this substance on the auxin of the plant. The reduction of cambial activity preceding flowering in the plants studied by Roberts and Struckmeyer would also indicate an opposition between auxin and flowering. The very rapid reactions to change in day-length in such plants as the soybean, of course, would not suggest that such cambial changes were causative in themselves, but they could certainly be an indication of decreased auxin production. Very recently, both Thurlow and Bonner (*7*) and Leopold (unpublished data) have found, using different plants and different methods, that auxin, applied externally, may inhibit to some extent the normal process of flowering. A number of older observations, both botanical and horticultural, point in the same direction, while the peculiar and (at present) isolated case of pineapple, whose flowering is promoted by auxin, cannot be overlooked. Whether auxin (either as a promoter or an inhibitor) plays a major role in the flowering process, however, is far from established, though there is doubtless an interesting avenue here to be opened up. A more extensive discussion of this phase of the problem has been given elsewhere (*6*).

It may be—and this is undoubtedly the usual course of research—that further study of these more concrete problems will lead to a gradual elucidation of the broader and more intangible unknowns. But, as was stated at the outset, the state of the field is such that a single clear-cut result might change its whole aspect almost overnight.

The consequences of major progress in this area are very great, not only for pure science but for agriculture. In these days when so much of the world is near to starvation no worker can fail to carry this thought in the back of his mind, in spite of the frequent statement that research is its own reward and that no further incentive is necessary. One purpose of a symposium like the present publication is to enable the individual student to effect something of a synthesis in his views. Such a synthesis can hardly fail to engender new ideas and thus to quicken the pace of progress.

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TECHNICAL PAPERS

Mechanical Transmission of a Virus Disease to Cucumber From Sour Cherry

J. Duain Moore, J. S. Boyle, and G. W. Keitt

Department of Plant Pathology, University of Wisconsin

Investigations of yellows and necrotic ring spot, virus diseases of sour cherry (*Prunus cerasus* L.), have been sharply limited because the only known mode of transmission of these diseases has been by grafting, and the known host range has been limited to stone fruits (*1–4*). Since mechanical transmission to herbaceous plants would open many possible avenues of investigation, experiments with this objective were undertaken.

In greenhouse studies in the spring of 1947 it was found possible to transmit mechanically a virus disease to cucumber (*Cucumis sativus* L. variety Ohio) from sour cherry (variety Montmorency). This was accomplished by grinding very young cherry leaves that were just beginning to show the initial symptoms of necrotic ring spot and by rubbing, with carborundum dust as an abrasive, the undiluted expressed juice on the cotyledons of young cucumber plants. While the percentage transmission in any single inoculation experiment was low, transmission was accomplished from 8 cherry trees known to be affected by both necrotic ring spot (*2*) and yellows (*3*) and from one known to be affected by necrotic ring spot but not by yellows. Similar tests of 8 cherry trees free from necrotic ring spot and yellows gave no symptoms on cucumber. Adequate numbers of uninoculated control cucumber plants remained, without exception, free of virus symptoms. Similar attempts to transmit disease from older cherry leaves have been unsuccessful. Mechanical transmission from cucumber to cucumber was obtained readily.

There has been some variation in symptoms on the cucumber with different temperatures, ages of the cucumber plants at the time of inoculation, and cucumber varieties. However, the following symptoms were commonly expressed after inoculation on the cotyledons of young cucumber plants on which the primary leaf was just beginning to unfold and when the plants were kept in an air-temperature range of 20–28° C: From 2 to 4 days after inoculation, small, round, yellow rings appeared on the cotyledons. These rings soon became yellow blotches that coalesced to form a marked mottle. The cotyledons usually persisted as turgid functional organs for many weeks, in contrast to those of normal plants, which soon became functionless, turned brown, and withered. Within 24–48 hrs after symptoms developed on the cotyledons, yellow spots began to appear on the unfolding leaves, beginning at the base of the leaf. The spot symptoms usually were followed by the development of yellow rings, mottle, and crinkle of the affected leaves. Occasionally the primary leaves wilted and died. The apical growing point was killed very quickly, and numerous plants have been maintained for several weeks with only the two cotyledons and the primary leaf. About 30–45 days after inoculation, bud proliferation, without elongation, was apparent in the axis of the killed growing point. Many flowers and dwarfed leaves developed in a very compact rosette. In a few instances, after a prolonged period of high greenhouse temperatures, several of these badly rosetted plants developed weak, spindly shoots.

A limited number of inoculations from cucumber to cherry were made in the greenhouse late in the season of 1948 by placing small pieces of cucumber leaf under the bark of cherry trees. Definite symptoms of necrotic ring spot developed on leaves of one of 6 cherry trees so inoculated. The diseased cucumber plant in this case had been inoculated from a cherry tree known to be affected by both necrotic ring spot and yellows. Ring spot symptoms appeared on one of 3 cherry trees similarly inoculated at the same time with leaf tissue from sour cherry showing necrotic ring spot, and the 3 uninoculated control trees showed no symptoms. The conditions of these experiments were evidently marginal for transmission of necrotic ring spot.

Final conclusions regarding the identity of the virus (or possibly viruses) that incites the disease on cucumber have not yet been reached. The symptoms on cucumber, the single case of transmission from a cherry tree known to be affected by necrotic ring spot but not by yellows, and the single case of apparent transmission of necrotic ring spot from cucumber to sour cherry strongly suggest that the necrotic ring spot virus incites the cucumber disease. However, the possibility is not excluded that another virus (or viruses) from sour cherry may be involved. Since the period of incubation for cherry yellows is long, the cherry trees inoculated from cucumber cannot be read for possible yellows symptoms until 1949. Further work on the identity of the virus (or viruses) that incites the cucumber disease is now in progress.

This, so far as we know, is the first mechanical transmission of a stone fruit virus disease and the first transmission of a virus disease from sour cherry to an herbaceous host.

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Crystallization of Hypophyseal Growth Hormone[1]

Choh Hao Li, Herbert M. Evans, and Miriam E. Simpson

Institute of Experimental Biology, University of California, Berkeley

Some time ago we described a method (*2, 3*) for the preparation of the anterior hypophyseal growth hormone in pure form from ox pituitaries. Although it was not

Fig. 1. Crystalline hypophyseal growth hormone (×125).

a crystalline preparation, physicochemical and biological studies then and since have indicated that it is a pure protein. Recently Fishman, Wilhelmi, and Russell (*1*) reported that a crystalline pituitary protein with high growth activity may be obtained by alcohol fractiona-

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