

Scoliid Wasps of Florida, *Campsomeris*, *Scolia* and *Trielis* spp. (Insecta: Hymenoptera: Scoliidae)¹

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The Featured Creatures collection provides in-depth profiles of insects, nematodes, arachnids and other organisms relevant to Florida. These profiles are intended for the use of interested laypersons with some knowledge of biology as well as academic audiences.

Introduction

The family Scoliidae is composed of fairly large, stout-bodied wasps, often brightly patterned in shades of red and yellow, white, or one of these colors in combination with black. These wasps are parasitoids of soil-inhabiting scarab beetle larvae.

The family Scoliidae is represented in America north of Mexico by 20 species and numerous subspecies, in five genera: *Campsomeris*, *Crioscolia*, *Scolia*, *Trielis* and *Triscolia* (Krombein 1951, 1958, 1967; Betrem 1972). Arnett (2000) identifies two other species in this family that are “introduced; probably not established.”

The scoliid wasps and related families (e.g., parasitic tiphiids, [velvet ants](#)) traditionally form a higher group (superfamily) called the Scolioidea. These wasps combine at least two notable features which help place them in an interesting and pivotal position within the Hymenoptera. Firstly, they have the biological characteristics of the more primitive parasitic Hymenoptera, and secondly, they have the morphological characteristics of the more advanced “stinging” wasps.

This combination of characters leads most present day hymenopterists to place ancestral scolioid wasps (and the related bethyloid wasps) as the most primitive of the higher bees, wasps, and ants (Evans and Eberhard 1970, Malyshev 1968, Iwata 1976, Spradbery 1973). Brothers (1975: 577–578) disagreed, however, and stated that “it is not appropriate” to consider a member of the Scolioidea as ancestral to the bees, wasps and ants.



Figure 1. Adult *Scolia nobilitata* Fabricius, a scoliid wasp.
Credits: Lyle J. Buss, University of Florida

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Synonymy

The historical treatment of names (i.e., nomenclature) in Scoliidae is quite complicated and is not discussed in this circular but names have been brought to current status by the use of Krombein (1951, 1958, 1967), Betrem (1972), and personal communication with Drs. K.V. Krombein and A.S. Menke (Smithsonian Institution and Systematic Entomology Laboratory, USDA, United States National Museum, Washington, D.C., respectively).

Identification

There is no current key to the five Nearctic genera of Scoliidae. *Scolia*, *Trielis*, and *Campsomeris* occur in Florida, while *Triscolia* and *Crioscolia* are limited to the western Nearctic (North America down to the Central Mexican plateau).

In Florida, three genera are represented by eight species. This publication provides a generalized, simplified pictorial key to genera of American Scoliidae north of Mexico. Then it provides methods for identifying the eight species which occur in Florida.

To key to genus requires examination of the wing venation and antennae. After the genus is determined, refer to the genera listed below and compare abdominal color and pattern to arrive at a species identification. In some cases, size may be useful as well, and the range is given for each species.

The genus key is applicable to both sexes except males of *Crioscolia* which do not demonstrate the characters of the female. These are most easily identified by association with the female.

Key to Nearctic Genera and Species of Scoliidae

The sexes of Scoliidae are separated as follows:

- females, antennae 12-segmented, abdomen 6-segmented
- males, antennae 13-segmented, abdomen 7-segmented. In addition, males have the antennae noticeably longer than females and possess a retractable, 3-pronged plate at the tip of the abdomen.

To Genus

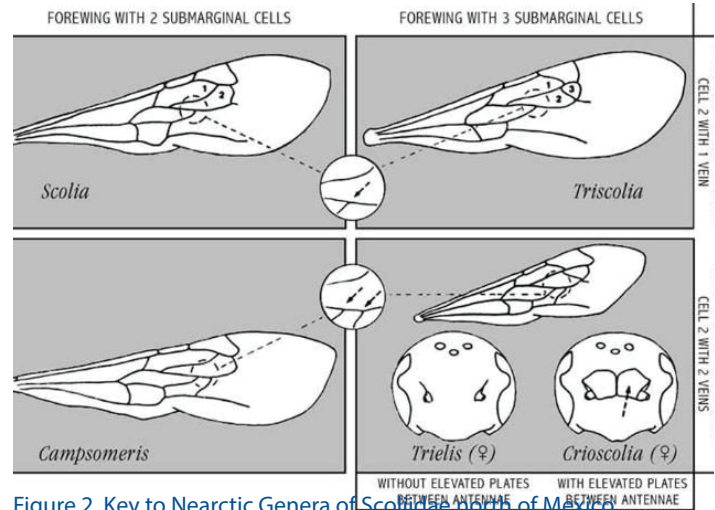


Figure 2. Key to Nearctic Genera of Scoliidae north of Mexico (*Crioscolia* and *Trielis* males not separable).

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To Species Occurring in Florida

This key is valid only for Florida. However, many of these species occur in other states.

Color legend:

B = black

O = orange

OB = orange-brown

RB = red-brown

W = white

Y = yellow

Species in Genus *Trielis*

Trielis octomaculata (SAY)

There are two Nearctic species in this genus, one of which occurs in Florida and the other in the western United States. The Florida species is *Trielis octomaculata* (Say) which is divided into three forms or subspecies, with *Trielis octomaculata hermione* (Banks) occurring along the Atlantic coast into Florida.

Variation

Body length is 10 to 15 mm ($\sim\frac{1}{3}$ – $\frac{1}{2}$ in). The white spots coalesce at the middle on some segments of some specimens, especially males.



Figure 3. *Trielis octomaculata* (Say).
Credits: Division of Plant Industry



Figure 5. *Scolia nobilitata* Fabricius.
Credits: Division of Plant Industry



Figure 4. Adult *Trielis octomaculata hermione* (Banks) scoliid wasps. Female (left), male (right).

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SPECIES IN GENUS *Scolia*

There are six Nearctic species, three of which occur in Florida. They may be separated by abdominal color and pattern, and the sexes are not noticeably different except in comparative lengths of the antennae.

Scolia nobilitata FABRICIUS

Variation

Body length is 10 to 15 mm ($\sim\frac{1}{3}$ – $\frac{1}{2}$ in). Segment 1 rarely with faint yellow spots, and those on segments 2 and 3 are sometimes very faint. Segments 4 through 7 may be dark mahogany to black.

Distribution

This species is found from the Atlantic coast to Colorado and Arizona.

Variation

The white spots coalesce at the middle on some segments of some specimens, especially males.



Figure 6. Adult *Scolia nobilitata* Fabricius, a scoliid wasp.
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Figure 7. Adult *Scolia nobilitata* Fabricius, a scoliid wasp.
Credits: Lyle J. Buss, University of Florida

Scolia bicincta FABRICIUS

Variation

Body length is 15 to 20 mm ($\sim\frac{1}{2}$ – $\frac{3}{4}$ in). The white bands on segments 2 and 3 are sometimes broken into spots.

Distribution

This species is found throughout the eastern United States.



Figure 8. *Scolia bicincta* Fabricius.
Credits: Division of Plant Industry



Figure 9. Adult *Scolia bicincta* Fabricius, a scoliid wasp.
Credits: Lyle J. Buss, University of Florida

Scolia dubia SAY

Variation

Body length is 20 to 25 mm ($\frac{3}{4}$ –1 in). The yellow spots on segment 3 are sometimes very faint or absent.

Distribution

This species is found throughout most of the United States.

Biology

A few observations on flight and courtship were made in 1918 by Rau and Rau and again in 1932 by Rau.



Figure 10. Adult *Scolia bicincta* Fabricius, a scoliid wasp.
Credits: Lyle J. Buss, University of Florida

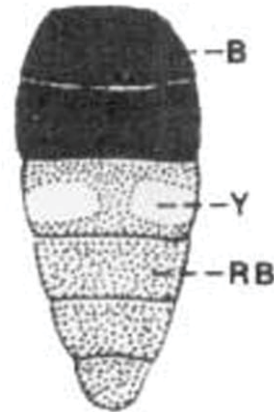


Figure 11. *Scolia dubia* Say.
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Figure 12. Adult *Scolia dubia* Say, a scoliid wasp.
Credits: Lyle J. Buss, University of Florida



Figure 13. Adult *Scolia dubia* Say, a scoliid wasp.
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Species in Genus *Campsomeris*

There are nine Nearctic species of *Campsomeris*, of which four occur in Florida. They may be separated by color pattern, but since the sexes differ both in pattern and shape of abdomen, it is necessary to illustrate each sex. Male specimens usually have the black areas of the abdomen with a faint metallic blue sheen. Females have six abdominal segments and males have seven. Some of these wasps are among the largest in Florida.

Campsomeris quadrimaculata (FABRICIUS)

Variation

Body length is 15 to 35 mm ($\sim\frac{1}{2}$ – $1\frac{1}{3}$ in). Females are easily characterized by the four orange spots which are stable, but the males are quite variable. For this reason I have illustrated the extremes of color variation for males, which vary from segments 2 and 3 with yellow spots, to segments 1 through 4 with yellow bands.

Distribution

This species ranges throughout most of the southeastern United States.

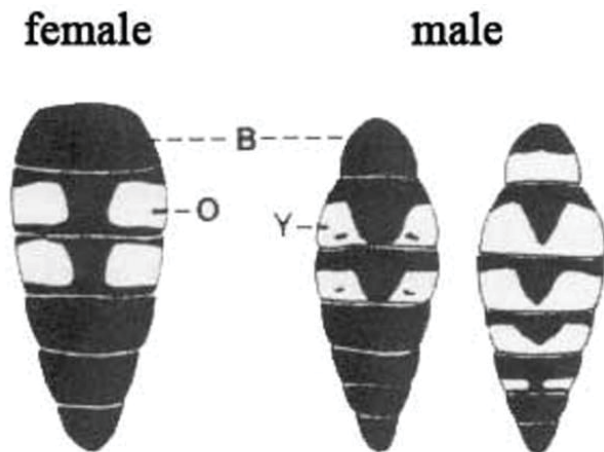


Figure 14. *Campsomeris quadrimaculata* (Fabricius).
Credits: Division of Plant Industry



Figure 15. Adult *Campsomeris quadrimaculata* (Fabricius), scoliid wasps. Female (top), male (bottom).
Credits: Lyle J. Buss, University of Florida



Figure 16. Adult *Campsomeris quadrimaculata* (Fabricius), a scoliid wasp.
Credits: Lyle J. Buss, University of Florida

Campsomeris trifasciata (SAUSSURE)

Variation

Body length is 10 to 15 mm ($\sim\frac{1}{3}$ – $\frac{1}{2}$ in). Both females and males have stable coloration and pattern.

Distribution

Found in southern Florida and most of the Greater Antilles.

Biology

Bradley (1928) reported that this species laid eggs on larvae of the scarab *Phyllophaga portoricensis* Smyth (presumably in Puerto Rico).

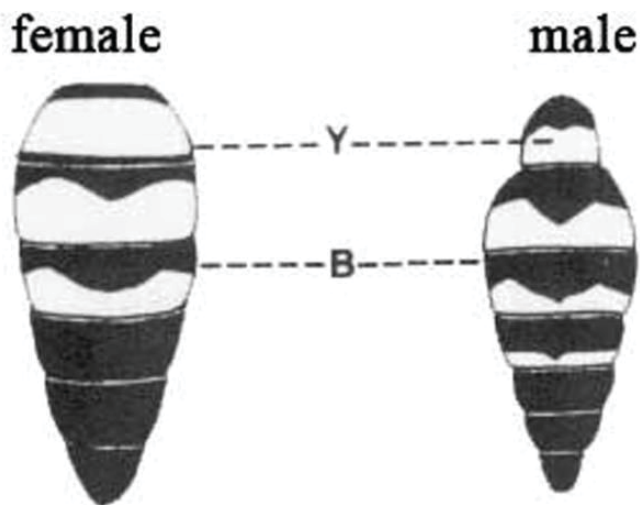


Figure 17. *Campsomeris trifasciata* (saussure).
Credits: Division of Plant Industry



Figure 18. Adult *Campsomeris trifasciata* (Saussure), scoliid wasps. Female (left), male (right).
Credits: Lyle J. Buss, University of Florida

***Campsomeris fulvohirta* (CRESSON)**

Variation

Body length is 15 to 20 mm ($\sim\frac{1}{2}$ – $\frac{3}{4}$ in). This is an uncommon species, and no variation was apparent in the few specimens I have seen.

Distribution

This species is known from southern Florida and Cuba.

Remarks

Males could be confused with those of *Campsomeris trifasciata*. They may be separated, however, by the last three abdominal segments of *fulvohirta* being orange-brown while those of *trifasciata* are black. Also, *fulvohirta* has the scutellum with two yellow spots, while *trifasciata* has a single yellow band.

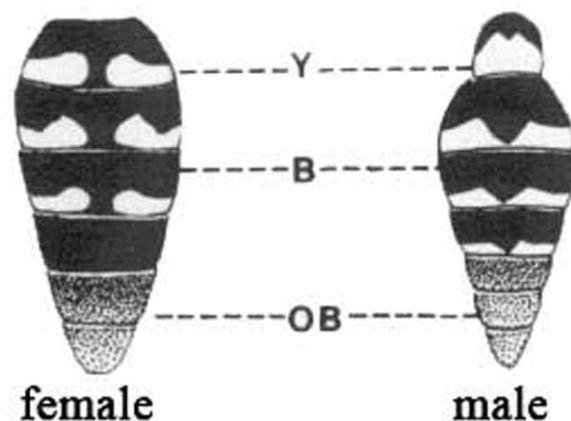


Figure 19. *Campsomeris fulvohirta* (Cresson).
Credits: Division of Plant Industry



Figure 20. Adult *Campsomeris fulvohirta* (Cresson), scoliid wasps. Female (left), male (right).
Credits: Lyle J. Buss, University of Florida

***Campsomeris plumipes fossulana* (FABRICIUS)**

Variation

Body length is 15 to 25 mm ($\sim\frac{1}{2}$ –1 in). Both sexes have stable color patterns.

Distribution

The species occurs over almost all of the eastern United States but is divided into three forms (subspecies). The form in Florida, *Campsomeris plumipes fossulana*, occurs throughout the lower southeastern United States.

Biology

Flower visitation records were given by Krombein (1952) for the Florida subspecies, and Kurczewski (1963) reported on the biology of a Midwestern subspecies.

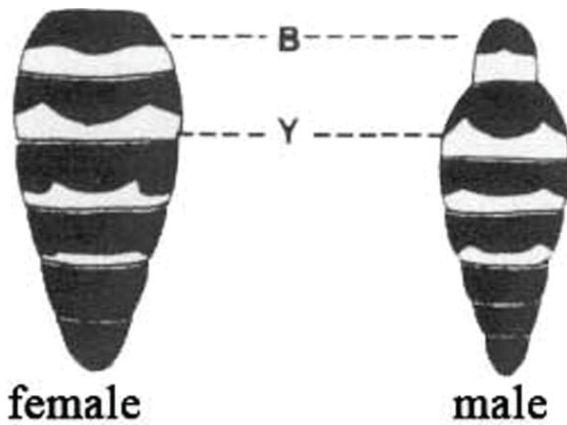


Figure 21. *Campsomeris plumipes fossulana* (Fabricius).
Credits: Division of Plant Industry



Figure 22. Adult *Campsomeris plumipes fossulana* (Fabricius), scoliid wasps. Female (left), male (right).
Credits: Lyle J. Buss, University of Florida



Figure 23. Adult *Campsomeris plumipes fossulana* (Fabricius), a scoliid wasp.
Credits: Lyle J. Buss, University of Florida

Biology

Considering the size of scoliids (up to 5 cm (2 in) long, wing span to 6 cm (2½ in)), surprisingly little is known about their biology. A generalized account of biology is given in this section, and specific references for each species. Charmoy (1922) gave a short annotated review of scoliid life histories and Clausen (1940) later added to this.

Male scoliids are frequently seen cruising close to the ground in irregular figure eight patterns (Krombein, personal communication). A dozen or so may be skimming the soil's surface, but not be noticed until the eye becomes accustomed to their presence. According to Iwata (1976) a female will land and dig into the soil using first her mandibles and then her fore- and midlegs.

As mentioned above, scoliid larvae are external parasitoids of soil-inhabiting scarab beetle larvae. Some scoliid adults use the scarab's own burrow instead of digging a new one (Iwata 1976). When a female wasp reaches the scarab larva she stings it into paralysis, and then she either lays an egg on the venter of the host (Bradley 1945) or moves the beetle larva deeper into the soil, hollows out a small chamber around it, and lays an egg (Clausen 1940, Iwata 1976).

Clausen (1940) and Fleming (1968) have pointed out that not all larvae which are stung receive an egg, but such larvae never recover from the sting. According to Malyshev (1968) and Iwata (1976) the egg is always laid with its posterior end free of the host body. Scoliidae lay their eggs oriented vertically to the scarab body, while the closely related Tiphidae lay their eggs oriented horizontally on the larva.

After hatching, the scoliid larva feeds on its scarab host for approximately one to two weeks and then spins an underground cocoon. According to Clausen (1940:307) most species "probably pass the winter in the mature larval stage within the cocoon."

Hosts

Scoliid wasps are parasitic upon larvae of soil-inhabiting scarab beetles. DeBach (1964) briefly reviewed the literature on these wasps for their use in the biological control of white grubs. The primary emphasis has been with grubs of sugar cane in Hawaii, the Mariana Islands, and Mauritius where control has ranged from "partially" to "completely" successful (DeBach 1964).

In the 1920s about 15,000 adults of two species of scoliid wasps, *Campsomeris annulata* Fabricius (= *Campsomeriella*) and *Campsomeris marginella modesta* (Smith) (= *Micromeriella*), were released in the northeastern United States to control the [Japanese beetle](#) (Krombein 1948). Even though these wasps were experimentally shown to parasitize this beetle, they did not become established in the United States (also see review by Fleming 1968).

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