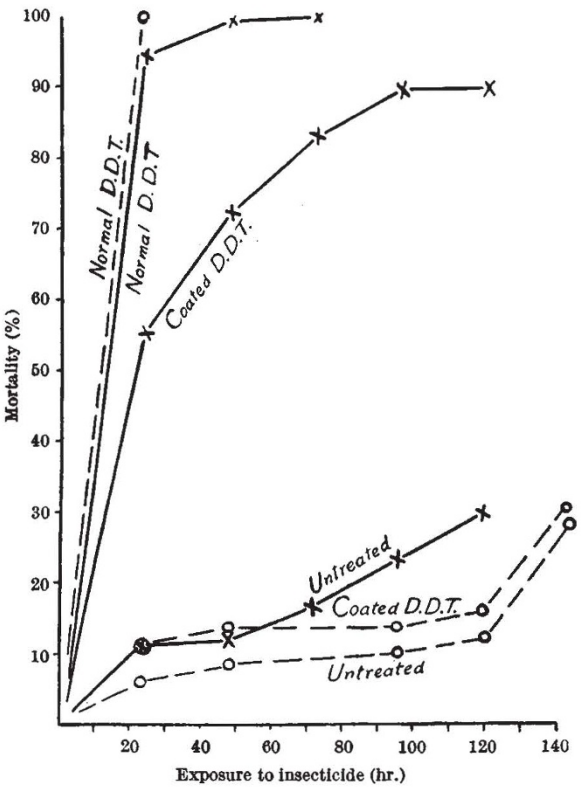
New Formulation of D.D.T. with Selective Properties

In order to produce insecticides which would be toxic only to certain groups of insects and not to others, it seemed a promising line of approach to make use of the known differences in the digestive capability of different insects. If individual particles of toxic compounds could be coated with substances digestible only by certain insects, then obviously only those insects would be killed by such coated insecticides.

Phytophagous insects are able to deal with hemicelluloses found in plant cell walls, and some wood-boring species also with celluloses, while carnivorous insects and insects such as most flies, bees and parasitic Hymenoptera cannot do so. Formulations of D.D.T. were therefore prepared in which the individual particles of D.D.T. were coated with degraded cellulose, by an acid precipitation of the degraded cellulose from alkaline solution to which a D.D.T. suspension had been added. A hardening process, carried out after acidification, greatly improved the characteristics of the coating.

These preparations were then sprayed on leaves or other surfaces and, after drying, test insects were allowed to come into contact with them. These tests showed that a thorough coating had eliminated the contact action of the D.D.T.

Comparing residual films of coated D.D.T. (sample *DC.* 103) and standard D.D.T. suspension both at 0·0157 mgm. D.D.T. per square centimetre, it was found that, in the former, the following D.D.T.-susceptible insects were not killed, or their mortality was significantly reduced: Diptera: *Lucilia sericata* Meig. (adults), *Syrphus* spp. (adults); Hymenoptera: *Apanteles glomeratus* Linn., *Apis mellifera* Linn., *Mormoniella vitripennis* Wlk. The same material sprayed at approximately the same rate on leaves which were then fed to larvæ of *Pieris brassicæ* Linn., *P. rapæ* Linn., and *Tortrix pronubana* Hübn., gave mortalities approaching those obtained with normal (uncoated) D.D.T. suspensions. Examples of the type of result obtained are shown in the accompanying diagram.



Effect on *Pieris brassicæ* larvæ (—x—) and on *Lucilia sericata* adults (– – o – –) of 'coated' and untreated D.D.T.

These experiments demonstrated that even the notoriously indiscriminate insecticide D.D.T. can be used as a selective insecticide specific to phytophagous insects. This development should prove useful in avoiding certain undesirable repercussions of D.D.T. spraying which are of considerable economic importance, such as outbreaks of other species of insects hitherto controlled by their natural enemies, for example, red spiders and mealy bugs after D.D.T. spraying of deciduous fruit against codling moth, and citrus against scale insect; or the rapid rebuilding of infestations of pests which are controlled by D.D.T. but are able to re-establish themselves because, in accordance with Volterra's Law of the Destruction of Averages, the simultaneous destruction of their natural enemies at the same rate as the destruction of the pests themselves leads to a more rapid building up of the pest population.

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Dependence of Anomaloscope Matching on Viewing-Distance or Field-Size

In a recent communication bearing the above title[1], we pointed out that with a particular anomaloscope the R/G ratio in the mixture required to match a narrow-band yellow depended on the viewing distance. Further work on more than forty normal observers has confirmed this effect, and also established the fact that the effect for each observer is substantially the same whether one eye is used or two eyes, as in the original investigation. Most observers required more green in the mixture the greater the viewing distance. Taking the R/G ratio as unity for an observer viewing an 18-mm. field at 50 cm. (subtending 2°), the ratio drops at a decreasing rate to an average value of about 0·85 at 300 cm. (20 ft.), beyond which there is little further change. The spread of results for different individuals is considerable, some observers dropping below 0·6.

We have now found that the introduction of a 3-mm. artificial pupil in front of the eye tends to reduce the lowering in R/G ratio, especially for those observers showing a particularly large drop. Thus, one of us (R. G. H.) finds that his R/G ratio, which normally drops to 0·6, only drops to 0·85 when using the artificial pupil, although at 50 cm. the ratio is unity in each case. A 3-mm. opaque stop, on the other hand, necessitates an even lower ratio for the match. Moreover, with the artificial pupil it appears that the R/G ratio is dependent simply on