Research Items

Spirit Beliefs in Suriname

IN the course of a detailed account of the folk-lore of the negroes of Suriname (Suriname Folk-lore : by Melville J. Herskovits and Frances S. Herskovits, *Columbia Univ. Contrib. Anthrop.*, **27**), based on material collected in Dutch Guiana in 1928 and 1929, it is pointed out that the essential factor in the beliefs of the Paramaribo town negroes, is divination, for through the work of the diviner all the elements of their system are drawn together, explained and controlled. These elements are four in number : the *akra* or soul, the *winti* or the gods, *obia* and *wisi*, good and evil magic, and the spirits of the dead. *Winti*, the negroes say, means wind. It is in every place, and is the air we breathe. The spirit too is everywhere. The term defines the gods and spirits, which rule the universe ; among the bush negroes gods are usually termed *gadö*, and in both city and among the bush negroes other terms are encountered. Although among the bush negroes a term for Supreme God frequently occurs, it is seldom that a sky-god is invoked in the town. The only reference is in the dance to the seven gods of the sky, the thunder gods. The earth gods are headed by the Earth Mother, who even in ritual is referred to by this euphemism, and is named correctly only in songs sung by those under possession. The Earth Mother has a large number of these 'strong' names, used only by initiates and in ritual performance. This variety of names may be due to the fact that the negroes are descendants of ancestors who hailed from very different parts of Africa. While other *winti* receive offerings only from their own devotees, the Earth Mother receives from all. The most prevalent type of *winti* among women are those associated with the snake. While some snake spirits may enter into possession of men, others possess women only. This seems to be connected with childbirth and the belief that ancestor spirits may make use of the snake. Other *winti* are connected with the river, or the bush, living in the ground, in trees and in holes. *Winti* may be acquired by inheritance, by choice of the spirit, or through the 'bad magic' of an enemy.

Expectation of Life in a Moth

MESSRS. RAYMOND PEARL and John R. Miner contributed a series of life tables for the pecan nut case-bearer moth (*Acrobasis caryæ*), of which a reprint has been received, to "Mélanges Paul Pelseneer" (*Mem. Musée Roy. d'Hist. Nat. Belgique*, ser. 2, fasc. 3 ; 1936). The details upon which the computations are based were taken from studies made on the insect by S. W. Bilsing and published in 1927. It appears that the proportional distribution of the imaginal life of the female moths into pre-reproductive, reproductive and post-reproductive phases, when compared with the equivalent divisions of the life of the human female, shows that the post-reproductive phase is substantially equally proportional in the two cases, while the *Acrobasis* female spends more than double the proportional amount of time in the pre-reproductive phase as compared with the human female. The mean duration of life of the moth shows an evident tendency to increase in the three successive generations after the first one. The female moths in all groups tend to be longer lived than the males by amounts that are probably significant. The relative variability in duration of life is roughly the same as that found in closely inbred strains of *Drosophila*. The above paper is part of a series of studies on life duration in the lower organisms : among insects complete life-tables have only as yet been calculated for the cockroach (*Blatta*) and *Drosophila*.

Root Systems

THERE is a general discussion of the technique of exposing and recording root systems by T. K. Pavlychenko in the *Canadian Journal of Research*, **15**, No. 2, February 1937. This account describes much American work, but makes no mention of the studies of root systems of fruit trees carried out for some years at the East Malling Research Station, reports of which have been published in the *Journal of Pomology*. The author then describes the soil block washing method which has been developed at the University of Saskatchewan. All thorough methods of exposing and measuring root systems are of necessity laborious, and make big demands upon time and material ; but this method, in which the roots are removed in soil blocks in specially constructed cases and then first soaked and freed from soil by constant gentle washing in a stream of water, must have been most successfully developed to judge from the photographs of root systems published. It is a little staggering to see the total length of the root system of a single wild oat plant, grown free from competition over a period of eighty days, estimated at fifty-four miles ! The root systems of three-year-old plants of slender wheat grass, brome grass and crested wheat grass are estimated at 9·9, 65·2 and 315·4 miles respectively.

Necrotic Lesions of Virus Diseases

THE virus diseases known as tobacco mosaic and aucuba or yellow mosaic, produce local necrosis upon the leaves of *Nicotiana glutinosa*. Brown spots, visible by the unaided eye, appear about two days after inoculation. A short paper by Dr. F. M. L. Sheffield (*Ann. App. Biol.*, 23, No. 4, 752–758 ; 1936) traces the appearance of these areas where the tissue is killed. Necrotic material begins to form first between the lower epidermis and the spongy parenchyma tissue of an infected leaf. It later extends upwards and outwards, until, about 72 hours after inoculation, all the cells in the immediate neighbourhood are dead. The virus is isolated within the necrotic area. The outer cells of the necrotic region are killed before the virus reaches them, and the virus cannot, apparently, traverse this dead tissue.

Indian Lac Research

AMONG the investigations commenced in February 1930 at the Indian Lac Research Institute were experiments which aimed at the improvement of the villagers' ordinary methods of exploiting the kusum tree (*Schleichera trijuga*) as a lac host (*Lac Research Institute Bulletin*, Nos. 15 and 20. Criterion Printing Works, Jackson Lane, Calcutta, 1936). In Bull. 24,

Mrs. Dorothy Norris, director of the Institute, discusses the success attained. By adopting the methods of pruning and cropping advocated, the kusum tree can be utilized in lac cultivation to much better advantage than under the rather crude methods of the Indian ryot (peasant). The hot weather crop (July) is known as *Jethwi* and the cold weather (February) as the *Kusmi* crop. The lines for the treatment of the tree were laid down in *Bull.* No. 15 and have proved highly successful. Trees pruned in February 1930 were ready for infection in February 1931, yielding a good crop of lac in July 1931, with a brood yield ratio of 1 : 3·1. A year later (the trees are rested for a year) in July 1932 the trees were again ready for infection and were cropped in February 1933, giving a brood ratio of 1 : 3·7. In February 1934 the trees were again ready for infection and gave a crop in July 1934 with a brood yield ratio of 1 : 3·2. In July 1935 the trees showed no sign of sickness or over-use, and were again infected and the crop, obtained in February 1936 was excellent in quality and gave a brood ratio of 1 : 3·1. It will be seen that these experiments were started six years ago only, and will require to be carried on for a much longer period to establish definite cropping figures; since so far only two *Jethwi* and two *Kusmi* crops have been compared.

The Arun River and Himalayan Uplift

THE Arun is one of those Indian rivers which rises north of the Himalayas and flows eastward, before turning southward and flowing through the Himalayas in a series of gorges between Mount Everest and Kangchenjunga. The theory that the river is an example of ordinary consequent drainage and that it has cut back and captured Tibetan drainage has been advocated by Hayden, Heron and others. The alternative explanation, that it is antecedent to the Himalayas and has maintained its course by vigorous erosion has also been suggested and is argued by Dr. L. R. Wager in a paper in the *Geographical Journal* of March. Dr. Wager pays particular attention to the remarkable Yo Ri gorge and the main gorge eleven miles lower down. In its upper course, the Arun flows over soft sedimentaries and forms a wide valley, but at the Yo Ri gorge it reaches hard gneiss in the Nyonno Ri anticline. This explains the change in form of the valley. West of the gorge lies the low pass of Kuyok La. Dr. Wager argues that if the original surface on which the Arun flowed had been anything like the present one, the river would have flowed through this pass. Since it did not do so, the Arun must have been established in its course before the present form of the land. The Tista River farther to the east probably shows a comparable history.

Temperature and Sunshine in the British Isles

Two interesting publications of the Meteorological Office have just appeared (London: H.M. Stationery Office). The first (No. 407) is entitled "Averages of Temperature for the British Isles" (1*s.* 3*d.* net), and the second (No. 408) "Averages of Bright Sunshine for the British Isles" (1*s.* net). In each case, the averages refer to periods ending in 1935, and are for individual months and the whole year. These averages correspond to some extent with the old 'normals', which were averages for a period, 1881–1915, which was assumed to be a whole Brückner cycle of weather, the length of which cycle was taken to be 35 years. As such a small part of our weather vagaries are consistent with such a cycle, it is doubtful whether very much is gained by using 35-year averages as representative of normal conditions. There is much to be said besides for having averages, such as these new averages, which do not include years like the early 'nineties, when the old-fashioned kind of winter with weeks of skating turned up fairly regularly each year. It is hard to give a satisfying definition of a 'normal'. If it is based on a short period, it will be objected to as too small a statistical sample. If the period is made very long, other critics will say that our climate has altered since the earlier years of the long period. Yet standards of reference of some kind seem necessary. For example, unless official forecasts give the actual range of temperature that is expected, which can scarcely be hoped for when places at different heights and different distances from the sea have to be grouped into a single 'district', the forecaster has to use expressions like 'cold' or 'rather cold', and these mean cold compared with the normal for the season. Those members of the public who want to know precisely what is implied must have averages of the kind given in these two booklets.

Viscosity of Air

G. KELLSTRÖM (*Phil. Mag.*, March) has made a new determination of the viscosity of air, using the viscous drag between concentric rotating cylinders. The mean value for the viscosity at 20° C. was found to be 18200×10^{-8} C.G.S. units. This value is about 0·7 per cent higher than the one used by Millikan in his determination of the electronic charge by the oil-drop method, and a substitution of the new value in Millikan's work raises the value of e from $4{\cdot}770 \times 10^{-10}$ to $4{\cdot}818 \times 10^{-10}$ E.S.U. The error in the viscosity data may therefore account for the difference between the oil-drop value of e and that obtained from absolute wave-length measurements of X-rays, namely, $4{\cdot}805 \times 10^{-10}$ E.S.U. (cf. NATURE 137, 655; 1936).

The Mysterious Number 137 Again

As mentioned in NATURE of May 23, 1936, p. 877, Euler and Kockel, working on a form of Born's unitary field theory, obtained the value 82·4 for the dimensionless pure number the explanation of which Born has declared to be the central problem of natural philosophy. An estimate of 130, which is much closer to the experimental value 137·2, has now been obtained by L. Infeld (*Proc. Camb. Phil. Soc.*, 33, 70; 1937) by using a different action function. It is shown that most of the consequences of the unitary field theory at first developed by Born and Infeld hold good for a whole range of action functions, all giving a static solution with central symmetry and finite energy, both for the electric and magnetic field, and reducing to Maxwell's action function for weak fields. That chosen by Born was distinguished by perfect symmetry between the electric and the magnetic field. A paper, not yet published, by Infeld and B. Hoffman will lay down a physical criterion to determine which function should be chosen. An even wider generalization of part of Born's electrodynamics has been made by P. Weiss (*ibid.*, 33, 79; 1937), who shows that every self-conjugate analytic function of a complex variable characterizes an electrodynamic field theory of the type proposed by Born. More stringent physical conditions, not yet available, are needed to thin out this over-luxuriant growth.