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## Report for 1929

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### The Plant in Disease ; Control of Disease

#### Rothamsted Research

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ascribed to the production of manganous hydroxide by an interaction of quinhydrone with manganese dioxide associated with the soil colloids.

#### THE SOIL POPULATION AND ITS BEHAVIOUR.

(Bacteriological and General Microbiological Departments.)

##### (a) BACTERIA.

- XIX. P. H. H. GRAY. "*Vibrio (Microspira) Agar Liquefaciens.*" Gray and Chalmers. *Annales de l'Institut Pasteur*, 1929. Vol. XLIII, p. 1058.

A reply to a criticism in a previous number of the above journal as to the cultural purity of the organism described by Gray and Chalmers in 1924.

##### (b) PROTOZOA.

- XX. D. WARD CUTLER AND L. M. CRUMP. "*Carbon Dioxide Production in Sands and Soils in the Presence and Absence of Amoebæ.*" *Annals of Applied Biology*, 1929. Vol. XVI, pp. 472-482.

Experiments are described on carbon dioxide production from soil and sand cultures containing a species of bacterium with and without amoebæ. The following results were obtained:—

1. Carbon dioxide production and bacterial numbers are correlated provided that amoebæ are not present, or are present in very small numbers.

2. The bacteria are more efficient as producers of carbon dioxide when their numbers are not rising, and less efficient when their numbers are increasing. This does not hold for young cultures. Also each bacterium becomes less efficient as the density of the population increases.

3. The amoebæ cause a decrease in carbon dioxide production in sands containing peptone, but an increase in sands containing mineral salts solution with glucose or soil extract.

#### THE PLANT IN DISEASE; CONTROL OF DISEASE.

(Entomological and Mycological Departments.)

##### (a) INSECT PESTS AND THEIR CONTROL.

- XXI. A. D. IMMS. "*Some Methods of Technique applicable to Entomology.*" *Bulletin of Entomological Research*, 1929. Vol. XX, pp. 165-171.

Describes methods of technique applicable to entomology that have been used by the author in the course of a number of years' experience. It deals with methods of mounting, staining, preserving and rearing insects adapted for different lines of investigation, and has been written with a view to assisting research workers both in this country and in other parts of the Empire.

- XXII. J. DAVIDSON AND H. HENSEN. "*The Internal Condition of the Host Plant in Relation to Insect Attack, with Special Reference to the Influence of Pyridine.*" *Annals of Applied Biology*, 1929. Vol. XVI, pp. 458-471.

Certain substances administered to the roots of broad beans are absorbed and transferred to the leaves and stems. Pyridine,

applied in this way in suitable concentrations, exercises a marked detrimental effect upon the aphids : the exact conditions, however, are rather difficult to define : among the important factors are those governing absorption by the plant and the effect of the pyridine on the plant after absorption. In the sand experiments, the effect on the aphids was largely proportional to the amount of pyridine administered to the plant : pyridine, however, depressed the growth of the plant. In soil cultures, the pyridine had a less detrimental effect on the plants and on the aphids, though in sufficiently high concentration, higher than was needed in sand, it proved to be toxic.

- XXIII. H. F. BARNES. "*Two Gall Midges (Cecidomyidæ) found in Stored Products.*" Bulletin of Entomological Research, 1929. Vol. XX, pp. 119-122.

Describes two new species of gall midges affecting stored products on the Continent, both species probably being more or less beneficial, since their larvæ possibly prey upon mites.

(b) FUNGUS PESTS AND THEIR CONTROL.

- XXIV. W. B. BRIERLEY. "*Variation in Fungi and Bacteria.*" Proceedings of the International Congress of Plant Sciences, 1929. Vol. II, pp. 1629-1654.

An introductory survey of the present position is followed by a brief critique of genetic phenomena, concepts and terminology in groups of organisms other than bacteria and fungi. The two latter groups are then considered and a critical analysis is made of the phenomena of variation that have been described. These may be classified from two points of view; firstly, on a basis of morphological and physiological criteria which arranges the data in phenotypic values and, secondly, according to the factors of their appearance and their mode of behaviour, which arranges the data in genetic values. Correlations between the two systems of classification are discussed. The types of variation in fungi and bacteria classified on the genetic basis are treated in relation to processes of growth and reproduction in these groups of organisms : aberrant types of genetic phenomena are considered. Fungi and bacteria are compared with other groups of organisms in respect of the types of genetic phenomena exhibited, the interpretation and classification of these types, the genetic concepts which emerge and the terminology adopted. Finally, the directions of genetic research on fungi and bacteria, and the possibilities and limitations are considered.

- XXV. M. S. MARTIN. "*Additional Hosts of Synchytrium endobioticum (Schilb). Perc.*" Annals of Applied Biology, 1929. Vol. XVI, pp. 422-429.

Infection of numerous species of Solanaceæ by *Synchytrium endobioticum* has been obtained, using Glynne's "green wart" method. Plants grown in contaminated soil did not show infection. The following new hosts are recorded : *Solanum dulcamara* var. *villosissimum*, *Nicandra physalodes*, *Solanum dulcamara* alba, *Solanum nodiflorum* and *Solanum villosum*.

In certain hosts the fungus may occur in the tissues, with little or no external sign of its presence.

XXVI. M. D. GLYNNE. "A Note on Some Experiments dealing with Sulphur Treatment of a Soil and its Effect on Wheat Yield." Proceedings of the Royal Society of Victoria, 1929. Vol. XLII, pp. 30-35.

This work was carried out by Miss Glynne during a visit to Australia.

A plot of land near Melbourne University, on which wheat had been grown for fourteen years, was reported to be so badly infested with fungi, causing foot and root-rot diseases in wheat, that a good crop could not be grown.

Soil treatment with sulphur gave large increases in crop, up to over 800% with sulphur as 0.15% of the soil.

In case sulphuric acid should reduce both crop and disease, treatment with acid was followed in some plots by an application of calcium carbonate after an interval for the acid to affect the fungus in the soil, before the wheat was sown. Increases in crop similar to those obtained with sulphur were obtained, both when sulphuric acid was applied alone and when it was followed by calcium carbonate.

A survey of the disease showed a relatively small amount present in controls and treated plots, and no significant difference between them.

The results indicate not an effect on disease, but a hitherto unsuspected sulphur deficiency or a deficiency in some other element or compound which is rendered available by the treatment.

An increase in crop obtained with ammonium sulphate, larger than that produced by the amount of sulphur contained in it, suggests also a nitrogen deficiency.

(c) BACTERIAL DISEASES.

XXVII. R. H. STOUGHTON. "The Morphology and Cytology of *Bacterium malvacearum* E.F.S." Proceedings of the Royal Society (B), 1929. Vol. CV, pp. 469-484.

Studies have been made of the internal structure and the growth forms of *Bacterium malvacearum*, the organism causing the Black-arm or Angular Leaf Spot disease of cotton.

By means of a special technique, it has been shown that all the cells of the bacterium possess a centrally-placed structure which divides at the same time as the cell, one-half of the structure passing into each of the daughter cells. The details of this division have been followed and reasons for believing it to be a true bacterial nucleus adduced.

Apart from this central structure, cells in a young culture of the organism frequently produce very small deeply staining bodies, which are liberated from the cell either by simple extrusion or by growth on a long stalk. These bodies appear to be identical with the "gonidia" described by other workers for various species of bacteria.

A second growth form which has been described is a larger coccoid body, which is formed by a process of budding from the parent cell. The details of this process have been followed.