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Review of *Carpophilus* (*Ecnomorphus*) Motschulsky, 1858
(Coleoptera: Nitidulidae: Carpophilinae)
in the West Indies

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Review of *Carpophilus* (*Ecnomorphus*) Motschulsky, 1858 (Coleoptera: Nitidulidae: Carpophilinae) in the West Indies

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Abstract. Two new species of *Carpophilus* Stephens, 1829 in the subgenus *Ecnomorphus* Motschulsky, 1858 (Coleoptera: Nitidulidae) were recovered in material from the Caribbean. Descriptions and detailed diagnoses are provided for *Carpophilus* (*Ecnomorphus*) *jamaicensis* Powell and Schnepf, **new species** and *Carpophilus* (*Ecnomorphus*) *thomasi* Powell and Schnepf, **new species**. A key to the *Carpophilus* (*Ecnomorphus*) of the West Indies is appended.

Key Words. Taxonomy, biodiversity, descriptions.

ZooBank registration. urn:lsid:zoobank.org:pub:21F3A30F-0648-43F9-A555-DEE7DD1F57D0

Introduction

The family Nitidulidae Latreille is distributed throughout the world and reported broadly throughout the West Indies (Blackwelder 1945). The family represents one of the most diverse lineages of cucujoid beetles; however, the group remains one of the more difficult to reliably identify. Specifically, the genus *Carpophilus* Stephens is often considered one of the most troublesome and diverse within the family and is commonly misidentified or unidentified in larger faunistic studies. *Carpophilus* currently contains more than 250 described species recorded from all major land masses except Antarctica (Powell et al. 2020). The subgenus *Ecnomorphus* Motschulsky, was erected in 1858 and is currently one of the largest subgenera with over 50 valid species worldwide (Kirejtshuk 2008, Powell 2020). A full generic and subgeneric level synonymy is given by Kirejtshuk (2008). *Ecnomorphus* is diagnosed by the following characters: 1) antennal club loosely formed between the 9th and 10th antennal segments and 2) having an overall more dorsoventrally flattened body form. The following newly described species share these characters, allowing reliable placement within the subgenus *Ecnomorphus*.

Leng and Mutchler (1914) provided a preliminary list of the Coleoptera of the West Indies, and included two species of *Ecnomorphus*, *Carpophilus dufau* Grouvelle and *Carpophilus tempestivus* Erichson, from Guadeloupe and Cuba, respectively. Several more checklists have been provided for the Coleoptera fauna of different islands in the West Indies (Blackwelder 1945; Wolcott 1951; Miskimen and Bond 1970; Woodruff et al. 1998; Peck et al. 2002, 2014; Peck 2005, 2006, 2009a, 2009b, 2010, 2011a, 2011b, 2016; Ivie et al. 2008; Perez-Gelabert 2008; Turnbow and Thomas 2008; Thomas et al. 2013); however, no other species of *Carpophilus* (*Ecnomorphus*) have been added to the fauna of the region. Peck (2005) listed 32 species of nitidulid present in Cuba, 13 of which are listed as “*Carpophilus*” but also include species of *Nitops* Murray and list several species that have since been synonymized or re-elevated so should be considered outdated. Peck et al. (2014) list 24 species of nitidulid in the Guadeloupe Archipelago, six of which are in the subfamily Carpophilinae (again, all listed as *Carpophilus* in the text, but several are considered *Nitops* by many authors). Peck et al. (2014) listed several additional species under

Carpophilus dimidiatus (Fabricius) as sibling species that are suspected to be present but unable to be confirmed as part of the study, further illustrating the lack of taxonomic resources for the group and the need for revision in the West Indies. In order to provide a foundation for more focused taxonomic work in the area, we present a review and dichotomous key to the *Carpophilus* (*Ecnomorphus*) that occur in the West Indies, as well as descriptions and diagnoses of two new species.

Materials and Methods

Materials studied are deposited in the following institutions:

BYU	Monte L. Bean Museum, Brigham Young University, Provo, UT, USA
CNC	Canadian National Collection, Ottawa, Ontario, Canada
FSCA	Florida State Collection of Arthropods, Gainesville, FL, USA
GSPC	Gareth S. Powell Collection, Lafayette, IN, USA
KESC	Kyle E. Schnepf Collection, Gainesville, FL, USA
MCZ	Museum of Comparative Zoology, Cambridge, MA, USA
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MNHUB	Museum für Naturkunde, Berlin, Germany
NHM	Natural History Museum, London, United Kingdom

Total length and width measurement values are averaged for a number of type specimens, given in parentheses after the measurement. Total length is defined as the distance from the anterior margin of the labrum to the apex of the pygidium, and total width was measured at the widest point across the elytra (often across the humeri). Pronotal length was measured at the midline from the anterior to posterior margin, and pronotal width was measured at the widest point across the pronotum. Inter-ocular distance was measured dorsally at the narrowest point. Specimen label data was reported verbatim with the following conventions: vertical lines (|) were used to designate line breaks, and double vertical lines (||) to designate different labels. The holotype label was printed on red acid-free card stock, all paratype labels were printed on yellow acid-free card stock. High-resolution dorsal and ventral habitus images were taken using a Vision Digital Passport Imaging System, as well as a Leica Z16 APO microscope using a JVC KY-F75U digital camera and stacked with Syncroscopy Automontage software, version 5.01.005. Distribution maps were generated using georeferenced label data visualized using SimpleMappr (Shorthouse 2010). Male genitalia dissections were completed by relaxing specimens for 48 hours in a chamber exposed to a 20% EtOH/80% water mixture. Desired structures were mounted to the original point using acid-free white glue.

Systematics

Family Nitidulidae Latreille, 1802

Subfamily Carpophilinae Erichson, 1843

Genus *Carpophilus* Stephens, 1829

Subgenus *Ecnomorphus* Motschulsky, 1858

Key to Species of *Carpophilus* (*Ecnomorphus*) of the Caribbean

1. Pronotal margins parallel at middle; lateral margins of pronotum without well-developed bead, or if weakly present, not reflexed (Fig. 1A) **2**
- Pronotal margins broadly rounded; lateral margins of pronotum with well developed, weakly reflexed bead (Fig. 1D) ***C. thomasi* Powell and Schnepf, sp. nov.**
- 2(1). Apex of elytra shorter at midline; body coloration mostly dark brown (Fig. 1A, F) **3**
- Apex of elytra truncate; body coloration mostly orange (Fig. 1C) ***C. tempestivus* Erichson**

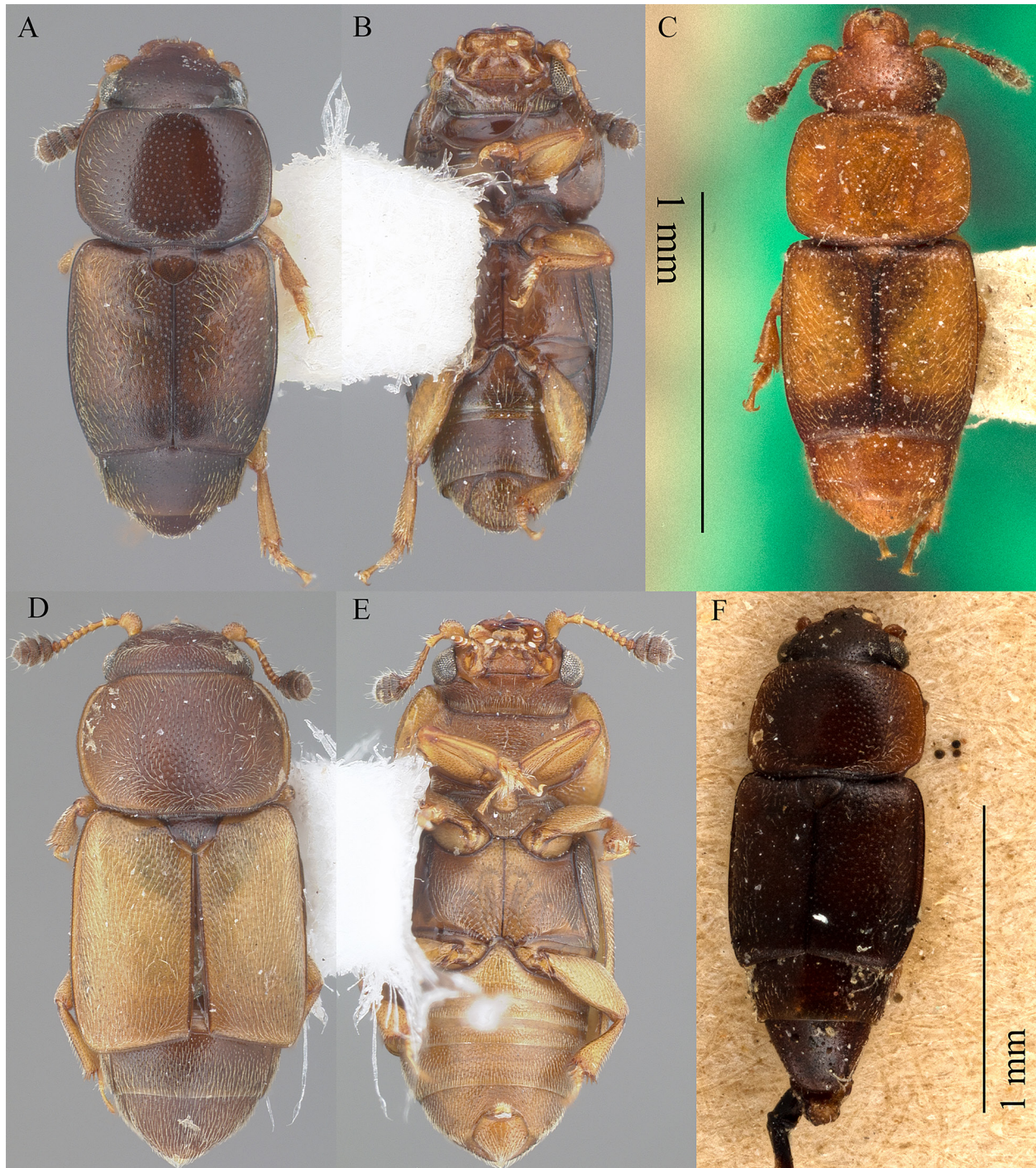


Figure 1. Caribbean *Carophilus* spp. **A–B)** *Carophilus jamaicensis* sp. nov., holotype. **C)** *Carophilus tempestivus* Erichson (lectotype MNHUB). **D–E)** *Carophilus thomasi* sp. nov., holotype. **F)** *Carophilus dufai* Grouvelle (lectotype MNHN). A, C–D, F, dorsal habitus. B, E, ventral habitus.

- 3(2). Last dorsally visible tergite longer than penultimate tergite; setae uniform in length over dorsal surface (Fig. 1F) *C. dufai* Grouvelle
- Penultimate dorsally visible tergite longer than last tergite; elytra with long gold primary setae (Fig. 1A) *C. jamaicensis* Powell and Schnepf, sp. nov.

Species Accounts

Carpophilus dufai Grouvelle, 1908

Specimens examined. Lectotype studied (MNHN) (Fig. 1F).

Geographical Distribution. Endemic to Guadeloupe. (Fig. 3).

Diagnosis. The separation between antennomeres 9 and 10 place this species within the subgenus *Ecnomorphus*. *Carpophilus dufai* is easily distinguished from other members of this subgenus in the Caribbean by the parallel sided lateral margins of the pronotum (broadly rounded in *C. thomasi*), and darker coloration (overall lighter coloration in both *C. tempestivus* and *C. thomasi*). *Carpophilus dufai* clearly has close affinities to *C. tempestivus* but is diagnosed by the length of the visible abdominal tergites (penultimate longer in *C. jamaicensis*, terminal segment longer in *C. dufai*).

Natural history. Unknown.

Carpophilus jamaicensis Powell and Schnepf, new species

(Fig. 1A–B, 2A)

LSID urn:lsid:zoobank.org:act:0DF10552-F331-40C0-806C-1B19272CBB5B

Specimens examined. Holotype (Deposited in CNC), HOLOTYPE: JAMAICA, 4000' | Hardwar Gap | VII.10.1966 | Howden & Becker || HOLOTYPE | *Carpophilus jamaicensis* | Designated by | Powell & Schnepf, 2020.

Paratypes. 15 additional specimens: 8 specimens, same data as holotype (4 CNC, 2 FSCA, 2 GSPC); 6 specimens, same data as holotype except date collected (CNC), VII.8.1966 (1), VII.9.1966 (1), VII.13.1966 (2), VII.23.1966 (2). 1 specimen: JAMAICA, St. And., St. Peters, VII.9.1966, Howden and Becker (CNC).

Description (holotype male). Overall weakly elongate, moderately dorso-ventrally flattened. Length 2.1 mm, width 0.8mm. Color dark brown, elytra lighter (Fig. 1A). Ventral body surface brown, legs light brown. Surface sculpturing on dorsal body surfaces moderately glossy; coarse golden pubescence.

Head much narrower than pronotum, finely punctured. Punctures uniform in distribution, becoming finer towards clypeus. Frontoclypeal region truncate, labrum deeply emarginate at midline, mandibles toothed, light brown. Maxillary palps reaching less than one half length of the mandibles, terminal palpomere fusiform. Labial palps short and broad, terminal palpomere truncate at apex. Eyes small, finely faceted, inter-ocular distance

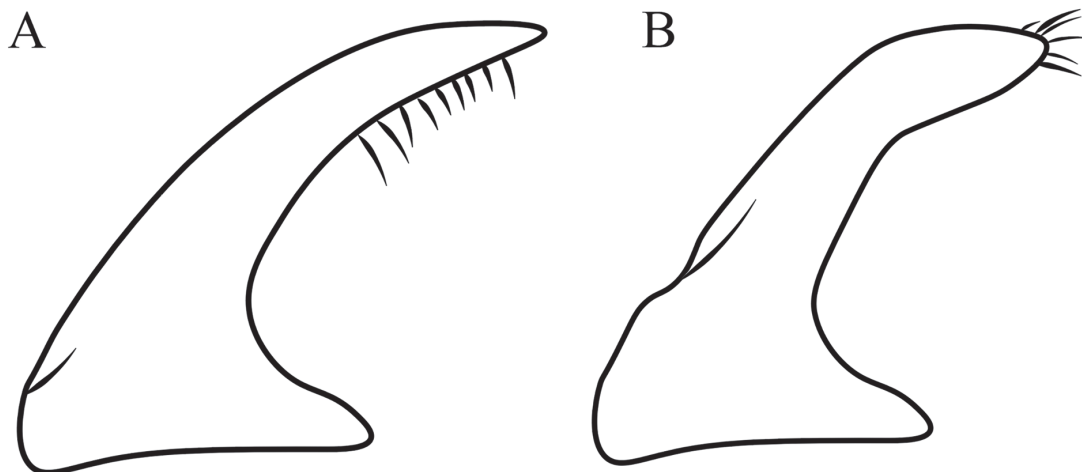


Figure 2. Line drawings of male genitalia in lateral view for new species. **A)** *Carpophilus jamaicensis* sp. nov. **B)** *Carpophilus thomasi* sp. nov.

0.38 mm. Antennal total length slightly less than width of head; antennomere 1 robust and curved, antennomere 2 long, slightly shorter than basal antennomere, antennomeres 2 and 3 about equal in length, antennomeres 2–8 expanding apically, antennomeres 4–8 each about one half length of antennomere 2, antennomere 8 with medial expansion, antennomeres 9–11 forming strong, compact club, slightly longer than wide.

Pronotum 1.5 times as wide as long, sides broadly rounded, both anterior and posterior angles broadly obtuse. Posterior margin with well-developed marginal line, particularly at middle. Disc flattened, moderately glossy, evenly punctured. Scutellar shield feebly pentagonal, reaching obtuse point posteriorly. Anterior of scutellar shield finely granulate, gradually becoming glabrous.

Elytra subequal in width to pronotum, also as wide as long. Elytra with long, sparse, thick gold setae. Humeri pronounced. Elytral anterior angles almost 90°, sides weakly arcuate; posterior angles almost 90°; elytral apices truncate, retreating towards midline. Two abdominal tergites dorsally visible.

Venter overall lighter, submentum narrow and transverse, antennal grooves well-developed. Prosternum finely punctate, punctures with fine golden setae, prosternal process flat in lateral profile, posteriorly rounded, widened behind coxae. Mesothoracic ventrite finely punctured; setose, sparsely and coarsely punctate at middle, punctures becoming finer and denser laterally. Abdominal ventrite 1 almost as long as metathoracic ventrite; abdominal ventrites 2–3 very short, almost hidden; ventrite 4 very elongate, as large as metathoracic ventrite, ventrite 5 large, equal to abdominal ventrite 1, granulate, slightly more coarsely punctate than previous ventrites. Pygidium rounded with distinct, evenly spaced punctures.

Legs somewhat short, femora robust, covered with fine golden pubescence. Tibiae expanded apically, with 4–5 apical tibial spurs. Basal 3 tarsomeres densely pubescent beneath.

Male genitalia (Fig. 2A), well sclerotized, in lateral view lateral lobes strongly curved, internal and external margins converging towards sharp apical points. Apex and apical third of internal margin lined with long setae.

Variation. Overall color varies in the type series from brown to dark brown, total body length ranges from 2.0–2.4 mm ($n = 4$) and width 0.7–0.8 mm ($n = 4$). Females with less robust femora and much less setae on tarsomeres.

Geographical distribution. This species is known from Jamaica. (Fig. 3).

Natural history. Unknown.

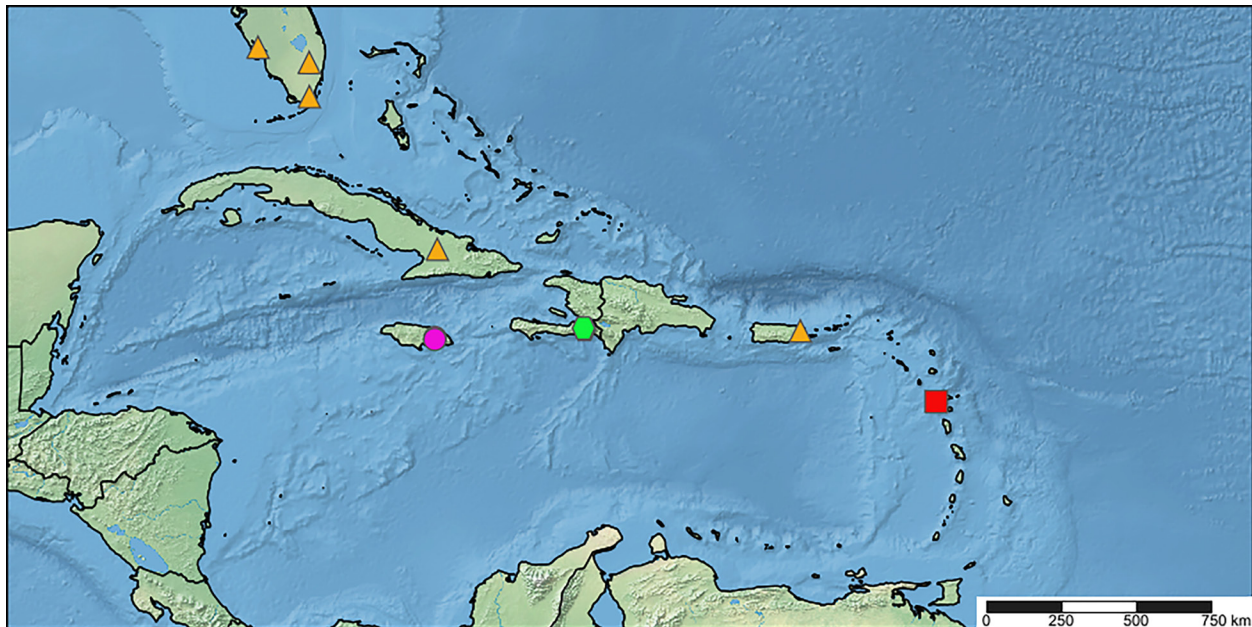


Figure 3. Distributions of *Carpophilus* (*Ecnomorphus*) in the West Indies. *Carpophilus dufauai* Grouvelle (red square), *Carpophilus jamaicensis* sp. nov. (pink circle), *Carpophilus tempestivus* Erichson (orange triangle), *Carpophilus thomasi* sp. nov. (green hexagon).

Etymology. The specific epithet was chosen by the original worker that recognized the need for this taxon to be described but unfortunately was unable to complete that work, Oldrich Marek, and is in reference to the type locality being the island of Jamaica. The epithet is an adjective.

Diagnosis. The separation between antennomeres 9 and 10 place this species within the subgenus *Ecnomorphus*. *Carpophilus jamaicensis* differs from *C. thomasi* in the parallel lateral margins of the pronotum (broadly rounded in *C. thomasi*) and smooth prosternum (reticulate in *C. thomasi*). *Carpophilus jamaicensis* is distinguished from *C. tempestivus* by coloration (dark brown in *C. jamaicensis*, orange in *C. tempestivus*) and elytral apices (shorter at midline in *C. jamaicensis*, truncate in *C. tempestivus*). *Carpophilus jamaicensis* clearly has close affinities to *C. dufauai* but is diagnosed by the length of the visible abdominal tergites (penultimate longer in *C. jamaicensis*, terminal segment longer in *C. dufauai*). This combination of characters with the addition of long gold primary setae on the elytra also serves to diagnose *C. jamaicensis* from other *Carpophilus* (*Ecnomorphus*) in surrounding regions (*i.e.* lack of long dorsal setae and shorter penultimate abdominal tergite in *Carpophilus ligneus* Murray).

***Carpophilus tempestivus* Erichson, 1843**

Specimens examined. Lectotype studied (MNHUB) (Fig. 1C)

Geographical distribution. Cuba, Puerto Rico, USA (Florida). (Fig. 3).

Diagnosis. The separation between antennomeres 9 and 10 place this species within the subgenus *Ecnomorphus*. *Carpophilus tempestivus* is easily distinguished from other members of this subgenus in the Caribbean by bright orange coloration, dark bands at apex of elytra, parallel sided lateral margins of pronotum, and evenly truncate elytral apices (lateral margins extending further than midline in all other consubgenerics in the region).

Natural history. All life stages are known to be associated with palmettos.

***Carpophilus thomasi* Powell and Schnepf, new species**

(Fig. 1D–E, 2B)

LSID urn:lsid:zoobank.org:act:9480762C-D78A-4928-B50C-7C12393DD139

Specimens examined. Holotype (Deposited in FSCA), HOLOTYPE: HAITI: Dept. Sud- | Queste, Parc Nat'l La Visite, vic.pk.hdqtra | 1880m., 20-21-V-1984 | M. C. Thomas || decaying sour-sop || HOLOTYPE | *Carpophilus thomasi* | Designated by | Powell and Schnepf, 2020.

Paratypes. 36 additional specimens: 28, same data as holotype (FSCA); 2, same data as holotype (CNC); 2, same data as holotype (GSPC); 2, same data as holotype (KESC); 1, HAITI: Dept. Sud-Queste, Parc National La Visite, vicinity park hdqtrs., 1880m. 10-V-1984, Coll. M. C. Thomas (FSCA); 1, HAITI: Dept. de l'Queste, Morne la Vista, 1890m elev., 12-16-II-1984, S.R. Yocom, flight intercept trap (FSCA).

Description (holotype male). Overall weakly elongate, moderately dorso-ventrally flattened. Length 2.9 mm, width 1.1 mm. Color light brown, pronotum reddish brown with pronotal margins lighter (Fig. 1D). Ventral body surface light brown. Surface sculpturing on dorsal body surfaces moderately glossy; fine golden pubescence.

Head much narrower than pronotum, finely punctured. Punctures uniform in distribution, becoming finer towards clypeus. Frontoclypeal region truncate, labrum deeply emarginate at midline, mandibles toothed, light brown. Maxillary palps, reaching about two thirds the length of the mandibles, terminal palpomere fusiform. Labial palps small, terminal palpomere truncate at apex. Eyes small, finely faceted, inter-ocular distance about 0.4mm. Antennal total length slightly longer than width of head; antennomere 1 robust and curved, antennomere 2 long, slightly shorter than basal antennomere, antennomeres 2 and 3 about equal in length, antennomeres 2–8 expanding apically, with each apical expansion conspicuously lighter in coloration, antennomeres 4–8 each about ½ length of antennomere 2, antennomere 8 with medial expansion, antennomeres 9–11 forming strong, compact club, slightly longer than wide.

Pronotum 1.45 times as wide as long, sides broadly rounded, both anterior and posterior angles broadly obtuse. Posterior margin with well-developed marginal line, particularly at middle. Disc flattened, moderately glossy, evenly punctured, punctures more conspicuous on disc, gradually becoming more shallow towards lateral margins. Scutellar shield feebly pentagonal; matching coloration of pronotum; reaching obtuse point posteriorly. Anterior of scutellar shield finely granulate, gradually becoming glabrous.

Elytra subequal in width to pronotum, also as wide as long. Humeri weakly pronounced. Elytral anterior angles almost 90°, sides parallel sided, posterior angles broadly rounded, elytral apices truncate, retreating towards midline. Two abdominal tergites dorsally visible.

Venter overall lighter, submentum narrow and transverse, antennal grooves well-developed. Prosternum finely punctate, punctures with fine golden setae, prosternal process slightly convex in lateral profile, apically rounded, widened behind coxae. Mesothoracic ventrite finely punctured; setose, coarsely punctate at middle, becoming finer and denser laterally. Abdominal ventrite 1 half as long as metathoracic ventrite; abdominal ventrites 2–3 very short, finely, sparsely punctate; ventrites 4 and 5 larger, equal to abdominal ventrite 1, granulate, slightly more coarsely punctate than previous ventrites. Pygidium rounded with distinct, evenly spaced punctures.

Legs somewhat short, femora robust, covered with fine golden pubescence. Tibiae expanded apically, with 4–5 apical tibial spurs.

Male genitalia (Fig. 2B), well sclerotized, in lateral view lateral lobes bent at almost right angle, internal and external margins straight and converging towards apical expansion. Each apex enlarged and triangular, patch of long setae at apex.

Variation. Overall color can be more reddish, to pale brown. Overall body length 2.4–3.6mm (n = 6), and width 0.9–1.3mm (n = 6).

Geographical distribution. This species is known from Haiti. (Fig. 3).

Natural history. The type series was collected on decaying soursop (*Annona* sp.).

Etymology. The specific epithet is in honor of the late Dr. Michael C. Thomas, who served as a valuable mentor to both authors as well as collecting most of the type series. The epithet is a noun in the genitive case.

Diagnosis. The separation between antennomeres 9 and 10 place this species within the subgenus *Ecnomorphus*. *Carpophilus thomasi* is easily distinguished from other members of this subgenus in the Caribbean by the broadly rounded lateral margins of the pronotum, parallel sided in *C. dufau*, *C. jamaicensis*, and *C. tempestivus*. The species is also unique in the weakly rugose nature of the prosternum (smooth in all other *Ecnomorphus* species in the region) and in possessing elytra that are much lighter but are still uniform in coloration. The strongly developed bead along the lateral margins of the pronotum is also not present in the consubgenerics in the region. This combination of characters also serves to diagnose *C. thomasi* from other *Carpophilus* (*Ecnomorphus*) in surrounding regions (i.e. pronotal margins not broadly rounded in *Carpophilus ligneus*).

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