Miscellaneum : Viruslike particles of "Glossina fuscipes fuscipes" Newst. 1910

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Miscellaneum

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Viruslike Particles of *Glossina fuscipes fuscipes* Newst. 1910

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Abstract

The ultrastructure of viruslike particles forming pseudo-crystalline arrays in the nuclei of midgut epithelial cells of *Glossina fuscipes fuscipes* (Tsetse fly, Diptera) is described.

These spherical particles measure about 350–390 Å in diameter. Their number increases with the age of the flies.

Introduction

Intranuclear viruslike particles (VLP) have been found in various cell types of *Drosophila:* they occur in fat bodies, oenocytes and central nervous tissue (PHILPOTT et al. 1969), in neurons and glia (HERMAN et al. 1971), as well as in salivary glands, accessory glands and muscles (MIQUEL et al. 1972) of imagines; FILSHIE et al. (1967) described them in cuprophilic cells of larvae, and WEHMAN & BRAGER (1971) in tissue cultured imaginal discs of the same insect genus.

Similar particles were seen in nuclei of muscle and hypodermal cells of a nematode (FOOR 1972).

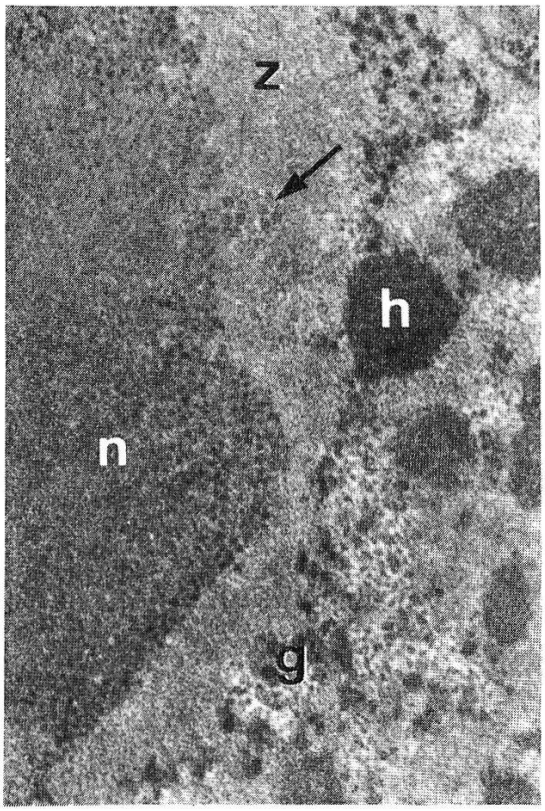
During ultrastructural investigations on *Trypanosoma brucei* in organs of *Glossina* we regularly found VLP in different cell types of the vector. In *Glossina fuscipes fuscipes* these particles were restricted to nuclei of midgut epithelial cells. They are distinct from the cytoplasmic VLP found in *G. morsitans* (JENNI 1973).

Material and Methods

Glossina fuscipes fuscipes (both sexes) emerged in the E.A.T.R.O. insectary (Tororo, Uganda) from pupae, which were either collected in the field (Lugala, Lake Victoria) or derived from a laboratory colony of the same origin. These flies got one infective bloodmeal (day 1 after emergence) on a rat showing a suitable parasitaemia of *Trypanosoma brucei,* and were subsequently fed daily on a clean ox and kept in a climatized (25 °C/80 % RH) dark fly room.

Flies (generally from day 18 on) were dissected; the midguts, salivary glands and reproductive organs were then processed for electron microscopy according to routine methods (STEIGER 1973).

Lead citrate and uranyl acetate stained serial sections (about 600 Å thick) were examined and recorded in a Zeiss EM 9 and Philips EM 300.



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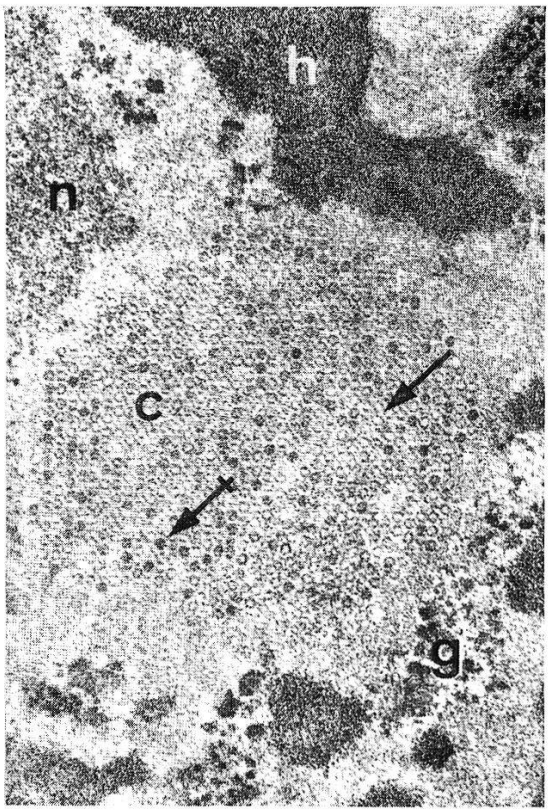

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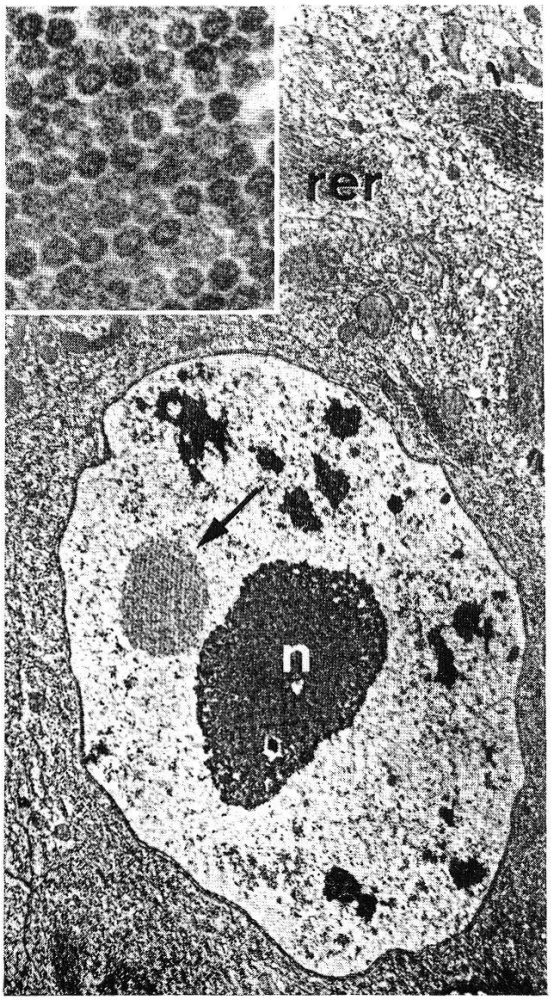

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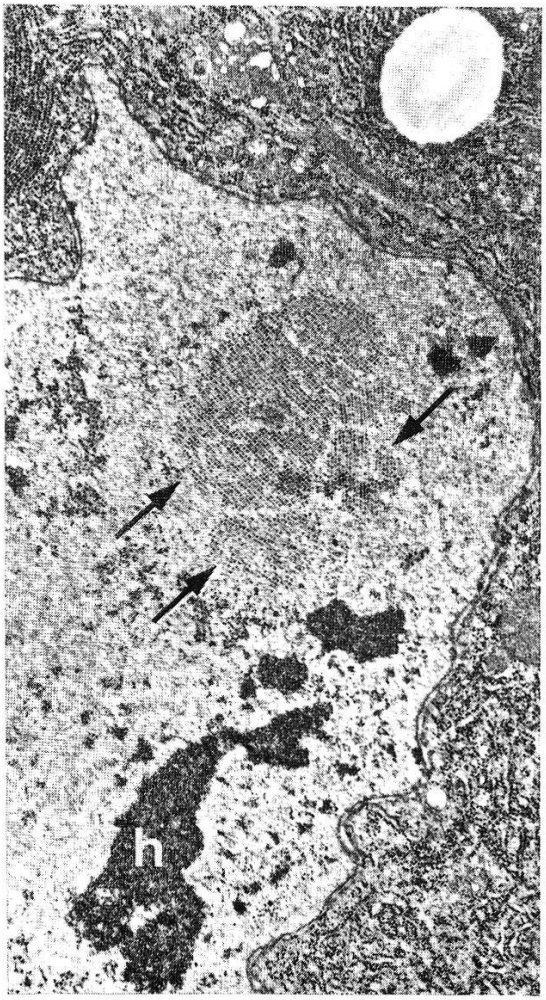

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Results

VLP can be seen in nuclei of midgut epithelial cells (Figs. 1–4). These measure 350–390 Å in diameter. They appear either "hollow" or contain electron-dense centrally disposed material (Figs. 2, 3 inset). The VLP form quasi-crystalline arrays up to 2.8 μm in diameter (Figs. 3, 4), which seem to be confined to the nucleolar region. The size of the arrays increases with age of the flies (between day 20 and 30); they are rather disperse in younger flies and compact in older ones. Inclusions have been found in practically all nuclei of the midgut epithelium.

Different stages of VLP development can be followed: first, single particles are detected in a specific zone adjacent to the nucleolus (Fig. 1). The number of the VLP then increases and single (Fig. 3) or multiple (Fig. 4) quasi-crystalline patterns arise. The zone of VLP formation is encircled by hetero-chromatin and electron-dense granules (Figs. 1, 2, 4). Later, the arrays occur free in a lighter nucleoplasm (Fig. 3).

Discussion

The viruslike particles found in the present study resemble morphologically those described in *Drosophila* (MIQUEL et al. 1972; PHILPOTT et al. 1969), *Aedes aegypti* (FILSHIE et al. 1967) and in a nematode (FOOR 1972). The latter author noticed a similar association of the VLP with the nucleolar region of the nucleus.

Although cytopathic effects could not be seen with certainty in our material, it would be tempting to relate the presence of VLP to the high mortality of young *G. fuscipes* (within 10 days after emergence) and to the low hatching rate we observed. A lot of young flies were found to have disrupted midguts, and in one case, where we checked the midgut ultrastructure of a young weak imago, large intranuclear VLP aggregates already could be seen. The occurrence of "viruses" in old flies would then rather be regarded as a latent infection.

Concerning a possible transovarial transmission of the VLP, crystalline inclusions in the reproductive organs have never been found so far.

We shall try to clarify the nature of the intranuclear VLP using new fly material of the same origin.

Fig. 1. 20 days after emergence. First single VLP (⟶) in the specific zone (z) close to the nucleolus (n). Heterochromatin (h), electron-dense granules (g). 36,000 ×.

Fig. 2. 25 days after emergence. Formation of crystalline arrays (c) in the juxta-nucleolar zone. The spherical VLP appear either "hollow" (⟶) or electron-dense (⟷). 36,000 ×.

Fig. 3. 30 days after emergence. Completed VLP crystal (⟶) free in the nucleoplasm. Rough endoplasmic reticulum (rer). 5250 ×. Inset: Detail from a VLP array. 90,000 ×.

Fig. 4. 30 days after emergence. Multiple crystalline inclusion (⟶) in the nucleoplasm. 12,000 ×.

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