Further studies are in progress to determine whether the pituitary principle can be identified with one of the recognized hormonal entities secreted by the pituitary gland.

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X-Ray Diffraction Studies of Inclusion Bodies Found in Plants Infected with Tobacco Mosaic Virus[1]

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Crystalline inclusion bodies in tobacco plants infected with tobacco mosaic virus were observed as early as 1903 (*1–2*), but to date no conclusive evidence has been obtained concerning the nature (or chemical identity) of these bodies. Bernal and Fankuchen (*3*) have shown that purified tobacco mosaic virus exhibits x-ray diffraction patterns arising from the intramolecular arrangement of the atoms within the virus molecule as well as from the intermolecular arrangement of the virus molecules with respect to each other. They showed that the intermolecular spacing varied with the ion concentration and, furthermore, that the order in the gels is two-dimensional but not three-dimensional. Oster and Stanley (*4*) have been able to observe the diffraction of visible light in freshly prepared gels and have calculated a layer spacing of about 3,000 A. More recently, Wilkins, Stokes, Seeds, and Oster (*5*) have reported optical evidence on the layering of inclusion bodies.

We decided to seek further evidence on the growth and development and on the identity and internal structure of the inclusion bodies associated with tobacco mosaic virus, by means of x-ray diffraction studies on inclusion bodies *in vivo*, supplemented by further observations under the microscope. In this paper we report preliminary results.

For the x-ray diffraction studies we used both Norelco and Hilger units, trying copper, iron, chromium, and cobalt radiations. The camera was a North-American Philips microcamera which we had modified by improving the specimen- and film-holders and by increasing the specimen-to-film distance (*6*). We directed the x-ray beam on single, large, rod-shaped inclusion bodies found within hair cells of diseased plants.[2] To date we have obtained a few diagrams from such bodies that show distinct spacings and orientation. The spacings correspond fairly closely to the strongest

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[2] The diseased tobacco plants were kindly given us by L. M. Black, of the Brooklyn Botanical Garden.

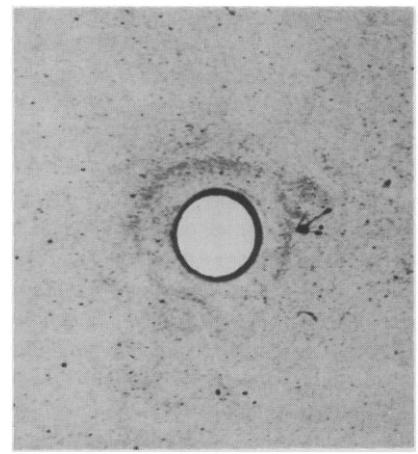

FIG. 1. Enlargement of microcamera diagram of inclusion body, taken with iron radiation. Arrow points to ring of roughly 24 A spacing.

maxima exhibited by the intramolecular diagrams of TMV gels (*3*). They are too few to permit positive identification if the x-ray evidence is taken by itself; in conjunction with the circumstantial evidence reported by others (*4, 5*), indications are strong that the inclusion bodies consist of the virus protein. X-ray diffraction studies on these microscopic objects require highly specialized equipment and techniques. We are still improving both, and intend to report on the instrumental details at a later date. Fig. 1 shows a typical diagram. Microscopic studies are reported by one of us in the note which follows.

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Microscopic Studies of Inclusion Bodies Found in Plants Infected with Tobacco Mosaic Virus[1]

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Inclusion bodies found in the hair cells and leaves of diseased tobacco plants suffering from mosaic dis-

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