardson, H. C. Trumble, and R. E. Shapter, illustrates very beautifully the delicate balance of factors that have to be considered in establishing useful permanent pasture under semi-arid conditions. In the Australian zone of winter rainfall and summer drought, *Phalaris tuberosa* has received particular attention at the Waite Institute, as it seems well adapted to form a sward where the annual rainfall is more than eighteen inches, with a winter incidence associated with a periodic summer drought. Similar climatic conditions are found in Cape Colony, portions of South America and California and in the Mediterranean countries to which this grass is indigenous. The problem is, however, to find the extent to which this grass can be cut or grazed and yet maintain a satisfactory turf. With a single

cut at maturity, the nutritive value of the herbage was poor. With more frequent cuts, the nitrogen value and the phosphate in the herbage cut rose rapidly; towards maturity this was not lost but migrated towards the base of the plant, so that repeated cutting rapidly reduced the storage in the underground stolons and roots. The general result was to conclude that three cuts a year is the best system if *Phalaris* is to give a permanent sward under Australian conditions. Another point of interest in these observations is that though nitrogen and phosphorus simply migrated to the base of the plant towards maturity and were not lost, potash at this time was rapidly lost to the soil, possibly by diffusion from the root system when physiological activity ceases.

Geology of Northern Rhodesia

A CONTRIBUTION by W. C. Hatfield to the geology of the Solwezi District of Northern Rhodesia, south of the Congo-Zambezi divide, was communicated to the Geological Society at its meeting on January 29. The area described forms part of the Central African Plateau, and is composed of folded and faulted Basement to Kundelungu rocks, truncated by a late Mesozoic peneplane which is now in the early stages of a new cycle of dissection. An original consequent drainage has been rejuvenated by a change in climate, possibly accompanied by uplift, resulting in superposition and modification by piracy. The crystalline Basement rocks are intruded by basic and granitic rocks. After a period of orogeny, the younger Mine and Kundelungu sediments were deposited. Gabbroid rocks were intruded into these and were followed by late-stage solutions which scapolitised the sediments, turned the gabbro into epidiorite and chloritised the Basement schists. In addition to the marked orogeny at the end of Kundelungu times, there is evidence of diastrophism following the deposition of the Mine Series, since the Kundelungu beds lie unconformably on the latter. The Solwezi area is situated on the southern limb of the Katanga geosyncline. Thrust faulting and overturned folding have resulted in a regional west-north-west strike and a northerly dip. The area is near the nose of a mass which moved northwards, compressing the southern side of the geosyncline into an arcuate belt of folds curving east-and-west around Northern Rhodesia.

Bababudanite (a Soda Amphibole)

IN 1907 a soda amphibole was discovered by Iyengar in the banded ferruginous quartzites of the Bababudan Hills of Mysore. Smeeth considered it to be a variety of riebeckite, and gave it the name 'bababudanite'. In the *Geological Magazine* of January, C. S. Pichamuthu gives a full account of the physical, chemical and optical properties of this mineral. The new analysis corresponds to the formula $4\text{NaFe}^{III}(\text{SiO}_3)_2 \cdot 2\text{FeSiO}_3 \cdot 3\text{MgSiO}_3$. Hitherto, bababudanite has been considered as an original mineral of basic igneous rocks which by reconstitution due to metamorphism yielded the iron and silica of the banded ferruginous quartzites. As a result of his field-work, Pichamuthu finds that the mineral is confined to narrow zones which are always at the immediate contact of epidiorite dykes. It is therefore itself a product of contact metamorphism and has nothing to do with the origin of the ironstones. An analysis

of bababudanite-magnetite-schist agrees well with analyses of amphibole-magnetite rocks occurring as intercalations in the Lake Superior banded ironstones, except that soda is present to the extent of 2-60 per cent, whereas the American examples are free from soda. Pichamuthu considers this soda to have been derived from spilitic basic rocks which he regards as one of the sources of the sediments. It is worthy of consideration, however, that the soda may have come from the epidiorite magma, since there is no indication of the occurrence of soda-bearing minerals in the banded ferruginous sediments away from the bababudanite contact zones. The latter would then constitute an interesting case of soda metasomatism.

Seasonal Variation of Daylight

THE average value of the daylight illumination to be expected at any given time of the day at different seasons of the year is of interest to the architect and to the householder. Owing to meteorological conditions, the illumination varies largely, and so the average value can only be obtained by making observations over a period of years. The average results of measurements for each month for the whole sky and for each quarter of the compass, obtained from observations taken at the National Physical Laboratory at Teddington and extending over ten years, are given in a report by the Department of Scientific and Industrial Research (Illumination, Technical Papers, 17. London: H.M. Stationery Office). The results show that the light from the whole sky is about eight times as great at 9 a.m. on a June or July morning as on a January morning. The average June noon is four to five times as bright as a December or January noon, and at 3 p.m. the illumination is nearly ten times as great in June as in December. In January the average illumination in foot-candles from the whole sky is 405 at 9 a.m., 850 at noon and 390 at 3 p.m. The report only gives the results of measurements made at Teddington, but measurements in other localities are being initiated. More detailed results are expected, as a photo-electric cell is now being used.

Measuring the Resistivity of the Earth

IN practical electrical work it is often very advisable to know the electrical resistivity of the earth in the neighbourhood of electric stations, cables, etc. Various methods of doing this are used, but the 'search coil' method used by Dr. J. Collard (*J. Inst. Elec. Eng.*, Jan.) is novel, and as it agrees roughly with other methods and can be used over a wide area, will be of value. The method consists in the measurement of the E.M.F.'s induced in a search coil placed at various distances from an earth-return circuit carrying alternating current. A set of curves is computed by theory for various values of the resistivity, and the one which passes through the experimental points gives the average resistivity. When a power transmission line exists in the neighbourhood of the site where the resistivity is to be measured, one of the harmonics of the line can be used as the inducing current. The method has been used to measure the resistivity of the earth at various places in England and Italy. The results obtained are given, together with particulars of the geological formation of the sites that have been measured.

The resistivity is least for alluvial soils, varying between 200 ohms and 400 ohms per cm. cube; that of clay is about three times as much, while the value for coal-bearing measures and chalk is about fifteen times as much. Sandstone varied between 6,000 ohms and 10,000 ohms per cm. cube and igneous rocks between 50,000 ohms and 100,000 ohms. A map is given showing how the resistivity varies in different parts of England.

The Corona Loss on Overhead Wires

IN very high tension systems for the electric transmission of power, the overhead wires are sometimes surrounded with brush discharges, generally called coronæ, which appreciably increase the transmission losses. To prevent this loss, the overhead wires might be insulated with insulating material of high electric strength. Provided the thickness of the covering is very small and its thermal conductivity sufficiently high, the wires may actually carry a greater current for the same rise in temperature. In addition, a higher voltage can be applied without any appreciable corona forming. In *World Power* of January, the effect of the humidity of the air on the corona loss on wires is considered. It was found experimentally that the corona loss increases slowly until the humidity exceeds 80 per cent, when it increases rapidly, and very rapidly when it approaches the dew point. With pressures of 100 kv. and 120 kv., the losses were found to be 3.6 kw. per km. and 11 kw. per km. respectively. When the surface was coated with shellac or paraffin, the loss increased very slowly at first as the voltage was increased, and then in the region of 132 kv. it increased rapidly and seemed to be almost independent of the humidity. It was found that the effect of the humidity on the corona losses of a conductor was less after the wire had been left to 'age' in the open air for some time. When the surface was treated with shellac and the humidity was 89 per cent, it was found that the losses at 120, 130 and 135 kv. were 0.6, 2.2 and 5.1 kw. per km. respectively.

Observations of Nova Herculis

RESULTS of observations of Nova Herculis 1934 are still appearing. In No. 4 of the *Mitteilungen der Wiener Sternwarte*, K. Graff publishes observations of brightness from December 1934 up to April 1935. More than 800 photometric observations, together with about a hundred visual observations, made both with optical apparatus and with the naked eye, were secured at the Vienna station in Mallorca. Magnitudes are reduced to the Revised Harvard scale. In the same volume, H. Krumpholz gives a reduction of the results of sixty-five observers to Graff's scale. This discussion embraces a great wealth of observational material. Again, in the same volume, K. Graff describes measurements of the colour of the Nova from over the same period (December to April). Measurements were made on a colour-wedge. The observed colour ranged from that of stars of type A0 to that of stars of type G0. The colour curve so obtained is complete, but, as the author points out, the presence of strong emission lines in the Nova spectrum deprives the observations of the simple physical meaning enjoyed by the colour temperatures of the continuous spectrum of the star apart from the emission lines.