

of this "fairy tale." We require to see an cœtrid catch a mosquito and lay its eggs on the abdomen of the latter. We also require (with pocket lens) to see a mosquito with eggs attached biting, and then to see the larvæ emerge and enter the skin. The larvæ when grown and *in situ* are best chloroformed; they can then be fairly easily expressed.

Beri-beri.—A practical demonstration of the view now generally accepted that beri-beri is due to the absence of the subpericarpal layer in polished rice, was afforded by the result of an expedition to the Snow Mountains, in Dutch New Guinea. Previous expeditions had failed except one, of only ten men, and in this *unpolished* rice was used. The expedition here recorded consisted of 204 natives and lasted seven months. There was not a single case of beri-beri. The daily ration in grams was:—Rice, unpolished, 700; fish or meat on alternate days, 150; kachangidju (a bean), 200; Javanese sugar, 50; coffee, 20; tea, 5; salt, occasionally, 20. What is required of rice millers is to produce a "nice-looking" rice with the pericarp removed and the subpericarp retained. Rice millers must accept the facts and not deny that polished rice is a cause of beri-beri, as happened in the writer's experience recently. A rice containing not less than 0.4 per cent. of phosphorus pentoxide is a safe one, but inspection or other simple tests is quite enough to tell a safe from an unsafe rice. "Parboiled" rice is also safe, but many natives will not eat it, as it does not look nice and has an objectionable smell.

Leprosy.—The successful cultivation of the bacillus has been claimed by various observers, but in the experiments detailed in this report all attempts were negative, although the "successful methods of other observers were followed." The subject is at present in a state of hopeless confusion.

Bilharzia.—It has been shown by Japanese workers that the Japanese form of this disease was contracted (by dogs) by immersion in water. It was thought that this proved the direct penetration of the skin by the miracidia that hatched from the egg, but Leiper and Atkinson have shown that it is the Cercariæ which have passed through a mollusc that are the infective stage.

The appendices give evidence of the enthusiasm with which research is followed, but we think there might be some co-ordinating system linking together researches in various colonies.

RECENT ENTOMOLOGICAL RESEARCH.

NO English-speaking zoologist is likely to have overlooked the exhaustive work on the life-cycle of *Trypanosoma lewisi*, recently published in the *Quart. Journ. Microsc. Sci.* (vol. lx., part 4), by Prof. A. E. Minchin and Mr. J. D. Thomson. This great research involved the dissection of 1700 rat-fleas (*Ceratophyllus fasciatus*), and Prof. Minchin gives, in the last number of the Journal of the Quekett Microscopical Club (2, vol. xii., No. 76), as a kind of by-product, some details of the anatomy of the insect. The nervous system, reproductive organs, and salivary glands receive special attention. In the nervous system there is a curious sexual dimorphism, the male having eight distinct abdominal ganglia, while the female possesses only seven. The salivary glands of the larva are much larger than those of the adult, and the larval duct is provided with a reservoir, wanting in the corresponding imaginal structure; these differences are correlated with the well-known difference in the nature of the food, the flea being a blood-sucker, while the larva devours solid particles—commonly the excreta of the rat. Students of insect anatomy will be grateful to

Prof. Minchin for his detailed account of his simple and successful methods of manipulation.

The woolly aphid of the apple, commonly known as "American blight," has been the subject of many interesting observations recently; for example, we have had Mr. J. Davidson's careful anatomical research into the different forms of the species (*Quart. Journ. Micr. Sci.*, vol. lviii., 1913, part 4), and Miss E. M. Patch's demonstration that the elm is the normal host-plant for the wingless sexual stage of the species and for the early spring generations (Maine Agric. Exp. Sta. Bull., 203, 217, 220, 1912-13). Now Mr. A. C. Baker has published (U.S. Dept. Agric., Report 101, 1915) a comprehensive account of the structure, life-history, and economic importance of the insect in a pamphlet of fifty-six pages, illustrated by fifteen excellent plates. He believes that the generic name *Eriosoma* (Leach, 1820) must supersede *Schizoneura* (Hartig, 1841), which has been universally used in recent years. As regards the life-cycle, he confirms the latest conclusions of Miss Patch that *E. ulmi* is identical with the currant-root feeding *fodiens*, while *E. lanigera* (the "American blight") is an altogether different species, with the elm as its normal "principal" host, and the apple, hawthorn, and rowan as alternative summer hosts. As a matter of fact, the virgin females of *lanigera* are commonly found on the bark or roots of apple-trees throughout the winter months, so that the sexual phase may be tending to disappear from the life-history altogether. It is interesting—after so many American writers have objected to the identification of their continent as the original home of this "blight," and have contended for its European origin—to find it here considered that the weight of evidence indicates the insect as a native of the "New World."

A similar doubt as to the country of its origin exists with regard to another orchard insect-pest, the pear thrips (Euthrips, or *Taeniothrips pyri*), which since 1900 has caused much damage both in the eastern and western United States, and in some English localities. A complete account of its life-history and habits in California, by Messrs. S. W. Foster and P. R. Jones, has just been published (U.S. Dept. Agric. Bull. 173). The adults feed in the blossom-buds, and the larvæ on the fruits, not of the pear only, but of other rosaceous trees; while pupation takes place in the soil, the transformation being completed about midwinter, though the winged thrips do not appear until some months later. In California all the adult individuals are believed to be parthenogenetic females, although males have been found in this country by Mr. R. S. Bagnall.

Dr. A. D. Hopkins continues his excellent systematic studies of the bark-beetles, with a "Classification of the Cryphalinæ" (U.S. Dept. Agric., Report 99), in which some new genera and a large number of new species are described, the latter not being all North American. This is the fourth "Contribution towards a Monograph of the Scolytoid Beetles," the second having appeared in the Proc. U.S. Nat. Mus., vol. xlvi., and the first and third as No. 17 of the Technical Bulletins of the U.S.D.A. Bureau of Entomology. This disconnected mode of publication—somewhat troublesome to the bibliographer—is due to the discontinuance of the special series of bulletins hitherto issued by the Bureau of Entomology, the results of the work of which will apparently henceforth be mingled with those emanating from other sections of the Department of Agriculture. From this centralisation there may perhaps be some benefit derivable that is not apparent to an ordinary entomologist, who cannot fail to appreciate its inconvenience. Report 107 of the U.S. Department of Agriculture consists of a short but valuable and beautifully illustrated paper on the larvæ of long-horn beetles of the division

Prioninæ, by F. C. Craighead. In the *Journ. Agric. Research* (vol. iv., No. 3) W. S. Pierce describes weevils of the genus *Diaprepes*, which injure sugarcane in the West Indies, and gives details as to their variation and life-history.

The gipsy moth (*Porthetria dispar*) imported from France into Massachusetts in 1869 continues to occupy the attention of American entomologists; Mr. A. F. Burgess describes the means adopted in the New England States for checking its ravages (Bull. U.S. Dept. Agric., 204). His account is illustrated by an interesting set of maps showing the present range of the species in New England, and also of some of its natural enemies which have been imported from Europe, of which the large ground-beetle, *Calosoma sycophanta*, is the most formidable. Reference is also made to the strange "wilt-disease" which at times fortunately becomes epidemic among the caterpillars. It has been made the subject of a special research by Mr. R. W. Glaser (*Journ. Agric. Research*, vol. iv., No. 2). He finds that the disease was not present in North America before 1900, and believes that its spread may be at least partly due to some of the introduced parasites. The causative micro-organism has not been demonstrated.

The cabbage-fly (*Phorbia* or *Chortophila brassicæ*) is one of our commonest and most destructive garden pests. Mr. J. T. Wadsworth has published (*Journ. Econ. Biol.*, vol. x., No. 1) a valuable and interesting account of a rove-beetle, *Aleochara bilineata*, the larva of which eats its way into the puparium of the cabbage-fly, and feeds on the pupa. "Like some other beetle life-histories, this shows a tendency to hyper-metamorphosis, the newly-hatched *Aleochara* being of the campodeiform type normal to the family, while the later instars, in accordance with their parasitic habit, have shortened legs and swollen bodies, approaching the cruciform type.

A contribution to our knowledge of the physiology of aquatic insects is due to Mr. S. K. Sen, who gives some observations on the respiration of Culicidæ (*Indian Journ. Med. Research*, vol. ii., No. 3). The larva of *Culex microannulatus* consumes 1.1 cubic mm. of oxygen per hour, the pupa 1.9 cubic mm., and the imago 2.5 c.c.; the increased oxygen-hunger of the pupa as compared with the larva is noteworthy, and it was found that the pupa is more quickly affected and killed by the want of oxygen. Systematic study of blood-sucking Diptera goes steadily on; the British species of Simulium are diagnosed by Mr. F. W. Edwards in the last number of the *Bulletin of Entom. Research* (vol. vi., part 1). This same number contains a report by Dr. W. A. Lamborn on the "control" of tsetse-flies (*Glossina*) in Nyasaland; a number of flies were caught by bird-lime spread on boards carried about by native boys, and digging-wasps are found to seize tsetse and carry them off. Hymenopterous parasites of the Chalcidoid group have been reared from *Glossina* puparia in northern Rhodesia, and these are described with excellent figures by Rev. Jas. Waterston, in the same number of the bulletin.

Of slight importance from the economic point of view, the Odonata (dragonflies) are yet of great general interest to the student of insects. Mr. E. B. Williamson has just published (*Proc. U.S. Nat. Mus.*, vol. xviii., pp. 601-38) some exceptionally valuable notes on Neo-tropical species belonging to the "demoiselle" (*Agrionine*) subfamily. The purely systematic entomological paper is usually a weariness to any not a specialist who may attempt to read it, but this author enlivens his accounts of structural details of diagnostic value with descriptions of the habits and adaptations of the beautiful insects which he loves to observe when alive in the swamps and forests of Central America and the Antilles.

G. H. C.

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THE NATURAL HISTORY OF CORUNDUM.¹

IN the Summary report of the Geological Survey of Canada for 1896 Mr. W. F. Ferrier directed attention to the occurrence of corundum crystals in the township of Carlow, Hastings County, Ontario, and to the probable economic importance of the discovery. This announcement led to the opening up of what has become the largest corundum mining industry in the world. In 1910 an important memoir by Adams and Barlow on the general geology of the district in which the corundum-deposits occur was published by the Geological Survey (*Geology of the Haliburton and Bancroft Areas*, Memoir No. 6), but the details as to these deposits were reserved for fuller treatment than was possible at that time. They are now given in the present volume, together with a general account of the occurrences of the mineral in other parts of the world.

Apart altogether from their economic importance, the Canadian deposits are of considerable scientific interest as throwing light on one of the methods by which corundum has been naturally produced. They are usually associated with nepheline and other alkaline syenites which occur at the junction of the great Laurentian granitic batholiths with the limestones of the Grenville series. Red alkaline syenites, rich in soda, together with their coarse-grained pegmatitic equivalents, are pre-eminently the corundum-bearing rocks throughout the district, although in one of the smaller areas the mineral occurs in anorthosites. The richest rock is known as corundum-pegmatite, dykes of which may attain a width of 18 ft. and contain as much as 75 per cent. of corundum. Individual crystals weighing 30 lbs. have been obtained from this rock. In other rocks they are smaller in size, and often sink to microscopic dimensions. The colour usually varies from blue to white. No transparent varieties suitable for use as gems have as yet been found.

In his classic researches carried out in Warsaw during the years 1891-96 and published in *Tschermak's Mineralogische und petrographische Mitteilungen* for 1898, Morozewicz proved that felspathic magmas, especially those rich in soda, possessed the power of dissolving alumina, and that on cooling the excess of alumina over that required to form felspar crystallised out as corundum. The facts described in this memoir clearly prove that the Canadian corundum has crystallised out of a highly felspathic magma in accordance with the principles experimentally established by Morozewicz. The mineral is extracted from the rocks by blasting, hand-picking, crushing, and dressing by methods akin to those frequently used by miners. From material fed to the mills containing 10½ per cent. of corundum a high-grade product consisting of from 90 to 95 per cent. is obtained. It is at present employed solely as an abrasive agent, although researches have been, and are still being, carried out to discover other uses. The value of the total amount placed on the market to the end of 1913 is about 2,000,000 dollars, and there has been no appreciable falling off in the amount produced during recent years. Its principal rivals are carborundum and artificial corundum, known as alundum, both of which are produced at Niagara Falls.

ANCIENT ARABIC METEOROLOGY.²

AT what stage of intellectual development, premonitory signs of weather were first connected with coincident, but probably unrelated, phenomena,

¹ "Corundum: Its Occurrence, Distribution, Exploitation and Uses." By Alfred Ernest Barlow, Department of Mines, Canada. Pp. 377+28 plates and a geological map of Central Ontario.

² "Some Arabic Weather Sayings." By Mohammad Bey Kasim. Reprinted from the *Cairo Scientific Journal*, Nos. 97 and 98. (Alexandria, 1914.)