Meconium in insects.

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Apocrita (Hymenoptera) larvae are from the most basal groups because the posterior portion of the midgut is closed without connection to the hindgut during the entire feeding period. Only after the end of feeding, generally close to the moment of pupa formation, does a connection form between the intestines, allowing the larva to eliminate undigested food and nitrogenous waste [1-3].

This interruption of the connection between the mid and hind intestines in larvae has been explained as an adaptation to avoid contamination of food with their feces, associated with the evolution of the parasitoid way of life. The interruption could be an adaptation to the acquisition of a predominantly liquid diet by the parasitoids, as it would allow an increase in the efficiency of digestion and assimilation of food taken from the host [3-5].

The meconium contained in insects consists of a mass of liquid or solid matter, brown, yellow, or red, which accumulates in the digestive tract during their metamorphosis and constitutes the first material defecated during their emergence. This structure has been observed in certain Coleoptera, Diptera, and Lepidoptera. Sometimes the newly emerged adult retains meconium in its rectum until sclerotization is complete, thus contributing to an increase in its body size. Meconium can play an important role as a pathogen reservoir for insects and plants during the pupal period and thus considerably reduce their infection [5-7].

In ants (Hymenoptera; Formicidae; Myrmicinae) during this period of radical transformations in the insect's tissues that allow it to go from larva to imaginal life, the last stage larva stops feeding and becomes completely immobile. One of the first signs of the drastic changes undergone by the tissues of Hymenoptera is characterized by the establishment of the connection between the middle and hind intestines when the digestive tube of the larva is closed and food waste accumulates at the level of the middle intestine, in a mass only called meconium [8-12].

This event co-occurs with the eversion of the pupal antenna. The beginning of pupal morphogenesis correlates with eliminating meconium at the end of the larval stage. Between the elimination of meconium and pupal ecdysis, the insects are called the “pre-pupa” or pharate phase. After approximately 5 days of the insect molting, the pupal stage begins. In the larger worker of *Acromyrmex octospinosus* (Reich 1793), the last stages last 25 days, at 26° C [8-12].

The flies (Diptera) for investigating environmental conditions mainly refer to the high abundance of individuals, so that sampling does not cause wealth loss and their sensitivity to environmental imbalances. Furthermore, in some cases the exoskeleton, meconium, and DNA can be used as structures for the accumulation of trace metals, varying according to diet and environmental pressures. Flies can function as indicators of human interference in natural environments due to

their rapid population response and environmental sensitivity. This sensitivity towards environments, combined with the rapid response in population terms to human modifications, gives flies the ability to function as indicators of human interference in natural environments [8-12].

Palmistichus elaeisis Delvare & LaSalle, 1993 (Hymenoptera, Eulophidae) is an endoparasitoid collected from pupae of *Sabulodes* sp. (Lepidoptera, Geometridae). The immature stages of this parasitoid were studied in the laboratory (25 ± 1ºC; 70 ± 10% RH; photophase 14 h) in pupae of the following Lepidoptera: *Diatraea saccharalis* (Fabricius, 1794) (Lepidoptera: Crambidae), *Anticarsia gemmatalis* Hübner, 1818, *Heliothis virescens* (Fabricius, 1781), *Spodoptera frugiperda* (Smith, 1797) (Lepidoptera: Noctuidae) and *Thyrinteina arnobia* (Stoll, 1782) (Lepidoptera: Geometridae). The pre-pupal stage lasted approximately 24 hours in all hosts tested, and the elimination of meconium was observed after the last larval instar human interference in natural environments.

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