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The Plant in Disease : Control of Disease

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An increase in nitrifying power of soil after passage through earthworms is recorded and accounted for by the digestion of organic matter and addition of CaCO_3 from the subsoil.

It is suggested that the evidence of many workers points to a possible autotrophic phase in the life cycle of heterotrophic organisms.

THE PLANT IN DISEASE : CONTROL OF DISEASE

(Departments of Entomology, Insecticides and Fungicides, and Plant Pathology)

(a) INSECTS AND THEIR CONTROL

- LVI. H. F. BARNES. "*Studies of Fluctuations in Insect Populations. I. The Infestation of Broadbalk Wheat by the Wheat Blossom Midges (Cecidomyiidae).*" *Journal of Animal Ecology*, 1932, Vol. I, pp. 12-31.

Fluctuations of insect populations are being studied in three directions : (1) the intensity of attack by the larvae ; (2) the degree of parasitism ; and (3) the dates of emergence and number of broods. Study of the two wheat blossom midges reveals considerable fluctuations in intensity of attack and the extent to which they are parasitised by other insects. Extensive new information regarding the bionomics of these two midges, *C. tritici* and *S. mosellana*, is given.

- LVII. H. F. BARNES. "*A Study of the Segmentation of the Antennae in Gall Midges.*" *Proceedings of the Zoological Society of London*, 1932, pp. 323-334.

From a study of over 14,300 individuals of fourteen species of economic importance, it is shown that, in some species and genera, food affects the size of the adult midges only ; in others it affects the size of adult midges and, in addition, the number of antennal segments. A formula is given for the frequency and range in the number of antennal segments.

- LVIII. H. F. BARNES. "*On the Gall Midges Injurious to the Cultivation of Willows. I. The Bat Willow Gall Midge (Rhabdophaga terminalis H.Lw.)*" *Annals of Applied Biology*, 1932, Vol. XIX, pp. 243-252.

The bionomics of the bat willow gall midge, which does serious damage to certain willows grown for basket-making and the cricket bat willow grown for sets, are described. The midge exhibits a distinct host-plant preference, choosing the bat willow (*S. coerulea*) when possible. But it also breeds readily on a golden willow (*S. alba* var. *vitellina*). It will not attack Black Maul (*S. triandra*), Long Skin (*S. viminalis*) and Dicky Meadow (*S. purpurea*).

- LIX. MARGOT E. METCALFE. "*Dasyneura leguminicola (Lint.), the Clover Seed Midge.*" *Annals of Applied Biology*, 1933, Vol. XX, pp. 185-204.

An attempt was made, after studying the biology of this midge, to find resistant or immune varieties of red clover. It is suggested that clovers grown for seed production should be in the green-head

either before or after the time of maximum emergence of the midges. The dates for cutting the first crop as a means of ensuring a clean second crop are discussed.

- LX. MARGOT E. METCALFE. "Some Cecidomyidae Attacking the Seed of *Dactylis glomerata* L. and *Lolium perenne* L." *Annals of Applied Biology*, 1933, Vol. XX, pp. 327-341.

Three species, two of which were new to science, have been found on these grasses in the Park Grass plots. Unsuccessful efforts were made to compel the midges to attack other grasses. Their biologies are described.

- LXI. MARGOT E. METCALFE. "The Morphology and Anatomy of the Larva of *Dasyneura leguminicola* Lint. (Diptera)." *Proceedings of the Zoological Society of London*, 1933, pp. 119-130.

The title of this paper is self-explanatory.

- LXII. MARGOT E. METCALFE. "Notes on the Structure and Development of the Female Genital System in *Dasyneura leguminicola* Lint. (Cecidomyidae, Diptera)." *Quarterly Journal of Microscopical Science*, 1933, Vol. LXXVI, pp. 89-105.

Genitalia of an appendicular nature are absent, the tubular abdominal segments being modified to form a tubular retractile ovipositor. Apart from the ovaries and a portion of the paired oviducts, the efferent system is unpaired and ectodermal in structure. The gonopore is posterior to the ninth sternite and is derived from the primitive spermathecal invagination as in the Coleoptera.

- LXIII. H. C. F. NEWTON. "On *Atomaria linearis* Stephens (Coleoptera, Cryptophagidae) and its Larval Stages." *Annals of Applied Biology*, 1932, Vol. XIX, pp. 87-97.

A brief survey is made of the habits and life history of *Atomaria linearis* Steph., the Pigmy Mangold Beetle, a pest of sugar beet and mangolds. The egg and larval stages are described for the first time.

- LXIV. F. TATTERSFIELD AND C. T. GIMINGHAM. "The Insecticidal Properties of *Tephrosia macropoda* Harv. and other Tropical Plants." *Annals of Applied Biology*, 1932, Vol. XIX, pp. 253-262.

Preliminary data are reported on the insecticidal properties of three tropical fish poison plants (*Tephrosia macropoda* Harv., *Mundulea suberosa* Benth. and *Neorautanenia* (*Rhynchosia*) *fisifolia* C. A. Sm.).

A list is given of other plants (most of them known to be fish poisons) from many different countries, which have been tested but appear to have little or no toxicity to *Aphis rumicis* L.

Extracts of the stems of black Haiari (*Lonchocarpus* sp.) are shown to be toxic as contact insecticides to young larvae of two species of moths. Older larvae are much more resistant.

All the plants so far tested which are toxic to both fish and to insects are members of the natural order Leguminosae.

- LXV. F. TATTERSFIELD. "*The Loss of Toxicity of Pyrethrum Dusts on Exposure to Air and Light.*" *Journal of Agricultural Science*, 1932, Vol. XXII, pp. 396-417.

Pyrethrum powders and dusts, prepared by grinding or by the incorporation of extracts of pyrethrum flowers upon absorbent earths, such as talc and kieselguhr, lose their insecticidal activity on exposure to light and air. The loss is more rapid in the case of artificially-prepared dusts than with ground flower-heads.

Both light and air play an important part in the process of inactivation, as samples of kieselguhr-pyrethrum and talc-pyrethrum dusts stored in closed vessels in the dark or exposed to air in the dark are relatively stable; also samples exposed to light in an atmosphere of carbon dioxide, nitrogen or *in vacuo* lose little of their toxicity under the same conditions of illumination; samples exposed in oxygen, however, rapidly lose their activity.

Both wet and dry oxygen were effective in destroying the activity of the dusts, but apparently at different rates, and the type of reaction may be different in the two cases.

The incorporation of anti-oxidants with talc-pyrethrum and kieselguhr-pyrethrum dusts retards loss of activity due to exposure to light and air.

Such compounds as pyrocatechol, resorcinol, hydroquinone, pyrogallol confer a large measure of protection against loss of toxicity. Phenol and phloroglucinol were not effective.

Tannic acid exerted a considerable measure of protection.

The protection was greater in the case of artificially-prepared dusts than with ground pyrethrum flowers.

There is no conclusive evidence that anti-oxidants, naturally occurring in pyrethrum, play any great part in stabilising the pyrethrins against inactivation. The greater part of the protection would appear to be due to particle size or to cellular inclusion.

(b) BACTERIAL DISEASES

- LXVI. R. H. STOUGHTON. "*The Morphology and Cytology of Bacterium malvacearum, E.F.S., Part II. Reproduction and Cell-Fusion.*" *Proceedings of the Royal Society B*, 1932, Vol. CXI, pp. 46-52.

New morphological forms have been observed in *Bacterium malvacearum*. The production of coccoid bodies, their liberation and subsequent development to form apparently normal rods are described, as well as the formation of densely spherical bodies, which apparently arise from the fusion of two cells and are liberated by the degeneration of the parent cells.

- LXVII. R. H. STOUGHTON. "*The Influence of Environmental Conditions on the Development of the Angular Leaf Spot Disease of Cotton. IV. The Influence of Atmospheric Humidity on Infection.*" *Annals of Applied Biology*, 1932, Vol. XIX, pp. 370-378.

It was found in control chambers that high humidities favour the development of the disease. Maximum infection occurred at 85 per

cent., and diminished rapidly at humidities below this figure. The relation of these results to the experiments on the influence of air temperature is discussed; and it is concluded that the importance of humidity is mainly physical in nature, by affecting the time of persistence of the infection droplets.

(c) VIRUS DISEASES

- LXVIII. J. CALDWELL. "The Physiology of Virus Diseases in Plants. III. Aucuba or Yellow Mosaic of Tomato in *Nicotiana glutinosa* and other hosts." *Annals of Applied Biology*, 1932, Vol. XIX, pp. 144-152.

The symptoms induced by aucuba or yellow mosaic of tomato in certain other members of the Solanaceae (notably *N. glutinosa* and *D. stramonium*) differ markedly from those in tomato. Neither formation of intracellular inclusions nor systemic infection occurs in those plants. In *N. glutinosa* the symptoms appear only on the rubbed leaves or portions of a leaf and little multiplication of the virus takes place. In *D. stramonium*, although no mosaic symptoms appear on the host, the virus travels through the tissues and can infect susceptible grafts. The use of *N. glutinosa* as a ready means of demonstrating the presence of a virus agent in a juice has been confirmed and simplified.

It is possible to inject the intracellular spaces of the leaf of *N. glutinosa* with virus juice without rupturing the cells, in which case no symptoms of the disease develop. The virus apparently is unable to enter unbroken cells.

- LXIX. D. MACCLEMENT AND J. HENDERSON SMITH. "Filtration of Plant Viruses." *Nature*, 1932, Vol. 130, p. 129.

By the use of graded collodion membranes it was shown that plant viruses vary in size, as judged by their ability to pass membranes of known porosity. Tobacco mosaic and yellow mosaic have a size of 15 $\mu\mu$, aucuba mosaic of tomato 40-50 $\mu\mu$, a virus of *Hyoscyamus* 150 $\mu\mu$. With these membranes it is possible to separate two viruses which occur together in nature.

- LXX. MARION A. HAMILTON. "On Three New Virus Diseases of *Hyoscyamus niger*." *Annals of Applied Biology*, 1932, Vol. XIX, pp. 550-567.

The source and general characters of three virus diseases occurring naturally in *Hyoscyamus* are described under the names of Hy. II, III and IV. They have a host range of various solanaceous plants, so far excluding potato. Hy. II and III are not filterable through a Pasteur-Chamberland filter of L3 grade, and are transmitted to and from all hosts except tomato by the peach aphid *Myzus persicae*. They survive for a relatively short period in clarified juice. They have many points in common with, and are probably related to the potato viruses X and Y. Hy. IV is filterable through an L3 candle and no insect vector has yet been found for it.