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Virus-like Particles in the Plant Hopper *Javesella pellucida* Fab.

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Javesella pellucida Fab. (Homoptera, Delphacidae) is one of two plant hoppers known to transmit the pathogen called European wheat striate mosaic virus (EWSMV) (Kisimoto & Watson, 1965) which has not yet been purified or identified visually (Serjeant, 1967). In an attempt to find the pathogen, infective hoppers were sectioned and examined in the electron microscope; 'healthy' hoppers, which had had no contact with infected plants, were also examined. In both kinds we found the virus-like particles, apparently unassociated with EWSMV, described below.

Hoppers collected at Sutton Bonington, Nottinghamshire (Ammar, 1969) and those from the Rothamsted stock were maintained on wheat as described by Slykhuis & Watson (1958). Organs from young adult hoppers were removed and fixed in glutaraldehyde, further fixed in osmium tetroxide, dehydrated in acetone, stained in uranyl acetate, embedded in Epon, sectioned and further stained in lead citrate, and examined in a Siemens Elmiskop 1A.

Virus-like particles were found in hoppers from the Rothamsted stock (Fig. 1, 2) but not in those collected at Sutton Bonington. They were most common in salivary glands but also occurred in the gut wall and brain. They were found only in the cytoplasm. Each particle was bacilliform, 65 nm. long and 30 nm. wide, with a lightly stained wall 4 nm. thick surrounding a dense core (Fig. 1). Most particles were in two-tiered rafts within vesicles but some occurred singly. Fig. 1*a* shows a raft of particles cut obliquely and, where the particles are thinly sectioned (lower left), the dense cores are seen to have lighter centres.

The hoppers, which feed only on members of the Gramineae, were fed on oats (var. Blenda), wheat (var. Capelle Desprez), barley (var. Proctor), cocksfoot (*Dactylis glomerata*, var., KMS) and ryegrass (*Lolium perenne*, var. S 22) to see whether they would transmit a virus to any of these plants. None showed any disease symptoms. Virus-like particles were never seen by electron microscopy in thin sections of wheat plants on which the hoppers had fed.

Virus-like particles have been described in apparently healthy hoppers of the species *Endria inimica* (Lee, 1965) and *Peregrinus maidis* (Herold & Munz, 1967). Neither kind of particle was transmissible to plants. The particles described by Lee were rods 300 nm. long and 30 nm. wide, and those described by Herold & Munz (1967) were spheres 54 nm. in diameter, so that neither kind resembled those we have found.

We do not know whether the virus-like particles found in *Javesella pellucida* affect the insect, but comparison of hoppers containing and lacking the particles may give evidence on this point.

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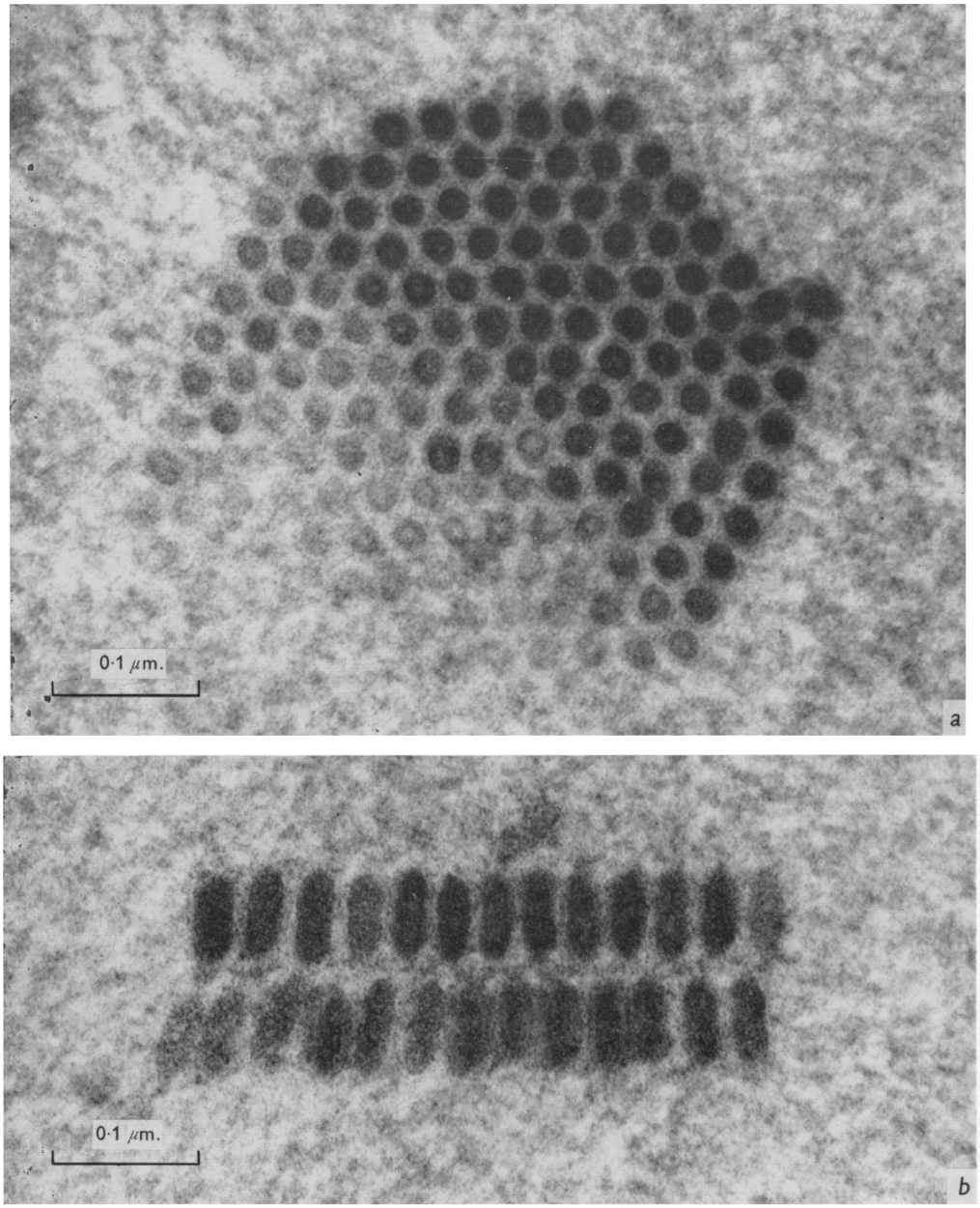

Fig. 1 (*a*) and (*b*). Two views of rafts of virus-like particles seen in sections of salivary glands of 'healthy' plant hoppers, *Javesella pellucida*.

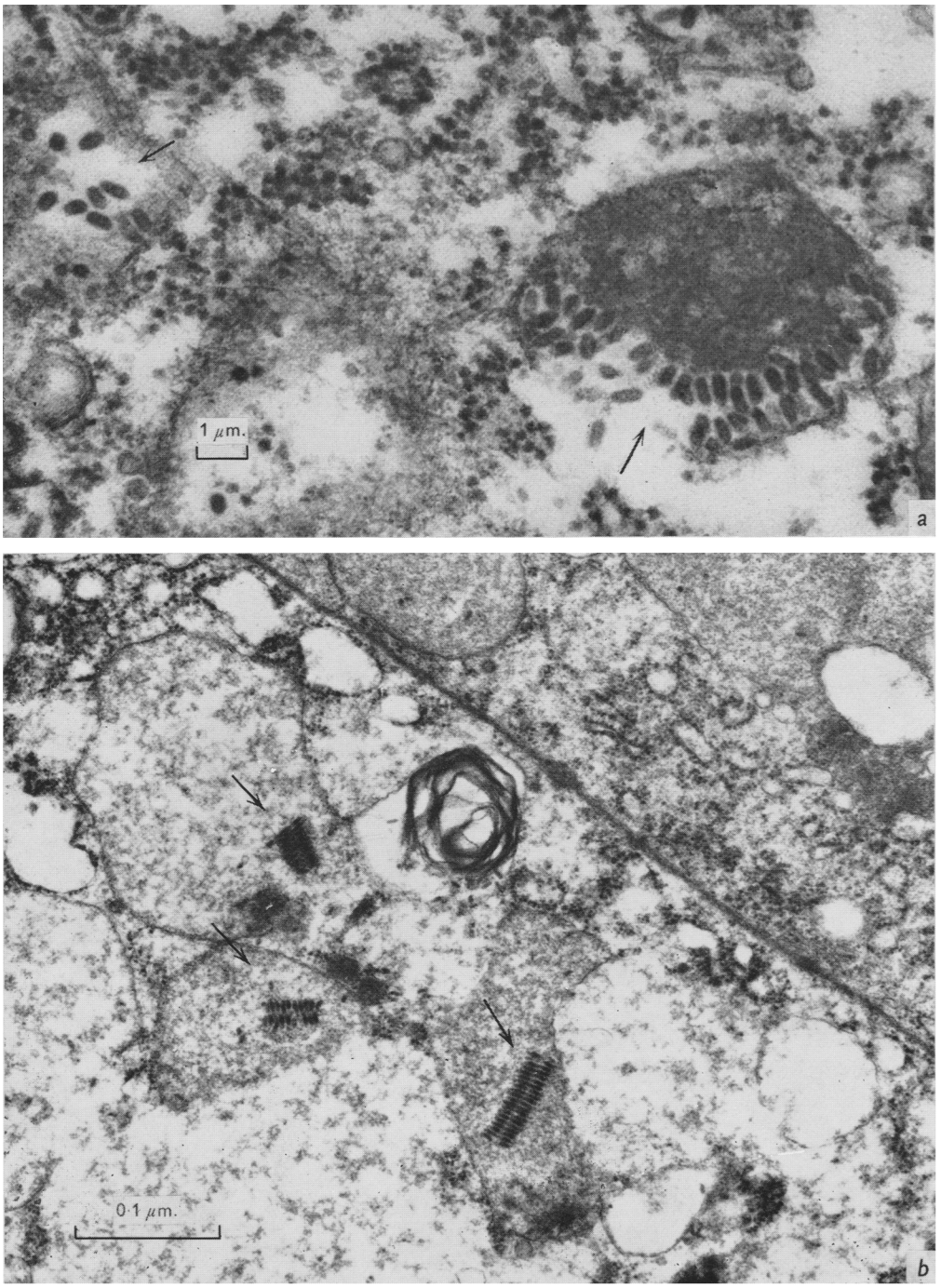

Fig. 2(*a*) and (*b*). Sections of salivary gland cells of *J. pellucida*. Arrows indicate groups of virus-like particles.

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