

University of Florida Book of Insect Records

Chapter 7 *Smallest Eggs*

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Taking into account female size, the smallest insect eggs are the microtype eggs of Tachinidae, which are usually 0.02 to 0.2 mm long but very rarely as long as 0.4 mm. The eggs of Zenillia pullata are exceptionally minute, only 0.027 by 0.02 mm. The volume of the macrotype egg of Gymnosoma sp., another tachinid, is approximately 2000 times the volume of the microtype egg of Z. pullata.

The eggs of insects vary greatly in appearance, size and number. Regarding size, a common belief has been that hemimetabolous insects have large eggs with much yolk and therefore develop within the shell into a form resembling that of their parents. The holometabolous insects, on the other hand, are supposed to have small eggs with little yolk and therefore hatch in an undeveloped form that does not resemble that of their parents (Hinton, 1981). The present paper is a literature review of the smallest eggs in the class Insecta.

Methods

Bibliographic data were gathered from CD-Rom Biological Abstracts (1985-1993), and Agricola (1970 to 1993). In addition, several general entomology, Hymenoptera, and Diptera books were consulted.

Results

In general, the eggs of insect parasites are the smallest eggs of insects. Relative to female size, the smallest insect eggs reported in the literature are the microtype eggs of Tachinidae (Hinton 1981). These eggs are usually 0.02 to

0.2 mm long, very rarely as much as 0.4 mm long (Hinton 1981). The eggs of *Zenillia pullata* are exceptionally minute, only 0.027 by 0.02 mm (Clausen 1940, Hinton 1981).

Townsend (1938, 1942) calculated the volume of a considerable number of Tachinid eggs and found that the largest macrotype egg of *Gymnosoma* sp., which is 0.9 mm long, is approximately 2000 times the volume of the microtype egg of *Z. pullata*.

Discussion

Traditionally holometabolous insect eggs have been considered smaller than hemimetabolous insect eggs. Anderson (1972a, 1972b) published dimensions of holometabolous and hemimetabolous eggs. He maintained that with a few exceptions mainly among Coleoptera and Lepidoptera, the eggs of holometabolous insects have dimensions of about 1 mm or less and develop and hatch in only a few days.

Hinton (1981) criticized Anderson's data because he compared hemimetabolous species that on the average are much larger than those of the holometabolous species. In addition, he did not include the size of the female, although large animals tend to lay larger eggs than small animals. Hinton (1981) suggested that a realistic comparison would be the ratio of the dry weight of the females to that of their eggs. However, he recognized that data were insufficient for this kind of comparison and instead listed the major axis of the egg as a percentage of the length of body of female from vertex of head to the tip of abdomen. He included 102 species of hemimetabolous

and holometabolous insects. Based on these data he concluded there is no difference in the size of eggs of hemimetabolous and holometabolous insects, and insects that lay thousands of eggs, like Ephemeroptera and the Tachinidae with microtype eggs, have very small eggs in relation to the size of the female.

It is important to point out that Hinton did not consider the families Mymaridae and Trichogrammatidae, which consist entirely of species that are egg parasites and consequently are usually very minute, some adults being less than 0.25 mm in length (Debach and Rosen, 1991). The mymarids contain some of the smallest insects known. One species of *Alaptus* has a body length of 0.21 mm (Borror et al, 1981), and the eggs of *Anagrus atomus* (Mymaridae) are 0.06 mm in length (Clausen, 1940). The trichogrammatids also contains some species of the genus *Megaphragma*, parasites of the eggs of thrips, that are no more than 0.18 mm in total length (Borror et al. 1989).

In general, the data on egg size are scarce and it is difficult to determine a record without extensive data on egg size for the families mentioned above. However, *Zenillia pullata* has an exceedingly minute egg, probably the smallest insect egg that has been measured.

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