

Research Items

Honey-Hunters of Tanganyika

AN isolated group of Wangindo in the north-eastern foothills of the Mahenge massif, Tanganyika Territory, live the life of their forefathers, for geographical reasons little influenced by the outside world. There are only a few hundreds of them, their more numerous kinsmen living a long distance off across the Liwale District border. They have no stock, but disliking the settled life of agriculture, hunt game with poisoned arrows, and above all like to wander off, sometimes for weeks, in search of honey. In an account of these people by the Rev. A. T. Culwick in *Man* of May, it is said that honey is the keystone of their economy. The Mgindo thinks in terms of honey, his house smells of it, his children are smeared with it, and his conversation invariably turns to "that hollow tree two days walk away where the bees are". The honey bird is his greatest friend and he will follow its call for days. When the tree with the honey is found, he cuts it down, taking the honey, but never failing to leave some of the grubs for the bird. The Wangindo make beehives, but do not hang them near their villages. They place them far away in inaccessible parts of the forest, finding them unerringly without blazing. The beehives are cylinders made of strips of bark of the *miombo* tree. One end of the cylinder is closed by a flap of bark bent over and held in place with a piece of string passed through holes. It is placed in a tree with the open end rather lower, to prevent the rain from getting in. Occasionally, but not universally, aromatic herbs are put in to attract the bees. When the honey is ready, the bees are driven out by smoke from a grass torch. The honey is placed in a bowl of hartbeeste skin and lowered to the ground by a rope attached to tongues of skin left for the purpose. The honey is squeezed from the comb by hand and eaten uncleaned. The wax is boiled, filtered, and then remelted into lumps for sale to traders. Though many Wangindo are travelled and even have been in Government service, they always return to their wild life.

Undescribed Pebble Industry from Natal

A HITHERTO undescribed flaked pebble industry was first observed by Mr. J. F. Schofield and Mr. J. G. Cramb on coastal sites in the neighbourhood of Durban so long ago as 1929, but it was not possible to decide on its exact horizon until a more definite stratigraphy was established. This was afforded by the Tongaat River site, discovered in December 1935, in which the pebbles were not only found in large quantities, but were also closely associated with implements of which the antecedents were more fully known. In a description of the industry by Mr. Schofield (*Ann. Durban Museum*, 3, 5; 1936), the lydianite pebbles, from which the implements are made, are said all to be small, the largest being less than two inches in diameter, and nearly all were very thin, not more than 5-6 mm. in thickness, differing in this from all pebble industries previously described. The implements were made from both pebble flakes and pebbles. The types of implements are end-

scrapers, hollow end-scrapers, bevelled end-scrapers, points, crescents and gravettes. Three degrees of patination have been noted. The implements have been found in association with Bantu pottery, Asturian core implements, implements of Wilton and Smithfield types, Still Bay implements and Glen Grey type implements. Their position in the time-scale is, however, indicated by the stratification at the Tangaat site, on which a layer of sterile sand, six feet thick, separates the industry from the Bantu deposits; and although the pebbles are associated in a few instances with Late Middle Stone Age material, they evidently belong to the Later Stone Age cultures of the Natal coast. They form a link between the Late Stone Age industries which succeeded each other amongst the prehistoric inhabitants, who nevertheless remained ethnically constant. This is consistent with the view of L. H. Wells that the Bush-Boskop hybrid race remained constant along the south-eastern seaboard, until it was further hybridised by Bantu-Bush hybrids.

Biological Control of the Sugar Cane Hopper in Hawaii

ACCOUNTS of the lengthy campaign for the biological control of the sugar cane leaf-hopper (*Perkinsiella saccharicida*) in Hawaii have been published from time to time by the Hawaiian Sugar Planters' Association. The insect was first observed in Hawaii by Dr. R. C. L. Perkins in 1900. How, or exactly when, it reached Hawaii can only be conjectured. It seems, however, very evident that it came with imported cuttings of cane for planting, and it was ultimately determined to be an undescribed species from Queensland. This fact, coupled with the circumstance that it did no noticeable damage in Australia, led to the conclusion that it was probably held in check by natural enemies. A plan was formulated for the control of the leaf-hopper by biological means, since the creature had attained a status of a major pest of cane in Hawaii. The immediate outcome was the organisation, in 1904, of a Division of Entomology at the Experiment Station of the H.S.P.A. The next step was the journey to Australia made by Mr. A. Koebele and Dr. R. C. L. Perkins with the object of studying leaf-hopper parasites. A number of parasites were discovered and ultimately established in Hawaii, but the final subjugation of the pest came later. This was only achieved when the predaceous plant-bug *Cyrtorhinus mundulus*, discovered in 1920 by the late Dr. F. Muir in Queensland, was introduced and established. In 1923 the biological control of the leaf-hopper was considered to be complete, and it has remained in a state of repression ever since. A connected account of the history of the pest, along with its biological control, is given by Mr. O. H. Swezy in Bulletin 21, Entomological Series, of the H.S.P.A. Experiment Station, Honolulu (Jan. 1935).

Asexual and Sexual Development in Ascidiaceans

IN an interesting paper comparing sexual and asexual development, Dr. N. J. Berrill (*J. Morph.*, 57, 353) has brought out many sharp contrasts

between the development of eggs and of buds in Ascidians. From a review of the literature concerning mitosis, tissue culture, regeneration and differentiation, it is concluded that cells cannot maintain structural differentiation during mitosis, and such cells are therefore unable to divide, or may divide amitotically, or may dedifferentiate before division. Cells which have dedifferentiated can only redifferentiate along the original line. In bud development, the cell sizes are minimal, polarity and bilaterality are present before development begins, and gross differentiation of form becomes apparent from the beginning. The initial bud masses contain only 40 cells in *Distaplia* but 1,000 or more in *Ecteinascidia*, and these cells undergo eight to ten cleavages. Cytological or cellular differentiation apparently begins only when cell divisions have ended. When there is no nutritive limitation, cell division continues until there are sufficient cells for the expression of all the characters, and the course of development is direct. If there is nutritive limitation, the number of cells is less and some characters may not be expressed until later. The large size of egg cells is due to an inhibition of cell division, a physiological condition which in some respects resembles anaesthesia. In sexual development, cleavage and differentiation are fundamentally dissociable processes, the rate of cleavage finally diminishing as a state of equilibrium is approached, represented by the attainment of minimal cell size for the species.

Some New British Copepods

It is not often that copepods new to science are recorded from Britain, but in his recent paper, "Copepods from the Interstitial Fauna of a Sandy Beach" (*J. Mar. Biol. Ass. United Kingdom*, 20, No. 2; 1935), Dr. A. G. Nicholls describes several new species and three new genera from Kames Bay, Millport. The copepods, in contrast to true sand-burrowing animals, do not displace the particles of sand through which they move but crawl over the surface of the grains. Wilson (1932) first directed attention to the abundant copepod fauna of such regions, describing his method of collecting, and introducing a number of new genera and species. The same method is followed by Dr. Nicholls, and the number of new forms described is interesting and surprising. All are feeble swimmers and move with an incessant wriggling worm-like motion; they are all minute, and, although belonging to different families, have many features in common, being elongate and cylindrical, with scarcely any demarcation between metasome and urosome, and in some cases with peculiarly modified spear-shaped setae on the swimming legs which are found in no other habitat. The different species show an almost specific distribution from low water to the highest part of the beach, which is submerged only by the highest tides and may receive large quantities of fresh-water from rain directly or by drainage. In some cases specific vertical distribution is shown, certain species being restricted to the top two or three centimetres of sand, while others are found only below this, at least during the period of tidal exposure. Those which inhabit the superficial parts of the beach may be subject to considerable changes of salinity. All the species appear to breed continuously, though they are more numerous in spring and summer than later in the year.

Polarity Phenomena in Cambial Activity

RECENT experiments with the aspen poplar (*Populus tremuloides*, Michx.) by A. B. Brown have produced results which lead the author to suggest that cambial activity is not rigidly polar in its development in the root. In the present contribution (*Canad. J. Res.*, 14, Feb., 1936), he describes experiments which involved ringing the roots which attach sucker shoots to the parent plant, the rings being made so that cambial activity was interrupted in one or more places at once. It was found that a much greater cambial activity in the morphologically upward direction took place than has hitherto been observed. On the other hand, similar experiments in stems produced very little cambial activity in the acropetal direction, and where a vigorous burst of activity was noticed the gradient of tissue production fell very rapidly. In the face of the results obtained from roots, the author suggests that cambial activity may not be inherently polar in its development, but that it shows a tendency to development in a morphologically downward direction rather than in a morphologically upward one.

White Rot of Lime Trees

THE common timber-rotting fungi do not usually attack lime trees, but the 'pitch-crust' fungus, *Ustilina vulgaris*, has the notoriety of being able to do so. Mr. W. H. Wilkins has made a study of the disease (*Trans. Brit. Mycol. Soc.*, 20, Pt. 2, 133-156, January 1936). The causal organism was isolated, and its pathogenicity established by re-infection. A lengthy report of the distribution of diseased and discoloured wood appears in the paper. Microscopic examination showed that the fungus attacked the cell-walls of the tracheids, but made its way along the woody tissue by way of the pits. The vessels, rays and parenchyma were practically unaffected. A barrier of discoloured wood marked the advance of the fungus up the trunk, and also into the roots. The disease is not widely distributed; but it rapidly destroys the commercial value of an infected tree.

The Diamond Pipes of South Africa

THE helium-ratios of a series of rocks and minerals from the kimberlite pipes of South Africa have been determined by A. Holmes and F. A. Paneth (*Proc. Roy. Soc.*, A, 154, 385-413; 1936). The helium-ratio of kimberlite, corresponding to an age of fifty-eight million years, is consistent with the late-Cretaceous age assigned to the diamond pipes. It is found that amphibolite xenoliths, known to represent Pre-Cambrian rocks, give 'ages' much higher than that of kimberlite. Three eclogite nodules have similar high helium-ratios and are thus proved to be accidental xenoliths representing pre-existing crustal rocks of much greater age than kimberlite. Holmes points out that this result shows that his hypothesis for the origin of potash-rich ultrabasic rocks has become untenable, since it was based on the assumption that kimberlite was a residual magma generated from peridotite magma by early crystallisation of eclogite and dunite. Xenoliths of the peridotite-pyroxenite suite from kimberlite, including zircons, are all found to have 'low' helium-ratios. Such low results are ambiguous, since they might indicate either (a) that the xenoliths were cognate with kimberlite, or (b) that the xenoliths represent old crustal rocks which lost their helium

at the time of their incorporation in the original magma of kimberlite. The second alternative is favoured by the fact that zircons from kimberlite investigated by Lord Rayleigh in 1909 proved to have a high helium-ratio, pointing to a Pre-Cambrian age for the zircon-pyroxenites to which Williams has traced the zircons. It is concluded that at least some of the members of the peridotite suite represent a deep-seated crustal layer of ultra-basic rocks.

The Gulf Stream and Agulhas Current

OBSERVATIONS of salinity, temperature and dissolved oxygen of the water, taken by the research vessels *Atlantis* and *Discovery II* on lines of stations across the Gulf Stream between Chesapeake Bay and Bermuda and across the Agulhas Current southward from Port Elizabeth, have recently been compared ("Aufblau und Bewegung von Golfstrom und Agulhasstrom", G. Dietrich, *Naturwiss.*, April 10, 1936). In both instances the least oxygenated layer lies at a depth of roughly 1,000 metres, rising to lesser depths on approaching the American coast. On the assumption that the current has the least and negligible velocity in this layer, the relative velocities in the other layers have been calculated by means of Bjerknes's theory. Force due to the earth's rotation causes a 'piling up' of the water, which can be calculated. The observed differences in mean sea-level along the United States coast are considered.

A New Densimeter

WHEN the density of a liquid is to be determined by using density bulbs, it seldom happens that any of the bulbs has exactly the right density. In a communication to the Editor, Dr. K. Kuhlmann, of the Institute of Fisheries, Moscow, states that by making a portion of the wall of a bulb flexible and subjecting the liquid under test to a measured pressure, the volume of the bulb can be so adjusted that its density is that of the liquid. From the pressure applied, the density may be calculated if the temperature is also known. The device is an application of the principle of the well-known hydrostatic toy, the 'diver'.

Magnetic Energy Spectrum of Cosmic Rays

P. M. S. BLACKETT has described (*Proc. Roy. Soc.*, A, May 1) a large electromagnet constructed to deflect cosmic ray tracks in a cloud chamber, and its use to obtain the energy distribution of cosmic rays. Unlike the solenoids used by some other workers, the magnet can be run with a rather low power consumption; 25 kw. allows tracks 17 cm. long to be photographed in a field of 14,000 gauss. The magnet has a 8,000 kgm. iron circuit and 3,000 kgm. copper windings. An innovation is the use of an air blast for cooling instead of water or oil. The technique of obtaining and measuring the cloud-chamber tracks has been elaborately worked out. The distortions introduced by unsymmetrical expansion in the chamber and by the photographic lens were eliminated by comparison with a set of tracks taken with no magnetic field. It was found possible to estimate particle energies up to about 2×10^{10} e.v., and an energy spectrum was obtained based on observation of 188 particles. The frequency of the tracks falls off with increasing energy roughly according to $1/E^2$, and positively and negatively charged particles occur in about equal numbers. The paper

contains incidentally some interesting observations on the image curvatures introduced by high aperture photographic lenses (see also *NATURE*, May 16, p. 838).

Cosmic Ray Showers

E. C. STEVENSON and J. C. Street have recently described experiments on the production of 'showers' by cosmic rays (*Phys. Rev.*, March 15). Photographs were taken with a large metal-lined wooden cloud chamber controlled by a coincidence arrangement of three Geiger-Müller counters. One counter was placed above and two below the chamber, and a lead plate was placed in the middle of the chamber. A number of complicated showers were observed, but the most striking observation was the frequent appearance of a divergent shower below the plate, apparently produced by a single electron incident from above. The counter arrangement is, of course, adapted to select this phenomenon. The most generally accepted view of shower formation has been the conversion of a photon, and a number of the observed showers were apparently produced in this way. The production of showers by single electrons is new and rather unexpected.

Maximum Vehicle Capacity of a Highway

It is stated in *Roads and Streets* of April that a very extensive survey of highway accidents in the United States was concluded in 1934 under the supervision of the Massachusetts Institute of Technology, the Federal Government providing £100,000 towards the expenses. More than two and a half million cars were studied when running on the road, and statistics of accidents were obtained from 200 towns and cities. One section of the report deals with the mathematical analysis of accident situations, and is instructive. Various formulæ have been suggested for the safe distance to be maintained between two vehicles following one another at the same speeds. The distance between the centres of the vehicles is equated to the sum of three terms, one a constant, another proportional to the velocity and the last proportional to the square of the velocity. It is necessary to assume that the coefficient of friction is constant at all speeds. Philadelphia and New York adopt formulæ of this type, the deceleration in the former formula being taken as 19 feet per sec. per sec. and in the latter 15 feet per sec. per sec. A reaction time of half a second is allowed in both cases. It would seem that some additional allowance should be made for a possible superiority in the braking power of the leading car. The Massachusetts Registry of Motor Vehicles tested on the road 687 pleasure vehicles with four-wheel brakes. Seventy-six per cent of these could be stopped from 20 m.p.h. in the standard distance of 30 feet or less. But only about 4 per cent could be stopped in less than 20 feet. An interesting corollary to the mathematical analysis of highway capacity is the case where a two-lane road is reduced at some point to one lane. Taking the curve giving the maximum capacity of a two-lane road in cars per hour, it is shown that the maximum number of cars per hour is 1,800. Each lane of the two-lane section must therefore discharge cars at a rate not exceeding 900 cars per hour. But this is accomplished at a speed of about 5 m.p.h. Hence no matter how full the single lane may be in time of congestion, traffic cannot pass along the two-lane road faster than 5 m.p.h. This explains the extremely slow speeds often experienced in congested highways.