

Potato Mop-Top Virus in Infected Cells

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The particles of potato mop-top virus (PMTV) resemble those of tobacco mosaic virus (TMV), and the two viruses are slightly related serologically. However, buffer extracts of tobacco leaves infected with PMTV contain very few virus particles and no evidence has been obtained of free virus RNA in the infected leaves. Many particles in sap appeared defective, with their protein helix uncoiled, usually at one end (Kassanis, Woods & White, 1972; Harrison & Jones, 1970). The purpose of this note is to describe the appearance of PMTV in infected cells. Leaves of young tobacco plants cv. Xanthi were inoculated with the aid of carborundum before they were fully expanded, and one week later small pieces of leaf showing fine necrotic markings were used. The pieces of leaf were fixed and embedded for electron microscopy following Milne's (1970) method.

Restricted areas of the cytoplasm contained particles packed together parallel to one another. Most areas were small (Fig. 1) but some were large and contained very many particles (Fig. 2). The large areas were approximately 10 μ m. across, and contained ribosomes and mitochondria. In size and appearance they resembled inclusion bodies, but we have failed to find inclusions by light microscopy.

The particles in large or small groups had widely ranging lengths. Particles sectioned at right angles to the long axis showed an electron dense core and a central hole (Fig. 3). Their external diameter was 19 nm., the diameter of the dense core 8 nm. and of the central hole 2.5 nm. In appearance and size they resembled the long rods described in tissues infected with the FLAVUM strain of TMV (Kolehmainen, Zech & Wettstein, 1965). When TMV particles 300 nm. long are well packed, as in crystals, only the RNA stains with osmium. The diameter of such virus particles is 7.9 nm., corresponding to that of encapsidated RNA. By contrast, the long rods of the FLAVUM strain of TMV have indefinite lengths, stain completely and have an external diameter of 19.1 nm. Kolehmainen *et al.* (1965) suggested that the long rods represented aggregated particles of length 300 nm. with a structural organization different from the particles in the crystal because they stain differently. Moreover, the long rods of the FLAVUM strain of TMV and PMTV are flexuous in contrast to the rigid appearance of the particles 300 nm. long. We have not seen any particles 300 nm. long in cells infected with PMTV. Long rods have previously been described only in cells infected with the FLAVUM strain, which is defective in that the virus protein becomes insoluble when infected plants are kept above 30° (Jockusch, 1966), and PMTV also seems at least partly defective in the arrangement of the protein.

There is no way of comparing the relative frequency of the long rods seen in cells infected with PMTV and the virus particles found in the extracted sap. Some of the particles in the sap were about 300 nm. long but most of them were shorter than this (Kassanis *et al.* 1972). If the long rods were aggregates of particles 300 nm. long, we might have expected to find more of these virus particles in the extracted sap. One possible explanation is that the large aggregates do not disperse during extraction and are lost during clarification. Another might be that the long rods are capsids (without RNA), but this seems impossible

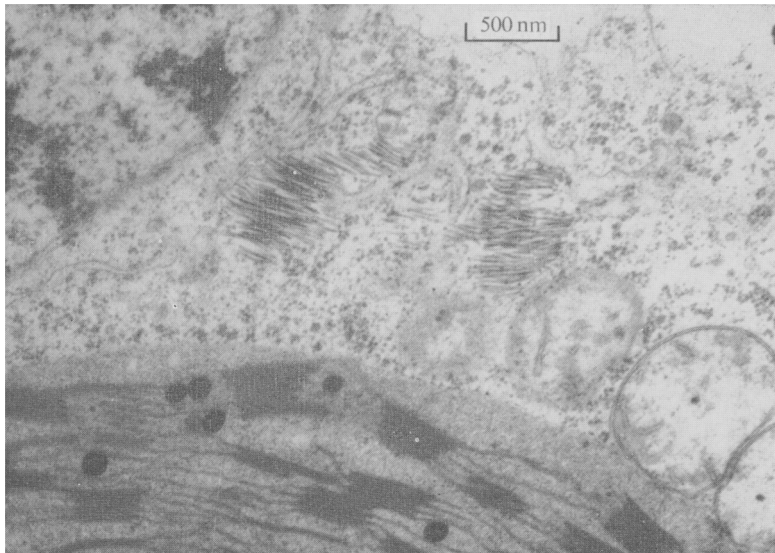


Fig. 1. Cytoplasm of tobacco plant cell infected with PMTV showing a small area with virus particles.



Fig. 2. Cytoplasm of tobacco plant cell infected with PMTV showing a large area with virus particles.

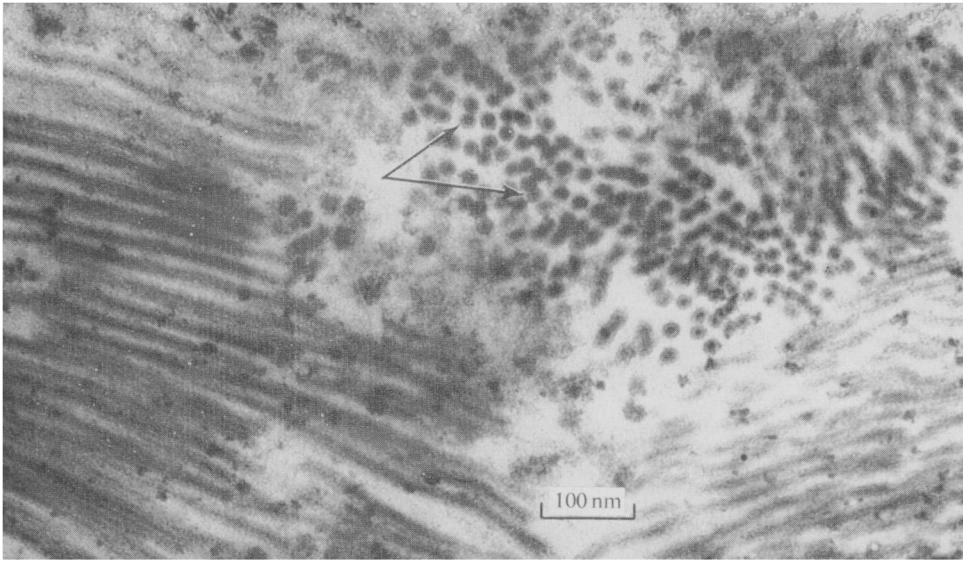


Fig. 3. Enlargement of infected tobacco cell showing cross-sections of virus particles, some having central hole (arrows).

because the dense core corresponds exactly to the diameter of the encapsidated RNA. Whatever may be the significance of the long rods of PMTV, their resemblance to those in cells infected with the FLAVUM strain of TMV is further evidence for PMTV and TMV being related.

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