ROTHAMSTED RESEARCH

Rothamsted Report for 1938

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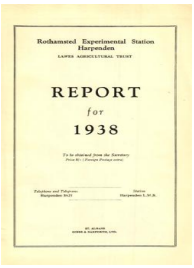

Technical and Other Papers Published in 1938

Rothamsted Research

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germination. Concentrations of reducing sugars up to 12.5 per cent. caused no apparent reduction in the germination of *B. larvae* spores on the chick embryo media. This is of interest because of previous suggestions that the reducing sugar content of bee larvae at various stages in their development might be connected with the age-incidence of American foul brood.

LXII. H. L. A. TARR. "*Studies on American Foul Brood of Bees. III. The Resistance of Individual Larvae to Inoculation with the Endospores of* Bacillus larvae." Annals of Applied Biology, 1938, Vol. XXV, pp. 807-814.

Experiments are described in which attempts were made to produce American foul brood by the direct inoculation of eggs, or of larvae from the time of hatching up to that just subsequent to sealing, by placing aqueous suspensions of the washed spores of *Bacillus larvae* in the cells. In no case did the disease develop in the colony into which the inoculated larvae were introduced. Positive results were, however, obtained by spraying a comb containing eggs and young larvae with an aqueous suspension of the spores of *B. larvae*, the disease becoming evident seven days after spraying. Since in this case the adult bees had access to the spore suspension it can be inferred that the adult bee plays an important part in the inoculation of the brood. Experiments designed to test the possibility that *B. larvae* undergoes some change during its carriage by the adult bee yielded negative results.

LXIII. H. L. A. TARR. "*Studies on European Foul Brood of Bees. IV. On the Attempted Cultivation of* Bacillus pluton, *the Susceptibility of Individual Larvae to Inoculation with this Organism and its Localisation within its Host.*" Annals of Applied Biology, 1938, Vol. XXV, pp. 815-821.

Attempts to grow *Bacillus pluton*, the causal organism of European foul brood in bees, on the minced tissues of the chick embryo, or on its chorio-allantoic membrane were unsuccessful, in contrast to *B. larvae*, which grows well on these media. Small doses of *B. pluton* which were unable to produce growth on chick embryo medium or on beef digest brood filtrate medium were instrumental in causing European foul brood in young bee larvae when placed in the cells along with the normal brood food. Stained sections cut from larvae of all ages and showing all stages of the disease showed that *B. pluton* is localised in the food mass within the peritrophic membrane. The disease is shown to be a purely intestinal infection of the bee larva. The organism responsible is a strict parasite.

TECHNICAL AND OTHER PAPERS

GENERAL

LXIV. E. J. RUSSELL. "*Science and the Indian Peasant.*" Journal of the Royal Society of Arts, 1939, Vol. LXXXVII, pp. 662-674.

LXV. E. J. RUSSELL. "*National Planning in Agriculture: its Possibilities and its Limits.*" Nineteenth Century and After, 1938, Vol. CXXIV, pp. 187-199.

LXVI. E. J. RUSSELL. "*Poland To-day.*" Journal of the Royal Society of Arts, 1938, Vol. LXXXVII, pp. 125-128.

LXVII. B. A. KEEN. "*What Happens to Rain.*" The Listener, 1939, Vol. XXI, pp. 319-320.

LXVIII. J. MEIKLEJOHN. "*The Starling—Friend or Enemy?*" Journal of the Royal Agricultural Society of England, 1938, Vol. XCIX, pp. 37-53.

This paper contains a review of the present knowledge of the status and habits of the starling, especially those which are of agricultural importance. It also contains an estimate of the density of the starling population in several parts of England, taken from comparative counts of nests, and an account of an experiment on the recovery of plants bitten off by birds.

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LXIX. E. J. RUSSELL. "*The Progress of Soil Science.*" Agriculture in the Twentieth Century. (Essays on Research, Practice and Organisation, to be presented to Sir Daniel Hall, 1939.)

LXX. E. J. RUSSELL. "*Sugar Beet Manurial Experiments. Results of the Rothamsted Station's Work.*" British Sugar Beet Review, 1938, Vol. XII, pp. 109-110.

LXXI. E. J. RUSSELL. "*Soils and Fertilisers.*" The Farmer's Guide to Agricultural Research in 1937. Journal of the Royal Agricultural Society of England, 1939, Vol. C, pp. 133-159.

LXXII. E. J. RUSSELL. "*Soil Conservation and Permanent Agriculture.*" Journal of the Australian Institute of Agricultural Science, 1939, Vol. V, pp. 21-32.

LXXIII. F. YATES and W. G. COCHRAN. "*Sampling Observations on Wheat.*" Journal of the Ministry of Agriculture, 1938, Vol. XLV, pp. 85-86, 624-627, 835-838.

LXXIV. G. NAGELSCHMIDT. "*Structure and Properties of Imperfectly Crystallised Clay Minerals.*" Report of the British Association, 1938, pp. 403-404.

LXXV. G. NAGELSCHMIDT. "*Rod-shaped Clay Particles.*" Nature, 1938, Vol. CXLII, p. 114.

In support of the suggestions that some of the minerals in clays and soil colloids may occur as rod- or needle-shaped particles, it is pointed out that other layer lattice minerals can be developed as rods under special conditions of growth (e.g. pyrophyllite from Tres Cerritas, California) and that rod-shaped minerals may have a structure based on single or double chains of silicon-oxygen tetrahedra, similar to the pyroxenes and amphiboles. An example of the latter type seems to be the series of clay minerals known as polygorskites, which include the minerals sapiolite and attapulgite.

LXXVI. R. K. SCHOFIELD. "*Physical Chemistry of Clay.*" Nature, 1939, Vol. CXLII, pp. 526-527.

LXXVII. R. K. SCHOFIELD. "*The Electrical Charges on Clay Particles.*" Soils and Fertilisers, 1939, Vol. II, pp. 1-5.

LXXVIII. R. K. SCHOFIELD. "*Physical Chemistry of Clay.*" The British Clay Worker, 1938, Vol. XLVII, pp. 208-210.

The above three papers can be summarised as follows.

Some of the charges on clay particles, due to isomorphous substitutions within the crystal lattice, are *permanent* in the sense that they are not influenced by the hydrogen ion concentration of the medium in which the clay is suspended. There are also "spots" on the particles which are charged or uncharged according to the reaction of the medium. They are of two kinds: acidic spots where negative charges can develop through the dissociation of hydrogen ions, and basic spots where positive charges can develop through the combination of hydrogen ions. The process in the case of the acidity spots is probably

$$\text{>Si—OH} \rightleftharpoons \text{>Si—}\overset{-}{\text{O}} + \overset{+}{\text{H}}$$

the silicon atoms being those situated at the edges of the silicon oxygen layer. The chemical nature of the basic spots is uncertain. They are not found in the clay minerals so far indentified but are frequent in the common clays. The equilibrium is possibly

$$\text{—Al—}\overset{+}{\text{O}}\text{H} \rightleftharpoons \text{—Al=O} + \overset{+}{\text{H}}$$

and may be due to an over-crowding in the octohedral layer.

A study of the variation of the electric charge with pH enables the amounts of permanent charge and of the acidic and basic groups to be determined. In certain clays the number of basic groups exceeds the negative charges. These exhibit well-defined iso-electric points.

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LXXIX. E. M. CROWTHER. "*The Determination of Silicon, Iron and Aluminium in Soils.*" Transactions of the Second Commission and Alkali Sub-Commission of the International Society of Soil Science, 1938, Vol. B, pp. 97-100.

LXXX. E. M. CROWTHER. "*The Maintenance of Soil Fertility.*" Report of the British Association, 1938, p. 519.

LXXXI. E. M. CROWTHER (with R. STEWART). "*The Separation and Analyses of Soil Clay Fractions.*" Agricultural Progress, 1938, Vol. XVI, pp. 55-60.

LXXXII. I. W. SELMAN. "*On the Use of Common Salt as a Fertiliser.*" Journal of the Ministry of Agriculture, 1938, Vol. XLV, pp. 237-246.

LXXXIII. H. V. GARNER. "*Sugar Beet Manurial Experiments.*" British Sugar Beet Review, 1939, Vol. XIII, pp. 41-43.

BIOLOGICAL

LXXXIV. H. F. BARNES. "*Recent Advances—Entomology.*" Science Progress, 1938, Vol. XXXII, pp. 542-47.

LXXXV. H. F. BARNES. "*Recent Advances—Entomology.*" Science Progress, 1938, Vol. XXXII, pp. 754-8.

LXXXVI. H. F. BARNES. "*Recent Advances—Entomology.*" Science Progress, 1938, Vol. XXXIII, pp. 117-23.

LXXXVII. D. MORLAND. "*Recent Investigations into Beekeeping at Rothamsted.*" Journal of the Royal Society of Arts, 1938, Vol. LXXXVI, pp. 394-404.

LXXXVIII. B. LOVIBOND. "*A Burying Beetle Peculiar to Sea Marsh Turf,* (Bledius tricornis *Herbst*)." Journal of the Board of Greenkeeping Research, 1938, Vol. V, pp. 217-218.

LXXXIX. K. GRANT. "*A Migration of Cabbage White Butterflies in Hertfordshire in May,* 1937." The Entomologist, 1938, Vol. LXXI, pp. 103-108.

XC. MARY D. GLYNNE. "*Eyespot Lodging of Wheat Caused by* Cercosporella herpotrichoides *Fron.*" Agricultural Progress, 1939, Vol. XVI, pp. 1-5.

XCI. F. C. BAWDEN and N. W. PIRIE. "*A Plant Virus Preparation in a Fully Crystalline State.*" Nature, 1938, Vol. CXLI, pp. 513-514.

XCII. F. C. BAWDEN and N. W. PIRIE. "*Plant Viruses* I: *Serological, Chemical and Physico-Chemical Properties.*" Tabulae Biologicae, 1938, Vol. XVI, p. 355.

XCIII. F. C. BAWDEN. "*Crystalline and Liquid Crystalline Viruses.*" Proceedings of the Royal Society of London, B, 1938, Vol. CXXV, pp. 297-299.

XCIV. F. C. BAWDEN. "*Some Recent Work on Plant Viruses.*" Empire Journal of Experimental Agriculture, 1939, Vol. VII, pp. 1-10.

XCV. S. D. GARRETT. "*Take-all or Whiteheads Disease of Wheat and Barley and its Control.*" Journal of the Royal Agricultural Society of England, 1937, Vol. XCVIII, pp. 1-11.

XCVI. J. HENDERSON SMITH. "*Some Recent Developments in Virus Research.*" Annals of Applied Biology, 1938, Vol. XXV, pp. 227-243.

XCVII. HUGH NICOL. "*Significance of Pollen in Brood Cappings.*" The Bee World, 1939, Vol. XX, pp. 9-10.

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