

"Mycetomes" in the Thrips Oocytes (Insecta, Thysanoptera)

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Bournier (1966) found a small ball-like structure in the ooplasm of young eggs of *Caudothrips buffai* (= *Bactrothrips buffai*), and he called it "mycetome", from the resemblance of the structure to symbiotic microorganisms in the oocyte reported for the other insects such as Blattaria, Hemiptera and Coleoptera. For some species of *Bactrothrips*, Haga (1985) also found similar structures in the oocyte, and he observed their successive changes along a series of oocytes in an ovariole. His observations can be clearly followed under a differential interference microscope (Fig.1). First, granules appeared in the young oocyte ooplasm. As the oogenesis proceeds, they increased in number, and they condensed and aggregated to bipolar positions to form two ball-like structures. Later the organogenesis advances, they are transferred and enclosed into the newly formed midgut lumen. Our knowledge on the structures is limited to the above-mentioned, and their details have been unknown. Here, we examined whether such structures are generally present throughout the order Thysanoptera, and we also verify their symbiotic nature.

We examined oocytes of 40 species of both suborders: Suborder Terebrantia (comprising seven families, after Mound *et al.*, 1980), three genera three species of Family Thripidae; Suborder Tubulifera (comprising only one family: Phlaeothripidae), 12 genera 23 species of Subfamily, Phlaeothripinae, six genera 14 species of Subfamily Idolothripinae. Among them, we found ball-like structures in 11 tubuliferan species, which belong to the Idolothripinae except for *Bagnalliella yuccae* of another subfamily Phlaeothripinae. The structures in *Bagnalliella yuccae* are reddish, and different in color from colorless ones in the idolothripine species. For the tubuliferans other than these 11 species and all the terebrantians examined, any structures referable to ball-like ones were not found, although oocytes contain diffused granules in some species. Here, it may be said that the

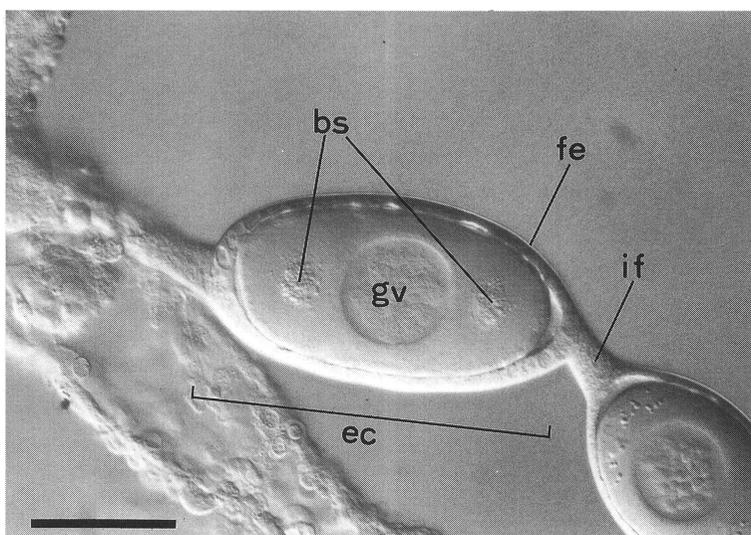


Fig. 1 An oocyte of *Bactrothrips brevitubus* in late previtellogenic stage (differential interference microscopy). Scale = 50 μ m. bs: ball-like structure, ec: egg chamber, fe: follicular epithelium, gv: germinal vesicle, if: interfollicular tissue.

structures assuming a ball-shape are not always distributed all over the order Thysanoptera.

Next, to examine their symbiotic nature, existence of nucleoplasm in the structures was tested histochemically. Ovaries of *Bactrothrips* spp., *Holurothrips morikawai* and *Bagnalliella yuccae* were fixed in the Bouin's fluid or paraformaldehyde and processed for 5-7 μ m thick serial paraffin sections, then they were stained with Mayer's acid hemalum (hematoxylin) and eosin, Schiff's reagent (Feulgen's reaction) and Hoechst dye 33342 (fluorescent staining).

The results were shown in Table 1. With Hoechst dye 33342, the ball-like structures of these three species examined fluoresced, therefore it may be concluded that the structures of all of species examined should have nucleoplasm. Stainability of the structures against hematoxylin and Feulgen's reaction, however, differs between the phlaeothripine *Bagnalliella yuccae* and the idolothropines: the structures in *Bagnalliella yuccae* were stained bluish and pale reddish, respectively, while those in idolothropines were not. It may be supported that different stainability to hematoxylin and Feulgen's reaction in *Bagnalliella yuccae* and idolothropines should reflect quantitative differences of nucleoplasm between them. Although more detailed morphological and histochemical studies should be desired to identify the ball-like structures, it might be, at present, possible to say that the structures should be derived from symbiotic microorganisms.

Table 1 Stainability of the ball-like structures in thrips oocytes.

	Hematoxylin	Feulgen's reaction	Hoechst dye 33342
<i>Bagnalliella yuccae</i>	++	+	++
<i>Bactrothrips</i> spp.*	—	—	+
<i>Holurothrips morikawai</i>	—	—	+

++, strong; +, weak; —, negative.

* *B. brevitubus*, *B. carbonarius*, *B. flectoventris*, *B. honoris*, *B. montanus*, *B. pictipes*, *B. quadrituberculatus*, and one *Bactrothrips* undescribed sp.

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