RESEARCH ITEMS

Effects of Insecticides on the Mid-gut Wall of a Larva

THE specific action of insecticides on the tissues of various insects is a little-explored field. Knowledge of this kind may prove of value in the selection, improvement and appliction of methods of insect control. A review of the physical and chemical effects of poisons on insect tissues cells and secretions is given by Trappmann (*Z. Pflanzenkrank.*, **48**; 1938), while the most recent contribution to this subject is by P. A. Woke, of the U.S. Department of Agriculture. In the *Journal of Agricultural Research*, **61**, 321–29 (1940), this writer discusses the effects of certain insecticides on the walls of the mid-intestine of the larva of the "southern armyworm" (*Prodenia eridania*). Lethal doses of the poisons were fed to the larvæ in turnip-leaf or sweet potato-leaf "sandwiches". The subjects of the trials were then killed and fixed after different intervals and the tissues examined histologically for comparison with control individuals. It appears that the action of arsenicals was followed by disintegration of the epithelial lining of the mid-intestine and damage to the visceral muscle-fibres. Ingestion of sodium fluoride resulted in disintegration of the substance of the cytoplasm and the nuclei. The epithelial cells of those larvæ that had ingested sodium fluoaluminate were greatly disintegrated and the cross-striations of the muscle-fibres were faint or obliterated. On the other hand, no changes in the epithelium or muscle-fibres followed the ingestion of barium fluosilicate, phenothiazine or rotenone that could be attributed with certainty to the substances named. Rotenone, it may be added, varies remarkably in its toxic action on different species of insects. Silkworm larvæ, for example, died within two hours from the effects of taking in minute quantities of this substance, whereas southern armyworm larvæ readily ingested 5–10 mgm. without showing ill effects. With regard to sodium fluoride, the observation of Hockenyos that this compound can be absorbed in lethal amounts directly through the integument of cockroaches, requires fuller exploration.

Termites and Soil Fertility

WHILE the destructive role of termites in the tropics is widely recognized, another aspect of their activities has so far attracted little attention, namely their effect on the physical and chemical properties of the soil, which they are known to influence to a great extent. Preliminary investigations carried out in Nigeria (*Nigerian Forester*, **1**, 8; 1940) have shown that the soil of an active termite heap contained an increased amount of fine particles, which tended to improve the water-holding capacity of the soil. The carbon content of a heap was six times, nitrogen content about five times, phosphorus content two and a half times, and potash content more than three times that of the normal soil. Bearing in mind the wide spread of termites in Africa and the enormous extent of their underground activities, the problem deserves a very serious study from the points of view of termite bionomics, soils, natural vegetation, crops and forestry.

Collembolan Fauna of New Zealand

J. T. SALMON, entomologist at the Dominion Museum, Wellington, has recently given an important account of these insects (*Trans. and Proc. Roy. Soc. New Zealand*, **70**; March, 1941). His memoir is the first attempt to discover and evaluate as nearly as possible the composition and distribution of the Collembolan fauna of the Dominion named. Some 101 new species are added to the New Zealand list which makes up the total number of species from that region to 185, exclusive of sub-species. The author finds that 77 per cent of the species are indigenous and explains this fact as being due to the long geological isolation of the country. The relationship of the New Zealand Collembola with those of South America is stated to be very weak as compared with its Australian affinities. In this connexion, however, it needs to be borne in mind that the Collembola of South America have, as yet, been very little studied. Summarizing, the author finds that the Collembolan fauna of New Zealand contains an ancient cosmopolitan element represented by such genera as Achorutes, Neanura and Onychiurus. An exceptionally strong affinity is betrayed with the Australian and Indo-Malayan forms. There is also a well-marked sub-antarctic element and a few, but important and striking, affinities with the American and African regions. It seems highly probable, according to the author, that the bulk of the species reached New Zealand by land bridges, from time to time connecting that country to northern Australia and the islands north of it, and extending towards Malaya. A comprehensive work of this kind will prove a stimulus to students for studying this group of insects and also for surveying the New Zealand forms still more thoroughly. A useful aid will be found in the diagnoses of the world's families, sub-families and tribes, while the 533 figures and the bibliography will prove an indispensable adjunct. The author mentions Stewart Island, the 'heel' of the South Island and the higher alpine regions over 4,000 ft. as being likely to contain many more species of these insects, adding that they were among the localities which he has, so far, been unable to visit.

Japanese Dinoflagellates

IN his work on the Peridinians of the Diplopsalis group, Tohru Hidémiti Abé describes many varieties of plate structure ("Studies on the Protozoan Fauna of Shimoda Bay. I.—The Diplopsalis Group", *Records of the Oceanographical Works in Japan*, **12**, No. 2, March 1941). These may be regarded as some of the more primitive of the thecate forms leading up to the genus Peridinium. Both northern and southern forms are in the collection studied from Asamushi and Shimoda. Those from Asamushi are almost certainly partly southern but mostly northern, and those from Shimoda only southern. There is a very great variety of plate pattern among the members of this group which Schiller in Rabenhorst's "Kryptogamen-Flora" (1937) includes in the genus Glenodinium. A further work on the same subject by Abé ("Notes on the Protozoan Fauna of Mutsu

Bay. *Diplopsalis* and its Allies", *Sci. Rep. Tohoku Imp. Univ.*, Sendai, Japan, 1941), including the strictly systematic portion and literature, is in process of publication.

Wolf-dog Hybrids

WOLVES and dogs may be crossed to give fertile hybrids. N. A. Iljin (*J. Gen.*, **42**, 359–413; 1941) has studied the segregation of characters in X 101 progeny of a cross (made at the Moscow Zoo) between a zonar grey wild wolf and a black sheep dog. Mendelian segregation is demonstrated for hair colour and hair pattern, eye colour, ear form, size and skull characters. There is evidence of genotypical control of tail shape, nervous disposition, time of rut, and general appearance, but environmental influences play some part. The bark of a dog is purely a modificatory character and may be easily acquired by a wolf. The origin of the domestic dog from *C. lupus* is considered possible.

Differential Response to X-Rays of Diploid and Tetraploid Barley

A TETRAPLOID barley produced by temperature shocks on the diploid Opal *B* variety has rather a low fertility due in part to its autopolyploid state and to the consequent production of offspring with aberrant chromosome numbers. A. Müntzing (*Köngl. Fysiog. Galls.*, Lund F., **11**, 1–10; 1941) has X-rayed this barley to endeavour to create differences between the chromosomes and therefore increase the fertility. In the experiments he found that the response of tetraploids to X-rays was much less than diploids. For example, 85 per cent of the expected number of tetraploids produced seeds after a dose of 15,000 r., whereas only 38 per cent of the expected diploids produced seeds. The difference is attributed to the fact that a gene hit at one locus in a tetraploid is protected by three other genes on the homologous chromosomes as compared with one other gene in a diploid.

Genetics of Galeopsis

A. MÜNTZING (*Heriditas*, **27**, 193–201; 1941), continuing his experiments with Galeopsis has produced autotetraploid *G. pubescens* and *G. speciosus*, and diploid and tetraploid hybrids between these species. It is found that hybridization between the diploid species and between the tetraploid forms are fertile, while no crosses between diploid and tetraploid forms were successful. The author was able to cross tetraploid *G. pubescens* and tetraploid *G. speciosa* with *G. Tetrahit*, which is believed to be a natural polyploid derivative of *S. pubescens* × *S. speciosa*. The possibility of repeating the synthesis of *G. Tetrahit* is thus possible. Tetraploid derivatives of different diploid individuals of *S. pubescens* show differences in pollen fertility in the first tetraploid generation.

The Pacific Earthquake of November 10, 1938

THIS earthquake has been the subject of careful study by S. M. Mukherjee and M. R. Rangaswami (*Bull. Seis. Soc. Amer.*, **31**, No. 2, 121; April, 1941). The instrumental data used were the published readings of seismograms by the observers at the various seismograph stations together with the authors' interpretation of the original seismograms obtained at Bombay, Agra, Calcutta and Kodaikanal. Using the times of P, the epicentre was located at 55·3° N., 158·5° W., which is some eighty miles south of the Alaskan Peninsula in the Pacific Ocean. The earthquake occurred at 20h. 18m. 40s. G.M.T. The authors state that the analysis of the P and S residuals reveals three successive shocks, the second and third occurring 7 and 12 seconds after the first. Examination of the Indian seismograms points to a fourth shock, about 20 sec. after the first. The multiple character of the shock is brought out more conspicuously when the observed times are compared with Jeffreys' surface-focus tables and corrected for ellipticity, than when compared with normal tables. The epicentres of the first three shocks are found to be the same. Mukherjee and Rangaswami considered the identification of the second movement of P with sP and pP and that of S with sS, but this view was found to be untenable on account of the depth of focus and the character of the non-instrumental observations. The hypothesis of 'surface focus' (that is, less than 10 km. depth of focus) appeared to fit in best with the observations used. The magnitude of the shock was found to be equal to that of the catastrophic Bihar-Nepal earthquake of January 15, 1934.

Earthquakes and Crustal Structure (Southern Pacific Region, U.S.A.)

THIS was the subject of a paper by C. F. Richter of the California Institute of Technology, Pasadena, to the Sixth Pacific Science Congress ("Earthquake Epicentres and Structure of the Pacific Region of North America—Southern Part" by C. F. Richter, Proc. Sixth Pacific Science Congress; 1939). The data used were the epicentres of earthquakes during 1930–1933 determined by J. S. Hughes and Miss E. F. Bellamy at Oxford, together with epicentres since 1933 determined by the United States Coast and Geodetic Survey, and by the Jesuit Seismological Association at Saint Louis, U.S.A. For historical work recourse was also had to the catalogues of Townley and Allen, and also of Wood, Allen and Heck for the years 1769–1933. Epicentres determined at Pasadena were also used. From all these data a map was constructed showing by separate marking the epicentres of large normal earthquakes, minor earthquakes and the few of intermediate depth in the area. The most noteworthy feature of the map was the appearance of a nearly continuous belt of epicentres following the Pacific Coast from near Vancouver Island to Panama. The important structural loop through the West Indies was much less active than the Pacific Coast, so that these seismological data do not assist in the solution of the geological problems of the exact location and character of the loop. Since 1769 three major earthquakes have occurred in California: (1) January 9, 1857, centring near Tejon Pass, with large displacements along the San Andreas fault; (2) March 26, 1872, in the major Sierra fault zone at the edge of Owens Valley; and (3) the San Francisco earthquake of April 18, 1906, with displacements along the San Andreas fault. Allen suggested a division of the fault zone into segments where the rocks are strong and fracture only under great stress, occasioning major earthquakes, and segments where they are weaker, yielding more readily and occasioning less-violent shocks. This appears to be borne out by Richter's work, which shows that as regards numbers of shocks the San Andreas fault was surprisingly inactive, especially near the regions of the great earthquakes mentioned above and near to the earthquake stations at Pasadena, Mount Wilson and Riverside.