Wedge-Shaped Beetles (suggested common name)
*Ripiphorus* spp. (Insecta: Coleoptera: Ripiphoridae)¹
David Owens, Ashley N. Mortensen, Jeanette Klopchin, William Kern, and Jamie D. Ellis²

**Introduction**

Ripiphoridae are a family of unusual parasitic beetles that are thought to be related to tumbling flower beetles (Coleoptera: Mordellidae) and blister beetles (Coleoptera: Meloidae). There is disagreement over the spelling of the family (Ripiphoridae) and genus (*Ripiphorus*) names. Here we use the original spelling that starts with only the letter “R”; however, an initial “Rh” has also been used in the scientific community (Rhipiphoridae and *Rhipiphorus*).

Generally, the biology of the family Ripiphoridae is poorly known. Ripiphorids parasitize bees and wasps (Hymenoptera), roaches (Blattodea), and wood-boring beetles (Coleoptera). However, the specific hosts for many ripiphorid species are unknown. Furthermore, only one sex (either male or female) has been described for several species, and the males and females of some species look different.

Two genera of Ripiphoridae infest hymenopteran (bee and wasp) nests: *Macrosiagon* Hentz (Fig. 1A) and *Ripiphorus* Bosc (formerly *Myodites* Latreille) (Fig. 1B). Species of *Macrosiagon* are parasites of a variety of Hymenopteran families including: Halictidae, Vespidae, Tiphidae, Apidae, Pompilidae, Crabronidae, and Sphicidae. *Ripiphorus* species parasitize only bees in the families Halictidae and Apidae.

**Distribution**

*Ripiphorus* species occur worldwide, except in Australia. They are distributed widely across North America, but they are most diverse in the southwestern United States deserts. *Ripiphorus fasciatus* has been collected from Atlantic Canada to the north, Kansas to the west, and Florida to the

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2. David Owens; Ashley N. Mortensen, biological scientist; Jeanette Klopchin, research assistant; William Kern, associate professor, UF/IFAS Fort Lauderdale REC; and Jamie Ellis, Entomology and Nematology Department, UF/IFAS Extension, Gainesville, FL 32611.

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Ripiphorus schwarzi has been observed in Massachusetts, Virginia, and Florida.

**Description**

*Ripiphorus* species are holometabolous (undergo complete metamorphosis). Descriptions of the egg, larval, and pupal stages are available only for one species, *Ripiphorus smithi* Linsley & MacSwain. Therefore, the information provided in the sections below is a generalization based on what is known about that species. A description of adult *Ripiphorus fasciatus* is available and is described in the “Adults” section below.

**Eggs**

Eggs are typically 0.5 mm long, 0.2 mm wide, and tapered.

**Larvae**

First instar larvae are heavily sclerotized, highly mobile, and are referred to as triungulins (Fig. 3A). They are equipped with an anal sucker and have a large sucker type pad on the ends of the tarsi. The second through sixth larval instars are morphologically very different from the first larval instar. The later instars are much less mobile, unsclerotized (soft-bodied), and have large tubercles (round projections) present on each segment (Fig. 3B).

**Pupae**

The structural form of the pupae is generally quite similar to the adult form of the same sex. The primary exceptions to this are that the hind wings are not unfolded and the abdomen is almost completely free of hair in pupae.

**Adults**

*Ripiphorus fasciatus* adults are 6-8 mm long and have a fly-like appearance because the elytra (1st pair of wings) are short, leaving the large, unfolded hind wings exposed. The hind wings are clear and the elytra are bicolored; the base of the hind wing is brown while the rest is yellow. The body is thick and appears humpbacked because the abdomen curls under the body. Their large eyes protrude from the head and the antennae consists of 10-11 segments. Males have bi-flabellate antennae (Fig. 5A), and females have pectinate antennae (Fig. 5B).

**Life Cycle**

*Ripiphorus smithi* is the only species of *Ripiphorus* for which a detailed life history is known. The life histories of all *Ripiphorus* species are presumed to be similar to that of...
**Ripiphorus smithi.** Therefore, the information provided in this section a generalization based on what is known about *Ripiphorus smithi*.

Adult *Ripiphorus* emerge during the summer. After mating, the females deposit 6 to 15 eggs into the buds of unopened flowers. The total number of eggs that each female lays is unknown, but dissected females have contained as many as 850+ eggs. When the flower opens, the eggs hatch and the first instar *Ripiphorus* begin to seek a host (Fig. 6A). The larvae will "stand" on the tip of their abdomens until an adult bee of their host species lands on the flower. The larvae then attach themselves to the adult bee that carries them back to their nest.

The *Ripiphorus* larva enters the host bee’s nest and waits on the bee’s pollen mass until an egg is laid and hatches. The *Ripiphorus* larva penetrates the bee larva and overwinters in the diapausing bee larva (Fig. 6B). When the bee reaches the pre-pupal stage, in the late spring/early summer, the *Ripiphorus* larva grows quickly and emerges from the thorax of the bee. As it emerges, the *Ripiphorus* larva molts and the molted exoskeleton plugs the wound on the honey bee pre-pupa (Fig. 6C). The *Ripiphorus* larva continues to feed on the same bee through four more molts until the bee is consumed, at which point the *Ripiphorus* pupates for 11-14 days. Superparasitism of a single bee larva by multiple *Ripiphorus* is rare, and when it does occur, neither of the *Ripiphorus* larvae completes development.

The adult life stage is very short (as few as 1-2 days; Table 1). After emergence, male *Ripiphorus* fly over the bee’s nesting areas to locate females for mating. It is suspected that the females release a strong sex pheromone that aids in the attraction of mates. Males may mate with two or more females, but females only mate once. Multiple males typically swarm to a single female. After the female has successfully copulated, the males disperse to find unmated females.

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Table 1. Table 1. Seasonality of *Ripiphorus* life stages. Table adapted from Linsley et al. 1952.

**Hosts**


*Ripiphorus fasciatus* parasitizes *Lasioglossum* Curtis and, possibly, *Halictus* Latreille species (Fig. 7 A & B). *Ripiphorus schwarzi* also parasitizes *Lasioglossum* bees and has been reported to parasitize a species of *Augochlora* (Fig. 7 B & C). However, there is some debate that the record on *Augochlora pura* Say may have been a misidentification of another species of *Ripiphorus*.

**Economic Importance**

*Ripiphorus* is distributed widely and can be locally abundant. However, their densities vary regionally and the reported rates of *Ripiphorus* infestation range from <1% to 28%. *Ripiphorus* are seldom encountered in nature because their immature stages occur primarily within the host’s nest and their free-living adult stage is very short (1-2 days). Their secretive life cycle makes an assessment of their economic and ecological impact very difficult. Additional research is necessary to determine the abundance and impact of *Ripiphorus* species.
Selected References


