

**A NEW SPECIES OF *CHAROXUS*  
(COLEOPTERA: STAPHYLINIDAE) FROM NATIVE FIGS  
(*FICUS* SPP.) IN FLORIDA**

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*Abstract.*—Adults of *Charoxus spinifer* Frank, from Florida, USA are described and illustrated. They bring to six the number of species in this Neotropical genus which is here transferred to the tribe Athetini (Coleoptera: Staphylinidae: Aleocharinae). Adults of *C. spinifer* were collected at ultraviolet light at night, in flight before dusk, and in syconia (fruits) of *Ficus aurea* Nuttall and *F. laevigata* Vahl (*F. citrifolia* P. Miller sensu DeWolf 1960), two fig species native to Florida, before the fruits ripened and fell from the trees. They are associated in fig syconia with adults of fig-pollinating wasps (Agaonidae) and other hymenopterous inhabitants and have been observed to prey on the wasps.

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This paper was prompted by the acquisition in south Florida in 1983 of a series of adults of an undescribed species of *Charoxus*, a genus of uncertain systematic position within Aleocharinae. Five species of *Charoxus* already were described from the Neotropical region, and some of these were believed to be in some way associated with *Ficus* syconia (Kistner 1981).

Investigation of the ecology and behavior of *C. spinifer* still is incomplete and will be presented in a later paper. Bronstein (1988) showed that *Charoxus bicolor* Kistner is a predator of fig wasps (Hymenoptera: Agaonidae) in syconia of *Ficus pertusa* L. in Costa Rica. The new species is described here.

MATERIALS AND METHODS

Specimens were examined under reflected light microscopes and drawings were made using a linear scale in one eyepiece. Dissections were made in dilute alcohol, the dissected parts were dehydrated in xylene, mounted in Canada balsam on microscope slides, and drawn with the aid of a camera lucida attached to a Zeiss compound microscope.

*CHAROXUS* SHARP, 1883

The type species is *C. fodiens* Sharp (1883), described from one male specimen from Panama. Neither additional species nor new distributional records were added until Kistner (1981) redescribed the genus and described four new species. Two of these are known from both Mexico and Jamaica, one from Paraguay, and one from Costa Rica. Specimens of two of the species were collected from *Ficus* trees.

**Charoxus spinifer** Frank, new species

Figs. 1–3

**Description:** Length 3.0–3.6 mm. Robust, cylindrical head and thorax, with abdomen linear and feebly inflated (Fig. 1). Head and pronotum ferrugineous but in some individuals entire pronotum and head except for frontal area darkly infuscate. Elytra with metallic luster, pale golden over most of their surface, but with scutellum and basal fifth, and apical quarter diagonally, darkly infuscate (Fig. 3a). Abdomen pale ferrugineous but much of surface darkly infuscate, with segment VI very darkly infuscate leaving only paratergites and narrow apical border of some specimens paler, other segments less infuscate at least apically. Antennae, mouthparts and legs ferrugineous but with femora and tibiae and apical half of last antennomere infuscate.

Head quadrate, its surface covered with moderate punctures separated by  $<2\times$  their diameter, surface between punctures with strong isodiametric microsculpture, the punctures bearing short, fine setae; eyes large and  $\pm$  equal in length to tempora; frontal suture absent; postclypeus extremely short, frons transverse, and thus antenna inserted at lateral corner of vertex; gular sutures parallel and separate throughout; maxillary acetabula extending as far posteriorly as posterior tentorial pits (which have a forward location relative to their position in some other members of the family); completely margined latero-ventrally by postgenal carina. Inner margin of right mandible with 2 teeth, the proximal one much broader and blunter; inner margin of left mandible without teeth. Maxillary palpus of 4 articles; galea slightly longer than lacinia and with apical tuft of fine setae; lacinia fringed medially with fine setae (Fig. 2a). Labial palpus of 3 articles; basal article longer than second, shorter than apical; apical article with terminal group of minute sensilla; ligula with median cleft (Fig. 2a). Antennomeres I–II slightly elongate, III quadrate, IV–X transverse, VII–X strongly so, XI capitate and without coeloconic sensilla. Pronotum slightly longer than broad, slightly broader than head, hind angles obtuse and rounded to base, punctate and sculptate as head, anterior margin bearing 1 pair of dark macrosetae and lateral margins 4 pairs. Mesosternal process about as long as metasternal and narrowly separated from it; mesocoxae narrowly separated, with margined acetabula; posterior coxae transverse; metasternum with a longitudinal row of about 12 punctures on each side of midline. Scutellum punctate as pronotum. Elytra glossy, the pale area with golden metallic luster, without microsculpture, punctures sparse, not arranged serially, with short, pale, fine setae, with a pair of dark macrosetae at anterior angles. Wings present, functional.

Abdominal tergites sparsely punctate, feebly sculptate except for VII and VIII, posterior margins of IV–VI each with 3 pairs of dark macrosetae, III with 2 pairs, posterior margin of tergite IV of male with a pair of strong spine-like processes (Fig. 2b); tergite VII of male with broad, U-shaped, median, elevated area (better developed in some specimens than in others), bearing a small tubercle just anterior to posterior margin, this tergite with 3 pairs of dark macrosetae anterior to apical margin (Fig. 2c); setal arrangement in female similar but tergite lacks U-shaped area and tubercle; tergite VIII of male and female similar, truncate apically, with 5 pairs of dark macrosetae (Fig. 2d); tergite IX of female divided longitudinally to accept tergite X, dentate apico-laterally, with 4 pairs of dark macrosetae, tergite X rounded

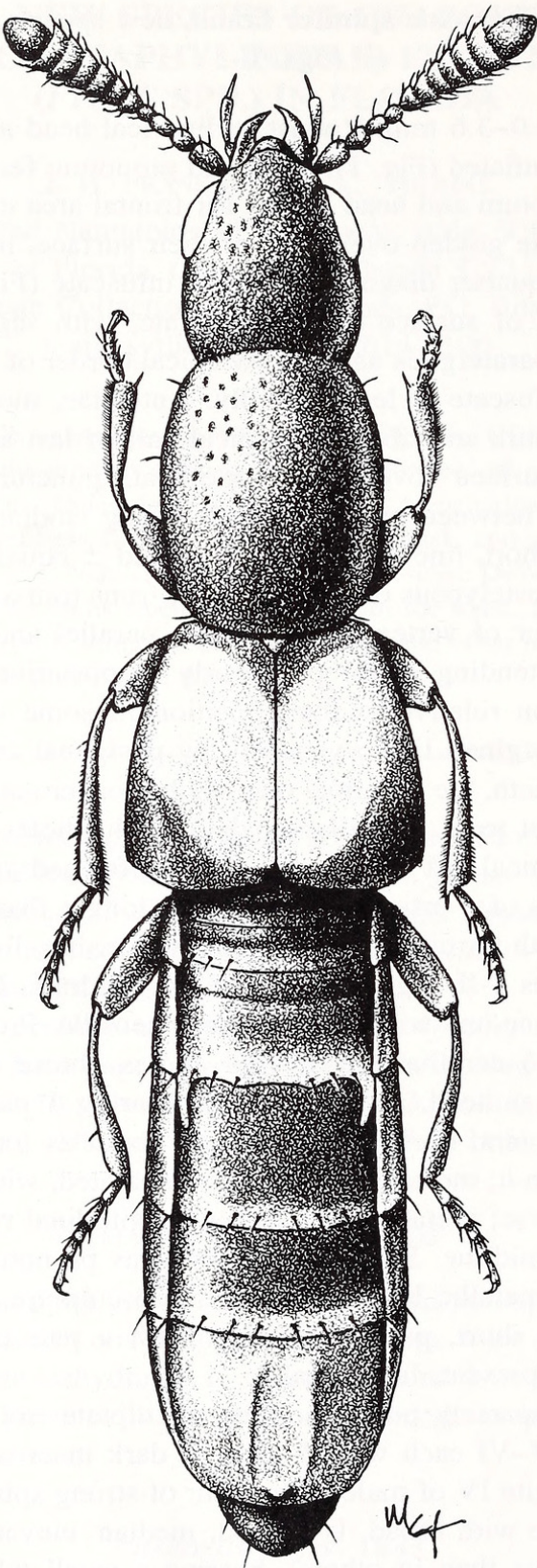


Fig. 1. Habitus of male *Charoxus spinifer*. Length 3.0–3.6 mm.

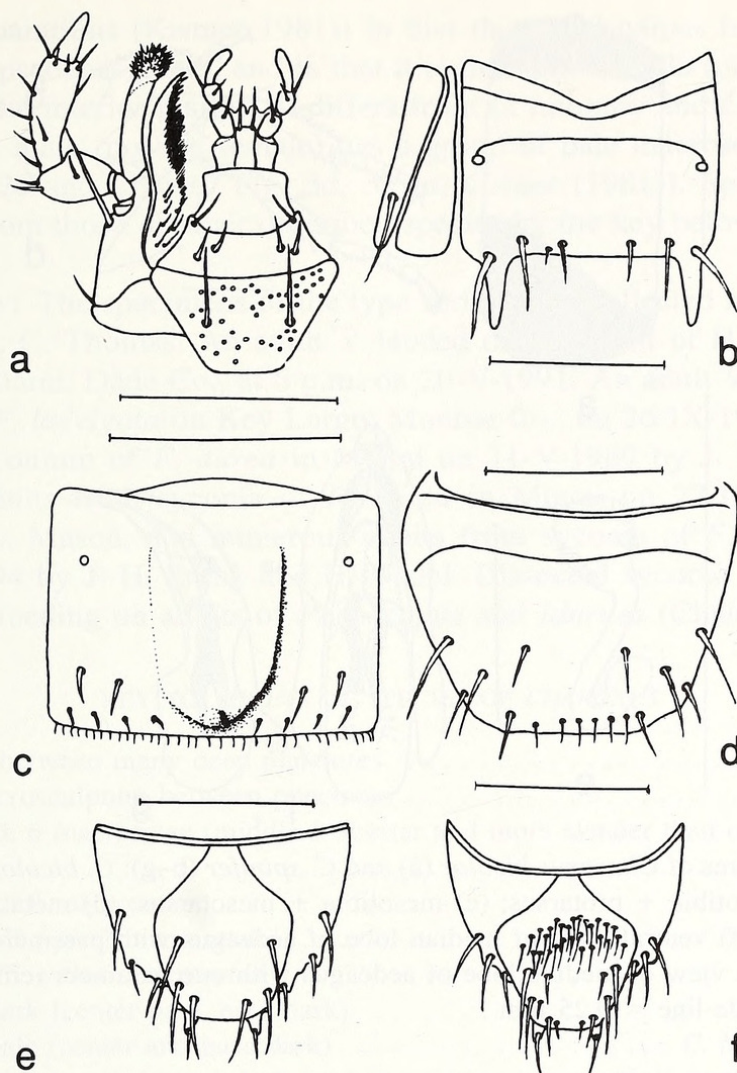


Fig. 2. Structures of *Charoxus spinifer*: (a) right maxilla and labium from below; (b) tergite IV of male with left paratergite and parasternite; (c) tergite VII of male; (d) tergite VIII of female; (e) tergites IX and X of female; (f) tergites IX and X of male; (g) protibia and tarsus; (h) mesofemur, tibia and tarsus; (i) metafemur, tibia and tarsus; (j) spermatheca; (k) lateral view of median lobe of aedeagus (AB = athetine bridge); (l) ventral view of median lobe of aedeagus with parameres. Scale line = 0.25 mm.

apically, with 3 pairs of dark macrosetae (Fig. 2e); tergites IX and X of male similar to those of female except that X bears a central group of pale setae (Fig. 2f).

Tarsi 4-5-5 segmented; protibia bordered externally with a row of short, stout spines (Fig. 3b); mesotibia bordered externally with a row of short spines which are less stout than those of protibia, and with 2 longer setae (Fig. 3c); metatibia without row of short spines but with a single long spine, basal article of metatarsus about equal in length to apical, slightly longer than article II, as long as III and IV together (Fig. 3d).

Spermatheca sclerotized (Fig. 3e). Median lobe of aedeagus strongly curved and bulbous partially divided, each paramere with 4 apical setae (Fig. 3f, g).

**Types:** A total of 84 adult specimens each glued with water-soluble glue to a 3 × 10 mm card rectangle; some of them partially dissected, with parts mounted in

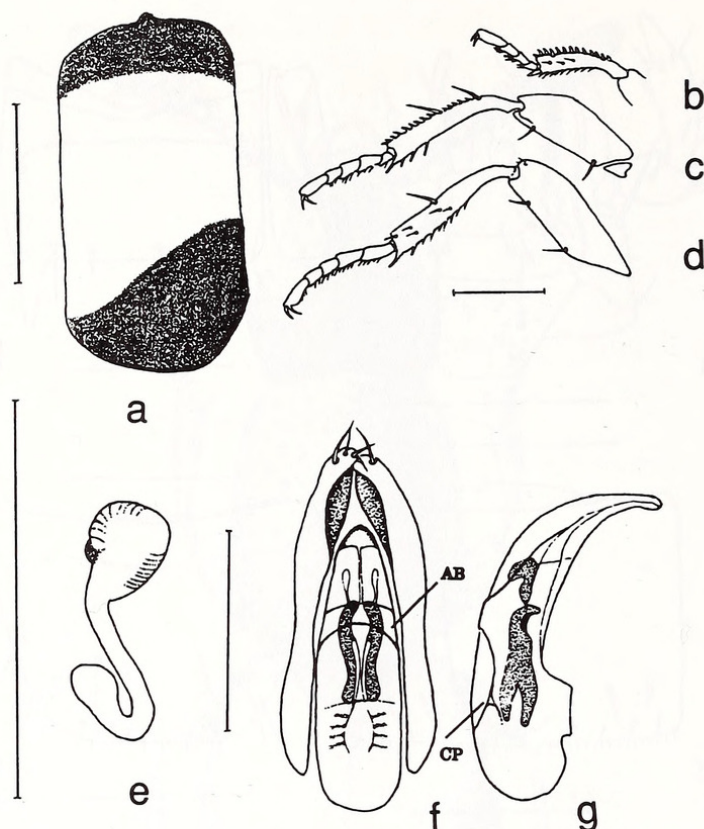


Fig. 3. Structures of *Charoxus bicolor* (a) and *C. spinifer* (b-g): *C. bicolor* (a): right elytron. *C. spinifer*: (b) protibia + protarsus; (c) mesotibia + mesotarsus; (d) metatibia + metatarsus; (e) spermatheca, (f) ventral view of median lobe of aedeagus with parameres (AB = athetine bridge); (g) lateral view of median lobe of aedeagus with one paramere removed (CP = compressor plate). Scale line = 0.25 mm.

Canada balsam on a celluloid rectangle beneath the card rectangle; parts of two specimens mounted on microscope slides. Labels: /USA, Florida, Dade Co., Camp Mahachee, 6-IX-1983 [31 specimens thus, 55 specimens 14-IX-1983]/ u.v. light trap, L. Parker/ *Charoxus spinifer* Frank HOLOTYPE [or PARATYPE]/. Holotype male and 4 paratypes in the Florida State Collection of Arthropods, others to be placed as follows: 4 paratypes in the Field Museum of Natural History, 4 in the Canadian National Collection, 4 in the British Museum (Natural History), 4 in the U.S. National Museum of Natural History, 4 in the Snow Museum (University of Kansas), the remainder in the collection of J. H. Frank.

**Type locality:** U.S.A., Florida, Dade Co., Camp Mahachee. This is an area of tropical hardwood trees, including *Ficus aurea*, adjoining Matheson Hammock park.

**Etymology:** The specific epithet was chosen because of the pair of spine-like processes of tergite IV of the adult male. Elsewhere in Staphylinidae it has been used for *Eupiestus spinifer* Fauvel and *Phytosus spinifer* Curtis.

**Diagnosis:** Specimens have been compared directly only with specimens of *C. bicolor*; comparative information on the other species is taken from Kistner (1981). This is the only known species of the genus in which tergite IV of the male has paired spine-like processes. It differs from *C. hermani* Kistner [most other species were not examined in detail because of insufficiency of specimens from which to

make slide preparations (Kistner 1981)] in that the labial palpus has 3 articles and lacks an apical pseudosegment, and in that it is the right maxilla (not the left) which has 2 teeth on the interior margin. It differs from *C. hermani* and *C. bicolor* Kistner in that only the male (not the female) has a group of pale macrosetae on tergite X [compare Fig. 2e and 2f with Fig. 3d, 3e in Kistner (1981)]. Specimens may be distinguished from those of other described species by the key below, modified from Kistner (1981).

**Natural history:** The specimens of the type series were collected at ultraviolet light operated for M. C. Thomas. An adult ♀ landed on the wrist of H. Nadel, at an *F. aurea* tree in Miami, Dade Co., at 6 p.m. on 20-V-1991. An adult ♀ was taken from a syconium of *F. laevigata* on Key Largo, Monroe Co., on 26-IX-1988 by H. Nadel, a ♂ from a syconium of *F. aurea* in Miami on 11-V-1989 by J. H. Frank and H. Nadel, three adults from syconia of *F. aurea* in Miami on 27-II-1991 by C. M. Mannion and L. Mason, and numerous adults from syconia of *F. aurea* in Miami on 10-14-V-1994 by J. H. Frank and H. Nadel. Dissected syconia yielded observations of adults feeding on adults of *Pegoscapus* and *Idarnes* (Chalcidoidea).

#### KEY TO ADULTS OF SPECIES OF CHAROXUS

- |    |   |                                |
|----|---|--------------------------------|
| 1  | Head smooth between many deep punctures .....   | 2                              |
| 1' | Head with microsculpture between punctures .....  | 3                              |
| 2  | Tergite VI with 6 macrosetae (middle 2 shorter and more slender than others) .....  |                                |
|    | ..... <i>C. major</i> Kistner   |                                |
| 2' | Tergite VI with 8 macrosetae .....  | <i>C. fodiens</i> Sharp        |
| 3  | Tergites VI–VII with 2 macrosetae .....   | 4                              |
| 3' | Tergites VI–VII with 6 macrosetae .....   | 5                              |
| 4  | Elytral apex dark (center pale, base dark) .....  | <i>C. bicolor</i> Kistner      |
| 4' | Elytral apex pale (center and base dark) .....  | <i>C. blackwelderi</i> Kistner |
| 5  | Elytra pale with small, lateral dark spot anterior to outer apical angle .....  |                                |
|    | ..... <i>C. hermani</i> Kistner   |                                |
| 5' | Elytra pale with base and outer apical angle dark (Fig. 1); tergite IV of ♂ with pair of prominent spines (Fig. 1); microsculpture between pronotal punctures strong; tergite VIII of ♂ and ♀ truncate apically (Fig. 2d); aedeagus as in (Fig. 3f, g); spermatheca as in Fig. 3e ..... | <i>C. spinifer</i> Frank       |

#### DISCUSSION

This discussion mainly concerns tribal placement of *Charoxus* in the subfamily Aleocharinae. Sharp (1883) was unsure of its placement, but noted resemblance to the Old World genus *Porus* Westwood, now in the tribe Lomechusini. An illustration of an adult of *Porus bissauensis* Pace (Pace 1988:22) is evocative of this resemblance. Kistner (1981) placed it in Aleocharini.

*Charoxus spinifer* traces to Lomechusini (as Zyrasini) in the key to tribes given by Lohse (1974) and has the characters of the tribe Lomechusini as given by Lohse (1974) as well as agreeing to some extent with the longer tribal description of Lomechusini (as Myrmedoniini) as given by Seevers (1978). Application of the tribal name Lomechusini for the name Zyrasini as used by Lohse (1974) and Kistner (1981), and for the name Myrmedoniini as used by Sharp (1883) and Seevers (1978),

is explained by Newton and Thayer (1992). Application of the tribal name Athetini for the name Callicerini as used by Lohse (1974) is also explained by Newton and Thayer (1992). Application of the tribal names Homalotini and Phytosini below also follows Newton and Thayer (1992).

Because of the presence of an additional (4th or pseudo-) segment of the labial palpus in *C. hermani*, and because of the structure of the antenna, the antennal insertion, the structure of abdominal segment IX, and the shape of the meso- and metanotum, Kistner (1981) transferred *Charoxus* from Lomechusini to Aleocharini. Kistner (1981) admitted that the position in Aleocharini is anomalous because Aleocharini have 4 articles in the labial palpus and 5 in the maxillary palpus, and he thought a new tribe may have to be named to contain it. Our finding of only 3 articles in the labial palpus of *C. spinifer* makes the position in Aleocharini even more anomalous. The tribal name Aleocharini is used differently by different authors. Kistner (1981) used it in the broader sense of Lohse (1974) and not the narrower sense of Seevers (1978). Seevers (1978), ambiguously, separated genera with tarsal formula 4-5-5 from Aleocharini as the tribe Hoplandriini, even though he stated that tarsal formula is not a tribal character.

Of the other generic characters used by Kistner (1981) in assigning *Charoxus* to Aleocharini, none was used in defining Aleocharini by Lohse (1974), or Aleocharini or Hoplandriini by Seevers (1978).

Adult *Charoxus* bear a superficial resemblance to *Rhopalocerina* Reitter [tribe Homalotini] (see Lohse 1974:41). The spinose pro- and mesotibiae resemble those of *Phytosus* Curtis [tribe Phytosini] (see Lohse 1974:40) and *Acanthostilbus* Cameron and *Porus* [tribe Lomechusini] (see Cameron 1939). The spine-like processes of tergite IV as well as the tubercle of tergite VII of the male of *C. spinifer* are reproduced in the male of *Zyras nigripennis* Bernhauer (see Cameron 1939:510) [tribe Lomechusini]. The fine, fringing setae of the maxillary galea (as in *Charoxus*) are used as a key-character by Lohse (1974) to separate Lomechusini from Oxypodini-Falagriini-Athetini (but see Sawada 1984:451 and Pace 1984:317 who show this character in Athetini). Margined mesocoxal acetabula [as noted by Kistner (1981) in *Charoxus*] occur in many tribes, but not in some termitophiles and myrmecophiles (Seevers 1978). The above characters do not suggest that *Charoxus* belongs to Aleocharini, but rather to Athetini or Lomechusini.

In Aleocharinae, the ventral side of the median lobe [the aspect opposite the vas deferens, *vide* Tikhomirova (1973)] bears a sclerotized compressor plate, continuous proximally with the bulbus, and attached to the median lobe laterally and distally by a thin membrane. The function of this compressor plate, which is attached to the internal dorsal surface of the median lobe by dorsoventral muscles, is to increase hydrostatic pressure within the median lobe and to cause eversion of the internal sac. Distal to the compressor plate on the ventral surface in Athetini alone (Seevers 1978), the sides of the median lobe are connected by a transverse, sclerotized strip, the "athetine bridge". Seevers (1978) credited this athetine bridge as the most promising tribal characteristic of Athetini, a group otherwise difficult to define. It occurs in *Charoxus* (Fig. 3d), together with a shallowly-divided bulbus [it is deeply divided in Lomechusini (Seevers 1978)] and narrow intercoxal processes [they are broad in Lomechusini (Seevers 1978)]. For these reasons, *Charoxus* is transferred here from Aleocharini to Athetini.

It is unfortunate that nothing has been published on the natural history of *Porus*, and that the Pace (1988) did not expand or comment upon the diagnosis by Cameron (1939). Resemblances between *Charoxus* and *Porus* are here assumed to be the result of convergent evolution in members of different tribes. However, without detailed comparison of specimens of *Porus* and *Charoxus*, we are uncertain that they belong to different tribes.

*Ficus* occurs worldwide in the tropics and subtropics. Could there be an Old World counterpart to *Charoxus*—an aleocharine genus associated with syconia of *Ficus*? We regret that we have not had the opportunity to collect insects in *Ficus* syconia in the Old World tropics. Although there are numerous reports of Hymenoptera associated with Old World *Ficus*, other arthropods that may occur there seem to have been ignored, whereas a rich specialized fauna is associated with such syconia in the New World (next paragraph).

Now that the association with *Ficus* syconia is clear, it should be possible for collectors to assemble good series of specimens, giving more adequate material for systematic study than has been available. At the same time, collectors should endeavor to obtain reliable identifications for the *Ficus* trees with which each *Charoxus* species is associated, forming a basis for ecological study. Some of the organisms inhabiting syconia of *Ficus* spp. in south Florida have been characterized by Roskam and Nadel (1990), Nadel et al. (1992), and Giblin-Davis et al. (1995). They include Nematoda, Acarina, Coleoptera, Diptera, and Hymenoptera.

#### ACKNOWLEDGMENTS

H. Nadel, C. M. Mannion and L. Mason (Tropical Research & Education Center, University of Florida, Homestead) contributed specimens and observations. Gratitude is due to J. S. Ashe (University of Kansas) and D. H. Kistner (California State University, Chico) for reviewing manuscript drafts. The authors are research associates of the Florida State Collection of Arthropods. The only taxonomic endeavor of the senior author is on Staphylinidae, thus the descriptions and opinions expressed here are due to him alone, and authorship of the new species names is credited to him alone. The junior author verified and refined the illustrations and text. This satisfied the recommendation by Blackwelder (1967) that no species description be credited to more than one author. This is University of Florida, Institute of Food & Agricultural Sciences, journal series no. R-01849.

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Received 20 September 1992; accepted 12 September 1996.



Frank, J. Howard and Thomas, M. C. 1996. "A New Species of *Charoxus* (Coleoptera: Staphylinidae) from Native Figs (*Ficus* spp.) in Florida." *Journal of the New York Entomological Society* 104, 70–78.

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