

REVIEW OF *SCYPHOPHORUS* (CURCULIONIDAE:
RHYNCHOPHORINAE)

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ABSTRACT

A summary is presented of distributional, synonymical, and ecological data on the two species of the New World genus *Scyphophorus*, with distinguishing characters of the genus and species, and the first known illustrations of the genitalia.

There are only two species in the New World genus *Scyphophorus*. One (*acupunctatus*) is the sisal weevil which is economically important and which has been carried accidentally in *Agave* from the New World to many parts of the Old World (Hawaii, Borneo, Java, Australia, Africa). The other species (*yuccae*) feeds on *Yucca* plants in the southwestern United States and in Baja California. Both species are black, fully winged, without scales or dorsal hairs; they are rather flattened beetles, fairly robust, usually from 10 to 19 mm. long, with long beak and pronotum, and inconspicuous sexual dimorphism. As in other Rhynchophorini, they have elbowed antennae and an exposed pygidium. At first glance they could readily be mistaken one for the other, but in reality they differ in more ways than do some genera.

As far as I know, the specific and sexual differences of these species have not been recorded previously, nor have the genitalia been illustrated. In fact, since the days of LeConte and Horn (1873, 1876), there has been no taxonomic review of the genus except for that of Champion (1910) which included *acupunctatus* only.

The genus was proposed by Schoenherr (1838) for 3 species of Gyllenhal. LeConte (1857) and Horn (1873) each added a species, but in 1876 LeConte acknowledged that there were only two valid species.

The species seem most closely related to those of the neotropical genera *Foveolus* Vaurie and *Metamasius* Horn, but they can be differentiated from them (and from those of the 16 other genera of Rhynchophorinae in the Western Hemisphere) by 3 characters. These may be found singly in species of allied genera but not all 3 in conjunction. They concern the club, the tarsi, and the genitalia. The spongy apex of the club is either retracted within the corneous part, or visible as only a feebly carinate line. The soles of the dilated third tarsal segments are glabrous except for a uniform fringe of dense, stiff hairs along the extreme apical border (Fig. 11). The long apodemes of the male genitalia are not forked and they are articulated by a membrane to the base of the aedeagus (Fig. 9, 10); a lateral line divides the dorsal and ventral surface of the aedeagus. The styli of the female genitalia emerge from narrow stalks, giving the appearance of one stylus on top of another (Fig. 5-8). It is interesting that the aedeagus found in *Scyphophorus* resembles, of the many rhynchophorine genera I have examined for this character, only that of the monotypic *Paradiaphorus* of South America and *Sphenophorus abbreviatus*

Fabricius of Europe. The female genitalia resemble also those of *abbreviatus*.

Approximately 1300 specimens have been examined, chiefly of the more abundant and widespread *acupunctatus*, as well as the types or designated lectotypes of 3 of the 6 described forms.

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ECOLOGY

The earliest association of the species of *Scyphophorus* with their host plants is by Horn (1873) for *yuccae*. In 1881 and 1886, Dugès described and figured the larvae and pupae of *acupunctatus*, now known as the sisal weevil, and listed its food plants as the maguey or century plant, *Agave mexicana* and *A. cubensis*. In the latter he found larvae, pupae, and adults together. Champion (1910) added *A. americana* and *Furcroea tuberosa* to the list from data on specimens collected by Biolley in Costa Rica. In the British Museum he found also a specimen labeled "bred in greenhouse, Windsor, 1891." Anderson (1948), in his studies of larvae from Arizona and Mexico, reported as host plants *Agave*, *Dasylyrion*, and mescal¹ (*Lophophora*). Additional hosts, *A. atrovirens*, *attenuata*, *ferdinandiregis*, *lecheguilla*, and *shawii*, were listed in a bulletin of the California Department of Agriculture (1959) in which was reported also a new host, the dragon tree (*Dracaena draco*). George W. Schwegel, an inspector in San Diego County, California, found heavy damage by larvae and adults to the roots and trunks of this tree, as well as to various *Agave* plants at Quail Park, Encinitas, San Diego County. Still another new host is soapweed (*Yucca glauca*) from which Charles W. O'Brien collected 24 adults in June, 1964, at State Lake, Logan County, Kansas. The only specimen reported from Arkansas (Crawford County) was on *Yucca*. In the southeastern United States, a specimen was collected in 1953 at Cape Sable, Florida, on the flowers of sisal (*Agave sisalana*) by E. L. Sleeper (1957).

¹This host record is probably erroneous since the common name "mescal" refers to several species of *Agave* from which alcoholic beverages (i.e. tequila, pulche, and mescal) are made. The confusion probably results from the fact that *Lophophora* (peyote) contains the drug mescaline, although the plant is not called "mescal". *Lophophora* is also an unlikely host because it is a member of the family Cactaceae, whereas all other hosts listed above are Liliaceae.—Editor.

This plant was introduced in 1840 to the Florida Keys and to the Everglades; Sleeper said his specimen may have come in some sisal plants from Yucatan.

In the Eastern Hemisphere, specimens in the British Museum from Java "attacking *Agave sisalana*" and from Tanga, Tanganyika from the same plant show how the weevil follows its host. At present, according to Materu and Hopkinson (1969:78), "the Sisal Weevil . . . is the main insect pest of sisal in East Africa . . . it has now spread inland to within 50 miles west of Arusha in Tanzania and the Voi area of Kenya."

In Hawaii the first specimen of *acupunctatus* was found in Honolulu. As reported by Swezey (1927), the weevil was seen by F. Muir in 1918 ". . . crawling on a window sill of the lavatory in the basement of the main building of the Experiment Station." Another specimen was found in June 1922, by T. L. Bissell ". . . in a dead sisal plant back of the U. S. Experiment Station." Zimmerman (1941:98) said the weevil ". . . is found only on the island of Oahu where it can at times be found in abundance about Honolulu boring in stems and leaves of sisal, sometimes killing the plants, and it has been found damaging *Agave mexicana*, an ornamental species." It may have been introduced into Hawaii in some ornamental plants. At the June 9 meeting of the Entomological Society of Hawaii in 1959, Mr. Bianchi exhibited an adult which he had reared from an *Agave*. This was said to be the first report of the weevil in several years and showed the ". . . remarkable persistence of the species in spite of the scarcity of its host plant."

The other species of *Scyphophorus*, *yuccae*, ". . . feeds on the *Yucca gloriosa*, on which plant it is found in the spring, at the base of the flower stalk" (Horn 1873:410). This is said to be a cultivated species. Larvae were collected in the stems of *Yucca whipplei* in October, 1886, in Los Angeles County, California (Anderson, 1948), and I have seen adult specimens collected from that plant by H. M. Graham at Tanbark Flat, Los Angeles County, in June, 1950. Bohart in April 1939, collected 2 adults from the same county "in Joshua flowers", the Joshua tree being also a *Yucca*, according to most botanists.

DISTRIBUTION

Scyphophorus acupunctatus is extremely widespread, ranging in the Western Hemisphere (Fig. 1) from the southern United States south through virtually all Mexico (including Tres Marias Islands), the larger Antilles (Cuba, Jamaica, Haiti), and Central America to northern South America. In the United States it is most abundant in Arizona, but occurs also in New Mexico, Colorado, Kansas, Texas, and California. One example is reported from farther east in Arkansas (Mt. Gaylor, Crawford County) and one from the tip of Florida (see Ecology above). I have also seen a male from Cleveland, White County, Georgia, in the collection of Barry Valentine, collected by L. Harris, Jr., but without host information. In South America my only records are Brazil (2 specimens), Colombia (7 specimens), and Venezuela (more than 100 specimens from Maracaibo, Merida, and the vicinity of Caracas).

In the Eastern Hemisphere *acupunctatus* is reported from Hawaii, Borneo, Java, Australia (Queensland), and eastern Africa (Kenya and Tanzania), probably traveling wherever the sisal plant grows.

Scyphophorus yuccae, on the other hand, is more restricted in its range. It is abundant in California only, and occurs in fewer numbers in Arizona (Pima County), western Texas (Brewster County), and northern Baja California (Santo Tomas). The counties in California where it has been taken are, in the north, Marin, Placer, Sonoma, San Francisco, and San

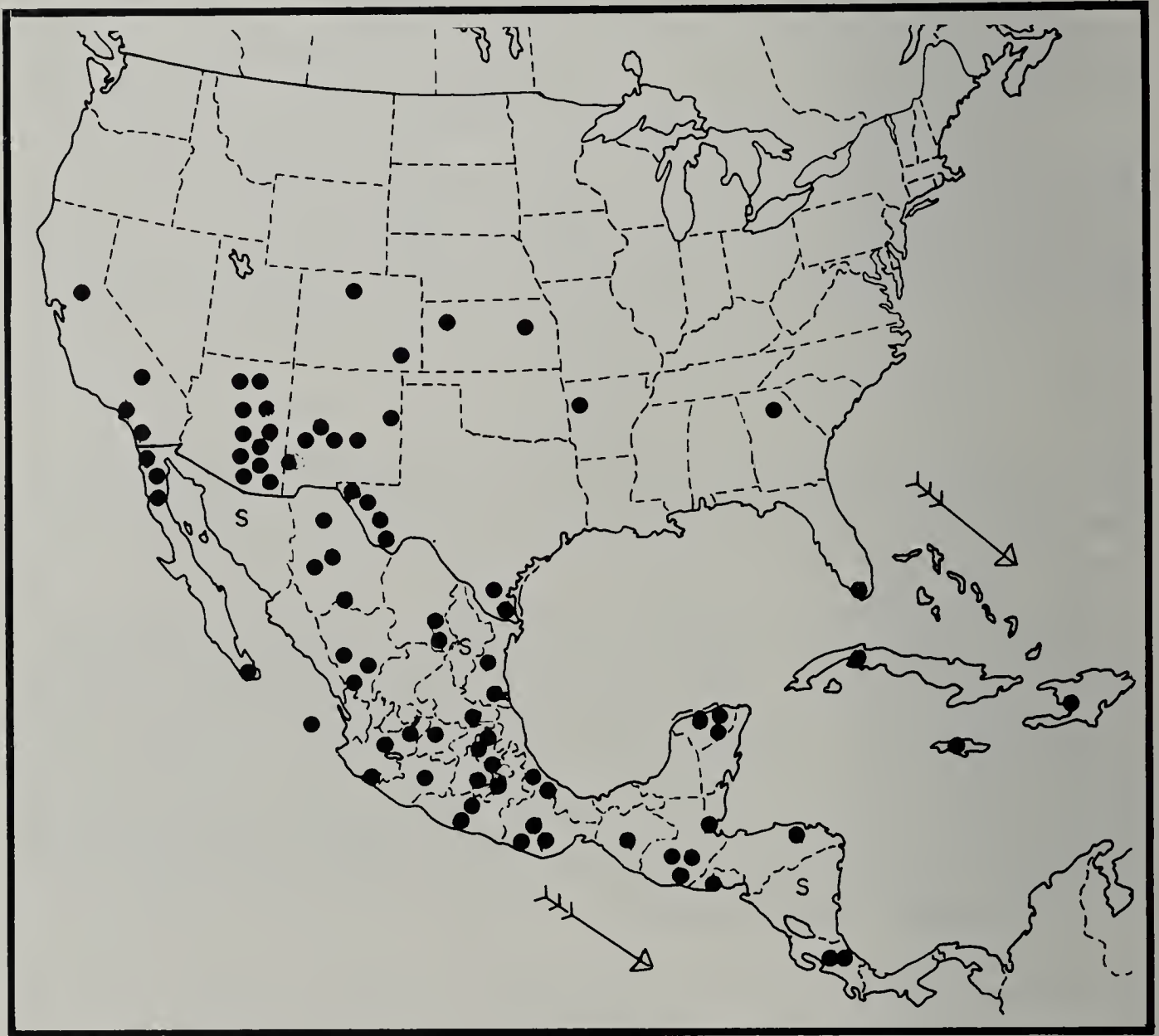


Fig. 1. Distribution of *Scyphophorus acupunctatus* in North America. Arrows point to South America, but see Distribution in the text. S = record for state or country only. Dots in Arizona represent about 30 localities.

Mateo, and to the south Monterey, Tulare, Inyo, Kern, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego.

Both species occur in northern Baja California, and have been taken together in a few of the same localities in the United States (i. e., Sequoia National Park, Tulare County, and Los Angeles County, California, also at Greaterville, southern Arizona, and Brewster County, Texas). If, as seems likely, *yuccae* breeds only in *Yucca gloriosa* and *whipplei*, its absence farther south may be due to the absence of its host plants, whereas *acupunctatus* breeds in many species of *Agave* as well as in other plants.

Another weevil of the same subfamily, but of a different tribe (Sipalini), which breeds also in *Yucca*, is *Yuccaborus frontalis*. In contrast to *Scyphophorus yuccae*, however, *Yuccaborus frontalis* has a subspecies (*sharpi*) which ranges more widely to the south, from Brownsville, Texas to Veracruz and Guerrero, Mexico.

Scyphophorus Schoenherr

Scyphophorus Schoenherr 1838:855. Type species (by original designation) *Scyphophorus acupunctatus* Gyllenhal; originally included species: *S. interstitialis* Gyllenhal and *S. anthracinus* Gyllenhal.

Eyes very large, elongate, touching below, but separated above. Mandibles pincer-like, inconspicuous. Beak nearly straight. Antenna inserted at base of beak, its funicle six-segmented. Club corneous, its spongy apical part either retracted and concave, or scarcely visible. Peduncle of postmentum elongate, flat. Pronotum without ocular lobes, as wide and almost as long as elytra. Scutellum visible. Front coxae narrowly to moderately separated; middle coxae separated by diameter of coxa. Prosternal process overlapping mesosternum. Mesepimeron as in Fig. 2 and 3. Metepisternum relatively wide, scarcely narrowing from front to rear. Femora clavate. Tibiae with outer apices dentate. Tarsus with third seg-

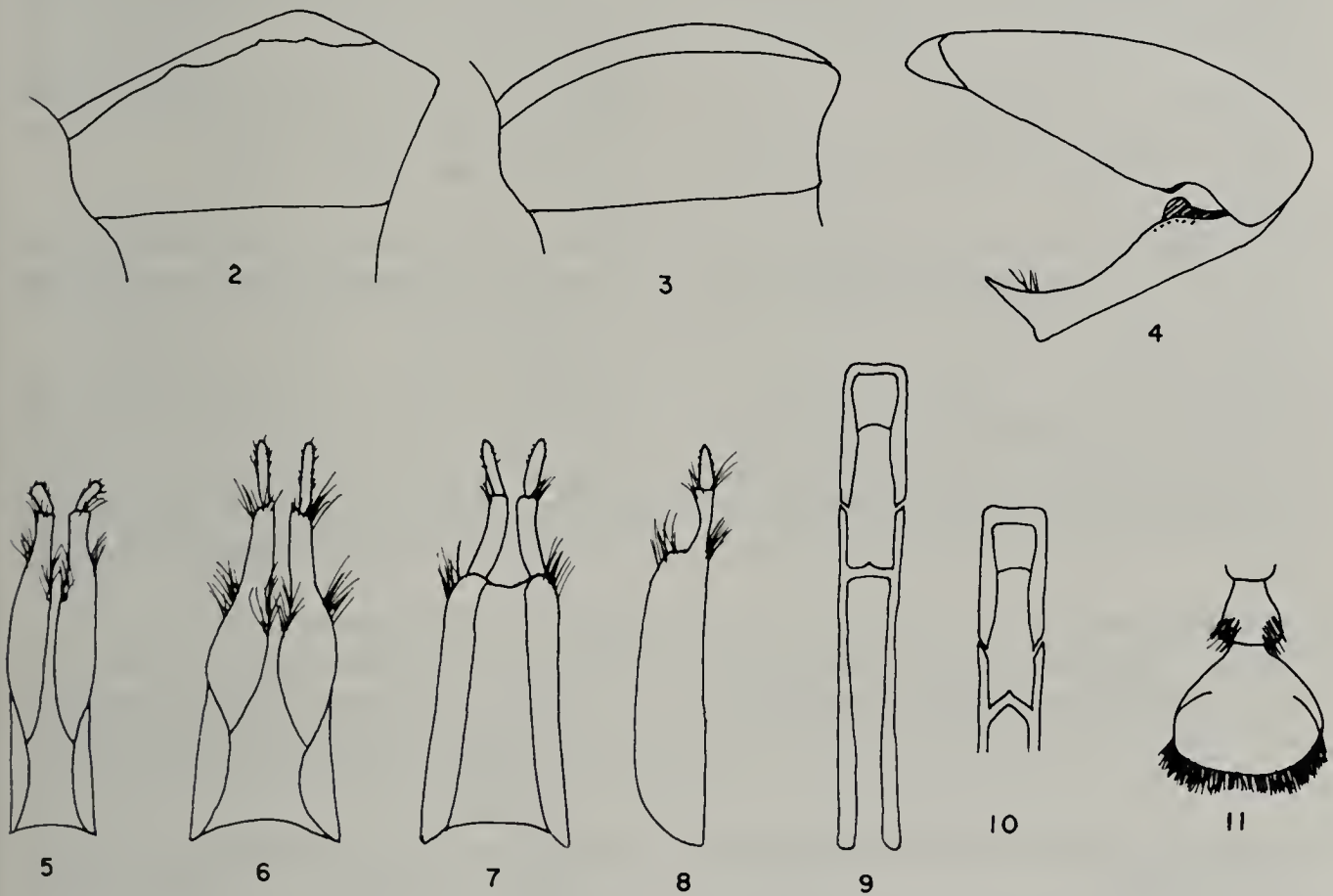


Fig. 2-11: *Scyphophorus*. 2. Mesepimeron of *S. acupunctatus* with uneven apical border. 3-5. *S. yuccae*. 3. Mesepimeron. 4. Interlocking femora and tibiae. 5. Genitalia of female, dorsal view. 6-9. *S. acupunctatus*. 6. Genitalia of female, dorsal view. 7. Same, ventral view. 8. Same, lateral view. 9. Aedeagus of male. 10. *S. yuccae*, aedeagus. 11. Third tarsal segment, ventral view.

ment dilated, bilobed, ventrally glabrous except for fringe of yellow hairs at extreme apex. Aedeagus with lateral line, and long apodemes articulated as shown in Fig. 9-10. Female genitalia (Fig. 5-8). Sexes not strongly differentiated, but males with double rows of tibial hairs longer and denser than those of females. Length, 8 to 24 mm.

KEY TO THE SPECIES OF *Scyphophorus*

Antennal club with spongy apex retracted, concave, not visible in lateral view; scutellum smaller, scarcely wider than base of sutural interval; elytra with intervals very finely, shallowly punctate; apices truncate
..... *acupunctatus* Gyllenhal

Antennal club with spongy apex truncate, somewhat carinate, visible in lateral view as narrow line; scutellum larger, longer, twice as wide as base of sutural interval; elytra with intervals deeply punctate in single line; apices obliquely retracted to suture *yuccae* Horn

Comparison of the Species of *Scyphophorus*

Characters given in the key are not repeated.

acupunctatus (Fig. 2, 6-9)

Beak shorter, stouter; at base below sinuate; of male ventrally broadly sulcate and bicarinate.

Antennae with segment 2 of funicle of same length as 3; terminal segment twice as wide as long.

Intercoxal space of prosternum narrower than beak at apex; of mesosternum almost as wide as coxa.

Mesepimeron in front angulate, often with irregular border.

Pronotum rather oblong; surface slightly convex, finely punctate.

Elytra with base broadly emarginate.

Pygidium shorter.

Tibiae with inner edge straight; outer apices strongly bidentate.

Femora with inner edge near apex emarginate.

Aedeagus with sclerotized apical border narrower than lateral borders, and basal crosspiece more or less straight (Fig. 9).

Styli of female genitalia longer, narrower (Fig. 6-8).

yuccae (Fig. 3-5, 10-11)

Beak longer, narrower; at base below sinuate and dentate; of male ventrally smooth or faintly impressed.

Antennae with segment 2 of funicle longer than 3; terminal segment less transverse.

Intercoxal space of prosternum as wide as beak at apex; of mesosternum at least as wide as coxa.

Mesepimeron in front feebly arcuate.

Pronotum narrowing to front; surface flat, deeply punctate.

Elytra with base virtually straight.

Pygidium longer.

Tibiae with inner edge at base deeply excavated and angulate in male, feebly emarginate in female; outer apices feebly bidentate.

Femora with inner edge near apex bluntly dentate in male, emarginate in female.

Aedeagus with sclerotized apical border about same width as lateral borders, and basal crosspiece arcuate (Fig. 10).

Styli of female genitalia shorter, wider (Fig. 5).

Scyphophorus acupunctatus GYLLENHAL

Scyphophorus acupunctatus Gyllenhal 1838:857, Mexico; type, female, in Naturhistoriska Riksmuseum, Stockholm, examined.

Scyphophorus interstitialis Gyllenhal 1838:856, St. [Santo] Domingo; lectotype, male, Santo Domingo, here designated from three original specimens from Santo Domingo and Mexico, in Naturhistoriska Riksmuseum, examined.

Scyphophorus anthracinus Gyllenhal 1838:858, Mexico; lectotype, female, here designated from two "types" in Naturhistoriska Riksmuseum.

Rhynchophorus asperulus LeConte 1857:58, Sacramento, [California]; type probably in Museum of Comparative Zoology, Cambridge.

Scyphophorus robustior Horn 1873:409, type locality omitted but supplied later by LeConte (1876), as Texas; type probably in Academy of Natural Sciences, Philadelphia.

Remarks: The above names were synonymized by LeConte (1876) except for *asperulus* which was synonymized by Horn (1873). The differences among the types of these synonyms illustrate the variability found among the 1000 or more specimens examined. Thus the pronotum may be subquadrate and the elytral intervals flat (*anthracinus*), or the pronotum distinctly longer than wide and the elytral intervals convex (*acupunctatus*); the surface may be opaque (*robustior*) or shining, the punctures small or rather coarse, the color reddish (*asperulus*) or black, the legs red or black or a combination of both. No geographic variation, however, was noted in any of these characters.

Scyphophorus yuccae HORN

Scyphophorus yuccae Horn 1873:110, "southern portion of California;" type probably in Academy of Natural Sciences, Philadelphia.

Remarks: The interlocking tibiae and femora of *yuccae* have not, to my knowledge, been noted previously. This character is more marked on the middle and hind legs than on the front legs and more marked in the male than in the female. The bases of the tibiae are emarginated or excavated to receive the rounded tubercle or the blunt tooth of the inner side of the femora.

The sexual dimorphism of the legs is not clear cut in all specimens, nor are the other secondary sexual differences notable. In general, however, the male differs from the female by having a long, deep, hairy venter; the inner side of the front tibia furnished with much longer and more abundant hairs; and the pygidium more rounded, less acuminate.

The size of specimens is from 10 to 18 mm, but I have seen an example as small as 8 mm and one as large as 24 mm.

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BOOK REVIEW

The Wasps by Howard E. Evans and Mary Jane West Eberhard. University of Michigan Press, Ann Arbor; 265 p., 122 fig.; 1970. Paperback, \$3.45; library edition, \$7.95.

No, we have not transferred wasps to the order Coleoptera. However, beetles play several important roles in the lives of wasps. Not only are many beetle larvae hosts for parasitic wasps of several groups, but there are beetles which are parasitic and predaceous on wasps.

Parasitic wasps of the families Scoliidae and Tiphidae are fairly well known as enemies of Coleoptera larvae found in soil and rotting wood, especially the white grubs (Scarabaeidae). Less well known is a subfamily of Tiphidae (the Methochinae) which attack larvae of Cicindelidae in their burrows, stinging them, laying their egg, and sealing off the burrow. Two of the 9 subfamilies of Sphecidae (Philanthinae & Crabroninae) also utilize Coleoptera as prey.

One of the chapters is entitled "Beetles as enemies of wasps," and it discusses representatives of 5 beetle families. Carabidae are mentioned as minor predators; Cicindelidae have been observed stealing prey; a species of Cleridae feeds on wasp larvae in cells in wood; but the most significant are the Rhipiphoridae and Stylopidae that are wasp parasites.

The book is well illustrated with line drawings and numerous photographs. This is another of the fine books from the pen of Howard Evans, an excellent entomologist as well as a prolific writer. I am sure that Fabre would be astounded with the amount of behavior studies now being conducted on the Hymenoptera. Surely beetles are equally interesting subjects and offer a nearly wide open field for investigation. It is lamentable that a good general biology, such as *The Wasps*, is not available for more orders of insects--especially the Coleoptera. (R. E. Woodruff)