chains or clumps appear in the course of about an hour and crystallization is complete in two or three hours.

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YELLOW-SPOT DISEASE OF PINEAPPLES TRANSMITTED BY THRIPS TABACI LIND.

EXPERIMENTAL evidence has been obtained by the writer that an insect identified as *Thrips tabaci* Lindeman is a major vector operating in the field occurrence of a destructive disease of pineapple plants in the Hawaiian Islands, and furthermore, that this insect carries the virus to pineapple from certain weeds of which *Emilia flammea* Cassini now appears most important. Hitherto no means of transmission of this disease has been known. This preliminary note summarizes the evidence which will be published in detail in the near future.

The yellow-spot disease of pineapples is an infectious chlorosis with some distinctive and striking characteristics. In many respects it resembles diseases of both mosaic and ring-spot types, while in others it stands alone. Symptoms begin with a distinct "initial spot" with which thrips egg-punctures and feeding injury are generally associated. This spot, of about 5 to 20 mm diameter, is characteristically circular or rounded in outline, chlorotic and somewhat hypertrophied. Often it is concentrically banded dark and light. Extending down the leaf from this initial spot and developing on the younger leaves of the plant are chlorotic stripes and circular spots, sometimes strikingly zonate. Occasionally a coarse mosaic pattern develops in plants that have been long diseased. Pronounced dwarfing occurs as in many virus diseases. In this case the dwarfing is commonly unilateral, and leads to a marked curvature of the plant. Necrosis and rotting of affected parts follow, leading to death and decay of the plant within a few weeks. Microorganisms, apparently wholly secondary, are involved in this breakdown, although none have been detected in earlier stages.

Closely associated with yellow-spot in its field occurrence is a virus disease of *Emilia flammea* which likewise shows both ring-spot and mosaic characteristics. Thrips (*T. tabaci*) collected from this diseased weed in the field and allowed to feed upon healthy pineapple and Emilia seedlings have transmitted the virus, producing yellow-spot in pineapple and ring-spot mosaic in Emilia. Furthermore, thrips reared through several generations in the greenhouse on diseased Emilia plants have similarly proved infective.

For critical experimental testing, pedigreed non-viruliferous colonies of this thrips were established. These colonies were started from a single larva each, which was removed to an insect-free seedling of Emilia or of *Pisum sativum* L. at the moment of hatching and before feeding had begun. Thrips from such colonies, when tested on both Emilia and pineapple seedlings, have proved non-infective. When, however, these non-viruliferous thrips have been allowed to feed on diseased Emilia plants they have acquired the virus which they have later transmitted to both Emilia and pineapple, producing typical symptoms in a high percentage of plants.

Preliminary evidence indicates that certain plants in addition to Emilia may be sources of the yellow-spot virus, but it appears that this one plant, because of its abundance in pineapple fields and because of its suitability for the rapid reproduction of thrips during certain seasons, is now of major importance. The feeding of this insect upon pineapple plants appears to be quite incidental, and therefore it is probable that any natural transfer of the virus from pineapple to pineapple is relatively uncommon.

This is not the first well-established case of virus transfer by one of the Thysanoptera. Pittman[1] (see also the report by Dickson[2]) has already demonstrated a thrips (*Frankliniella insularis*) to be the vector of spotted wilt of tomatoes in Australia.

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FRACTURING AND MOVEMENT IN ROCKS WITHOUT APPARENT DISPLACEMENT[1]

A RATHER unusual kind of rock deformation has been found along one of the branches of Bluff Creek in the southeastern part of the Nortonville quadrangle about thirteen miles northeast of Hopkinsville, Kentucky. The rocks at this locality exhibit typical features of faulting but show no dislocation of the beds. They are abundantly grooved and slickensided, showing the effects of movement under compressive force, but bedding planes can be traced across the breaks with none or at the most not more than one or two inches of dislocation. All the features of faulting are the results of components of vertical movement. Careful examination has failed to reveal any trace of either oblique or horizontal movement parallel to the

[1] H. A. Pittman, "Spotted Wilt of Tomatoes," *Jour. Council Sci. and Industrial Res.* (Australia), 1(2): 74–77, 1927.

[2] B. T. Dickson, "Spotted Wilt of Tomatoes," in "The Work of the Division of Economic Botany for the Year 1928–29," *Council Sci. and Industrial Res.* (Australia) *Pamphlet*, 14: 18–19, 1929.

[1] Published with the permission of the director of the Kentucky Geological Survey.