

Research Items

Jungle Yellow Fever

ONE of the most interesting sections of the annual report for 1935 of the International Health Division of the Rockefeller Foundation deals with the occurrence and aetiology of what is termed "jungle yellow fever". This form of yellow fever is met with in Brazil in districts in or close to uncut forest or jungle, and in which the ordinary and only vector of yellow fever in town or city, the mosquito *Aedes aegypti*, is absent. One large area was discovered in 1934 in which more than sixty fatal cases had occurred, all with one possible exception acquiring their infection in rural areas in which this mosquito did not exist. Accumulated evidence suggests that jungle yellow fever usually occurs in man as an accidental infection secondary to an infection in a lower animal, much as bubonic plague occurs secondary to plague in rats and other animals. Evidence is presented that jungle yellow fever is secondary to the disease in the wild monkeys of the district, with transmission by mosquitoes of the genus *Haemagogus*, for it was demonstrated that a large proportion of the monkeys of the district had a naturally acquired immunity to yellow fever, and that the infection could be experimentally transmitted by *Haemagogus* sp. Work upon several other diseases—malaria, hookworm disease, diphtheria, yaws, tuberculosis and others—is surveyed in the report, as well as the aid given by the Foundation in furthering public health education throughout the world.

Genetics and Cytology of Hybrid Ducks

THE intergeneric hybrids between Aylesbury and Muscovy ducks have been studied genetically and cytologically by Prof. F. A. E. Crew and Dr. P. C. Koller (*Proc. Roy. Soc. Edinb.*, 66, pt. 3). Aylesbury ♀ × Muscovy ♂ produces sterile males and grossly abnormal females with rudimentary ovary and no sex behaviour. Both sexes have a crest. In the reciprocal cross, the males are sterile while the females have a normal ovary, lay small eggs and show normal sex behaviour. The females are uncrested. The chromosomes of the parent species show no visible differences, consisting in each of five pairs of long chromosomes and numerous tiny granules, the highest chromosome count obtained being 72. Spermatogenesis shows numerous abnormalities, including short or multipolar spindles, binucleate spermatogonia, chromosome elimination, supernumerary post-meiotic divisions and giant multinucleate cells. One chromosome in the hybrid commonly lagged on the spindle in meiosis, probably because of a short terminal inversion. Since this would be insufficient to account for the phenomena of sterility, and also because the parent species show differences in nuclear and cell size and in rate of embryonic development, it is suggested that the abnormal gametogenesis is due to genetic factors which do not affect chromosome pairing, but which affect the harmonious relationship between chromosomes and spindle. This is conceived to be a result of profound differences in cell metabolism between the parental genera.

Chalcid Wasps of the Genus *Harmolita*

TECHNICAL BULLETIN No. 518 of the U.S. Department of Agriculture (September 1936) is a brochure forming a second revision of the species of the genus *Harmolita* (*Isosoma*) of America north of Mexico. Its author, Mr. W. J. Phillips, was, until lately, entomologist in the U.S. Bureau of Entomology and Plant Quarantine. It is seventeen years since the first revision of the genus was published, and in the present communication some twenty new species are described. The members of the group show a remarkable specificity of their host preferences, and it is only very rarely that a species will develop in more than one species of host. The author adds that he has never known a species of *Harmolita* to oviposit in plants of different genera. The extensive key which accompanies this paper refers to the females only: in half the known species males do not normally occur. The basis of the revision is the author's discovery of a new character in the sculpturing of the ventral aspect of the petiole and of its point of fusion with the ventral sclerite of the abdomen. This character is used with reference to identification of the males, where it appears to be better than other characters, although less valuable than with regard to females. The genus is one of definite economic importance since some of its members attack certain cereals and cultivated grasses.

Japanese Bopyrids

THREE recent papers by Dr. Sueo M. Shiino deal with interesting new Bopyrids ("Bopyrids from Tanabe Bay (3)". *Mem. Coll. Sci.*, Kyōtō Imp. Univ., Ser. B., 11, No. 3; 1936. "Bopyrids from Shimoda and other Districts" and "Bopyrids from Misaki", *Rec. Oceanograph. Works in Japan*, 8, Nos. 1, 2 and 3; 1936). The first is a continuation of his work published in this same journal in 1933 and 1934. Several new forms are described, mostly from crabs or shrimps. The new genus *Cataphryxus* has been created for *C. primus* in a former paper called *Epiphryxus primus*, the generic name *Epiphryxus* having been used by Nierstrasz and Brender à Brandis to describe a phryxid *E. adriaticus*. The second paper also includes new species, the material being collected at Shimoda, Nagasaki and Formosa. The new genus *Heterocephon* is here created for an Ione-like Bopyrid, closely related to *Dactylocephon*, *Metacephon*, *Anacephon* and *Hypocephon*, all having well-developed endopodites in the female and the medio-dorsal process absent. A table shows the differences between these genera. The third paper includes species collected near the Marine Biological Station at Misaki.

Spores of the Mushroom

MISS D. M. CAYLEY has made a detailed study of the spores and spore-germination in wild and cultivated mushrooms (*Trans. Brit. Mycol. Soc.*, 20, Parts 3 and 4, November 1936). It has been stated that the wild mushroom has four basidiospores, and the cultivated form only two; but Miss Cayley has

shown that two of the three common varieties in cultivation have a number of spores varying from one to four. The origin of the cultivated mushroom is very obscure, and the present paper does not illuminate this question; but mycologists will be greatly interested in the discussion of circumstantial evidence for heterothallism in the genus *Psalliota*. Spores of wild mushrooms are haploid, and it is suggested that *P. campestris* and *P. arvensis* may be haplodioecious. The cultivated mushroom is a saprophyte, but there is a certain amount of evidence that the wild form may be a facultative parasite upon the roots of grasses.

Some Diseases of the Potato

MODERN knowledge has not brought a new cure for the fungus causing wart disease of potatoes, but numerous investigations have elucidated the incidence and pathogenic cycle of the disease. The Ministry of Agriculture and Fisheries has provided an admirable summary of modern findings in its new Advisory Leaflet No. 274, "Wart Disease of Potatoes". This replaces the old Leaflet No. 105, and perhaps the most striking addition is a list of solanaceous plants, other than the potato, which have been infected artificially with the causal fungus *Synchytrium endobioticum*. Such hosts do not, however, seem to play any practical part in spreading the disease under natural conditions. The subject matter of all sections of the leaflet has been entirely rewritten, and the list of immune varieties has been brought up to date. Advisory Leaflet No. 278, which replaces Leaflet No. 164, makes a clear presentation of the menace of the virus disease leaf roll to the potato crop. Roguing diseased plants from isolated crops with very slight incidence of the malady, and fumigation of seed-tuber stores to eradicate transmitting insects, are the control measures recommended.

Glaciation of Bantry Bay District

THE results of a study of the evidences of the latest glaciation in the neighbourhood of Bantry Bay have recently been recorded by A. Farrington (*Sci. Proc. Roy. Dublin Soc.*, 21, No. 37; 1936). The area was invaded by an ice-sheet coming from the north-north-west over the ridge formed by the Cah and Slievemiskish Mountains, which were overwhelmed to a height of about two thousand feet. The Bay was filled with ice which escaped south-westwards along the Bay itself; north-eastwards into the mountain valleys, where fine terminal moraines are found; and south-eastwards as far as Skibbereen. The terminal moraine of this sheet can be traced for about twenty miles from the pass of Keimaneigh to Skibbereen. The press of ice coming down the Glengarriff valley was congested at the head of the Bay, and there is evidence of much differential movement within the ice-mass. Drumlin trains mark the north-east and south-west ice movements, but in the south-east direction they are poorly developed. The occurrence of erratics of typical crinoidal limestones of Lower Carboniferous type on the south shore of the Bay seem to have been derived from a former exposure of Carboniferous limestone which is now covered by the waters of the Bay. Otherwise they must have been carried from the outcrops at Kenmare without leaving a single example on the ranges to the north of the Bay.

Obtaining Upper Air Data

A RECENT report circulated by Science Service of Washington, D.C., deals with a new development of upper air research. The sounding balloon, with recording instruments that are not at once recovered, is not equal to the demands of modern weather forecasters for prompt information about the physical state of the upper air. This failure has led to the construction in various countries of devices carried by balloons which send out automatically, by radio, reports of pressure, temperature and humidity. The latest of these comes from the California Institute of Technology. Carried by a balloon 5 feet in diameter, and emitting on a wave-length of 1.7 metres, it has already yielded a sounding up to 30,000 feet. L. E. Wood, graduate assistant of the Institute, has designed the meteorograph, and has developed for it a 2-volt storage battery that weighs only 4½ gm. Fifty of these batteries are used in series in place of the ordinary dry battery system. The radio transmitting apparatus is the work of Capt. C. O. Maier, of the U.S. Signal Corps. A very small tube emits a constant signal, which is interrupted by a timing device that translates the data for broadcasting. It is a modified watch that develops twenty-five times the power of an ordinary watch. Power for the radio comes from three dry cells, of 135 volts in all, and three small storage batteries. The signals are recorded on an electrically operated tape.

A New Actinometer

AS a result of experiments carried out in the laboratory of the Meteorological-Hydrographical Institution at Stockholm, A. Angström has produced a new design of actinometer. This is described under the heading "A Simple Actinometer" in paper No. of the Institution reprinted from *Gerlands Beiträge zur Geophysik* (48, 303; 1936). The author suggests that in some ways it would be better to reduce rather than to increase the number of actinometers; but this one was designed and made for the glaciological expedition of Prof. H. Ahlmann to Iceland in the summer of 1936, and worked well, and as it was felt also that a very simple and portable instrument is in demand for meteorological work, it seemed desirable to publish a description of it. The new actinometer consists of a thermometer with blackened spiral bulb the plane of which is perpendicular to the graduated stem. Solar radiation is admitted through an aperture in the lid of a cylinder which surrounds the thermometer. At the bottom end of the cylinder is a Fuess aspirator similar to those used on psychrometers. When the inside of the apparatus has been brought to air temperature, which takes about two minutes, the aspirator is removed and the cylinder is trained on the sun with the aid of a diopter. An exposure of 90 seconds is made, and the rise of temperature is observed. This rise is for a particular instrument nearly proportional to the intensity of the solar radiation. The constant by which the rise must be multiplied to get the radiation intensity is found for each instrument by comparisons made with some standard instrument of more elaborate pattern. Figures are quoted which suggest that the error arising from the use of this simple actinometer will usually be less than three per cent, which for many purposes is quite accurate enough. An observation can clearly be made in a very short time.

Clarification of River Water

IN an account of an extensive series of experiments on the clarification of water from the River Vltava in Czechoslovakia (*Proc. Masaryk Academy of Work*, 10, 233; 1936), Prof. J. Milbauer concludes that crude aluminium sulphate is the most satisfactory clarifying agent for this and other river waters. In his investigations it was found that the addition of 100 mm. of the salt per litre gave the best results. Pure aluminium sulphate was not so satisfactory, probably because the silica and other impurities in the crude salt play an important part in flocculating the aluminium precipitates. The most suitable temperature was 10° C.; below this point flocculation was slow. Clarification was favoured by hydrogen ion concentrations up to $pH = 4.2$. Beyond this it decreased to a minimum at $pH = 5.0$. The addition of such substances as calcium hydroxide, ferric sulphate or silica had no perceptible influence, although addition of excess of charcoal was favourable to sedimentation. Cheap natural products like chalk, felspar, clay, dolomite powder, coal dust, peat or infusorial earth had no useful action on the process. Addition of colloids (proteins, saponine, silicic acid, etc.) were definitely detrimental, but kaolin and certain industrial wastes and the ash from a refuse-burning station were beneficial in assisting the flocculation of the precipitates from the addition of aluminium sulphate to the river water. Pre-treatment with ozone, chlorine, carbon dioxide or sulphur dioxide was not advantageous.

Magneto-optic Method of Chemical Analysis

THE work of Allison and others on the magneto-optic apparatus has been called into question by certain observers who have been unable to observe the 'minima' which are claimed to be characteristic of the substances under observation. Gordon Hughes has recently described a photographic method whereby small changes in light intensity have been successfully detected and the reality of minima conclusively demonstrated (*J. Amer. Chem. Soc.*, 1924; 1936). More than 2,300 photographs taken in this investigation show that there is a small effect—the change of light intensity for a minimum being 0.7 per cent—which is characteristic of the substance under test in the apparatus. Water-blanks showed approximately zero percentage change. The presence of foreign materials did not change the magnitude of the intensity change for a minimum. The direction of the effect was found to be dependent on the direction of the magnetic field in the coils, and to reverse with the setting of the Wollaston prism on either side of the critical 45° position. The measured photographic effect was found to occur only at positions of minima which had been previously determined by repeated visual observations. It is concluded that the photographed effect is identical with the visual effect and that the latter is real, despite the not unexpected inability of certain workers to observe it.

Locomotive Furnace Control

THE principle of furnace control by means of the carbon dioxide concentration in the flue gases is well known in its application to stationary units. In practice, conditions of firing and air supply are regulated, and heat losses in the flue gases (carbon

monoxide and hydrogen) are eliminated by maintaining the carbon dioxide at a fixed optimum percentage. Measurement of the carbon dioxide content is frequently carried out by a thermal conductivity method, but unfortunately this is complicated by the fact that both carbon monoxide and hydrogen affect the readings of any thermal conductivity meter. On application of this principle to locomotive furnaces, where conditions of firing and air supply are not so readily controlled as in stationary plants, the presence of carbon monoxide and hydrogen has a very pronounced effect on the carbon dioxide meter reading. V. Binns and S. Bairstow, in a paper read before the Institute of Fuel on November 25, emphasized this factor and outlined investigations which had been made with the view of assessing the accuracy of thermal conductivity methods of gas analysis when applied to locomotive flue gases. Results of such investigations proved that this method can be adopted, providing appropriate corrections are made to meter readings. The method of correction is simple and is well illustrated in the paper by a rapid graphical method.

Strength of Materials

IN a paper entitled "The Relationship between Mechanical Tests of Materials and their Suitability for Specific Working Conditions" read before the North-East Coast Institution of Engineers and Shipbuilders on December 18, Dr. N. P. Inglis dealt with the various stipulations most or all of which are usually included in the specification of an important steel forging; he analysed critically each of these from the point of the useful information it provides and demonstrated that for service under particularly severe conditions, such as high temperature, mechanical tests require to be supplemented by precise knowledge of chemical composition, method of manufacture, amount of ingot croppage and of hot work, and the nature of the heat treatment given. It was, however, also shown that from the ordinary mechanical tests, by the adoption of suitable procedure, much more than the usual amount of information could be derived and, as an example, the value of the Izod test both as a guide to the correctness or otherwise of heat treatment in certain alloy steels, and also as a means of indicating the presence of laminations or other effects of segregation, was quoted. In this last connexion, the position of the notch must be suitably arranged and, following from his discussion of this point, the author suggested that microscopic examination of Izod test fractures would add materially to the information of the mere figures of the test. Among other matters, the deterioration of mechanical properties under severe service conditions was discussed, and the results of two groups of notched bar tests were cited. The first of these referred to a number of samples of different qualities of steel subjected, during fifteen months' service, to temperatures of 410°–430° C., and it was here shown that while some samples depreciated to Izod values 14–80 per cent of their original figures, in others the initial value was fully maintained. In the second group, similarly varying results, arising from different preparatory treatment, were obtained in samples subjected to subnormal temperatures of –30° C. while in service.