Research Items

Mental Tests of the African. The difficulties and special methods requisite in the study of the African by the employment of intelligence tests are discussed by Dr. R. A. C. Oliver, Carnegie fellow for educational research in Kenya, in *Africa*, vol. 7, pt. 1. Dr. Oliver has been engaged in the study of general intelligence, and in a lesser degree of musical talent, in Kenya natives. His general tests were devised to measure the intelligence of natives who had received some schooling, and were non-verbal tests, the problems being presented in pictures and other symbols. The kind of test to be used varies with the feature of African mentality in which we are interested; but we ought to know more about the African's abilities in specific activities and their special strength or weaknesses. The type of test will also depend on education and the language situation. Two lessons are suggested by experience: first, that it is highly desirable to precede the test with a demonstration and practice; and secondly, that the time allowed should be unlimited or ample. An application of a general intelligence test to 124 pupils of a secondary school for European boys and 93 pupils of a secondary school for African boys in Kenya produced two main facts. The average mark of the African was 85 per cent of the average mark of the European; secondly, 14 per cent of the Africans gained a mark as high or higher than the average European mark. This leads to a conjecture that, comparing the variability with that of Europeans, a small percentage of Africans might be capable of a university education; a larger percentage might complete the secondary school course; a still larger percentage might undertake a few years in the secondary school and the mass of the African people might take a full primary school course.

European Bitterling spawning in American Mussels. The bitterling (*Rhodeus amarus*), a European minnow, was introduced into Sawmill River, New York, in or before 1925, and after surviving for a few years disappeared. The suggestion was made that lack of suitable mussels, within which the eggs might be deposited, determined the disappearance of the bitterling. C. M. Breder, however, has made special observations of bitterlings and American mussels, kept together in an aquarium (*Copeia*, 1933, p. 147). Although actual oviposition was not observed, the courtship behaviour of the fishes agreed with the descriptions in European aquarium journals, and when one of the mussels was opened four days later, seven bitterling embryos were found in the gill folds, embedded as described for European mussels. The first opened mussels belonged to the species *Unio complantus*, but two specimens of another species, *Anodonta cataracta*, contained three and ten embryos respectively. Since in Europe *Rhodeus* is known regularly to use both *Unio pictorum* and *Anodonta cygnea*, it would seem that a considerable variety of mussels is available for the peculiar reproductive habits of the bitterling, and that other causes than the unsuitability of the mussels must be sought to account for the disappearance of the specimens set free in an American stream.

Fossil Insects from the British Rhaetic and Lias. The Trustees of the British Museum issued during 1933 the third of their series of publications on fossil insects. The present work is in the form of a small handbook entitled "The Panorpoid Complex in the British Rhaetic and Lias" by Dr. R. J. Tillyard. The material upon which it is based consists of nearly one hundred specimens, contained in the British Museum, with a further eleven specimens in the Museum of Practical Geology. It includes examples belonging to the orders Neuroptera, Mecoptera, Paratrichoptera, Trichoptera and Diptera. These groups, along with the Lepidoptera (not represented among the material) form a related assemblage of orders which constitute what Dr. Tillyard has termed the Panorpoid Complex. They centre around the primitive order Mecoptera, and it is to this group that most of the specimens dealt with in this memoir belong. The Mecoptera in the collection include nine species, embracing four genera, of which three of the latter were previously undescribed. The Neuroptera comprise two new species, each representing an already known genus, while the only Paratrichopteron forms the type of a new family—the Liassophilidæ. The Trichoptera are represented by fourteen specimens, all pertaining to species (mostly new) of the genus *Necrotaulius*. Of the Diptera there are only three examples: these are Tipaloid forms which are referred to the new genus *Liassotipula* and the new species *anglicana*. As is usual among British Museum publications, this work is well printed and admirably illustrated. It is obtainable through booksellers or from the Museum, price 5*s*.

Studies on Cuticle. V. B. Wigglesworth has recently recorded observations on the cuticle of the blood-sucking bug, *Rhodnius* (*Quart. J. Micr. Sci.*, 76, Part II, 1933). The cuticle consists of two primary layers—a very thin epicuticle and a relatively thick endocuticle traversed by fine pore-canals. The epicuticle is composed of material (cuticulin) the chemical properties of which are like those of the cutin or suberin of plants. The endocuticle is composed of protein and chitin, and is made up of two layers. The nymphal stages of *Rhodnius* ingest from six to twelve times their weight of blood at a single meal and the adults may take three times their own weight. The abdomen is therefore capable of great distension, which is accomplished in the nymph and the adult in a different way. In the former the endocuticle is flexible and free from cuticulin, and in the fasting nymph the overlying epicuticle is thrown into deep folds. When the abdomen is distended with blood the endocuticle is stretched and attenuated and the folds of the epicuticle are smoothed out. In the adult the outer part of the endocuticle is permeated with cuticulin, is rigid and can not be stretched. A deep longitudinal fold or pleat in the lateral wall of the abdomen permits distension of this region. The dermal glands and their ducts, the structure of the epidermis, including the cells crowded with spheres of uric acid, the process of moulting and the formation of new cuticle are described. It is suggested that the cenocytes, a new generation of which arises at each moult (except the last) from embryonic cells in the epidermis, synthesise some of the nonchitinous constituents of the cuticle during moulting and of the egg-shells during maturation of the ova.

Research on Lichens. A paper by Miss A. Lorrain Smith in vol. 18, pt. 2, of the *Transactions of the British Mycological Society* reviews recent lichen literature (pp. 93–126). The author describes several works on lichens which have appeared during the last two years. Perhaps the most monumental of them is Zahlbruchner's "Catalogus Lichenum". Contributions to our knowledge of gonidia, parasymbiosis, lichen structure, soralia, isidia, cephalodia, and apothecial reproduction are reviewed critically. The section on physiology collects some very useful knowledge about lichen acids, and paragraphs on the rate of growth, lichens as pests and gall formations are very interesting. Systematy and ecology are treated at considerable length, and a bibliography of nearly three hundred references is of great benefit to all students of lichens.

Entomogenous Fungi of Egypt. A short bulletin (No. 120) of the Technical and Scientific Service of the Ministry of Agriculture for Egypt deals with some entomogenous fungi in Egypt (by Dr. R. M. Nattrass, pp. 1–9, Cairo, 1932). The paper describes various fungi which attack Egyptian insects. Species of the genera *Empusa*, *Aspergillus*, *Beauveria*, *Metarrhizum* and *Mucor* are involved, and some of their cultural characters are given. Inoculation experiments are described, but there seems little likelihood that fungi may be used as a method of control for insect pests. The work is admittedly of a preliminary nature, but warrants extensive investigation for the sake of the mycological problems involved.

West Highland Tectonics. At the meeting of the Geological Society on January 10, Prof. E. B. Bailey presented a valuable paper on the structure of the Loch Leven to Glen Roy district. Study of the current-bedded quartzites of Loch Leven has confirmed various deductions previously recorded and has led to certain new conclusions. T. Vogt, S. Buckstaff and O. N. Rove are found to be correct in claiming the Eilde Flags as the oldest member of the Eilde Flag–Cuil Bay succession. R. G. Carruthers is correct in placing three quartzites and three mica-schists between the Eilde Flags and the Ballachulish limestone. The gigantic recumbent folds of the district tend to retain their inverted limbs intact and to lose their normal limbs by drag. The Am Bodach quartzite is found to belong to the Eilde, and not to the Glen Coe, quartzite; it occurs in a recumbent fold that has its roots four miles farther east. The quartzite of the eastern Stob Coire Easain, above Loch Treig, is also Eilde quartzite and marks another large-scale inversion. The strong folding of the Fort William slide in Glen Roy, first recognised during a preliminary traverse by R. G. Carruthers, has now been established in detail.

The Quinhydrone Electrode. The increasing use of the quinhydrone electrode makes a study of its normal potential of importance, and in this connexion some experiments by Harned and Wright (*J. Amer. Chem. Soc.*, December 1933) are of interest. The cell: Pt / Quinhydrone, HCl(0·01*M*) / AgCl / Ag, without liquid junction was used, and details as to the preparation of the materials and the technique, the cell being operated in vacuum (a necessity for the silver electrode), are given. By combining the results with those for the cell H_2(1 atm.)/HCl(*m*)/AgCl/Ag, previously investigated, the electromotive forces of the important cell Pt/Quinhydrone, HCl(*m*)/H_2(1 atm.) are calculated, and thence the normal potential of the quinhydrone electrode. Values were found at temperatures from 0° to 40°, although side reactions quickly destroy the equilibrium at temperatures above 30°. The values for the normal potential of the quinhydrone electrode are expressed in a quadratic equation as regards dependence on temperature, and it is shown that they agree to 0·2 millivolt with those interpolated from the earlier measurements of Biilmann and his collaborators, who measured the potentials directly against the hydrogen electrode. The new results are considered the best available at the present time. Some peculiarities in the behaviour of the cells are of interest.

Vitamins from Egg Yolk and Fish Oil. Dr. N. K. Basu, working in Calcutta, reports in communications to the Editor that he has obtained vitamin A by irradiation of a sterol isolated from egg-yolk, and also that he has succeeded in isolating crystals of vitamin D from a fish oil. The egg-yolk sterol has a melting point of 62°–67° C.: on irradiation with ultra-violet light of wave-length 2750–3000 A., a substance reacting strongly with antimony trichloride was obtained. Spectroscopic examination of the product showed the maximum absorption to be in the ultra-violet at 3280 A., and the blue colour developed with antimony trichloride showed absorption bands at 5720 A. and 6200 A. Crystalline vitamin D was isolated from the oil of *Notopterus chital*, a fish common in Bengal. A concentrate obtained from the oil was distilled at a temperature of 120°–140° C. and at a pressure of 1 mm. On cooling, this crystallised in the form of needles having a melting point of 117°–120° C. and showing maximum absorption at 2650 A.: the crystals gave no precipitate with digitonin. The final confirmation of the identity of these two products with vitamins A and D respectively will, of course, depend on the results of the biological tests, which are not reported. The properties of the crystals obtained from the fish oil agree fairly well with those of calciferol. It is more difficult to correlate the production of vitamin A from a sterol with the fact of its formation from carotene in the body.

Radiation from Variable Stars. The very delicate operation of measuring the radiation from stars with the aid of specially constructed thermocouples attached to the 100-in. telescope at Mount Wilson has previously been mentioned in NATURE (123, 425). The results of observations by E. Pettit and S. B. Nicholson on variable stars during the period 1921–27 have now been published in the *Astrophysical Journal* (78, 320). Observations were made on twenty-one long-period variables, nine irregular variables, two Cepheids, and on Algol. In the case of the long-period variables, it was found that on the average the real energy maximum occurs about 50 days later than the visual light maximum, though the variations of temperature are approximately in phase with the light curves. The average temperature range is from 1800° K. to 2350° K., and the coolest star observed (χ Cygni) varies from 1630° K. to 2260° K. In the case of the two Cepheid variables η Aquilae and δ Cephei, as well as in Algol, the changes in radiometric magnitudes are in phase with their light curves. This result is to be expected, since the maximum of energy for stars of this class is in the visual region of the spectrum.