ENTOMOLOGY CIRCULAR NO. 179
JUNE 1977

FLA. DEPT. AGRIC. & CONSUMER SERV.
DIVISION OF PLANT INDUSTRY

THE SCOLIID WASPS OF FLORIDA
I. INTRODUCTION, BIOLOGY, AND KEY TO NEARCTIC GENERA[1]
(HYMENOPTERA: SCOLIIDAE)

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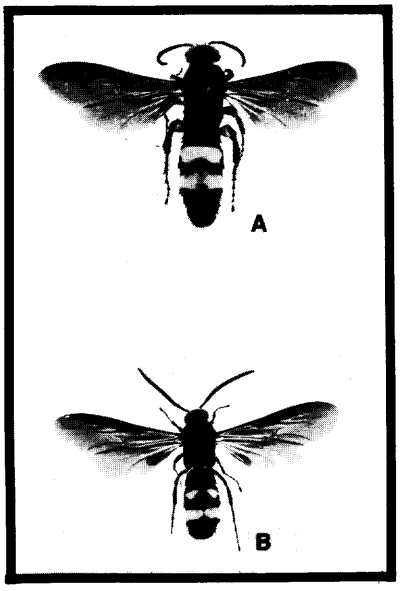
INTRODUCTION: The family Scoliidae is composed of fairly large, stout-bodied wasps (fig. 1A, B), often brightly patterned in shades of red and yellow, white, or one of these colors in combination with black. Scoliid wasps are parasitic upon larvae of soil-inhabiting scarab beetles. DeBach (1964) briefly 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 1920's about 15,000 adults of 2 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).

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 2 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.

The family Scoliidae is represented in America north of Mexico by 20 species (and numerous subspecies) in 5 genera (Krombein, 1951, 1958, 1967; Betrem, 1972). In Florida 3 genera are represented by 8 species. The present circular gives a generalized account of biology and a simplified pictorial key to genera of American Scoliidae north of Mexico. Future circulars will treat the 8 Florida species belonging to the genera Scolia, Trielis, and Campsomeris. 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, U.S.D.A., United States National Museum, Washington, D.C., respectively).



BIOLOGY: Considering the size of scoliids (up to 5 cm long, wing span to 6 cm), surprisingly little is known about their biology. A generalized account of biology will be given in this section, and specific references will be discussed under each species in future circulars. 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. Some scoliids 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 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 Tiphiidae lay their eggs oriented horizontally on the larva. After hatching, the scoliid larva feeds on its scarab host for approximately 1 to 2 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."

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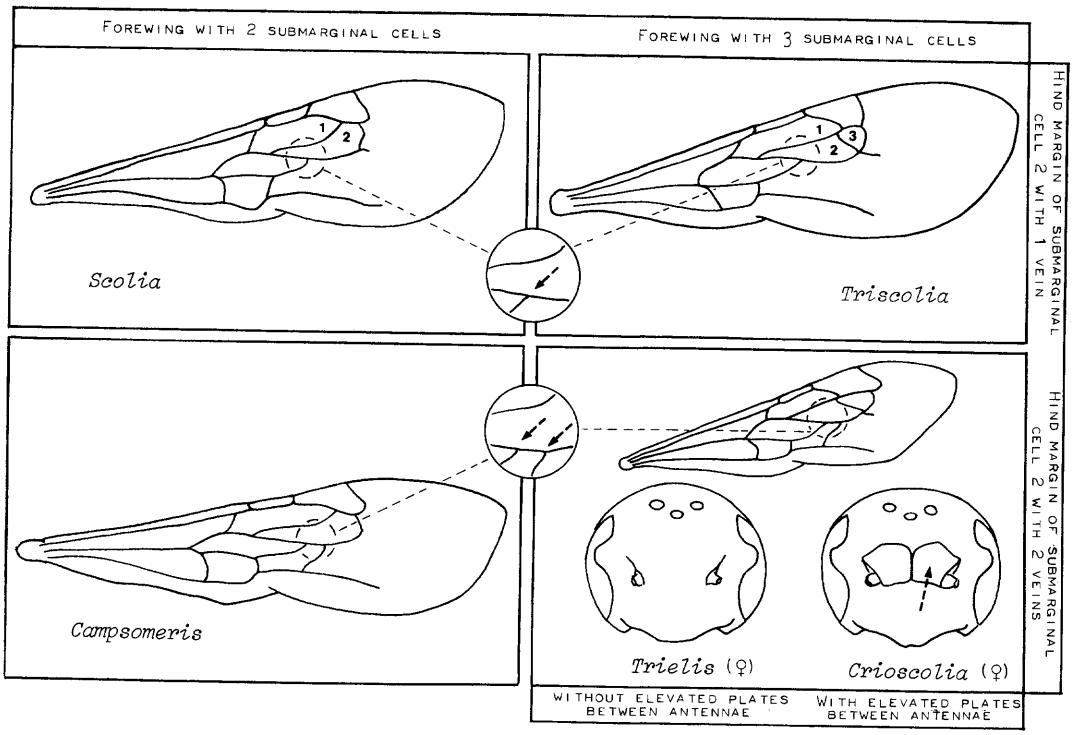
IDENTIFICATION: There is no current key to the 5 Nearctic genera of Scoliidae. Scolia, Trielis, and Campsomeris occur in Florida, while Triscolia and Crioscolia are limited to the western Nearctic. The following pictorial key will serve to identify these genera. The key is applicable to both sexes except males of Crioscolia which do not demonstrate the characters of the female. These are most easily identified by association with the female. The sexes of Scoliidae are separated as follows: females (fig. 1A), antennae 12 segmented, abdomen 6 segmented; males (fig. 1B), antennae 13 segmented, abdomen 7 segmented. In addition, males have the antennae noticeably longer than females and possess a retractible, 3-pronged plate at the tip of the abdomen.

KEY TO NEARCTIC GENERA OF SCOLIIDAE
(Crioscolia and Trielis males not separable)



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