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# Phylogenetic Analysis of the Scarab Family Hybosoridae and Monographic Revision of the New World Subfamily Anaidinae (Coleoptera: Scarabaeoidea)

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(Coleoptera: Scarabaeoidea)**

**Federico C. Ocampo**



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Volume 19

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1. **Introduction to the Scarab Family Hybosoridae (Coleoptera: Scarabaeoidea).** Federico C. Ocampo.
2. **Molecular Phylogenetics and Systematic Placement of the Family Hybosoridae (Coleoptera: Scarabaeoidea).** Federico C. Ocampo and David C. Hawks.
3. **Phylogenetic Analysis of the Subfamily Anaidinae (Coleoptera: Scarabaeoidea).** Federico C. Ocampo.
4. **Catalog of the Subfamilies Anaidinae, Ceratocanthinae, Hybosorinae, Liparochrinae, and Pachyplectrinae (Scarabaeoidea: Hybosoridae).** Federico C. Ocampo and Alberto Ballerio.

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Phylogenetic Analysis of the Scarab Family  
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(Coleoptera: Scarabaeoidea)

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**Abstract.** Phylogenetic analyses and taxonomic revisions were conducted on the scarabaeoid family Hybosoridae. Two new subfamilies of Hybosoridae are described, Liparochrinae and Pachyplectrinae. Phylogenetic analysis and a systematic revision of the New World subfamily Anaidinae are provided. The phylogenetic analyses of the family Hybosoridae, based on molecular data from the 28S D2 and D3 regions rDNA and 18S rDNA, support the monophyly of Hybosoridae. Five clades (referred to as subfamilies) comprise the Hybosoridae: Anaidinae, Ceratocanthinae, Hybosorinae, Liparochrinae (new subfamily), and Pachyplectrinae (new subfamily). As a result, the following family-group names have new status: Anaidinae (previously considered a tribe) and Ceratocanthinae (previously considered a family). Phylogenetic analyses of the subfamily Anaidinae, based on 117 adult morphological characters, support the monophyly of the subfamily, which now includes six genera: *Anaides* Westwood, *Callosides* Howden, *Chaetodus* Westwood, *Cryptogenius* Westwood, *Hybochaetodus* Arrow, and *Totoia* Ocampo. Character states supporting clades of Anaidinae are discussed. Descriptions of all subfamilies of Hybosoridae are provided. Keys to genera and species of Anaidinae, and synopses of all genera are provided. Two genera of Anaidinae are revised: *Anaides* and *Chaetodus*. The genus *Anaides* now includes 13 species, eight of which are new. The new species are: *A. carioca*, *A. howdeni*, *A. onofrii*, *A. ortii*, *A. parvulus*, *A. plana*, *A. quinckeii*, and *A. vartorellii*. The species *A. reticulatus* Endrödi is placed in synonymy with *A. fossulatus* Westwood. The genus *Chaetodus* now includes two subgenera and 33 species, 19 of which are new. The new species are: *C. datoii*, *C. globosus*, *C. hoffmanni*, *C. jamesonae*, *C. maquipucuna*, *C. mimi*, *C. nigrofrons*, *C. noirregularis*, *C. paucarae*, *C. paulseni*, *C. pax*, *C. platynotus*, *C. octocarinatus*, *C. ratcliffei*, *C. rodolfo*, *C. sagittarius*, *C. smithi*, *C. teamscaraborum*, and *C. tricarinatus*. A new species in the genus

*Totoia* Ocampo, *T. magnifica*, is described and now brings the total number of species in this genus to three species. The subgenus *Pseudohybosorus* Endrödi is placed in synonymy with *Chaetodus* Westwood. *Pseudohybosorus drifti* Endrödi and the subspecies *Chaetodus amazonicus inesperatus* Martínez are placed in synonymy with *Chaetodus amazonicus* de Borre. *Chaetodus apicipennis* Petrovitz is placed in synonymy with *C. exaratus* Arrow. *Chaetodus striatus* de Borre is placed in synonymy with *C. irregularis* Westwood. A catalog of the world Hybosoridae species is provided.

**Resumen.** Se condujo un análisis filogenético y revisiones taxonómicas de la familia Hybosoirae (Scarabaeoidea). Dos nuevas subfamilias de Hybosoridae son descritas, Liparochrinae y Pachyplectrinae. Se proveen análisis filogenéticos y una revisión sistemática de la subfamilia Neotropical Anaidinae. Los análisis filogenéticos de la familia Hybosoridae basados en datos moleculares de las regiones 28S D2 y D3 rADN y del 18S rADN, soportan la monofilia de Hybosoridae. Cinco clados (referidos aquí como subfamilias) comprenden la familia Hybosoridae: Anaidinae, Ceratocanthinae, Hybosorinae, Liparochrinae (nueva subfamilia) y Pachyplectrinae (nueva subfamilia). Como resultado, los siguientes nombres del grupo familia poseen nuevo estatus: Anaidinae (previamente considerada tribu) y Ceratocanthinae (previamente considerada familia). Análisis filogenéticos de la subfamilia Anaidinae, basados en 117 caracteres morfológicos de adultos sostienen la monofilia de la subfamilia que ahora incluye seis géneros: *Anaides* Westwood, *Callosides* Howden, *Chaetodus* Westwood, *Cryptogenius* Westwood, *Hybochaetodus* Arrow y *Totoia* Ocampo. Los caracteres que dan soporte a los clados de Anaidinae son discutidos. Se proveen descripciones de todas las subfamilias. Se proveen claves para los géneros y especies y sinopsis para todos los géneros de Anaidinae. Dos géneros de Anaidinae son revisados: *Anaides* y *Chaetodus*. El género *Anaides* ahora incluye 13 especies, ocho de ellas nuevas. Las nuevas especies son: *A. carioca*, *A. howdeni*, *A. onofrii*, *A. ortii*, *A. parvulus*, *A. plana*, *A. quinckei* y *A. vartorellii*. Las especie *A. reticulatus* Endrödi es sinonimizada con *A. fossulatus* Westwood. El género *Chaetodus* ahora incluye 33 especies, 19 de las cuales son nuevas. Las especies nuevas son: *C. datoi*, *C. globosus*, *C. hoffmanni*, *C. jamesonae*, *C. maquipucuna*, *C. mimi*, *C. nigrofrons*, *C. noirregularis*, *C. paucarae*, *C. paulseni*, *C. pax*, *C. platynotus*, *C. octocarinatus*, *C. ratcliffei*, *C. rodolfo*, *C. sagittarius*, *C. smithi*, *C. teamscaraborum* y *C. tricarinatus*. Una nueva especie del género *Totoia* Ocampo, *T. magnifica*, es descrita y ahora el género cuenta con tres especies. El subgénero *Pseudohybosorus* Endrödi es sinonimizado con *Chaetodus* Westwood. *Pseudohybosorus drifti* Endrödi y la subespecie *Chaetodus amazonicus inesperatus* Martínez son sinonimizadas con *Chaetodus amazonicus* de Borre. *Chaetodus apicipennis* Petrovitz es sinonimizada con *C. exaratus* Arrow. *Chaetodus striatus* de Borre es sinonimizada con *C. irregularis* Westwood. Se provee un catálogo de los Hybosoridae del Mundo.



## INTRODUCTION TO THE SCARAB FAMILY HYBOSORIDAE (COLEOPTERA: SCARABAEOIDEA)

**Federico C. Ocampo**

*Hay algo en mi espíritu que me lleva a forjarme, en un instante, la apoteosis de un marino o de un viajero. Entiendo por viajero no sólo el que camina kilómetros con sus pies en busca de adalantos y descubrimientos sino también aquel que los recorre con su imaginación, haciendo progresar los conocimientos que han de ir sometiendo a los pies de la humanidad los demás elementos de la naturaleza, para llevarnos al goce pleno de nuestra libertad sobre la Tierra. Si bien hoy ya no existen los Colón, los Cook, los Livingstone, que descubrieron nuevos mundos y que murieron en su epopeya y que hoy no podrían encontrar ni modestos imitadores, no por falta de coraje sino por falta de escenarios, habrá otros, innumerables, que seguirán las huellas de los Linnaeus, los Darwin, los Wallace, los Moreno o los Humboldt. Ellos concluirán la tarea del conocimiento del Mundo, y llegará un día en que todo lo creado nos será revelado por su estudio, y ese día la Tierra será digno pedestal del Hombre. Este trabajo es una humilde contribución a la epopeya del conocimiento de nuestro Mundo y de los seres que lo habitan.*

— Federico C. Ocampo (based on thoughts of F. P. Moreno)

The Hybosoridae is a large, cosmopolitan family of Scarabaeoidea that is most diverse in the tropics. The group is considered as a family within the Scarabaeoidea or as a subfamily of the family Scarabaeidae. I follow Gardner (1935), Paulian (1939), Lawrence and Newton (1995), and Jameson and Ratcliffe (2002) and considered the group a family. The taxonomic research presented here supports this placement. The family contains more than 220 described species placed in 35 genera, including those described in the following chapters, but this figure is likely to increase as indicated by the large number of undescribed taxa that have been detected in recent years. The Hybosoridae is a heterogeneous group of relatively small scarabs, with adults usually ranging in size from 3-7 mm. The majority of the species are brown or black. The antennae are 9-10 segmented, with a 3-segmented club. Little is known about the biology of hybosorid species. Adults feed on dung, carrion, fungi, or rotting wood, and some are found in ant and termite nests. Some species, particularly in the Australian genus *Liparochrous* Erichson and those of the subfamily Ceratocanthidae, are capable of rolling up their body to form a compact ball. Larvae are known for only

six species in five genera, and they were collected in decomposed plant material or under bark. Larvae and adults of some species are known to stridulate.

To understand the composition of the family and its systematic placement within Scarabaeoidea, I performed a phylogenetic analysis of Hybosoridae. During the course of this work, it became clear that the diversity of the group was underestimated, and the phylogenetic limits of the family were misrepresented in previous classifications. In this work, I provide phylogenetic analyses of the family Hybosoridae and the subfamily Anaidinae (new status), revise the Anaidinae genera, describe new taxa, synonymize some names, make lectotype designations, provide identification keys to genera and species of Anaidinae, and present a taxonomic checklist of the world Hybosoridae.

### **Hybosoridae**

The name Hybosoridae was first proposed by Erichson in 1847. With the exception of catalogs (*i.e.*, Arrow 1912) and checklists (*i.e.*, Allsopp 1984, 1986; Ocampo 2000) no major comprehensive work has ever been conducted for the group since its original description.

The characters commonly used to diagnose species of the family Hybosoridae (excluding Ceratocanthinae) have been prominent mandibles and labrum and a 10-segmented antenna with a 3-segmented club in which the basal segment is hollowed out to receive the penultimate and ultimate segments. While these are useful to diagnose most species of the Hybosoridae, many exceptions are found. Recent hybosorid classifications (Nikolajev 1999) were based primarily on overall morphological similarity, on the observation of a small set of characters of a small number of taxa, or they simply followed previous classifications (*i.e.*, Allsopp 1984). In terms of evolutionary patterns, I have found that the classification of Hybosoridae is greatly in need of revision.

The Hybosoridae is hypothesized to be the sister taxon of Diphylostomatidae and Glaphyridae (Crowson 1968, 1981), closely related to Aclopininae (Scarabaeidae) (Allsopp 1983), or closely related to Dynamopodinae and Orphninae (Scarabaeidae) (Hanski and Cambefort 1991). Previous evolutionary hypotheses placed the Ochodaeidae basal to Hybosoridae plus Ceratocanthidae (Scholtz *et al.* 1988); Geotrupidae basal to Ochodaeidae + (Ceratocanthidae and Hybosoridae) (Scholtz and Chown 1995; Browne and Scholtz 1995, 1999); Hybosoridae intermediate between Trogidae and Ceratocanthinae (Howden and Gill 1988a, 2000); or Hybosoridae as a sister taxon of Glaresidae (Nikolajev 1995). Phylogenetic analyses based on larval characters (Grebennikov *et al.* 2004) supports the hypothesis that the family Hybosoridae is paraphyletic unless it includes the Ceratocanthidae.

Traditionally, classifications treated Ceratocanthidae (or Ceratocanthinae) as separate from the Hybosoridae (*i.e.*, Paulian 1939; Lawrence and Newton 1995; Jameson 2002; Howden and Gill 1988a, 2000). Nikolajev (1999) considered hybosorids as a subfamily containing six tribes: Anaidini, Dynamopodini, Hybosorini, Ceratocanthini, Thinorycterini, and Scarabatermitini. He suggested that the ceratocanthids might be derived from hybosorids. In the same publication, Nikolajev

(1999) also provided a short description for each of the tribes he considered, but he did not provide an explicit list of genera assigned to each tribe, and the character set used to define each group does not apply for many genera and species. Consequently, most of the hybosorid taxa remained taxonomically "orphaned." Although there is a general consensus that there is a "close relationship" between hybosorids and ceratocanthids, a phylogenetic analysis of the family Hybosoridae had never been published, and the systematic placement of the group within Scarabaeoidea continues to be debated as well as the relationships among genera. Among the Old World Hybosorinae, the most comprehensive works are Kuijten's revisions of the African and Asian genera (1978, 1981b, 1983, 1985, 1986, 1988) and the revision of the mainly Australian genus *Liparochrus* by Paulian (1980a). Among the New World hybosorids, no fully comprehensive work has ever been conducted. Recent publications in this group include those of Martínez (1988, 1994), Martínez and Morón (1990), Ratcliffe and Ocampo (2001) and Ocampo (2002a-b-c, 2003).

The main objectives of this work are: 1) to place the family Hybosoridae in a phylogenetic framework and to discuss the relationships with other scarabaeoid taxa; 2) to analyze the phylogenetic relationships among hybosorids in order to propose a classification that reflects these relationships; 3) to hypothesize the phylogenetic relationships among genera of the hybosorid subfamily Anaidinae; 4) to revise the Anaidinae genera *Anaides* and *Chaetodus*; and 5) to provide a taxonomic checklist of the world Hybosoridae.

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## MOLECULAR PHYLOGENETICS AND SYSTEMATIC PLACEMENT OF THE FAMILY HYBOSORIDAE (COLEOPTERA: SCARABAEOIDEA)

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### MATERIAL AND METHODS

#### Sampling of taxa

Adult specimens of nine Hybosoridae genera were included in the analysis as ingroup taxa. Adult specimens of Ceratocanthidae, Glaphyridae, Ochodaeidae, and Scarabaeidae (subfamilies Aclopininae, Alidiostomatinae, Aphodiinae, Cetoniinae, Dynastinae, Melolonthinae, Orphninae, Rutelinae, and Scarabaeinae) were used as outgroup taxa. The outgroup was selected with the intent of having representatives of other families and subfamilies of Scarabaeoidea with special emphasis on the type genus of each higher taxon. Specimens were collected in 95-99% ethanol for the molecular analysis. The complete list of taxa, locality, specimen voucher number, and depository are presented in Table 1.

#### PCR amplification and sequencing

**DNA Extraction.** DNA was isolated from the thoracic muscles or legs of individual beetles. The DNA was extracted with the phenol/chloroform method following the protocol described by Campbell *et al.* (1993).

**PCR Amplification.** Insect universal primers (Simon *et al.* 1994) were used for

amplification of 28S rDNA D-DF 5'-CGT-GTTGCTTGATA GTGAGC-3' and 28S D-CR2 5'-TCAAGACGGGTCTGAAAGT-3'; and 28S D3F 5'-GACCCGTCTTGAAACAC-GGA-3' and D3R 5'-TCGGAAGGAACCAGC-TACTA-3'. For amplification of 18S rDNA 18SF: 5'-AAATTACCCACTCCCGGCA-3' and 18SR: 5'-TGGTGAGGTT TCCCGT-GTT-3' primers were used. Samples were sequenced using the BigDye Terminator cycle sequencing ready reaction kit (Applied Biosystems Inc.) on an ABI 310 automated DNA sequencer following manufacturer's instructions.

#### Phylogenetic analysis of the molecular data

DNA sequences were aligned by eye using MacClade 4 (Madison and Madison 2000). DNA sequences from 28S D2 and D3 regions and 18S were combined in a single data set. Maximum-parsimony (MP) analyses were performed in PAUP\* version 4.0b10 (Swofford 1998) using heuristic searches (TBR branch swapping; MulTrees option in effect) with 100 random stepwise additions of taxa. Robustness of the inferred MP tree was tested by bootstrapping (Felsenstein 1985) as implemented in PAUP\* with 500 replicates, each starting with a simple addition sequence, followed by TBR branch swapping holding no more than 1000 trees.

Table 1.

Taxa	Collection data	Depository	Voucher #
<b>OUTGROUP</b>	---	---	---
Glaphyridae	---	---	---
<i>Glaphyrus superbus</i>	Armenia	UCRC	S-521
<i>Anthypna</i> sp.	Italy	UCRC	S-424
<i>Lichnanthe ursina</i>	USA: California	UCRC	S-60
Ochodaeidae	---	---	---
<i>Ochodaeus mandibularis</i>	USA: California	UCRC	S-8
<i>Neochodaeus praesidii</i>	USA: Arizona	UCRC	S-55
<i>Codocera ferruginea</i>	Russia	UCRC	S-517
<i>Parochodaeus kansanus</i>	USA: Nebraska	UCRC	S-
Scarabaeidae	---	---	---
Aclopiniae	---	---	---
<i>Aclopus</i> sp.	Argentina: Mendoza	UNSM	FO-5
Allidiostomatinae	---	---	---
<i>Allidiostoma hirtum</i>	Argentina: La Rioja	UNSM	FO-8
Aphodiinae	---	---	---
<i>Aphodius aegrotus</i>		UCRC	S-
Cetoniinae	---	---	---
<i>Cetonia carthoni</i>	Spain: Alicante	UCRC	S-551
Dynastinae	---	---	---
<i>Dynastes granti</i>		UCRC	S-
Melolonthinae	---	---	---
<i>Melolontha melolontha</i>	France	UCRC	S-574
Orphninae	---	---	---
<i>Aegidium</i> sp.	Nicaragua	UNSM	AS-39
Rutelinae	---	---	---
<i>Rutela sanguinolenta</i>	Panama	UCRC	S
Scarabaeinae	---	---	---
<i>Scarabaeus deludens</i>	South Africa	UCRC	FO-42
Ceratocanthidae	---	---	---
<i>Ceratocanthus</i> sp. 1	Nicaragua	UNSM	AS-128
<i>Ceratocanthus</i> sp. 2	Honduras	UNSM	FO-3
<i>Germarostes globosus</i>	USA: South Carolina	UCRC	S-34
<i>Germarostes</i> sp. 1	El Salvador	UNSM	FO-28
<i>Germarostes</i> sp. 2	El Salvador	UNSM	FO-29
<i>Germarostes posticus</i>	Chile	UNSM	S-
<i>Pterorthchaetes insularis</i>	Thailand	UNSM	FO-4
<b>INGROUP</b>	---	---	---
Hybosoridae	---	---	---
<i>Anaides laticollis</i>	Nicaragua	UCRC	S-131
<i>Chaetodus piceus</i>	Brazil: Minas Gerais	UNSM	AS-131
<i>Chaetodus</i> n. sp.	Nicaragua	UNSM	FO-1
<i>Coilodes castaneus</i>	Nicaragua: Matagalpa	UCRC	S-58
<i>Hybosorus illigeri</i>	USA: California	UCRC	S-13
<i>Hybosorus ruficornis</i>	South Africa	UNSM	FO-
<i>Phaeochrous emarginatus</i>	Thailand	UCRC	S-66
<i>Phaeochroops rattus</i>	Malaysia	UCRC	S-269
<i>Liparochrus silphodes</i>	Australia: Queensland	UNSM	AS-134
<i>Liparochrus matthewsi</i>	Australia: New Caledonia	UNSM	FO-2
<i>Liparochrus infantus</i>	Australia: Queensland	UNSM	
<i>Antiochrus aberrans</i>	Australia: Queensland	UNSM	AS-129
<i>Pachyplectrus laevis</i>	USA: California	UCRC	S-6

## RESULTS

### Maximum parsimony (MP) analysis.

DNA sequences from 28S D2 and D3 regions and 18S were combined in a single data set that produced an alignment of 2061 positions. Of these, 1464 were constant (71.03%), and 375 were parsimony informative (18.19%). The analysis was performed with equal weighting of the character state data. The analysis produced 1 MP tree (Length: 2097, CI: 0.443, RI: 0.573) The tree is shown in Fig. 1. Bootstrap support values above 50% are shown on the branches of the tree (Fig. 2). The resultant tree showed that, within the Scarabaeoidea, the family Hybosoridae is paraphyletic and includes Ceratocanthidae (Fig. 1, node A) (bootstrap support 90 %). The Hybosoridae + Ceratocanthidae is member of a large clade that contains three Glaphyridae genera, *Anthypna*, *Glaphyrus*, and *Lichnanthe*, and the Ochodaeidae (Fig. 1, node 1). The Ochodaeidae and Hybosoridae are sister taxa (Fig. 1, node 2). Within the Hybosoridae, *Pachyplectrus*, *Anaides*, *Chaetodus*, *Antiochrus*, and *Liparo-chrus* cluster together with the Ceratocanthidae (Fig. 1, nodes C-G). The hybosorid clade composed of the genera *Phaeochrous*, *Hybosorus*, *Phaeochroops*, and *Coilodes* form the sister clade to the Hybosoridae (in part) + Ceratocanthidae (Fig. 1, node B). *Pachyplectrus* is the sister taxon of (*Anaides* + *Chaetodus*) (Fig. 1, node E) + (*Liparo-chrus* + *Antiochrus*) + (Ceratocanthidae) (Fig. 1, node D-G). The Ceratocanthidae and *Liparo-chrus* + *Antiochrus* constitute a monophyletic group that is well-supported with high bootstrap value (96 %) (Fig. 1, nodes F-G).

## DISCUSSION

Our analyses consistently suggest that Hybosoridae is a paraphyletic group with respect to the Ceratocanthidae. The most probable sister taxon of Hybosoridae + Ceratocanthidae is the scarabaeoid family Ochodaeidae (Fig. 1, node 2). Our hypothesis is congruent with some of the previous hypotheses based on morphological data that proposed the monophyly of hybosorids

+ ceratocanthids and the ochodaeids as sister taxon of this clade (Scholtz *et al.* 1988; Scholtz and Chown 1995; Browne and Scholtz 1995, 1999). Our hypothesis is inconsistent with previous hypotheses that considered Ceratocanthidae as a sister group of the hybosorids (Scholtz *et al.* 1988; Scholtz and Chown 1995; Browne and Scholtz 1995, 1999; Howden and Gill 1988a, 2000). Our analyses strongly support the hypothesis of Ceratocanthidae as a derived hybosorid group which is the sister taxon of *Liparo-chrus* + *Antiochrus* (Fig. 1, nodes F-G). The phylogenetic placement of Ceratocanthidae as the sister taxon of *Liparo-chrus* + *Antiochrus* is also consistent with the phylogenetic analysis based on morphological characters (see the phylogenetic analysis of the subfamily Anaidinae in this work). The systematic placement of the Ceratocanthidae as a derived group of hybosorids is also supported by larval characters (Grebennikov *et al.* 2004).

Although our analyses provide important insights into the systematic placement and phylogenetic relationships of the family Hybosoridae and the higher-level relationships of hybosorids, many questions remain to be answered. The phylogenetic relationships among Ceratocanthidae and Hybosoridae genera are still uncertain (a phylogenetic analysis of the Anaidini and the relationships among its genera is presented in this work) as well as the systematic placement of the genera *Borrochrus* and *Daimothoracodes* (see the phylogenetic analysis of the subfamily Anaidinae in this work).

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Fig. 1. Maximum parsimony (MP) phylogram based on molecular data. (Length: 2097, CI: 0.443, RI: 0.573).



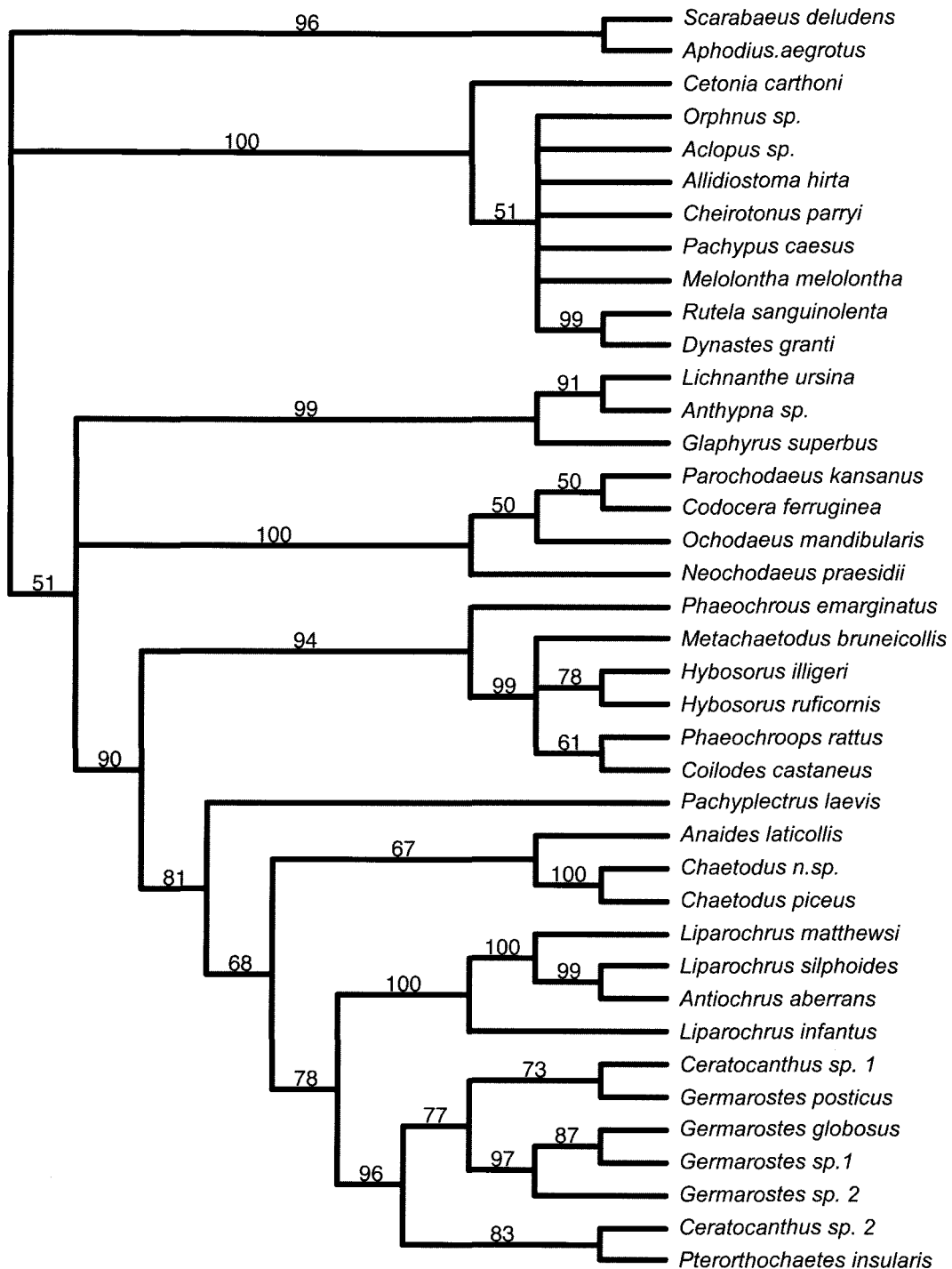


Fig. 2. Bootstrap consensus tree. Bootstrap support values above 50% are shown on the branches of the tree.

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**PHYLOGENETIC ANALYSIS OF THE ANAIDINI BASED ON  
MORPHOLOGICAL DATA AND REVISION OF THE NEW WORLD  
TRIBE ANAIDINI**

**Federico C. Ocampo**

**MATERIALS AND METHODS**

**Specimens**

This study is based on examination of nearly 5,000 specimens borrowed from 55 institutions and collections. Some specimens were available at the University of Nebraska State Museum (UNSM) and the United States National Collection (USNM) (currently at the University of Nebraska). Additional specimens were borrowed from, or deposited in, the following institutional and private collections. Names of curators or collection managers are included in parentheses.

AMNH American Museum of Natural History, New York, NY (Lee Herman).  
 ANSP Academy of Natural Sciences, Philadelphia, PA (Donald Azuma).  
 BCRC Brett C. Ratcliffe Collection, Lincoln, NE.  
 BDGC Bruce D. Gill Collection, Ottawa, ON, Canada.  
 BMNH The Natural History Museum, London, England (Malcolm Kerley).  
 CASC California Academy of Sciences, San Francisco, CA (Roberta Brett).  
 CBAC Carlos Bordón Collection, Maracay, Venezuela.  
 CDAE California State Collection of Arthropods, Sacramento, CA (Chuck Bellamy).  
 CMNC Canadian Museum of Nature, Ottawa, ON, Canada (François Génier).  
 CMNH Carnegie Museum of Natural History, Pittsburgh, PA (Robert Davidson).  
 CNCI Canadian National Collection of Insects, Ottawa, ON, Canada (Yves Bousquet).  
 DCCC David C. Carlson Collection, Fair Oaks, CA.  
 EAPZ Escuela Agrícola Panamericana, Zamorano, Honduras (Ron Cave).

EGRC Edward G. Riley Collection, College Station, TX.  
 EMEC Essig Museum of Entomology, University of California, Berkeley, CA (Cheryl Barr).  
 FCOC Federico C. Ocampo Collection, Lincoln, NE.  
 FMNH Field Museum of Natural History, Chicago, IL (Al Newton, Margaret Thayer).  
 FSCA Florida State Collection of Arthropods, Gainesville, FL (Mike Thomas, Brenda Beck, Paul Skelley).  
 FVMC Fernando Vaz-de-Mello Collection, Lavras, Brazil.  
 HAHC Henry and Anne Howden Collection, Ottawa, ON, Canada. (Deposited at CMNC).  
 HECO Hope Entomological Museum, Oxford, England (Darren J. Mann).  
 HNHM Hungarian Natural History Museum, Budapest, Hungary (Otto Merkl).  
 IAIZA Instituto Argentino de Investigaciones de Zonas Áridas (IADIZA), Mendoza, Argentina (Sergio Roig-Juñent).  
 INBC Instituto Nacional de Biodiversidad (INBio), Santo Domingo de Heredia, Costa Rica (Angel Solís).  
 JMMC Jean Michel Maes Collection, León, Nicaragua.  
 LACM Los Angeles County Museum of Natural History, Los Angeles, CA (Brian Brown).  
 LEMQ Lyman Entomological Museum, McGill University, PQ, Canada (Terry Wheeler, Stéphanie Boucher).  
 MACN Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina (Axel Bachmann).  
 MCZC Museum of Comparative Zoology, Harvard University, Cambridge, MA (Philip Perkins).

- MHNE Museo de Historia Natural del El Salvador, San Salvador, El Salvador (Eunice Echeveria).
- MIZA Museo del Instituto de Zoología Agrícola Francisco Fernández Yépez, Universidad Central de Venezuela, Maracay, Venezuela (Luis Joly).
- MLPA Museo de La Plata, La Plata, Argentina (Analia Lanteri).
- MHNG Museum d'Histoire Naturelle, Geneva, Switzerland (Giulio Cucodoro).
- MNHN Muséum National d'Histoire Naturelle, Paris, France (Jean Menier).
- MTEC Montana State University, Bozeman, MT (Michael Ivie).
- MXAL Miguel Angel Morón Collection, Xalapa, Veracruz, Mexico.
- NHMB Entomologische Abeilung, Naturhistorisches Museum Basel, Switzerland (Daniel Burckhardt).
- NMPC National Museum of Natural History, Prague, Czech Republic (Josef Jelínek).
- OSAC Oregon State University, Corvallis, OR (Darlene Judd).
- PKLC Paul K. Lago Collection, University, MS.
- QCAZ Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador (Giovanni Onore).
- QBUM Museu Nacional, Rio de Janeiro, Brazil (Miguel Monné).
- RMNH Rijksmuseum Van Natuurlijke Historie, Leiden, Netherlands (J. van Tol).
- ROME Royal Ontario Museum, Toronto, ON, Canada (Doug Currie, Brad Hubley).
- SEMC Snow Entomological Museum, University of Kansas, Lawrence, KS (Steve Ashe).
- TAMU Texas A&M University, College Station, TX (Ed Riley).
- UCRC Entomology Museum, University of California, Riverside, CA (Doug Yanega, David Hawks).
- UMRM W. R. Enns Entomology Museum, University of Missouri, Columbia, MO (Robert Sites).
- UNSM University of Nebraska State Museum, Lincoln, NE (Brett Ratcliffe, Mary Liz Jameson).
- USNM United States National Museum, Washington, D.C. (David Furth, Gloria House).
- UVGC Universidad del Valle de Guatemala, Guatemala City, Guatemala (Jack Schuster).
- WBWC William B. Warner collection, Chandler, AR.
- ZMHB Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (Hella Wendt).

### Preparation of specimens

Genitalia and mouth parts were preserved in glycerin in microvials pinned beneath the specimens from which they were removed. Larger structures (hind wings, abdominal sternites) were glued to archival cards pinned beneath the specimen from which they were removed.

### Descriptions

To avoid repetition, characters of lower ranking taxa (*e.g.*, species, tribes) are not repeated in description of higher-ranking taxa (*e.g.*, genera, subfamilies). Some species descriptions included characters present in all of the species of that particular genus. These are included in the species description to facilitate comparison between species of different genera or other higher-ranking taxa.

### Label data

For type material, information on each label is reproduced as exactly as possible using ordinary type except for scientific names, which are reproduced in italics. Specimen labels were copied using "/" between lines and ";" between labels. All primary types here designated (holotypes, allotypes, and lectotypes) have my red, hand-written, primary type label. All paratypes here designated have my yellow, hand-written or printed paratype label.



## Locality data

Geographical distribution is organized by country and alphabetically by state or province and locality. The number of specimens recorded for each country and locality are given between parentheses. Temporal distribution is given chronologically by month with the number of specimens recorded for each month between parentheses.

## Measurements

Measurements were made with an ocular micrometer on a Leica MS5 stereomicroscope at 10X, 25X, and 40X. Measurements of body parts are:

*Body length*: distance from anterior to posterior margin of pronotum (at middle) plus distance from base to apex of elytra (at suture).

*Body width*: transverse distance between lateral margins of elytra at middle.

*Pronotal length*: distance from anterior to posterior margin of pronotum at middle.

*Pronotal width*: distance between lateral margins at middle.

## Terms for structural features

### Punctures, sculpture, and chaetotaxy.

*Puncture density* was considered “dense” if punctures were nearly confluent to less than two puncture diameters apart, “moderately dense” if punctures were two to six diameters apart, and “sparse” if punctures were separated by more than six diameters.

*Puncture size* was defined as “small” if punctures were 0.02 mm or smaller, “moderate” if 0.02-0.07 mm, and “large” if 0.07 mm or larger. Surface sculpture was defined as “sparsely areolate-ocellate” if there was (on average) a space of more than one diameter between areolate-ocellate punctures, “moderately dense” if there were 0.5-1.0 diameters between areolate-ocellate punctures,

and “densely areolate-ocellate” if areolate-ocellate punctures were confluent or the space between them was less than 0.5 diameters. Setae were defined as “sparse” if there were a few scattered setae, “moderately dense” if the surface was visible but with many setae, and “dense” if the surface was not visible through the setae.

*Elytral striae* were counted from the elytral suture at the middle of the elytron. Elytral intervals were counted from the first elytral stria.

**Body parts.** Most of the terms used to designate details of structures of the body parts follow that of previous publications (Ocampo 2001, 2002a, 2002b, 2003; Ocampo and Vaz-de-Mello 2002).

**Mouth parts.** Terminology and descriptions of mouthparts follow that of Nel and Scholtz (1990) and Ocampo (2003).

**Hind wings.** Terminology for the hind wing structures and venation follow those of Ocampo (2003).

**Male genitalia.** Terminology for the male genitalia follows that of d’Hotman and Scholtz (1990) and Ocampo (2003). Illustrations of the male genitalia show dorsal and lateral views.

## Designation of lectotypes

Lectotypes are designated in order to preserve the nomenclatural stability of the taxa studied.

## Species concept

I follow the phylogenetic species concept outlined by Wheeler and Platnick (2000): “Species are the smallest aggregation of populations diagnosable by a unique combination of characters.” Based on the observation that an aggregation of populations shares a unique combination of characters states, it can be hypothesized that this aggregation is a distinct species.

The species concept applied in this work meets important criteria: it provides the finest level of resolution of kinds of organisms that can be justified on the basis of constantly distributed, observable attributes and provides theoretically justified interpretations of hierarchical patterns. It provides the elements for cladistic analyses, without requiring that such analyses be performed *a priori*. Phylogenetic species are character-based and formulated as hypotheses that make specific predictions. These hypotheses can be critically tested through further observations. Finally, phylogenetic species are independent of assumptions about specific processes of evolution and modes of speciation, and they provide the logical basis from which such mechanisms may be studied (Wheeler and Platnick 2000).

### Classification scheme

For the purposes of this work, I followed the 12-family classification scheme of Browne and Scholtz (1995, 1999), Lawrence and Newton (1995), and Jameson and Ratcliffe (2002). As a result of this study, the Anaidini *sensu* Nikolajev (1996) is considered as a subfamily (rather than tribe), and Ceratocanthidae Martínez (1968) is considered a subfamily (rather than family), and two new subfamilies are proposed herein: the Liparochrinae and Pachyplectrinae.

### Criteria for ranking

Phylogenetic taxonomy uses a phylogeny as a graphic model for constructing a biological system (Shpeley and Ball 2000).

All family and generic group taxa in this study are defined in terms of genealogical relationships rather than of overall shared attributes (plesiomorphic and or apomorphic).

### Biogeographic terms

Biogeographic terms for regions, subregions, and provinces follow Morrone (1999, 2001). The distribution area of a taxon is defined as the region within which any taxonomic unit is distributed. Designation and identification of areas of endemism follow the definition of Platnick (1991): an area of endemism is defined by the congruent distributional limits of two or more species.

### PHYLOGENETIC ANALYSIS OF THE ANAIDINI BASED ON MORPHOLOGICAL DATA

**Sampling of taxa.** Adult specimens of all genera previously hypothesized to be part of the Anaidini *sensu* Nikolajev (*Anaides*, *Callosides*, *Chaetodus*, *Cryptogenius*, *Hybochaetodus*, and *Totoia*) were included in the analysis, and adult specimens of 12 other Hybosoridae and Ceratocanthidae were used as the outgroup. The genus *Borrorchrus*, considered as subgenus of *Chaetodus* (Martínez 1988, 1994), was included to test the hypothesis of relationship within *Chaetodus*. The outgroup was selected based on results of the molecular phylogenetic analysis and preliminary analysis of the family Hybosoridae based on morphological data (Ocampo in preparation). The complete list of taxa included in the analysis is presented in Table 2.

Table 2.

OUTGROUP	INGROUP cont.
Ceratocanthidae	<i>Anaides onofrii</i> n. sp
<i>Ceratocanthus vicarius</i>	<i>Anaides simplicicollis</i>
<i>Germarostes globosus</i>	<i>Anaides vartorellii</i> n. sp.
Hybosoridae	<i>Callosides bartolozzii</i>
<i>Coilodes castaneus</i>	<i>Callosides genieri</i>
<i>Coilodes gibbus</i>	<i>Callosides campbelli</i>
<i>Hybosorus illigeri</i>	<i>Chaetodus allsoppi</i>
<i>Hybosorus orientalis</i>	<i>Chaetodus amazonicus</i>
<i>Liparochrus multistriatus</i>	<i>Chaetodus assuai</i>
<i>Liparochrus geminatus</i>	<i>Chaetodus brancuccii</i>
<i>Antiochrus aberrans</i>	<i>Chaetodus exaratus</i>
<i>Antiochrus brunneus</i>	<i>Chaetodus irregularis</i>
<i>Brenskea coronata</i>	<i>Chaetodus piceus</i>
<i>Pachyplectrus laevis</i>	<i>Chaetodus teamscaraborum</i> n. sp.
	<i>Chaetodus venezolanus</i>
<b>INGROUP</b>	<i>Chaetodus villisicollis</i>
Anaidini (Hybosoridae)	<i>Hybochaetodus flaco</i>
<i>Anaides fossulatus</i>	<i>Hybochaetodus obscurus</i>
<i>Anaides howdeni</i> n. sp.	<i>Totoia brachycarina</i>
<i>Anaides laticollis</i>	<i>Totoia splendida</i>
<i>Anaides longeciliatus</i>	<i>Borrochrus ciliatus</i>
<i>Anaides ortii</i> n. sp.	<i>Borrochrus mutilus</i>

### Morphological characters used in the phylogenetic analysis

A total of 117 adult morphological characters were included in the analysis. Of these, 32 are multistate characters and 85 are binary characters. All characters are discrete and were analyzed unordered.

### Phylogenetic analysis of morphological data

Maximum-parsimony (MP) analyses were performed in PAUP\* version 4.0b10 (Swofford 1998) using heuristic searches (TBR branch swapping; MulTrees option in effect) with 100 random stepwise additions of taxa. Robustness of the inferred MP trees

was tested by bootstrapping (Felsenstein 1985) as implemented in PAUP\* with 500 replicates.

### Character list

#### Body form:

1. Body can be rolled into a ball (completely or partially).  
0: Absent  
1: Present

#### Head:

2. Antenna.  
0: 10-segmented  
1: 9-segmented
3. Antennal club with first segment externally tomentose.  
0: Present  
1: Absent

4. Antennal club.
  - 0: Not cupuliform, short
  - 1: Not cupuliform, elongated
  - 2: Cupuliform, partially receiving segments 2 and 3
  - 3: Cupuliform, fully receiving segments 2 and 3
5. Head with frontoclypeal juncture forming a sharp angle.
  - 0: Absent
  - 1: Present
6. Head with 2 small, transverse carinae.
  - 0: Absent
  - 1: Present
7. Eye canthus.
  - 0: Developed
  - 1: Obsolete
8. Eye canthus with ridge or thickened section.
  - 0: Present
  - 1: Absent
9. Eye canthus with distinct, setose area.
  - 0: Present
  - 1: Absent
10. Frons with horn or tubercle.
  - 0: Present
  - 1: Absent
11. Clypeus with horn or tubercle.
  - 0: Present
  - 1: Absent
12. Frontoclypeal suture.
  - 0: Evident
  - 1: Not evident (obsolete)
13. Clypeal apex (dorsal view).
  - 0: Rounded
  - 1: Rectangular, quadrangular
  - 2: Truncate
14. Clypeus and frons with areolar punctures.
  - 0: Absent
  - 1: Present
15. Clypeal anterior margin (lateral view).
  - 0: Vertical surface not developed
  - 1: With vertical surface inverted
  - 2: With vertical surface blunt
  - 3: With vertical surface oblique, everted
16. Clypeus with small tooth at apex.
  - 0: Absent
  - 1: Present
17. Clypeal edge with setae on vertical surface.
  - 0: Absent
  - 1: Present
18. Eyes.
  - 0: Clearly visible in dorsal view
  - 1: Not clearly visible in dorsal view
19. Eye shape.
  - 0: Circular
  - 1: Semicircular, with posterior half blunt
20. Mandibles protruding beyond anterior margin of labrum.
  - 0: Present
  - 1: Absent
21. Mandibles with dorsal edge reflexed.
  - 0: Present
  - 1: Absent
22. Mandibular mediodorsal tooth.
  - 0: Absent
  - 1: Present
23. Mandibular subapical tooth.
  - 0: Absent
  - 1: Present
24. Mandibular external sculpture.
  - 0: Absent
  - 1: Present
25. Mandibular external fringe of thick setae on basal third.
  - 0: Absent
  - 1: Present
26. Mandibular shape at base, in lateral view.
  - 0: Thin
  - 1: Thick
27. Mandibular molar area with mycangium.
  - 0: Absent
  - 1: Present
28. Labrum length.
  - 0: Short (less than 1:4 as long as wide)
  - 1: Long (1:2 as long as wide)
29. Labrum apical margin.
  - 0: Smooth and rounded
  - 1: Indented at middle
  - 2: Rounded and serrate
  - 3: Sinuate at middle
30. Labral apical fringe of setae.
  - 0: With fine setae densely arranged
  - 1: With fine setae sparsely arranged
  - 2: With thick setae sparsely arranged
31. Labium: apex of mentum.
  - 0: Rounded
  - 1: Slightly indented
  - 2: Deeply indented
32. Labium: surface of mentum.
  - 0: Smooth
  - 1: Sculptured

33. Labial palps.  
0: with 4 palpomeres  
1: with 3 palpomeres

**Pronotum:**

34. Pronotal form on dorsum.  
0: Evenly convex  
1: Flat  
2: Convex, with convexity accentuated on apex
35. Pronotal basal bead.  
0: Lacking  
1: Incomplete  
2: Complete and thin (less than 0.3 mm)  
3: Complete and wide (wider than 0.3 mm)
36. Pronotal apical bead.  
0: Absent  
1: Present
37. Pronotal flattened lateral projections.  
0: Absent  
1: Present
38. Pronotal anterior angles.  
0: Rounded  
1: Subacute (between 60° and 90° angle)  
2: Acute (45° angle)  
3: Acuminate (less than 45° angle)
39. Pronotal lateral margin.  
0: Smooth  
1: Denticulate, serrate
40. Pronotal setae on lateral margin.  
0: Without setae  
1: With dense setae  
2: With setae arising between teeth  
3: With sparse setae
41. Pronotal posterior margin.  
0: Rounded  
1: Produced at middle  
2: Sinuous
42. Pronotal disc punctures.  
0: Absent  
1: Small  
2: Large  
3: Areolar
43. Pronotum with net-like sculpture.  
0: Absent  
1: Present
44. Pronotal posterior triangular projection.  
0: Absent  
1: Present, well-developed, without medial groove  
2: Present, poorly developed, without medial groove  
3: Present, well-developed, with medial groove
45. Pronotum with basomedial, large depression.  
0: Absent  
1: Present
46. Pronotal basal fovea.  
0: Absent  
1: Present
47. Pronotal discal, longitudinal carinae.  
0: Absent  
1: With 2 incomplete carinae (present on apical half of pronotum)  
2: With 2 complete carinae  
3: With 4 complete carinae
48. Pronotal marginal carina.  
0: Absent  
1: Present
49. Pronotal posterior angles.  
0: Rounded  
1: Right  
2: Acute
50. Pronotal disc setae.  
0: Absent  
1: Sparsely setose  
2: Densely setose

**Scutellum:**

51. Scutellum shape.  
0: Triangular  
1: Subtriangular
52. Scutellum width.  
0: Wider than long  
1: Longer than wide
53. Scutellum apex.  
0: Rounded  
1: Pointed
54. Setae on scutellum.  
0: Present  
1: Absent

**Elytra:**

55. Elytral disc: form.  
0: Convex  
1: Flat
56. Elytron with 10, 12, or -13 well-defined striae.  
0: Absent  
1: Present
57. Elytral carinae.  
0: Absent  
1: Present
58. Elytral disc with marginal carinae from humerus to declivous area.  
0: Absent  
1: Present
59. Elytral disc with 2 central carinae.  
0: Absent  
1: Present

60. Elytral disc with 1 lateral carina.  
0: Absent  
1: Present
61. Elytral disc costate.  
0: Absent  
1: Present
62. Elytron with basocentral, elongated tubercle between humerus and suture.  
0: Absent  
1: Present
64. Elytron with basolateral tubercle between humerus and suture.  
0: Absent  
1: Present
64. Elytral disc with tubercles.  
0: Absent  
1: Present
65. Elytral surface.  
0: Smooth  
1: With punctures  
2: With variable sculpture
66. Elytron with chain-like sculpturing.  
0: Absent  
1: Present
67. Elytron with areolar sculpture.  
0: Absent  
1: Present, not dense (not net-like)  
2: Present, dense (net-like)
68. Elytral disc: setae.  
0: Present  
1: Absent
69. Elytral tubercles on declivous area.  
0: With 1 tubercle  
1: With 2 tubercles  
2: With 3 tubercles  
3: Without tubercles
70. Elytral disc with small, aligned tubercles.  
0: Absent  
1: Present
71. Elytral humeral tooth.  
0: Absent  
1: Present
72. Elytral epipleuron at base.  
0: Exposed  
1: Not exposed
73. Elytral epipleuron: form.  
0: Incomplete  
1: Complete, tapered toward apex  
2: Complete, twisted  
3: Complete, equal in width, not twisted  
4: Complete, wider at apex, not twisted
75. Prosternum.  
0: Bi-concave  
1: Simple  
2: Tetra-concave
76. Prosternal shield (process).  
0: Not developed  
1: Poorly developed  
2: Well-developed, perpendicular to plane of body  
3: Well-developed, posterior process, directed posteriorly
77. Mesosternal posterior process.  
0: Invaginated  
1: Not invaginated
78. Metasternum at middle.  
0: Long  
1: Short
79. Metasternum with cross-like sculpture on medial suture.  
0: Absent  
1: Present
80. Abdominal sternites.  
0: With posterior margin sclerotized and slightly reflexed  
1: With posterior margin not sclerotized and not reflexed

**Legs:**

81. Procoxa apex.  
0: Globose  
1: Flattened
82. Procoxa.  
0: Subdivided on apical half  
1: Not subdivided on apical half
83. Metatrochanter.  
0: With apical tooth  
1: Without apical tooth
84. Meso- and metafemoral surface.  
0: Entirely strigulate  
1: Entirely smooth  
2: Strigulate on posterior half only
85. Protibial denticles on external margin.  
0: Absent  
1: 9 or more, perpendicular  
2: 2-6, oriented toward apex  
3: 7 or more, oriented toward apex
86. Protibial teeth at base.  
0: Not united  
1: United
87. Protibial teeth.  
0: Basal and medial teeth triangular, apical tooth not triangular  
1: All teeth not triangular
88. Protibia with 2 dorsal carinae.  
0: Absent  
1: Present

**Venter:**

74. Venter sculpture.  
0: Smooth  
1: Strigulate

89. Protibia with denticles between medial and basal teeth.  
0: Absent  
1: Present
90. Mesotibial transverse carina.  
0: Absent  
1: Poorly developed  
2: Well-developed
91. Meso- and metatibial shape.  
0: Triangular  
1: Not triangular
92. Meso- and metatibial apex.  
0: Not expanded  
1: Slightly expanded  
2: Distinctly expanded
93. Metatibial transverse carina.  
0: Absent  
1: Poorly developed  
2: Well-developed
94. Metatibial spine.  
0: Absent  
1: Present  
2: Present, developed as a furcal process
95. Male protibial spur.  
0: Not curved at apex  
1: Curved at apex
96. Male external mesotibial spur.  
0: Present  
1: Present, reduced  
2: Absent, obsolete, or fused with tibial apex
97. Meso- and metatibial spurs.  
0: Simple (with apex acute)  
1: Shovel-like
98. Mesotibia with apical spine.  
0: Absent  
1: Present  
2: Present, bifid
99. Ventral position of protibial tarsus.  
0: At or apical of second tooth  
1: Basal of second tooth
100. Male protarsomere 1.  
0: As long as 5  
1: Shorter than 5 (but developed)  
2: Longer than 5  
3: Shorter than 5 (1/4 as long as 5)
101. Protarsomeres 2-4.  
0: Subglobose  
1: Elongated (twice as long as wide)  
2: Slender (more than twice as long as wide)
102. Protarsal claws at apex.  
0: Without split (simple)  
1: With split on median claw
103. Metatarsomere 1.  
0: Long (longer than metatarsomere 2)  
1: Short (as long or shorter than metatarsomere 2)
- Hind wing:**
104. Hind wing with M-Cu loop.  
0: Absent  
1: Present
105. Hind wing MP3 vein.  
0: Present  
1: Absent
106. Hind wing MP4 vein.  
0: Present  
1: Absent
107. Hind wing MP3 and MP4 fused.  
0: Present  
1: Absent
108. Hind wing RA4 short, contacting or close to RP1.  
0: Absent  
1: Present, continuous, fused  
2: Present, discontinuous, not fused
109. Hind wing secondary ghost branches.  
0: Absent  
1: Present
110. Hind wing covered with setae.  
0: Absent  
1: Present
111. Hind wings.  
0: Fully developed  
1: Highly reduced, obsolete
- Male genitalia:**
112. Male genitalia.  
0: Symmetrical  
1: Asymmetrical
113. Male genitalia with posteromedial extensions.  
0: Absent  
1: Present
114. Male genitalia: lateral projections of phallobase.  
0: Absent  
1: Present, well-developed  
2: Present, poorly developed
115. Parameres with apicolateral process.  
0: Absent  
1: Present
116. Parameres bilobed.  
0: Absent  
1: Present
117. Parameres reduced to two small, flat plates.  
0: Absent  
1: Present

## RESULTS

For the parsimony analyses all characters were run unordered and (initially) equally weighted. The character matrix was analyzed with PAUP\* using a heuristic search. The initial search yielded 10 most equally parsimonious trees (Length: 319). After the initial heuristic search, characters were reweighted in PAUP\* according to a rescaled consistency index (RC), and successive weighting (Farris 1969) was applied. After characters were reweighted, a new heuristic search was performed. Stability was reached after two iterations. The successive weighting yielded 18 trees (Length 131.05, CI: 0.659, RI: 0.895, and RC: 0.590). The selected topology is shown in Fig. 3. The consistency index (CI) and retention index (RI) obtained for the trees are consistent with a matrix of this size, and the CI: 0.659 is above the expected for a data set of 41 taxa according to the polynomial regression analysis of empirical data by Sanderson and Donoghue (1989). This indicates that homoplasy is not a major concern with the matrix and character weights used in the analysis, and the characters in general support monophyletic clades. Bootstrap supports above 50% are shown on the consensus tree (Fig. 4).

The result of the phylogenetic analysis (MP) of the tribe Anaidini suggests that the group is monophyletic (Fig. 3 and Fig. 6, node A). The analysis also supports the monophyly of all Anaidini genera: *Anaides*, *Callosides*, *Chaetodus*, *Cryptogenius*, *Hybochaetodus*, and *Totoia* (Fig. 3, nodes A-G). The tribe Anaidini is monophyletic based on five synapomorphies: mandibular shape at base, in lateral view thick (character 26: 1); labium with mentum apex deeply indented (character 31: 2); pronotal anterior angles acute (45° angle) (reversed in *Anaides simplicicollis* Bates) (character 38: 2); elytral carinae present (reversed in *Chaetodus* subgenus *Chaetodus*) (character 57: 1); and metasternum with cross-like sculpture on medial suture (character 79: 1).

The clade composed of *Liparoehrus* + *Antioehrus* is the sister group of the Ceratocanthidae (Fig. 3, node 1). The clade (*Liparoehrus* + *Antioehrus*) + Ceratocanthidae is

the sister group of the Anaidini (Fig. 3, node 2). This is consistent with my results of phylogenetic analyses obtained based on molecular data (see phylogenetic analysis of the family Hybosoridae (this work)) (Figs. 1-2).

The genus *Hybochaetodus* is the sister taxon of the remainder of the Anaidini (Fig. 3 node H). This node is supported by three unambiguous synapomorphies: antennal club with first segment externally tomentose (character 3: 1); pronotal posterior margin irregular, produced at middle (character 41: 1); and elytral epipleuron complete, equal in width from base to apex, not twisted (modified in *A. onofrii*) (character 73: 3). The genus *Chaetodus* is the sister taxon of the clade composed by (*Totoia* ((*Callosides* + *Cryptogenius*) + *Anaides*)) (Fig. 3, node I). This clade is supported by four unambiguous synapomorphies: eye canthus with a ridge or thickening (character 8: 0); clypeus and frons with areolar punctures (character 14: 1); pronotum with net-like sculpture (reversed in *A. simplicicollis*) (character 43: 1); and basal metatarsomere short (character 103: 1). *Totoia* is the sister taxon of the clade composed by *Callosides* + *Cryptogenius* and *Anaides* (Fig. 3, node J). The clade is supported by one unambiguous synapomorphy: pronotum with posterior triangular projection well-developed (character 44: 1). The genera *Callosides* and *Cryptogenius* are sister taxa based on four unambiguous synapomorphies (Fig. 3, node K): mandibular molar area with mycangium (character 27: 1); labral apical margin medially sinuate (character 29: 3); metatrochanter without apical tooth (character: 83: 1); and protibial teeth united at bases (character 86: 1). The synapomorphies supporting the monophyly of each genus are listed in the generic synopses.

## DISCUSSION

Nikolajev (1996) erected the tribe Anaidini primarily for the fossil genus *Cretanaides* Nikolajev. He mentioned *Anaides laticollis* Harold as the extant member of the tribe but did not include a formal description



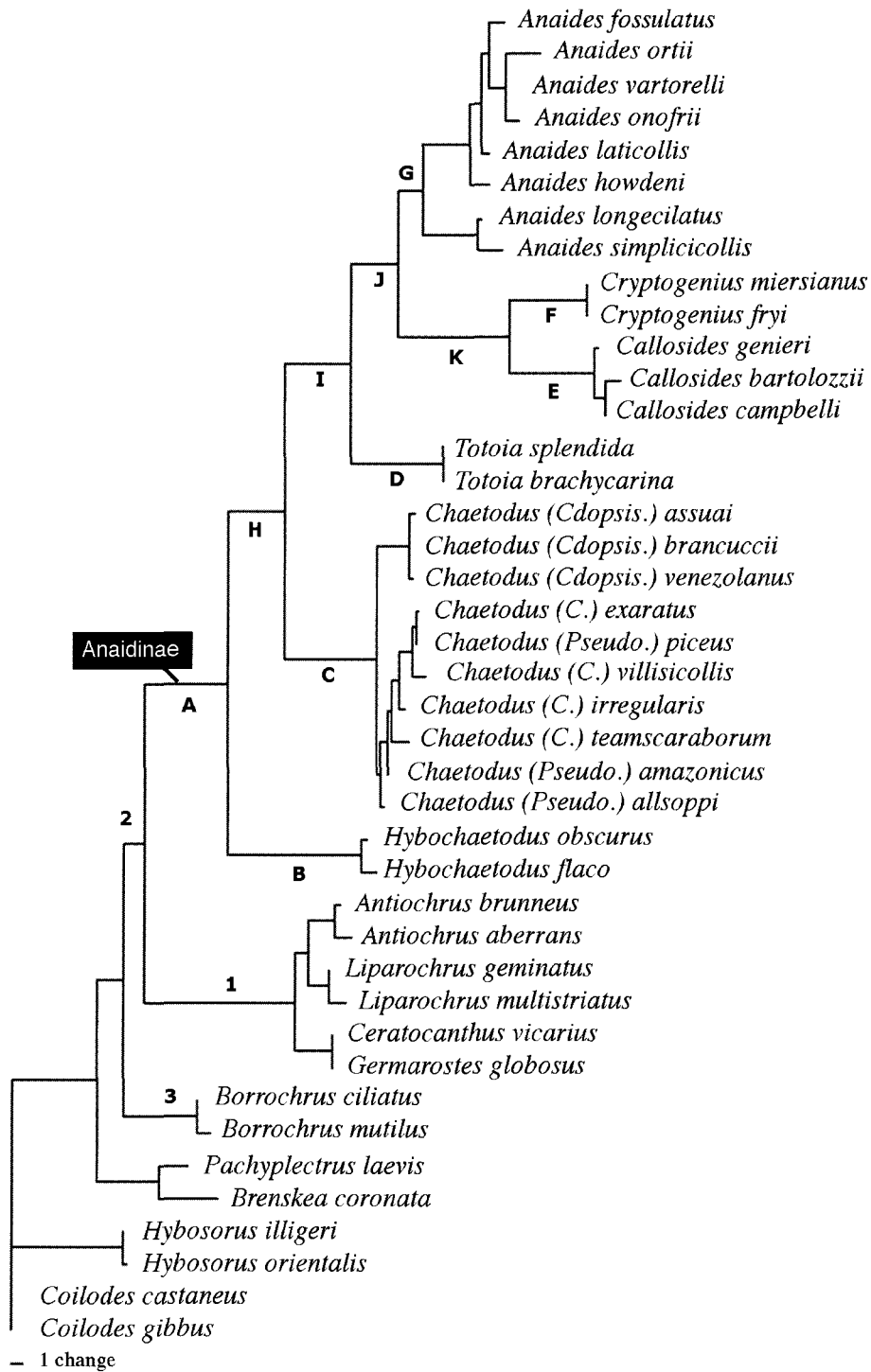


Fig. 3. Maximum parsimony tree of the tribe Anaidini based on 117 morphological characters. This is one of 18 most parsimonious trees. Tree length 131.05 CI: 0.659, RI: 0.895, and RC: 0.590.

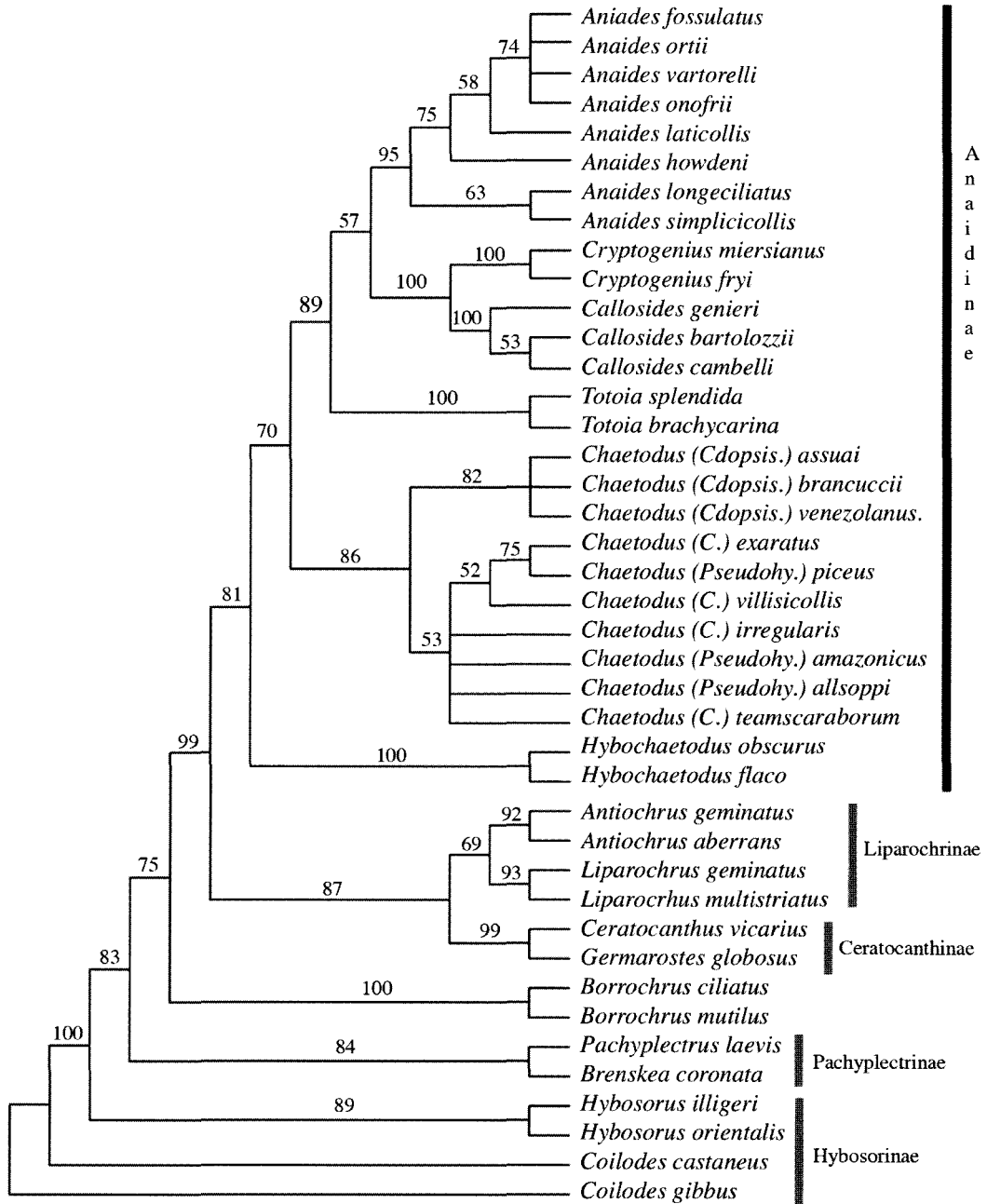


Fig. 4. Strict consensus tree of 18 MP trees based on 117 morphological characters. Bootstrap values higher than 50% are shown on top of branches. This tree shows the new higher classification proposed for the Hybosoridae.

of the group. Later, Nikolajev (1999) provided a short description of the Anaidini, and he placed three genera in the tribe: *Anaides*, *Cryptogenius*, and *Callosides* (a fourth genus included *Cremastochilodius* Krikken is a junior synonym of *Cryptogenius* Westwood). Howden (2001) noticed that neither *Callosides* nor *Cryptogenius* fit in Nikolajev's description of Anaidini, and he described the tribe Cryptogeniini (Hybosoridae) for these two genera. In his description, Howden mentioned that *Anaides* "is probably the genus most closely related to Cryptogeniini." In their analysis of the systematic position of the genus *Cryptogenius*, Scholtz *et al.* (1987) also mentioned that *Cryptogenius* is closely related to *Anaides*. My phylogenetic analysis of Anaidini supports the hypotheses of Howden (2001) and Scholtz *et al.* (1987) and places *Anaides* as the sister taxon of *Cryptogenius* + *Callosides*. Howden, based on Nikolajev's description of the group, also suggested that *Chaetodus* Westwood should be placed with the anaidines, and this is also supported by my phylogenetic analysis. Paulian and Cambefort (1995) considered that the genus *Daimothoracodes* Petrovitz might be related to *Cryptogenius* and *Callosides*. Howden (2001) disagreed with this and suggested that *Daimothoracodes* should be placed with the "more typical" New World hybosorid genera (Hybosorinae) or assigned to a separate tribe. This genus was not included in my analysis, and it is considered as *incertae sedis* in this work. Martínez (1988, 1994) divided the genus *Chaetodus* in four subgenera: *Borrochrus* Allsopp, *Chaetodus* Westwood, *Chaetodopsis* Martínez, and *Pseudohybosorus* Endrödi. As a result of my phylogenetic analysis, one subgenus of *Chaetodus*, *Borrochrus* Allsopp, is neither a member of the genus *Chaetodus* nor of the tribe Anaidini (Fig. 3, node 3). Because this genus does not fit in any of the subfamily descriptions presented in this work, and because my analysis included only two genera of the subfamily Hybosoridae, I do not have enough evidence to place it in any hybosorid subfamily. Thus, I consider *Borrochrus* as *incertae sedis*.

According to my phylogenetic analysis, the subgenera *Chaetodus* (*Chaetodus*) and *Chaetodus* (*Pseudohybosorus*) are polyphyletic (see the *Chaetodus* revision for a new classification proposed for this genus and its subgenera). Martínez (1988, 1994) established *Chaetodus* subgenera based on the number of elytral striae. In my phylogenetic analysis, this character is highly homoplastic, and apparently the condition of having 10, 12, or 13 elytral striae evolved many times within the genus *Chaetodus*.

### Higher Classification of the Hybosoridae

Based on the molecular phylogenetic analyses of Hybosoridae by Ocampo and Hawks (Figs. 1-2, 5) and the phylogenetic analysis of the Anaidini based on morphological data (Figs. 3, 4), the higher classification of the family is revised.

### FAMILY HYBOSORIDAE ERICHSON, 1847

The tribes Thinorycterini Semenov and Reichardt (Scarabaeidae: Aphodiinae) and Dynamopodini Arrow (Scarabaeidae: Dynamopodinae) were considered as members of the family Hybosoridae by Nikolajev (1999). However, they are not included in this work, since I did not find character-based justification to place these taxa within Hybosoridae.

The description of the family Hybosoridae is derived from the combination of the subfamily descriptions provided herein.

### SUBFAMILY ANAIDINAE NIKOLAJEV, 1996 NEW STATUS

(Figs. 6, 8-76)

Cryptogeniinae Howden, 2001. **New synonym.** Type genus: *Anaides* Westwood, 1845.

**Description.** Length 2.0-14.0 mm. Shape variable. Color brown, black, or reddish

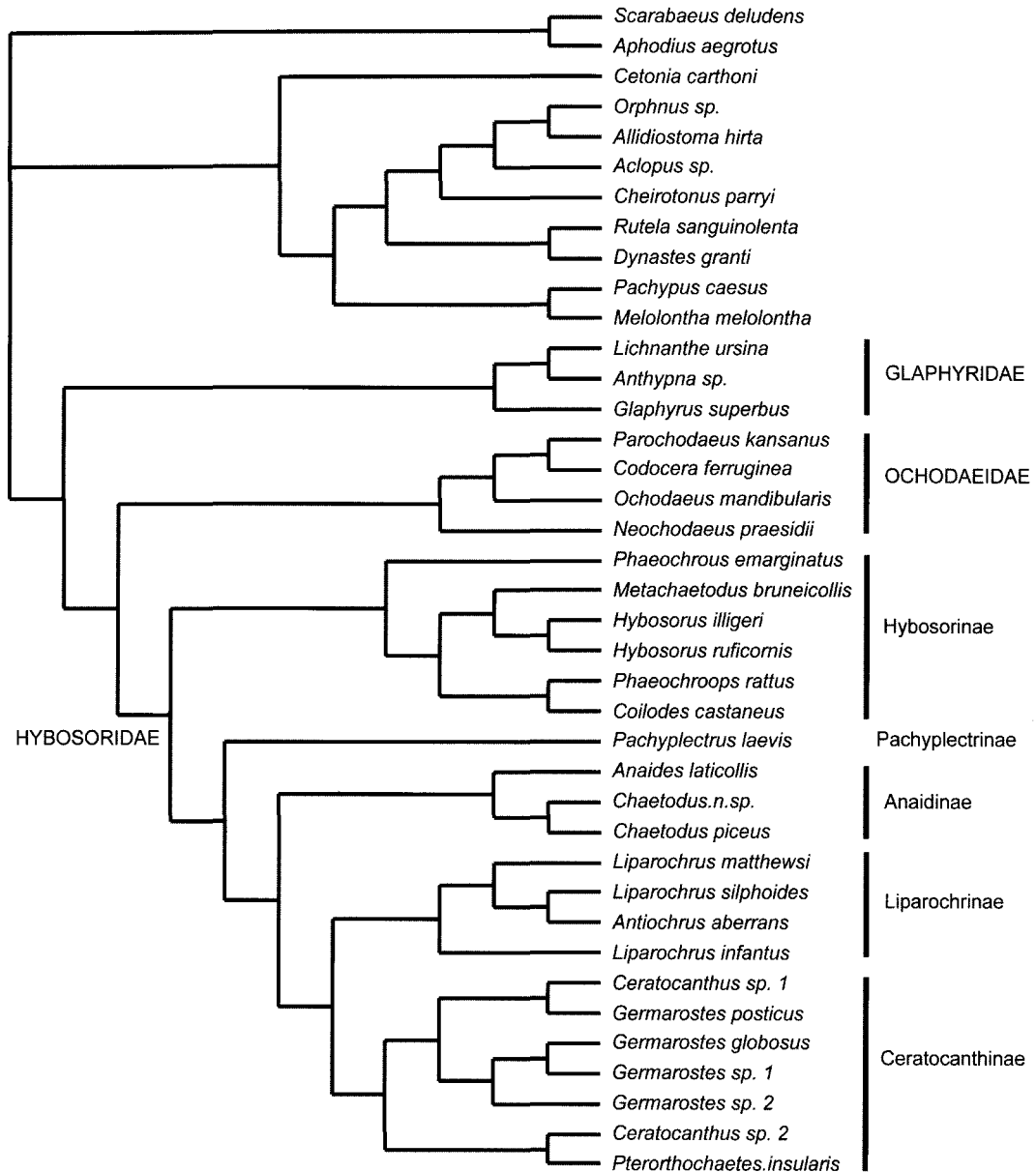


Fig. 5. Maximum parsimony (MP) cladogram based on molecular data. (from Ocampo and Hawks, this work) showing the proposed classification for the family Hybosoridae.

brown. Head not deflexed. Antennae 10-segmented with 3-segmented, opposable club; club oval, first segment cupuliform or not. Eye canthus variably developed. Eyes developed. Labrum produced beyond apex of clypeus, prominent. Mandibles produced

beyond apex of labrum, thick at base, apex pointed, external surface generally sculptured. Maxillae with 4-segmented palpi; labium with apex indented, with 4-segmented palpi (rarely 3-segmented). Pronotum convex or flat, generally sculptured or punctate;



Fig. 6. Habitus of a new species of the genus *Totoia*.

base sinuous or with triangular projection. Scutellum exposed, triangular. Elytra convex or flat, generally sculptured, striae well-defined. Pygidium concealed by elytra. Hind wings well-developed or reduced, with M-Cu loop present or absent, MP3 vein present, and MP4 vein present or absent. Venter with sculpturing strigulate or vermiculate. Prosternum bi-concave. Mesosternum not invaginated. Abdomen with 5-6 free sternites (first sternites obscured by hind coxae except lateral edges) and 8 functional spiracles; spiracles 1-7 situated on pleural membrane, spiracle 8 situated in tergite. Protibiae with 2 or 3 teeth. Meso- and metatibia without transverse carinae. Tarsi 5-5-5. Ventral position of protarsi at or apical of second tibial

tooth. Tarsal claws simple. Male genitalia symmetrical (rarely slightly asymmetrical).

**Composition.** The subfamily Anaidinae includes seven genera (one fossil) and 57 species (two fossil).

**Distribution.** Neotropical; subregions Caribbean, Amazonica, and Chaqueña. The fossil genus *Cretanaides* Nikolajev is from the Cretaceous of Siberia.

**Natural history.** Adults feed primarily on dung and carrion, and some species feed on fungi. Most species are attracted to lights.

**SUBFAMILY  
CERATOCANTHINAE  
MARTÍNEZ, 1968**

Acanthoceridae Lacordaire, 1856 (synonym). Type genus *Ceratocanthus* White, 1842 (= *Acanthocerus* MacLeay, 1819 not *Acanthocerus* Palisot de Beauvois, 1818).

**Description.** Length 2.0-10.0 mm. Shape variable, generally globose or nearly spherical when head and pronotum deflexed. Color generally black, greenish black, or purplish, often with metallic luster. Head deflexed. Antennae 8, 9 or 10-segmented, with 3-segmented, opposable club; club oval or elongate, first segment not cupuliform. Eye canthus developed. Eyes developed. Labrum partially exposed beyond apex of clypeus, prominent. Mandibles partially exposed beyond apex of clypeus. Maxillae with 4-segmented palpi, labium with apex not indented, with 4-segmented palpi. Pronotum generally convex, smooth or punctate; base sinuous or rounded or (rarely) other shape. Scutellum exposed, triangular. Elytra convex, generally punctate, striae well-defined or not. Pygidium concealed by elytra (not in Scarabatermitini). Hind wings well-developed or reduced, with M-Cu loop present or not, MP3 and MP4 veins present or absent. Venter with surface generally smooth, sometimes vermiculate. Prosternum bi-concave. Mesosternum not invaginated. Abdomen with 5 free sternites and 8 functional spiracles; spiracles 1-7 situated on pleural membrane, spiracle 8 situated in tergite. Protibiae with 2 or 3 teeth. Meso- and metatibiae without transverse carinae. Metatibia generally expanded at the apex. Tarsi 5-5-5. Ventral position of protarsi basad to the second tibial tooth. Tarsal claws simple. Male genitalia symmetrical or not.

**Composition.** The subfamily Ceratocanthinae includes three tribes, 40 genera, and 328 species.

**Distribution.** Australian, Afrotropical, Indomalaysian, Neotropical, Nearctic, and Palearctic regions.

**Natural history.** Adults can be collected on the bark and branches of dead trees and on fungi. Adults have also been found in association with termites and ants and adults are occasionally attracted to lights. Most species are able to deflex their head and pronotum, thus forming a ball. This behavior probably helps them to avoid predators. Adults probably feed on fungi or rooting wood. Larvae have been collected under bark and in burrows of Passalidae (Coleoptera: Scarabaeoidea) (Jameson 2002). Adults and larvae of some species stridulate.

**SUBFAMILY HYBOSORINAE  
ERICHSON, 1847**

(Figs. 7a-b)

Type genus: *Hybosorus* MacLeay, 1819.

**Description.** Length 2.0-15.0 mm. Shape variable, generally rounded. Color brown, black, or reddish brown. Head not deflexed. Antennae 10-segmented (rarely 9-segmented), with 3-segmented, opposable club; club oval or elongate, first segment cupuliform or not. Eye canthus developed. Eyes developed. Labrum produced beyond apex of clypeus, prominent. Mandibles produced beyond apex of labrum, prominent, external edge rounded at base, apex pointed, external surface generally not sculptured. Maxillae with 4-segmented palpi, labium with apex not indented, with 4-segmented palpi. Pronotum convex, generally punctate, base sinuous or rounded. Scutellum exposed, triangular. Elytra convex, generally punctate, striae well-defined. Pygidium concealed by elytra. Hind wings well-developed or reduced, with M-Cu loop present, MP3 and MP4 veins present. Venter with surface generally smooth, sometimes vermiculate. Prosternum bi-concave. Mesosternum invaginated. Abdomen with 5-6 free sternites and 8 functional spiracles, spiracles 1-7 situated on pleural membrane, spiracle 8 situated in tergite. Protibiae with 2 or 3 teeth. Meso- and metatibia with or without transversal carinae. Tarsi 5-5-5. Ventral position of protarsi at or apical to the second tibial tooth. Tarsal claws simple or complex (toothed or with ventral split). Male genitalia asymmetrical.

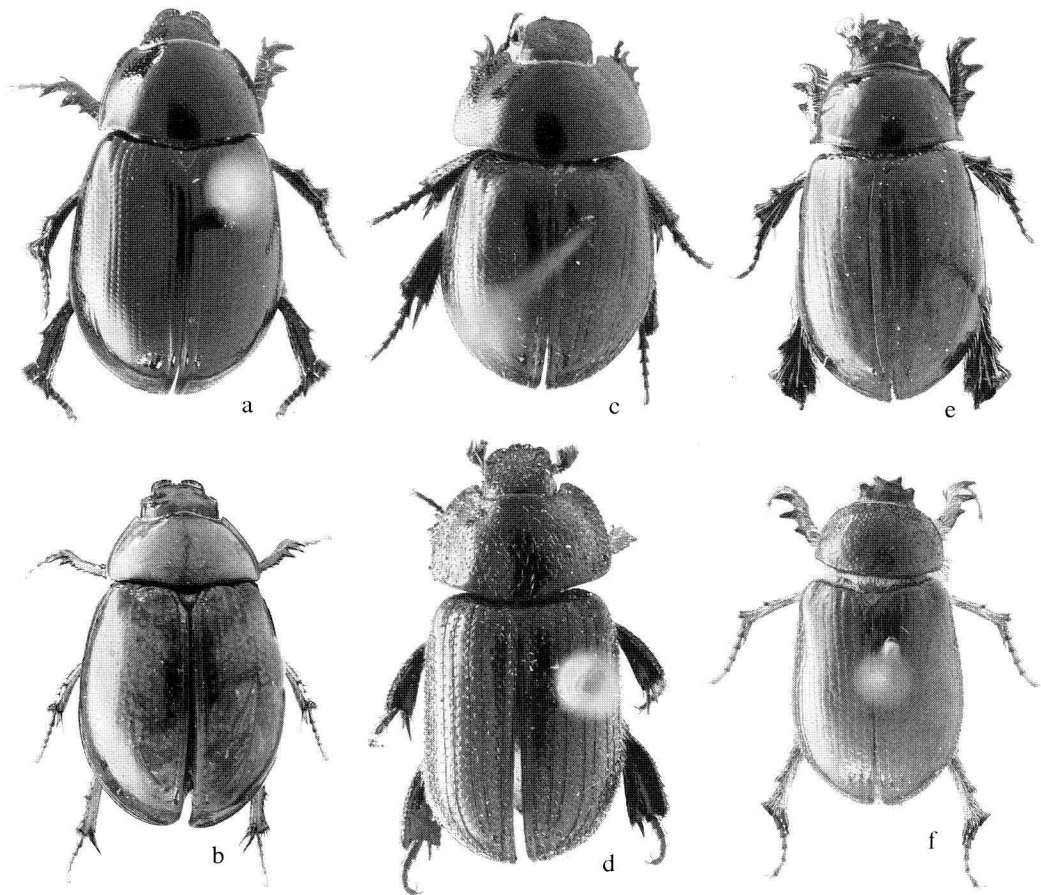


Fig. 7. a-b) Hybosorinae: a) *Hybosorus illigeri* Reiche, b) *Coilodes castaneus* Westwood, c-d) Liparochrinae: c) *Liparochrus geminatus* Westwood, d) *Antiochrus brunneus* Sharp, e-f) Pachyplectrinae: e) *Pachyplectrus laevis* LeConte, f) *Brenskeia coronata* Reitter.

**Composition.** The subfamily Hybosorinae includes 24 genera (four fossil) and 132 species (five fossil).

**Distribution.** Australian, Afrotropical, Indomalaysian, Neotropical, Nearctic, and Palaearctic regions.

**Natural history.** Adults feed primarily on dung and carrion, and one species is known to be predaceous (*Hybosorus illigeri*) (Rozas *et al.* 1991; Ocampo 2002). Most species are attracted to lights. Larvae have been collected in decomposed plant material and associated with roots. Larvae of some species stridulate.

### SUBFAMILY LIPAROCHRINAE OCAMPO, NEW SUBFAMILY

(Figs. 7c-d)

Type genus: *Liparochrus* Erichson, 1848. Here designated.

**Description.** Length 2.0-17.0 mm. Shape variable, generally globose and nearly spherical when head and pronotum deflexed. Color black, brown, or reddish brown. Head partially deflexed. Antennae 10-segmented, with 3-segmented, opposable club; club oval, first segment cupuliform. Eye canthus variably developed. Eyes developed. Labrum exposed beyond apex of clypeus, prominent.

Mandibles partially exposed beyond apex of clypeus. Maxillae with 4-segmented palpi, labium with apex not indented, with 4-segmented palpi. Pronotum convex, smooth or punctate, base sinuous or rounded. Scutellum exposed, triangular. Elytra convex, generally punctate, striae well-defined or not. Pygidium concealed by elytra. Hind wings well-developed or reduced, with M-Cu loop present, MP3 and MP4 veins present. Venter with surface generally vermiculate. Prosternum bi-concave. Mesosternum not invaginated. Abdomen with 5 free sternites and 8 functional spiracles, spiracles 1-7 situated on pleural membrane, spiracle 8 situated on tergite. Protibiae with 2 or 3 teeth. Meso- and metatibiae without transversal carinae. Metatibia occasionally expanded. Tarsi 5-5-5. Ventral position of protarsi at or basal to second tibial tooth. Tarsal claws simple or complex. Male genitalia distinctly asymmetrical.

**Composition.** The subfamily Liparochrinae includes two genera and 48 species.

**Distribution.** Australian and Indomalaysian regions. Most species are from humid areas of Queensland and the Northern Territory in Australia.

**Natural history.** Adults feed on carrion and dung. A few species were collected on fruits (Paulian 1980). Larvae are unknown.

#### SUBFAMILY PACHYPLECTRINAE OCAMPO, NEW SUBFAMILY

(Figs. 7e-f)

Type genus: *Pachyplectrus* LeConte, 1874. Here designated.

**Description.** Length 4.0-11.0 mm. Shape rounded. Color brown. Head not deflexed. Antennae 10-segmented, with 3-segmented, opposable club; club oval, first segment cupuliform. Eye canthus developed. Eyes developed. Labrum produced beyond apex of clypeus, prominent. Mandibles produced beyond apex of labrum, prominent, external

edge rounded at base, apex pointed, external surface not sculptured. Maxillae with 4-segmented palpi, labium with apex not indented, with 4-segmented palpi. Pronotum convex, smooth or punctate; base rounded. Scutellum exposed, triangular. Elytra convex, smooth punctate, striae well-defined or not. Pygidium concealed by elytra. Hind wings well-developed, with M-Cu loop present, MP3 and MP4 veins present. Venter with surface smooth. Prosternum tetra-concave. Mesosternum not invaginated. Abdomen with 5 free sternites and with 8 functional spiracles; spiracles 1-7 situated on pleural membrane, spiracle 8 situated on tergite. Protibiae with 3 teeth. Meso- and metatibia with well-developed transversal carinae. Tarsi 5-5-5. Ventral position of protarsi apical of second tibial tooth. Tarsal claws simple. Male genitalia symmetrical.

**Composition.** The subfamily Pachyplectrinae, includes two genera and three species.

**Distribution.** Nearctic and Palaearctic regions.

**Natural history.** Species of Pachyplectrinae occur in dry, sandy areas. Adults of *Pachyplectrus laevis* LeConte were found under carrion and owl pellets (Ocampo 2002). Adults of *Brenskea* Reitter are attracted to lights. Larvae are unknown.

#### PHYLOGENETIC TRENDS IN THE FAMILY HYBOSORIDAE

Hybosoridae is a heterogeneous group of scarabs. Previous attempts to establish the evolutionary trends in the family Hybosoridae mostly failed because of the high diversity of the group, and because most of these attempts included too few taxa to analyze comprehensively. None of the previous interpretations of the phylogenetic trends in the family Hybosoridae are based on a phylogenetic analysis.

**Antennae:** Based on my phylogenetic analyses, I hypothesize that the ancestral condition is 10-segmented. Ten-segmented antennae



are present in almost all Hybosorinae (9-segmented in *Metachaetodus* de Borre), in all Pachyplectrinae, and Liparochrinae. The Ceratocanthinae possess 8-, 9-, or 10-segmented antennae. I consider 8- and 9-segmented antennae to be secondary reductions. The 3-segmented antennal club, with the first antennal club cupuliform is a basal synapomorphy shared with some Ochodaeidae; this condition is reversed independently several times in different Hybosoridae (*i.e.*, Ceratocanthinae, some species of *Apalonychus* [Hybosorinae] and *Anaides* [Anaidinae]). The 3-segmented antennal club, with the first antennal club cupuliform, is commonly used to diagnose members of this family, but it is not a completely reliable character since many exceptions are found.

**Legs:** I hypothesize that meso- and metatibiae with a single transverse carinae, to be the ancestral condition of Hybosoridae. This trait is present in most Hybosorinae (sometimes reduced, *i.e.*, some species of *Phaeocrhoops* Candèze and *Dicraeodon* Erichson), and in the Pachyplectrinae, but it is absent in the Anaidinae, Liparochrinae, and Ceratocanthinae. Based on my phylogenetic analyses, the position of the protarsus at or apical to the second tibial tooth is considered the primitive condition in the family Hybosoridae, and it is present in all hybosorids except the Ceratocanthinae. In the Ceratocanthinae, the position of the protarsus is basal to the second tibial tooth (Howden and Gill 2000). Simple tarsal claws, without a split or basal tooth, is considered the primitive condition of the family. Complex tarsal claws are found in several species of Hybosorinae and in the Liparochrinae. According to my phylogenetic analyses, this condition is derived and most probably evolved independently in these groups.

**Venter:** Based on my phylogenetic analyses, the presence of a mesosternal posterior process that is invaginated between the mesocoxae is derived, and it is a synapomorphy of the Hybosorinae. All other subfamilies have the mesosternal process not invaginated between the mesocoxae.

**Male genitalia:** My phylogenetic analyses suggest that symmetrical male genitalia is the plesiomorphic condition of the family. Asymmetrical parameres are present in the Hybosorinae and in Liparochrinae. In both subfamilies, the evolution of asymmetrical genitalia is considered apomorphic. Scholtz (1990), based on male genitalia and mouthparts, proposed the division of the family into Old and New World lineages. This hypothesis is not supported by the results of my phylogenetic analyses, which suggest that asymmetrical genitalia appeared at least twice in hybosorid evolution.

**Hind wing:** Based on my phylogenetic analyses, the hind wing with the M-Cu loop present is plesiomorphic in the Hybosoridae. It is present in most Hybosorinae (with a few exceptions, mostly due to secondary reduction in small species), in the Anaidinae (absent in *Totoia* Ocampo and *Callosides* Howden), in the Pachyplectrinae, and in the Liparochrinae, but it is absent in most of the Ceratocanthinae.

**Biology:** Adults of Hybosoridae feed primitively on humus, carrion, or dung. This condition is primitive and present in all groups except the Ceratocanthinae. Ceratocanthines often feed on fungi and many are found in ant and termite nests. In the subfamily Hybosorinae, some species are known to be predators of other insects (*i.e.*, *Hybosorus illigeri* Reiche), and some Anaidinae presumably feed on fungi (*Cryptogenius* Westwood and *Callosides*) (Howden 2001). Based on my phylogenetic analyses, in adult hybosorids, predation behavior and fungus feeding are derived feeding habits.

The ability to roll into a ball is characteristic of members of Ceratocanthinae, some Liparochrinae, and a few species of Hybosorinae. My phylogenetic analyses suggest that the ability to roll into a ball is a derived condition. The presence of this character is reversed in some Ceratocanthinae such as in the tribes Scarabatermini Nikolajev and Ivieolini Howden and Gill (Ceratocanthinae).

## PHYLOGENETIC TRENDS IN THE SUBFAMILY ANAIDINAE

The Anaidinae is a relatively homogeneous group of hybosorids, with all extant species living in the New World.

**Mouthparts:** Most anaidines, *Anaides*, *Chaetodus*, *Hybochaetodus*, and *Totoia*, have the typical mandibles extending beyond the margin of the labrum. *Cryptogenius* and *Callosides* have the mandibles not extended beyond the labrum. Based on my phylogenetic analysis, this condition is a derived character in the subfamily.

**Pronotum and elytron:** The pronotal and elytral sculpturing is relatively complex in

the subfamily. The presence of pronotal and elytral carinae and tubercles is distinctive in the four apical genera in the phylogenetic tree (Figs. 5, 6): *Totoia*, *Cryptogenius*, *Callosides*, and *Anaides*.

**Legs:** In all genera of Anaidinae, with the exception of the genus *Anaides*, males have the external mesotibial spur reduced. In *Anaides* species (except *A. rugosus*), males have the external mesotibial spur absent. I consider this character state derived.

**Biology:** Most species of Anaidinae are known to feed on dung and carrion. Species of *Callosides* and *Cryptogenius* feed on fungi, a condition that I consider derived in the subfamily based on my phylogenetic analyses.

## TAXONOMIC REVISION OF THE GENERA OF ANAIDINAE NIKOLAJEV, 1996

*Nomina si nescis, perit et cognition rerum.*

*If you don't know the names, your knowledge of the things perishes.*

—Carl Linnaeus, *Critica Botanica* No. 210, 1737

### Key to Genera of Anaidinae

1. Elytral disc nearly flat, sides separated from disc by strong carina . . . . . 2
- 1'. Elytral disc convex, carina (e) present or not . . . . . 5
2. Head with frontoclypeal juncture not forming a sharp angle (Fig. 8a) . . . . . 3
- 2'. Head with frontoclypeal juncture forming a sharp angle (Fig. 8b) . . . . .  
*Cryptogenius Westwood*
3. Elytra tuberculate. Metathoracic wings not developed or vestigial . . . . . *Callosides Howden*
- 3'. Elytra not tuberculate. Metathoracic wings well-developed . . . . . 4
4. Pronotum with 4 well-developed longitudinal carinae (Fig. 6, 74) . . . . . *Totoia Ocampo*
- 4'. Pronotum with or without 2 longitudinal carinae (Figs. 20, 10) . . . . . *Anaides Westwood*
5. Pronotum with posterior, medial depression. Metasternum short at middle (Fig. 9a)  
 . . . . . *Hybochaetodus Arrow*
- 5'. Pronotum without posterior, medial depression (small fovea may be present). Meta-  
 sternum long at middle (Fig. 9b) . . . . . *Chaetodus Westwood*

### Clave para los Géneros de Anaidinae

1. Disco elitral plano (a casi), lados spearados del disco por una carena bien marcada . . . 2
- 1'. Disco elitral convexo, carena presente o no . . . . . 5
2. Cabeza con la sutura frontoclipeal no formando un ángulo pronunciado (Fig. 8a) . . . 3
- 2'. Cabeza con la sutura frontoclipeal formando un ángulo pronunciado (Fig. 8b) . . . . .  
 . . . . . *Cryptogenius Westwood*
3. Elitros con tubérculos. Alas metatorácicas no desarrolladas o vestigiales . . . . .  
 . . . . . *Callosides Howden*
- 3'. Elitros sin tubérculos. Alas metatorácicas bine desarrolladas . . . . . 4
4. Pronoto con 4 carenas longitudinales bien desarrolladas (Fig. 6, 74) . . . . . *Totoia Ocampo*
- 4'. Pronoto sin carenas o con dos carenas longitudinals (Figs. 20, 10) . . . . .  
 . . . . . *Anaides Westwood*

- 5. Pronoto con depresion basal en al medio. Metaesternio corto en el medio (Fig. 9a) . . . . . *Hybochaetodus* Arrow
- 5'. Pronoto sin depresion basal en al medio (pequeñas foveas pueden estar presentes). Metaesternio largo en el medio. (Fig. 9b) . . . . . *Chaetodus* Westwood

**ANAIDES WESTWOOD, 1845**

(Figs. 6, 9b, 10-27)

*Anaides* Westwood 1845:157.

**Taxonomic history.** The genus *Anaides* was described by Westwood (1845) for one species, *A. fossulatus* Westwood. Since the description of *Anaides*, five other species have been described in the genus. No major work on this genus has ever been conducted, and a key to species had never been published. As defined here, the genus *Anaides* includes 13 species (eight of which are new).

**Type species.** *Anaides fossulatus* Westwood, 1846. by subsequent monotypy.

**Description.** Scarabaeoidea, Hybosoridae, Anaidinae. *Form:* Body elongate, sides subparallel, dorsum convex, elytral apex rounded. *Head:* Surface with numerous small foveae at base, disc and apex areolate-ocellate or rugose. Frons (lateral view) convex at middle. Eye canthus present. Eyes in dorsal view slightly visible (clearly visible in *A. rugosus*). Frontoclypeal suture obsolete. Clypeus with margins reflexed, apex acutely produced or not, vertical surface of apex blunt. Labrum with apex truncate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum, external surface coarsely sculptured. Labium with apex of mentum indented. Antennae 10-segmented. *Pronotum:* Surface convex, areolate-ocellate or punctate, with 2 or no longitudinal carinae. Anterior margin with bead, lateral margins denticulate or smooth, posterior margin with distinctive medial projection. *Scutellum:* Shape subtriangular, apex acute. *Elytron:* Form elongate, convex, surface sculpture variable. Lateral margin with longitudinal carina from humerus to apical declivity. Apical declivity with 1 or

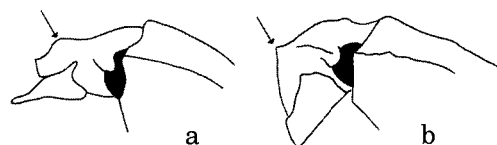


Fig. 8. Lateral view of frons and clypeus of Anaidinae, a) frontoclypeal juncture not forming a sharp angle, b) frontoclypeal juncture forming a sharp angle.

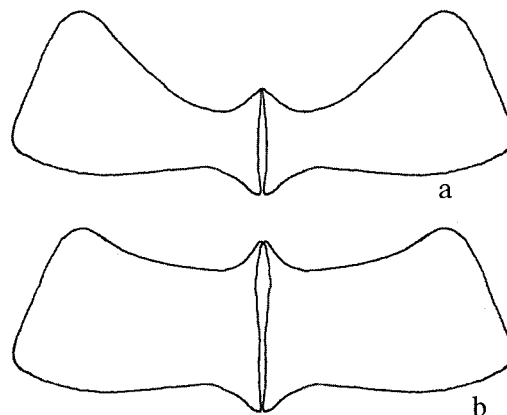


Fig. 9. Metasternum of a) *Hybochaetodus* species and b) *Chaetodus* species.

rarely 2 elongated tubercles. Epipleuron with surface flat. *Hind wing:* Surface covered with microscopic setae; MP3 vein present, MP4 vein present or absent (not fused when both present); RA4 vein present; secondary ghost branches present; M-Cu loop present. *Venter:* Prosternum biconcave. Mesosternal apex not invaginated between mesocoxae. Metasternum long at middle (Fig. 9b). Abdominal sternites 2-4 without median, longitudinal keel; abdominal sternites 4-8 with surface strigulate, posterior margin not sclerotized or strongly reflexed. *Legs:* Meso- and metatibia slender or robust, outer margin with 2 longitudinal rows of teeth. *Male genitalia:* Parameres symmetrical, with dorsal extensions (Figs. 18, 27).

**Diagnosis.** *Anaides* is easily distinguished from other genera of Hybosoridae by the following combination of characters: pronotum convex, with surface punctate or areolate-ocellate and with two or no longitudinal carinae; elytra elongate, convex, surface variably sculptured, lateral margin with longitudinal carinae from humerus to apical declivity; with one, or rarely two, elongated tubercles on declivous area; hind wings covered by microscopic setae, with M-Cu loop present, MP3 vein present, and MP4 present or absent (not fused when both present); and abdominal sternites 4-8 with posterior margin normally sclerotized, not reflexed.

**Distribution.** *Anaides* is a Neotropical genus whose species are distributed in Central America, South America, and the West Indies. Its distribution includes the following countries: Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Barbados, Trinidad and Tobago, Guyana, Suriname, Venezuela, Colombia, Brazil, Ecuador, Peru, Bolivia, and Dominican Republic (fossil). *Anaides* species are primar-

ily found in low- and mid-elevation tropical forests between 20° N and 20° S latitudes, and they have been collected from near sea level to 4,000 m altitude.

**Natural history.** Species of *Anaides* are attracted to carrion and dung, which suggests these are their primary food sources. Specimens of *Anaides* species are attracted to light. Nothing is known about the biology of the larva of *Anaides laticollis* Harold (the only described larva of this genus) (Grebennikov *et al.* 2004).

**Phylogenetic relationships.** My phylogenetic analysis indicates that the genus *Anaides* is the sister taxon of the clade composed by *Callosides* + *Cryptogenius* (Figs. 5, 6). The genus *Anaides* is monophyletic based on the following synapomorphies: clypeus with horn or tubercle present; pronotum convex, with convexity accentuated on apical half; elytral disc flat; elytron with chain-like sculpture; male external mesotibial spur absent, obsolete, or fused with mesotibial apex; and mesotibia with apical spine absent.

### Key to Species of *Anaides*

1. Pronotum with 2 distinct, central, longitudinal carinae (sometimes reduced on basal half) (Figs. 10, 12, 13, 15, 17, 21, 25) . . . . . 2
- 1'. Pronotum lacking central, longitudinal carinae. (Figs. 14, 19, 20, 23, 24) . . . . . 8
2. Epipleuron wider at apex (nearly twice as wide as at middle) . . . . . 3
- 2'. Epipleuron equal in width at apex and medially or slightly wider at apex . . . . . 5
3. Elytron without basal tubercles, elytral disc convex . . . . . *A. carioca* Ocampo sp. nov.
- 3'. Elytron with 1 or 2 basal tubercles, elytral disc flat or (rarely) slightly convex . . . . . 4
4. Elytron with 1 elongated, basal tubercle, with distinct depressed area between basal tubercle and humerus (Fig. 21) . . . . . *A. quinckeii* Ocampo sp. nov.
- 4'. Elytron with 2 elongated, basal tubercles, lacking distinct depressed area between medial basal tubercle and humerus (Fig. 15) . . . . . *A. onofrii* Ocampo sp. nov.
5. Elytral surface distinctly areolate-ocellate (Fig. 17). Protibial medial and apical teeth united at base (Fig. 17) . . . . . *A. ortii* Ocampo sp. nov.
- 5'. Elytral surface different than above. Protibial medial and apical teeth not united at base . . . . . 6
6. Elytron lacking or with poorly developed basal tubercles. Protibia with less than 8 denticles between base and basal tooth (Fig. 13) . . . . . *A. laticollis* Harold
- 6'. Elytron with well-developed basal tubercles. Protibia with more than 8 denticles between base and basal tooth . . . . . 7
7. Parameres as in Figs. 27 k-l, Barbados . . . . . *A. vartorellii* Ocampo sp. nov.
- 7'. Parameres as in Figs. 18 c-d. South America . . . . . *A. fossulatus* Westwood

- 8. Pronotum strongly rugose (Fig. 23) . . . . . **A. rugosus** Robinson
- 8'. Pronotum densely punctate or densely areolate-ocellate . . . . . 9
- 9. Pronotum densely punctate, glabrous (Fig. 24). Elytron without basal tubercles (Fig. 24) . . . . . **A. simplicicollis** Bates
- 9'. Pronotum densely areolate-ocellate, setose. Elytron with or without basal tubercles . . . . . 10
- 10. Pronotum with well-developed posterior projection, with medial acute tooth; lateral margins strongly denticulate. Length less than 6 mm (Fig. 19) . . . . . **A. parvulus** Ocampo sp. nov.
- 10'. Pronotum with poorly developed posterior projection, lacking median acute tooth, lateral margins smooth or with denticles on anterior half. Length greater than 6 mm . . . . . 11
- 11. Elytron with 2 tubercles on apical declivity (Fig. 20) . . . . . **A. planus** Ocampo sp. nov.
- 11'. Elytron with 1 tubercle on apical declivity (Fig. 14) . . . . . **A. longeciliatus** Balthasar

**Clave para las Especies de *Anaides***

- 1. Pronoto con 2 distintivas carenas centrales longitudinales (a veces reducidas a la mitad basal) (Figs. 10, 12, 13, 15, 17, 21, 25) . . . . . 2
- 1'. Pronoto sin carenas longitudinales centrales (Figs. 14, 19, 20, 23, 24) . . . . . 8
- 2. Epipleuron mas ancho en el ápice (casi dos veces mas ancho que en el medio) . . . . . 3
- 2'. Epipleuron de igual ancho en el ápice que en el medio o ligeramente mas ancho en el ápice . . . . . 5
- 3. Elitro sin tubérculos basales, disco elytral convexo . . . . . **A. carioca** Ocampo sp. nov.
- 3'. Elitro con 1 o 2 tubérculos basales, disco elitral chato o (raramente) ligeramente convexo . . . . . 4
- 4. Elitro con 1 tubérculo basal alargado, área deprimida distintiva entre el húmero y el tubérculo basal (Fig. 21) . . . . . **A. quinckeii** Ocampo sp. nov.
- 4'. Elitro con 2 tubérculos basales alargados, sin área deprimida distintiva entre el húmero y el tubérculo basal (Fig. 15) . . . . . **A. onofrii** Ocampo sp. nov.
- 5. Superficie elitral distintivamente areolada-ecelada (Fig. 17). Protibia con los dientes medio y apical juntos (Fig. 17) . . . . . **A. ortii** Ocampo sp. nov.
- 5'. Superficie elitral diferente a la de arriba. Protibia con los dientes medio y apical no juntos . . . . . 6
- 6. Elitro sin o con pobremente desarrollados tubérculos basales. Protibia con menos de 8 denticulos entre la base y el diente basal (Fig. 13) . . . . . **A. laticollis** Harold
- 6'. Elitro con tubérculos basales bien desarrollados. Protibia con mas de 8 denticulos entre la base y el diente basal . . . . . 7
- 7. Parámetros como en la Figs. 27 k-l, Barbados. . . . . **A. vartorellii** Ocampo sp. nov.
- 7'. Parámetros como en la Figs. 18 c-d, Sudamérica . . . . . **A. fossulatus** Westwood
- 8. Pronoto marcadamente rugoso (Fig. 23) . . . . . **A. rugosus** Robinson
- 8'. Pronoto densamente puncteado o densamente areolado-ocelado. . . . . 9
- 9. Pronoto densamente puncteado, glabro (Fig. 24). Elitro sin tubérculos basales (Fig. 24) . . . . . **A. simplicicollis** Bates
- 9'. Pronoto densamente areolado-ocelado, setoso. Elitro con o sin tubérculos basales . . . 10
- 10. Pronoto con proyección posterior bien desarrollada; con un dinte agudo en el medio; márgenes laterales fuertemente denticulados; menor de 6 mm (Fig. 19). . . . . **A. parvulus** Ocampo sp. nov.
- 10'. Pronoto con proyección posterior poco desarrollada; sin dinte agudo en el medio; márgenes laterales no denticulados; mayor de 6 mm . . . . . 11
- 11. Elitro con 2 tubérculos declivitales (Fig. 20) . . . . . **A. planus** Ocampo sp. nov.
- 11'. Elitro con 1 tubérculo declivital (Fig. 14) . . . . . **A. longeciliatus** Balthasar

**1. *Anaides carioca* Ocampo  
sp. nov.**

(Figs. 11, 18 a-b)

**Type material.** Holotype male at HAHC labeled: "BRASIL: RJ / Rio do Janeiro / Jardim Botânico / XII 1990 / F. Z. Vaz de Mello"; "*Anaides carioca* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten).

**Description. Holotype male.** Length 6.40 mm; width 3.30 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose; setae sparse, long. Clypeus with medial tubercle, shape subtrapezoidal; disc slightly concave on sides; apex weakly rounded; surface punctate; punctures dense, large. Clypeal margins reflexed, denticulate, acute apically; vertical surface of apex blunt with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae, lateral margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, partially capable of receiving penultimate and ultimate segments. *Pronotum:* Surface convex, convexity accentuated medially, 0.69 times as long as wide, surface densely areolate-ocellate, sparsely setose, with 2 central, longitudinal carinae; carinae straight, left carina interrupted at middle. Anterior margin with weak bead; lateral margins slightly denticulate, denticles each bearing 1-2 setae; posterior margin with well-developed, subtriangular projection at middle. Lateral margin with notch before anterior angle. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron:* Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely setose. Lateral margin with 1 carina extending from humerus to apical declivity. Base with 1 poorly developed tubercle between suture and humerus. Humerus with 1 small, poorly developed tubercle. Apical declivity with 1 elongated tubercle. Epipleuron shagreened,

wider at apex. *Venter:* Prosternal surface strigulate; prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth and between basal and middle teeth; basal and middle teeth subtriangular; dorsal surface with 2 setose, longitudinal carinae; outer carina denticulate; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur absent; medial spur present, apex acuminate. Metatibia subequal in width from near base to near apex; apex truncate, with poorly developed outer process. *Parameres:* Figs. 18 a-b.

**Female.** Unknown.

**Etymology.** The specific epithet "*carioca*" refers, in Portuguese, to those from the Brazilian city of Rio de Janeiro, applied here to this species from that city.

**Diagnosis.** *Anaides carioca* is distinguished from other *Anaides* species by the presence of a tubercle on the clypeus; two longitudinal, pronotal carinae; basal elytral tubercles obsolete; elytral disc slightly convex; and epipleuron wider at apex. The shape of the parameres is also diagnostic (Figs. 18 a-b).

**Distribution** (Fig. 11). Brazil. One specimen examined from HAHC.

**BRAZIL (1): Rio de Janeiro:** Rio de Janeiro (1).

**Temporal data.** December (1).

**Natural history.** The specimen of *A. carioca* was collected at about 100 m altitude.

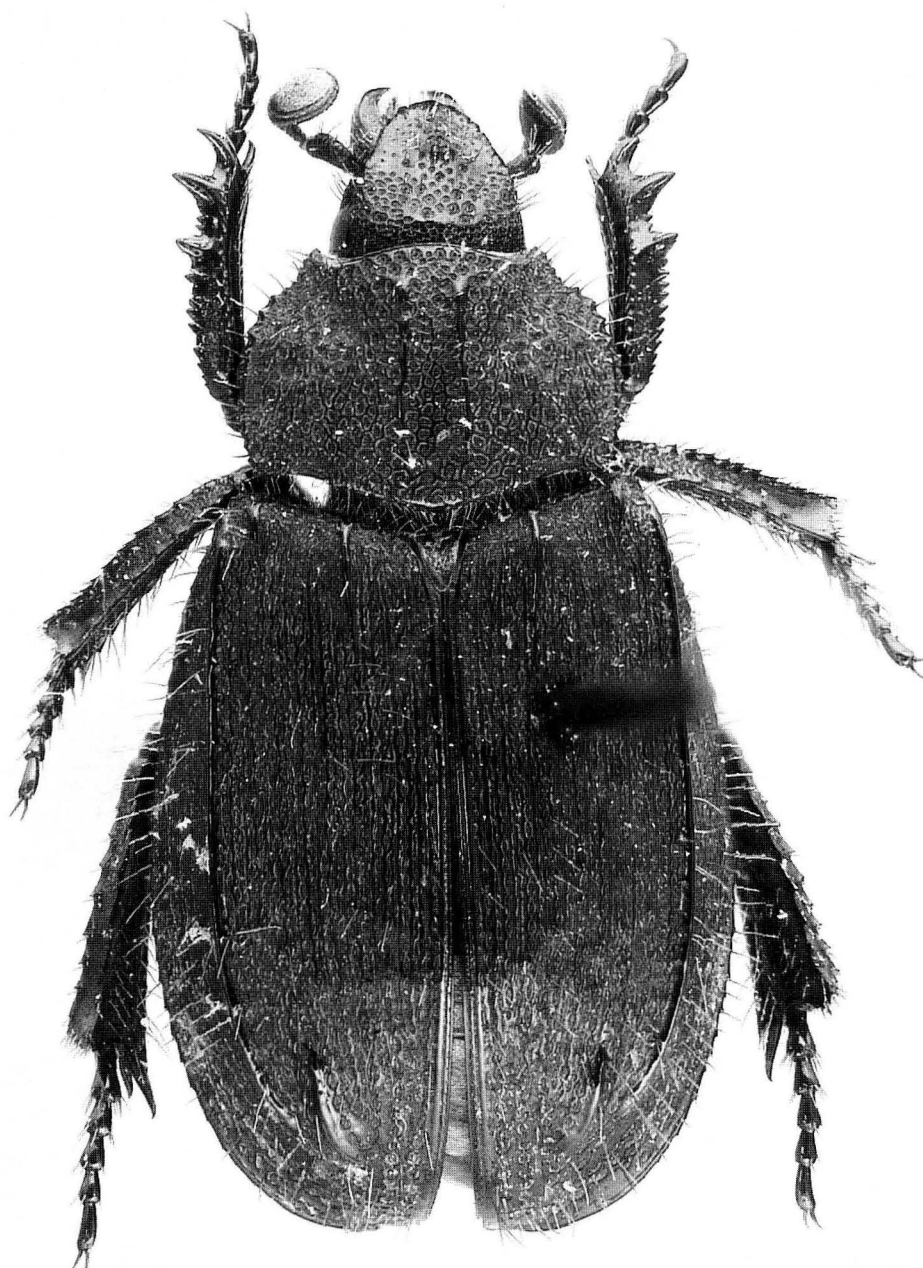


Fig. 10. *Anaides fossulatus* Westwood, male.

**2. *Anaides fossulatus* Westwood,  
1846**

(Figs. 10, 11, 18 c-d)

*Anaides fossulatus* Westwood 1846: 168.

*Anaides reticulatus* Endrödi 1963: 46.

**New Synonymy.**

**Type material:** Lectotype female at Oxford University (HECO) labeled: "*Anaides fossulatus* W. / (*Adelops cornatus* Dej catalog Carthagena"; "Type / Westwood / Proc. Ent. Soc. / 1841 / 41 / Coll Hope Oxon"; "Type Coll: 536 / *Anaides fossulatus* W. / Hope Dept. Oxford"; "*Anaides fossulatus* Westwood / Lectotype / F.

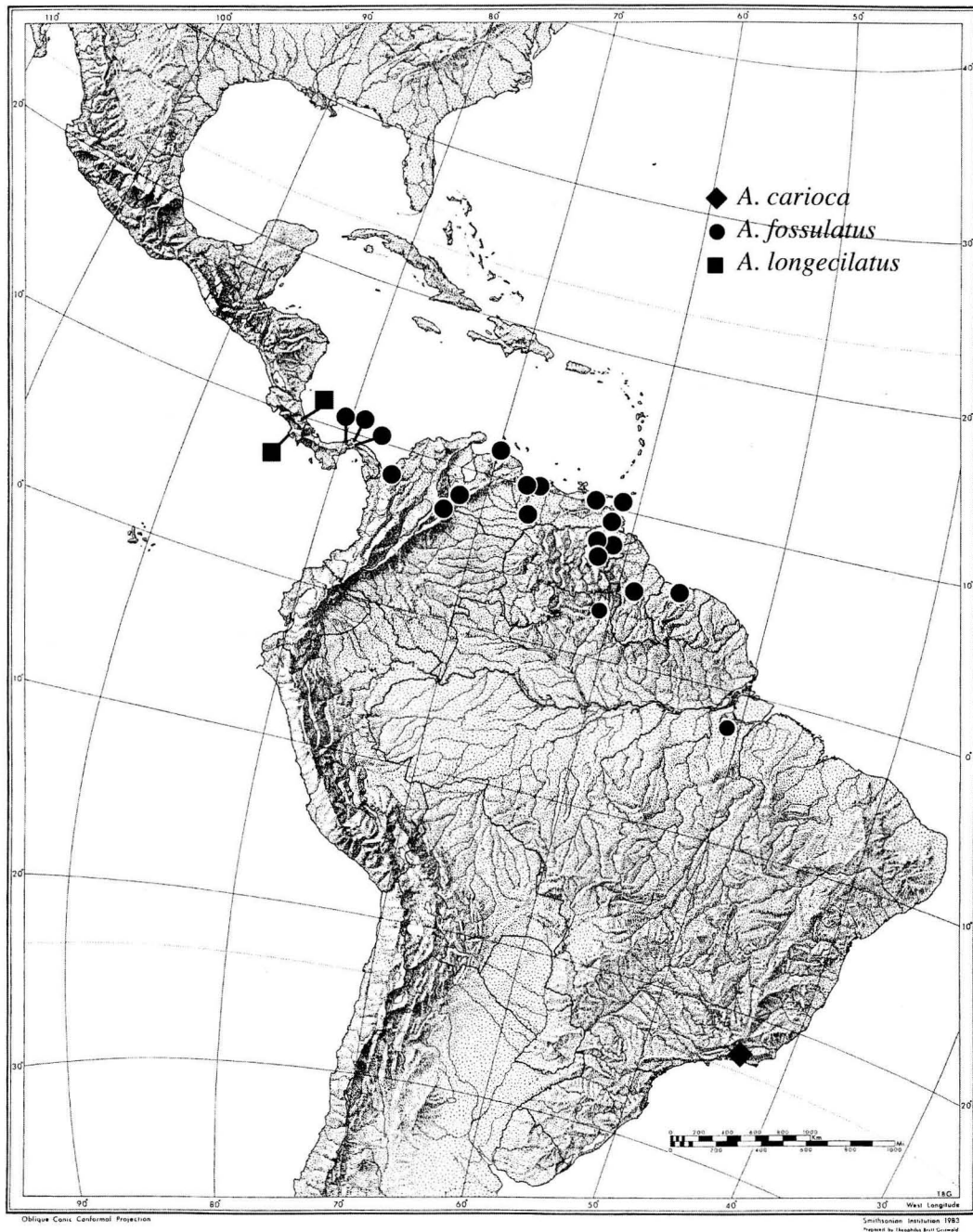


Fig. 11. Distribution of *A. carioca*, *A. fossulatus*, and *A. longeciliatus*.

C. Ocampo 2003" (red label, handwritten). Lectotype here designated. *Anaides reticulatus* Endrödi holotype (at HNHM) labeled: "Anaides reticulatus Endrödi / Holotype"; "Suriname Sidoredjo / VII 1959a"; "J. V. d. Drift coll." There are no character-based differences between *A. fossulatus* Westwood

and *A. reticulatus* Endrödi; therefore, I place these two species in synonymy.

**Description.** Male. Length 5.60-8.20 mm; width 3.50-4.50 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base



slightly convex at middle. Clypeus and frons setose; setae sparse, long. Clypeus with medial tubercle, disc slightly concave on sides, shape subtrapezoidal; apex weakly rounded; surface punctate; punctures dense, large. Clypeal margins reflexed, denticulate, acute apically; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae; lateral margins subparallel. Mandibles protruding beyond labrum, external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, partially capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 10): Surface convex, convexity accentuated medially, 0.70 times as long as wide, surface densely areolate-ocellate, sparsely setose, with 2 central, longitudinal carinae, carinae straight (sometimes discontinuous). Anterior margin with weak bead; lateral margins slightly denticulate, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular projection medially. Anterior angles acute, posterior angles right angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 10): Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely setose. Lateral margin with 1 carina extending from humerus to apical declivity. Base with 1 elongated tubercle between suture and humerus. Humerus with 1 small tubercle. Apical declivity with 1 elongated tubercle. Epipleuron shagreened, equal in width from humeral angle to apex, or slightly wider at apex. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with posteromedial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth and between basal and middle teeth; basal and middle

teeth subtriangular; dorsal surface with 2 setose, longitudinal carinae, outer carina denticulate; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur absent; medial spur present, apex acuminate. Metatibia subequal in width from near base to near apex; apex truncate, with poorly developed outer process. *Parameres*: Figs. 18 c-d.

**Female.** Length 6.10-7.60 mm; width 3.10-4.60 mm. Females differ from males in the following respects: protibial spur evenly curved; mesotibia with 2 spurs, spurs subequal in length.

**Diagnosis.** *Anaides fossulatus* is distinguished from other species of *Anaides* by the presence of a median tubercle on the clypeus; two pronotal carinae; two basal tubercles on the elytra (the one closer to the suture elongated); and epipleuron equal in width from humeral angle to apex or slightly wider at apex. The shape of the parameres is also diagnostic (Figs. 18 c-d).

**Distribution** (Fig. 11). Panama, Colombia, Venezuela, Guyana, Brazil, Trinidad and Tobago, and Suriname. 174 specimens examined from AMNH, BDGC, CBAC, CMNC, EGRC, FMNH, HAHC, MHNG, MIZA, MNHN, RMNH, SEMC, UNSM, and USNM.

**BRAZIL** (8): **Para:** Altamira (6); **Roraima:** Ilha de Maracá (2).

**COLOMBIA** (5): **Norte de Santander:** Chinacota (3km N) (2); **Antioquia:** Turbo (1); No data (2).

**PANAMA** (39): **Colón:** Gatún Lake (3); **Panamá:** Parque Nacional Soberanía (Pipeline Road km 6.1) (4); Barro Colorado Island (15); El Llano-Carti Road (2); Fort Kobbe (7); Gamboa (2); Las Cumbres (1); Madden Forest (4); Plantation Road (6.9 km S Gamboa) (3).

**TRINIDAD AND TOBAGO** (26): Arima (13 km S) (3); Arima Simla Reserve Station (8.0-18 km N) (7); Tanapuna, Mt. Saint Benedict (15); Tamana Dry Cave (1).

**VENEZUELA** (80): **Amacuro**: Piacoa (11 km W) (1); **Aragua**: Maracay (2); **Bolivar**: Anacoco (1); El Dorado (20 km S) (4); Guri (8 km N) (1); **DF**: Naiguata (2); Los Caracas Litoral (9); **Guarico**: Río Guarico (1); **Miranda**: Guatoporo National Park (28-35 km N Altogracia) (47); Los Teques (1); **Monagas**: Caripe (1); **Tachira**: San Juan Colón (5 km S) (6); San Cristóbal (20 km N) (2); **Yaracuy**: Yaritagua (13).

**GUYANA** (13): **Essequibo**: Mazaruni Potaro District (13).

**SURINAME** (3): Paramaribo (2); Sidoredjo (1).

**Temporal Data.** January (1), March (4), April (4), May (13), June (76), July (9), August (8), September (13), October (7), November (13), December (28).

**Natural history.** Adults of *A. fossulatus* are attracted to light, dung, and carrion. Specimens were collected from near sea level to 1,200 m altitude.

### 3. *Anaides howdeni* Ocampo

**sp. nov.**

(Fig. 12)

**Type material.** Holotype embedded in Miocene amber at HAHC labeled: "*Anaides howdeni* / Holotype / F. C. Ocampo" (my red holotype label, handwritten).

**Type locality.** Dominican Republic.

**Description. Holotype male.** Length 5.30 mm; width 2.60 mm. **Color:** Head, pronotum, scutellum, venter, and legs reddish-brown. **Head:** Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose; setae sparse, long. Clypeus with tubercle medially, disc slightly concave on sides, shape subtrapezoidal; apex weakly rounded; surface punctate; punctures dense, large. Clypeal margins reflexed, vertical surface of apex blunt, with fringe of setae. Mandibles protruding beyond labrum, external surface sparsely



Fig. 12. *Anaides howdeni* Ocampo.

setose, apex acute. **Pronotum:** Surface convex, convexity accentuated medially, sparsely setose, with 2 central, longitudinal carinae; carina straight. Anterior margin with weak bead, lateral margins setose. Anterior angles acute, posterior angles right-angled. **Scutellum:** Shape subtriangular, surface glabrous, apex acute. **Elytron:** Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely setose. Disc with 2 longitudinal carinae, carinae extend from base to declivitous area. Lateral margin with 1 carina extending from humerus to apical declivity. Humerus with 1 small tubercle. Apical declivity with 1 elongated tubercle. Epipleuron shagreened, tapered from humeral angle to apex. **Venter:** Prosternal surface strigulate. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. **Legs:** Metatrochanter with posteromedial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth and between basal and middle teeth; basal and middle teeth subtriangular; dorsal surface with 1 setose, longitudinal carina; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4

subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur absent; medial spur with apex acuminate. Metatibia subequal in width from near base to near apex; apex truncate, with poorly developed outer process.

**Etymology.** I name this species "*howdeni*" to honor Dr. Henry Howden in recognition of his extraordinary contribution to our knowledge of scarab beetles.

**Diagnosis.** *Anaides howdeni* is distinguished from other species of *Anaides* by the presence of one tubercle in the middle of the clypeus; pronotum with two medial carinae; elytral disc with two longitudinal carinae, carinae extending from base to apical declivity; and epipleuron tapered from humeral angle to apex.

**Remarks.** This description lacks some detail because certain characters of the body cannot be seen due to the dark nature of the amber in which it is embedded. The amber in which it is embedded has been dated as Miocene in age (Grimaldi 1995). Iturralde-Viñent and MacPhee (1999) indicated that all the main amberiferous deposits in the Dominican Republic (including those with biological inclusions) were formed in a single sedimentary basin during the late Early Miocene through early Middle Miocene (15-20 million years ago). The amber piece probably came from the mountain range north of Santiago de los Caballeros in the Dominican Republic where most of the mines are located. The amber-bearing unit comprises the upper 300 m of La Toca Formation and consists of sandstone interspersed with a conglomerate of pebbles, organic matter, and the thin coal lamellae (Iturralde-Viñent and MacPhee 1999).

**Female.** Unknown.

**Distribution.** Dominican Republic (Miocene). 1 specimen from HAHC.

**DOMINICAN REPUBLIC (1):** No data (1).

#### 4. *Anaides laticollis* Harold, 1863

(Figs. 13, 16, 18 e-f)

*Anaides laticollis* Harold 1863: 175.

**Type material:** *Anaides laticollis* Harold lectotype female BMNH labeled: "Type"; "*Anaides laticollis* Harold / type / Sallé"; "Cordoba"; "Mexico / Sallé Coll"; "*Anaides laticollis* / Harold / LECTOTYPE / F. C. Ocampo" (my red lectotype label, handwritten). Lectotype here designated. One paralectotype female at BMNH labeled: "Type"; "*Anaides laticollis* Harold / type / Sallé"; "Cordoba"; "Jose farm / Mexico / Sallé Coll"; "850"; "*Anaides laticollis* / Harold / PARALECTOTYPE / F. C. Ocampo" (my yellow paralectotype label, handwritten).

**Description.** Male. Length 5.90-7.00 mm; width 3.60- 4.55 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose; setae sparse, long. Clypeus with medial tubercle; disc slightly concave on sides, shape subtrapezoidal; apex weakly rounded; surface punctate; punctures dense, large. Clypeal margins reflexed, denticulate, acute apically; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae; lateral margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, partially capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 13): Surface convex, convexity accentuated medially, 0.70 times as long as wide, surface densely areolate-ocellate, sparsely setose; with 2 central, longitudinal carinae; carinae straight (sometimes discontinuous). Anterior margin with weak bead; lateral margins slightly denticulate, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular projection medially. Anterior angles acute, posterior

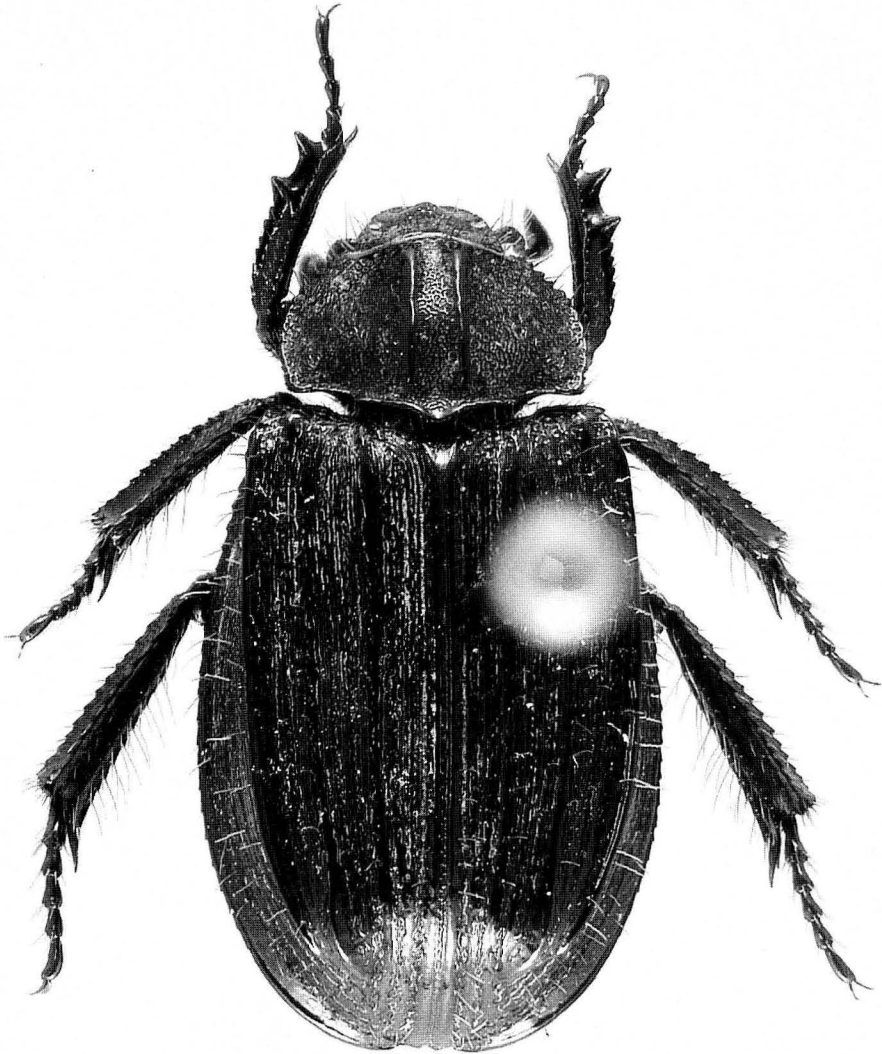


Fig. 13. *Anaides laticollis* Harold, male.

angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 13): Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely setose. Lateral margin with 1 carina ex-

tending from humerus to apical declivity. Base lacking or (sometimes) with 1 poorly developed, elongated tubercle between suture and humerus. Humerus with 1 poorly developed, small tubercle. Apical declivity with 1 elongated tubercle. Epipleuron

shagreened, equal in width from humeral angle to apex. *Venter*: Prosternal surface strigulate; prosternal shield with postero-medial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with postero-medial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth and between basal and middle teeth, and sometimes between medial and apical teeth; basal and middle teeth subtriangular; dorsal surface with 2 setose, longitudinal carinae, outer carina denticulate; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur absent; medial spur present, apex acuminate. Metatibia subequal in width from near base to near apex; apex truncate, with poorly developed outer process. *Parameres*: Figs. 18 e-f.

**Female.** Length 5.20-6.50 mm; width 3.70-4.30 mm. Females differ from males in the following respects: protibial spur evenly curved; mesotibia with 2 spurs, medial spur longer than external spur.

**Diagnosis.** *Anaides laticollis* is distinguished from other species of *Anaides* by the presence of a median tubercle on the clypeus; two pronotal carinae; basal tubercles on the elytra obsolete or absent; and epipleuron equal in width from humeral angle to apex or slightly wider at apex. The shape of the parameres is also diagnostic (Figs. 18 e-f).

**Distribution** (Fig. 16). Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama. 517 specimens

examined from BCRC, BMNH, BWGC, CMNC, CNCI, EGRC, EMEC, FCOC, FMNH, MHNG, HAHC, INBC, LACM, MACM, MHNE, MNHN, UNSM, USNM, and UVGC.

**BELIZE** (11): Augustine (1); Cave Branch (4); Bleu Creek Village (6).

**MEXICO** (80): **Chiapas**: Berriozabal (12 km NW) (1); Boca de Chajul (2); Ocozocoautla (16 km NW) (2); Palenque (6.8 km S) (4); Palenque (100 km SE) (1) Santa Rosa (1); **Hidalgo**: Jacala (3); Molango, Cañada Otongo (9); **Oaxaca**: Reforma (1.7 km E) (3); Valle Nacional (1); **Puebla**: Tlaxcalantongo (3 km S) (1); **San Luis de Potosí**: Xilitla (9 km W) (8); **Veracruz**: Catemaco Pipiapan (3); Fortín (7); Huatuzco (6); Lake Catemaco (3); Orizaba (1). No data (24).

**GUATEMALA** (33): **Zacapa**: La Unión (3 km S.) (2); Alotanango (SW) (1); **Alta Verapaz**: Lankin (1); Tactic (1); Sebol (38 km SW) (1); **Escuintla Palin**: Montaña el Chilar (1); **Izabal**: Cayuga (1); Cerro San Gil (12); **Petel**: Parque Nacional Tikal (3); Tikal (2); **Quezaltenango**: Zunil (14.2 km SW) (4); Capetillo (2). No data (2).

**EL SALVADOR** (2): No data (2).

**HONDURAS** (17): **Olancho**: Parque Nacional La Muralla (17).

**NICARAGUA** (10): **Matagalpa**: Montaña Selva Negra (10); **Río San Juan**: Los Guatuzos (10).

**COSTA RICA** (357): **Alajuela**: San Ramón de Dos Ríos (2); **Guanacaste**: Cerro Cacao (2 m SW) (36); Parque Nacional Guanacaste (19); Parque Nacional Rincón de la Vieja (48); Volcán Miravalles (15); Volcán Rincón de la Vieja (4.5 km SW) (2); **Limón**: Cerro Cocori, Finca de E. Rojas (1); Reserva Biológica Hitoy Cerere (1); **Puntarenas**: Estación Agujas (10); Estación Biológica Las Alturas (20); La Tigra (1.4 km N) (6); Monteverde (55); Parque Nacional Amistad, Finca Cafrosa (38); Parque Nacional Corcovado (4); Península de Osa, Rancho Quemado (79); Reserva Biológica Carara, Estación Quebrada Bonita (13); Rincón de Osa (5); Rincón de Osa (7 km W) (3).

**PANAMA** (24): **Chiriquí**: Cerro Pando (1); Finca La Suiza (3); Hartmann's Finca (16); Hato del Volcán (1 Km SW) (4).

**Temporal Data.** February (6), March (31), April (55), May (127), June (96), July (76), August (77), September (40), October (1), November (1).

**Natural history.** Adults of *A. laticollis* are attracted to lights, dung, and carrion. Specimens were collected from near sea level to 1,500 m altitude.

### 5. *Anaides longeciliatus*

Balthasar, 1938

(Figs. 11, 14, 18 g-h)

*Anaides longeciliatus* Balthasar 1938: 60.

**Description.** Male. Length 7.30-7.60 mm; width 4.30-5.00 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose; setae sparse, long. Clypeus with medial tubercle; disc slightly concave on sides, shape subtrapezoidal; apex weakly rounded; surface punctate; punctures dense, large. Clypeal margins reflexed, acute apically; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae, lateral margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, partially capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 14): Surface convex, convexity accentuated medially, 0.78 times as long as wide, surface densely areolate-ocellate, sparsely setose, setae long; with or without 2 central, longitudinal carinae (if present, poorly developed, straight, sometimes discontinuous). Anterior margin with weak bead; lateral margins slightly denticulate, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular projection medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 14): Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely

setose. Lateral margin with 1 carina extending from humerus to apical declivity. Base without (sometimes present, poorly developed) elongated tubercle between suture and humerus. Humerus with 1 small tubercle. Apical declivity with 1 elongated tubercle. Epipleuron shagreened, equal in width from humeral angle to apex, or slightly wider at apex. *Venter:* Prosternal surface strigulate, prosternal shield with posteromedial process developed. Metasternal surface strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with posteromedial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth; basal and middle teeth subtriangular; dorsal surface with 2 setose, longitudinal carinae; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae robust; outer surface with 2 longitudinal rows of poorly developed teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur absent; medial spur present, apex acuminate. Metatibia wider toward apex, with poorly developed outer process. *Parameres:* Figs. 18-g-h.

**Female:** Length 7.80-7.10 mm; width 5.10-5.40 mm. Females differ from males in the following respects: protibial spur evenly curved; mesotibia with 2 spurs, medial spur longer than external.

**Diagnosis.** *Anaides longeciliatus* is distinguished from other species of *Anaides* by the presence of one median tubercle on the clypeus; pronotum with or without two central, longitudinal carinae (if present poorly developed, straight; sometimes discontinuous); elytral base lacking elongated tubercle between suture and humerus (sometimes present, poorly developed); humerus with one small tubercle; and epipleuron equal in width from humeral angle to apex or slightly



Fig. 14. *Anaides longeciliatus* Balthasar, male.

wider at apex. The shape of the parameres is also diagnostic (Figs. 18 g-h).

**Distribution** (Fig. 11). Costa Rica and Panama. 421 specimens examined from BDGC,

CMNC, FCOC, HAHC, INBC, MACM, MTEC, SEMC, UNSM, and USNM.

**COSTA RICA** (410): **Alajuela:** Colonia Palmareña (5 km N) (1); Guatuso (1); Parque Nacional Tenorio, Puesto Quebradón (14);

**Cartago:** Turrialba (1); **Guanacaste:** Cerro Cacao (1); Cerro Cacao (2 km SW) (1); Las Pailas (4.5 km SW Volcán Rincón de la Vieja) (7); Estacion Marisa (1); **Heredia:** La Selva (13); Parque Nacional Braulio Carrillo (2); **Limón:** Manzanillo, RNFS Gandoca y Manzanillo (1); Reserva Biológica Hitoy Cerere (31); Sardinas, Barra del Colorado (67); Sector Cerro Cocori, Finca de Rojas (30); Valle de la Estrella Pandora (1); **Puntarenas:** Las Cruces (10); Península de Osa, Rancho Quemado (209); Reserva Biológica Carara (13); Reserva Forestal Golfo Dulce (6). **PANAMA (11): Chiriquí:** Cerro Pando (1); **Coclé:** El Copé (7.2 km NE) (1); **Panamá:** Cerro Campana (7); El Llano-Carti Road (1); Parque Nacional Soberanía (1).

**Temporal Data.** January (5), February (19), March (36), April (105), May (91), June (98), July (28), August (12), September (1), October (1), November (2), December (4).

**Natural history.** Specimens of *A. longeciliatus* are attracted to lights, dung, and carrion. Specimens were collected from near sea level to 800 m altitude.

### 6. *Anaides onofrii* Ocampo sp. nov.

(Figs. 15, 16, 18 i-j)

**Type material:** Holotype male at UNSM labeled: "ECUADOR: Napo Prov. / Yasuni N. P. Yasuni Research Sta. / 76° 36' W 00° 38' S, 215 m / VII-27-VIII-1-1998 / lowland rainforest. Ratcliffe, Jameson, Smith, Villatoro"; "*Anaides onofrii* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at UNSM with same data as holotype except: "*Anaides onofrii* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Eight paratypes at QCAZ labeled: "ECUADOR NAPO / SCYASUNI 250m / 7-14SEP1999 F. Maza"; "Ex. Intercepcion / trap." Seven paratypes at FMNH labeled: "ECUADOR: Pastaza; Cusuimi / Rio Cusuimi, 150km SE / Puyo, 800. VII:18-23: / 1971, leg. B. Malkin." Six paratypes at HAHC labeled: "ECU: Napo, Limoncocha / 250m. 21.VII.1976 / S.& J. Peck,

Ber350,brkn. / termite nest siftings." Five paratypes at SEMC labeled: "PERU: Dept. Loreto / 1.5 km N Teniente López / 2°35.66' S, 76°06'92" W / 19 Jul 1993, 210-240 m / Richard Leschen # 152 ex: *Favolus brasiliensis*." Four paratypes at HAHC labeled: "Peru: Huanuco / Tingo María / Universidad / Coll. Martínez / Dic. 974." Three paratypes at HAHC labeled: "ECUADOR / Pcia. Napo / lago Agrio / Coll. Martínez / Jun. 976." Two paratypes at UNSM and two paratypes at FCOC labeled: "ECUADOR: Napo Prov. / Yasuni N. P. Yasuni Research Sta. / 76° 36' W 00°38' S, 215 m / VII-27-VIII-1-1998 / lowland rainforest. Ratcliffe, Jameson, Smith, Villatoro." Two paratypes at QCAZ labeled: "ECUADOR PASTAZA / VILLANO / 3 JUL 1996 J Naranjo." Two paratypes at HAHC labeled: "BOLIVIA, D° Cochab. / Pcia. Chapare. S. F. del / Chipiriri 400m XI 55 / Martínez coll." Two paratypes at UNSM labeled: "ECUADOR: Napo Prov. / Jatun Sacha Biological Station / 77° 37' W, 1° 04' S, VII-24-26-1998 / lowland rain forest, 450 m / Ratcliffe, Jameson, Smith, Villatoro." One paratype at HAHC labeled: "ECU: Turrialba / 6kmE Rio Negro 1500m 13-17. vii. 76 S. Peck / for.car.tps. 49-50." One paratype at HAHC labeled: "ECU: Limoncocha / 10.15. II.1975 / J. M. Campbell." One paratype at CNCI labeled: "ECU: Limoncocha / Napo 800" / 15.III.1976 / J. M. Campbell." One paratype at HAHC labeled: "ECU: Napo, 250m / Limoncocha / 18.vi.76, S.&J.Peck / for litter ber348 / *Ficus* fruits." One paratype at FMNH labeled: "ECUADOR: Pastaza; Ashuara / Rio Macuma, 10km. From / Rio Morona, 300m. VII: / 7-16:1971, leg. B. Malkin." One paratype at HAHC labeled: "LETICIA, Amazonas / Colombia 700ft. / Feb. 23-Mar. 2/74 / H. A. Howden." One paratype at QCAZ labeled: "ECUADOR / NAPO YAMPUNA / 25-I-89 / Legit P. Ponce"; "Ex: Trampa / de carne en / Bosque." One paratype at UNSM labeled: "ECUADOR, SUCUMBOS 175 KM E.S.E. OF COCA / LA SELVA BIO. STATION / VOUCHER # H98-557 / 27 JUNE 1997 / H. GREENEY III." One paratype at SEMC labeled: "PERU: Tambopata Prov. 15 km NE Pto. Maldonado / 24 jun 1989, 200m / J. Ashe, R. Leschen #267 / ex:pile of



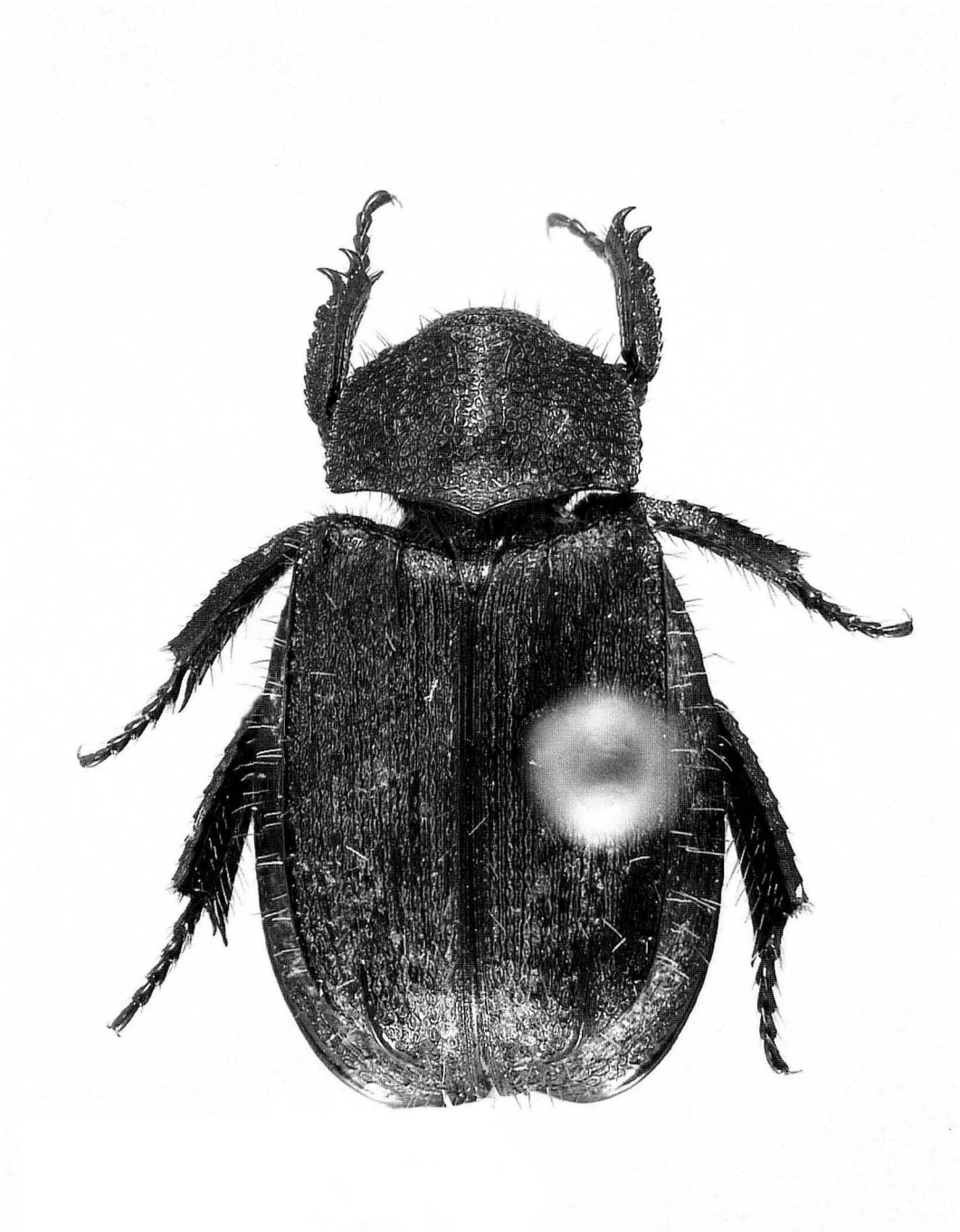


Fig. 15. *Anaides onofrii* Ocampo, male.

dead ants." One paratype at SEMC labeled: "PERU: Tambopata Prov. 15 km NE Pto. Maldonado / 15 July 1989, 200m / J. Ashe, R. Leschen #267 / ex: funnel trap." One paratype at SEMC labeled: "PERU: Tambopata

Prov. 15 km NE Pto. Maldonado / 6 July 1989, 200m / J. Ashe, R. Leschen #267 / ex: femmes." One paratype at SEMC labeled: "PERU: Tambopata Prov. 15 km NE Pto. Maldonado / 22 June 1989, 200m / D. Silva

/ #198 / ex: pit fall trap." Two paratypes at SEMC labeled: "PERU: Tambopata Prov. / Madre de Dios Dpto. / 15 km NE Puerto"; "Maldonado, Reserva / Cuzco Amazónico 12°33' S, 69°03' W / 200m, #Z2U4"; "ex: pitfall trap #384 / 4 July 1989. J. S. Ashe, / R. Leschen, D. Silva." One paratype at HAHC labeled: "nr Somi Brui / Lima, Peru / IX-19-35 / Waytkowski." All paratypes with my yellow paratype label (handwritten): "*Anaides onofrii* / PARATYPE / F. C. Ocampo."

**Type locality.** Ecuador, Napo, Yasuní National Park, Yasuní Research Station.

**Description. Holotype male.** Length 6.20 mm; width 3.60 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose; setae sparse, long. Clypeus with tubercle medially, disc slightly concave on sides, shape subtrapezoidal; apex weakly rounded; surface punctate; punctures dense, large. Clypeal margins reflexed, denticulate, acute apically; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae; lateral margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, partially capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 15): Surface convex, convexity accentuated medially, 0.70 times as long as wide, surface densely areolate-ocellate, sparsely setose; with 2 central, longitudinal carinae, carinae straight. Anterior margin with weak bead; lateral margins slightly denticulate, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular projection medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 15): Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely

setose. Lateral margin with 1 carina extending from humerus to apical declivity. Base with 1 elongated tubercle between suture and humerus. Humerus with 1 small tubercle. Apical declivity with 1 elongated tubercle. Epipleuron shagreened, wider at apex. *Venter:* Prosternal surface strigulate, prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with posteromedial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth and between basal and middle teeth; basal and middle teeth subtriangular; dorsal surface with 3 setose, longitudinal carinae; outer carina denticulate, protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur absent; medial spur present, apex acuminate. Metatibia subequal in width from near base to near apex; apex blunt, with poorly developed outer process. *Parameres:* Figs. 18 i-j.

**Allotype female.** Length 6.48 mm; width 3.55 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved; mesotibia with 2 spurs, medial spur longer than external.

**Paratypes.** Length 6.29-7.22 mm; width 3.51-4.44 mm. Paratypes do not differ significantly from the primary type.

**Diagnosis.** *Anaides onofrii* is distinguished from other *Anaides* species by the presence of one medial tubercle on clypeus; pronotum with two carinae; elytral base with one elongated tubercle between suture and

humerus; humerus with one small tubercle; epipleuron wider at apex. The shape of the parameres is also diagnostic (Figs. 18 i-j).

**Etymology.** I take great pleasure in naming this species after my good friend, Alejandro Onofri.

**Distribution** (Fig. 16). Colombia, Ecuador, Peru, and Bolivia. 61 specimens examined from: CMNC, FCOO, FMNH, QCAZ, HAHC, SEMC, and UNSM.

**COLOMBIA** (1): **Amazonas:** Leticia (1).

**ECUADOR** (42): **Napo:** Lago Agrio (3); Limoncocha (10); Reserva Biológica Yasuní (16); Yampuna (1); **Pastaza:** Ashuara (1); Cusumi (7); Villano (2); Estación Biológica La Selva (1); **Tunguragua:** Rio Negro (6 km E) (1).

**PERU** (16): **Huánuco:** Tingo María (4);

**Lima:** Lima (1); **Loreto:** Teniente López (1.5 km N) (5); **Madre de Dios:** Puerto Maldonado (15 km NE) (6).

**BOLIVIA** (2): **Cochabamba:** Chapare (2).

**Temporal Data.** January (1), February (1), March (3), May (1), June (8), July (26), July-August (3), September (9), November (2), December (4).

**Natural history.** Specimens of *A. onofrii* are attracted to carrion. Some specimens were found associated with fungi, on *Ficus* fruits, and on a pile of dead ants. Specimens were collected between 210-450 m altitude.

### 7. *Anaides ortii* Ocampo sp. nov.

(Figs. 16, 17, 18 k-l)

**Type material.** Holotype male at UNSM labeled: "VENEZUELA: Aragua / Parq. Nac Henri Pittier / Est. Biol. Rancho Grande / N10° 20' W67° 41', cloud forest / VI-21-24-1999, 1100m / Ratcliffe, Jameson, Smith, Villatoro"; "ex dung baited pitfall trap"; "*Anaides ortii* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at UNSM with same labeled as holotype except: "*Anaides ortii* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). One

hundred and sixty nine paratypes at UNSM and ten paratypes at University of Maracay, Venezuela labeled: "VENEZUELA: Aragua / Parq. Nac Henri Pittier / Est. Biol. Rancho Grande / N10° 20' W67° 41', cloud forest / VI-21-24-1999, 1100m / Ratcliffe, Jameson, Smith, Villatoro." Fifty paratypes at UNSM labeled: "VENEZUELA: Aragua / Parq. Nac Henri Pittier / Portochuelo Pass / VI-7-13-1999, 1200m / Ratcliffe, Jameson, Smith, Villatoro"; "ex: flight intercept trap." Forty four paratypes at UNSM labeled: "VENEZUELA: Aragua / Parq. Nac Henri Pittier / Est. Biol. Rancho Grande / N10° 20' W67° 41', 1100m / VI-7-13-1999, cloud forest / Ratcliffe, Jameson, Smith, Villatoro"; "ex dung baited pitfall trap." Nine paratypes at SEMC labeled: "VENEZUELA: Aragua / Rancho Grande Biol. Stn. / 1150 m, N10° 21' W67° 41' / 25-28 II 1995 S. Marshall / ex yellow pan traps." Six paratypes at HAHC labeled: "VENEZUELA: Aragua parque Nac. H. Pittier / Rancho Grande, env. / 9-10 IV 1994 1100 m / L. Masner." Five paratypes at HAHC labeled: "1100m. Rancho Grande / Aragua, Venezuela / Feb. 20-21, 1971 / H. & A. Howden." Five paratypes at HAHC labeled: "Ven: Edo. Aragua / Rancho Grande, 1100 m / 19-23. ii. 1971, S. Peck / forest carrion traps." Four paratypes at WBWC: "VENEZUELA: Aragua / Rancho Grande / 1100., 6-8.III.1988 / F. Génier, human feces." Three paratypes at FMNH labeled: "Los Camales / Ven / G. Vivas-B." Two paratypes at SEMC labeled: "VENEZUELA: Aragua / Rancho Grande Biol. Stn / N10° 21' W67° 41' / 1390 m, 1-8 March 1995 / R. W. Brooks#49 / ex: human feces trap." Two paratypes at SEMC labeled: "VENEZUELA: Aragua / Rancho Grande Biol. Stn / N10° 21' W67° 41' / 1250 m, 26-28 Feb 1995 / R. W. Brooks#14 / ex: human feces trap." One paratype at SEMC labeled: "VENEZUELA: Aragua / Rancho Grande Biol. Stn. / Pico Periquitos, 1250 m / N10° 21' W67° 41' / 12-14 May 1998; J. Ashe. R. Brooks, R. Hanley / VEN1ABH98 030 ex: flight intercept trap." One paratype at HAHC labeled: "VEN: Edo Aragua / Rancho Grande, 1000m / 25-27.ii.1971, S. Peck / forest human dung t." One paratype at HAHC labeled: "VENEZUELA / Rancho Grande / D. Havrama-leg / Coll. Martínez / Feb. 987."

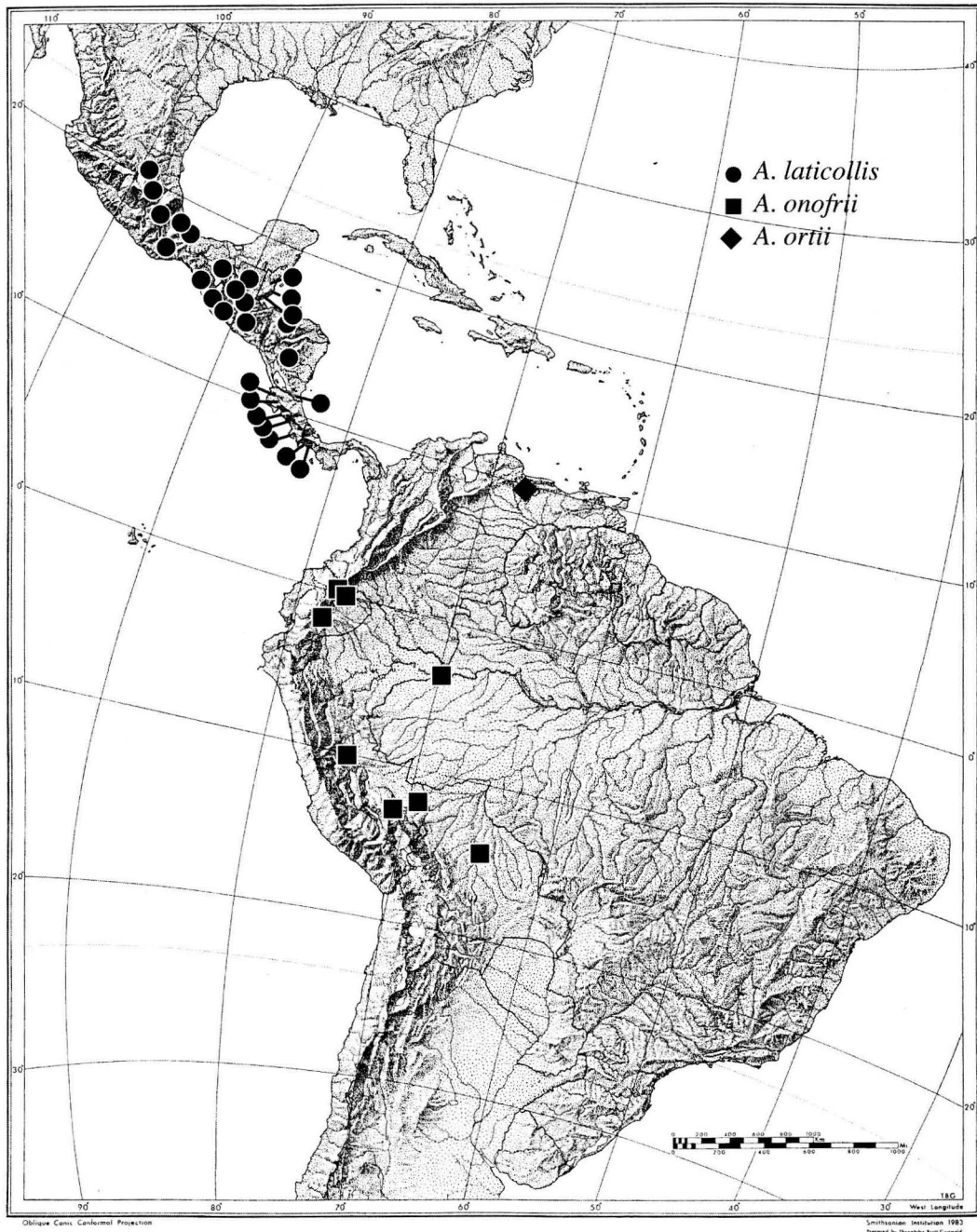


Fig. 16. Distribution of *A. laticollis*, *A. onofrii*, and *A. ortii*.

All paratypes with my yellow paratype label (handwritten): "*Anides ortii* / PARATYPE / F. C. Ocampo."

**Type locality.** Venezuela, Aragua, Parque Nacional Henry Pittier, Rancho Grande.

**Description. Holotype male.** Length 6.30 mm; width 3.60 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose, setae sparse. Clypeus

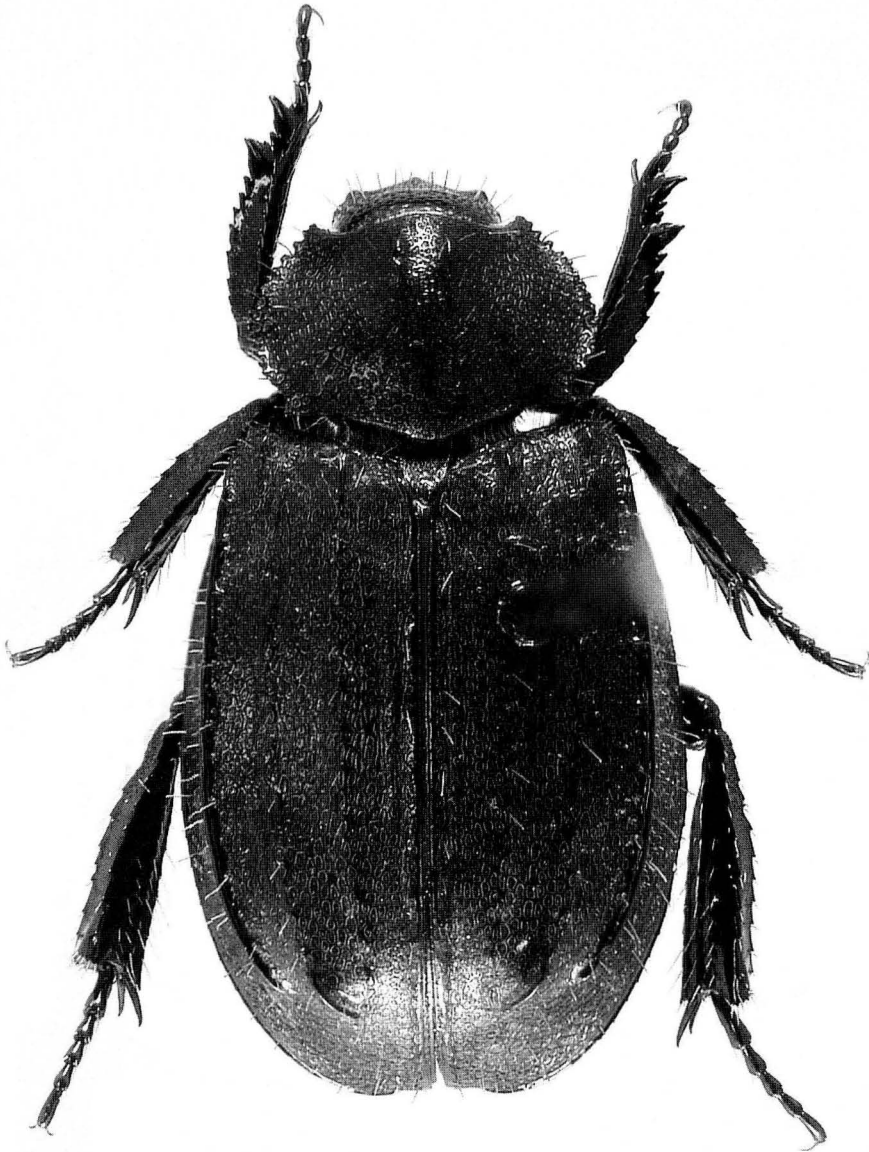


Fig. 17. *Anaides ortii* Ocampo, female.

with poorly developed medial tubercle; with disc slightly concave on sides, shape subtrapezoidal; apex weakly rounded; surface punctate; punctures dense, large. Clypeal margins weakly reflexed, acute apically; vertical surface of apex blunt, with fringe

of setae. Labrum subrectangular, dorsal surface with fringe of setae, lateral margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex,

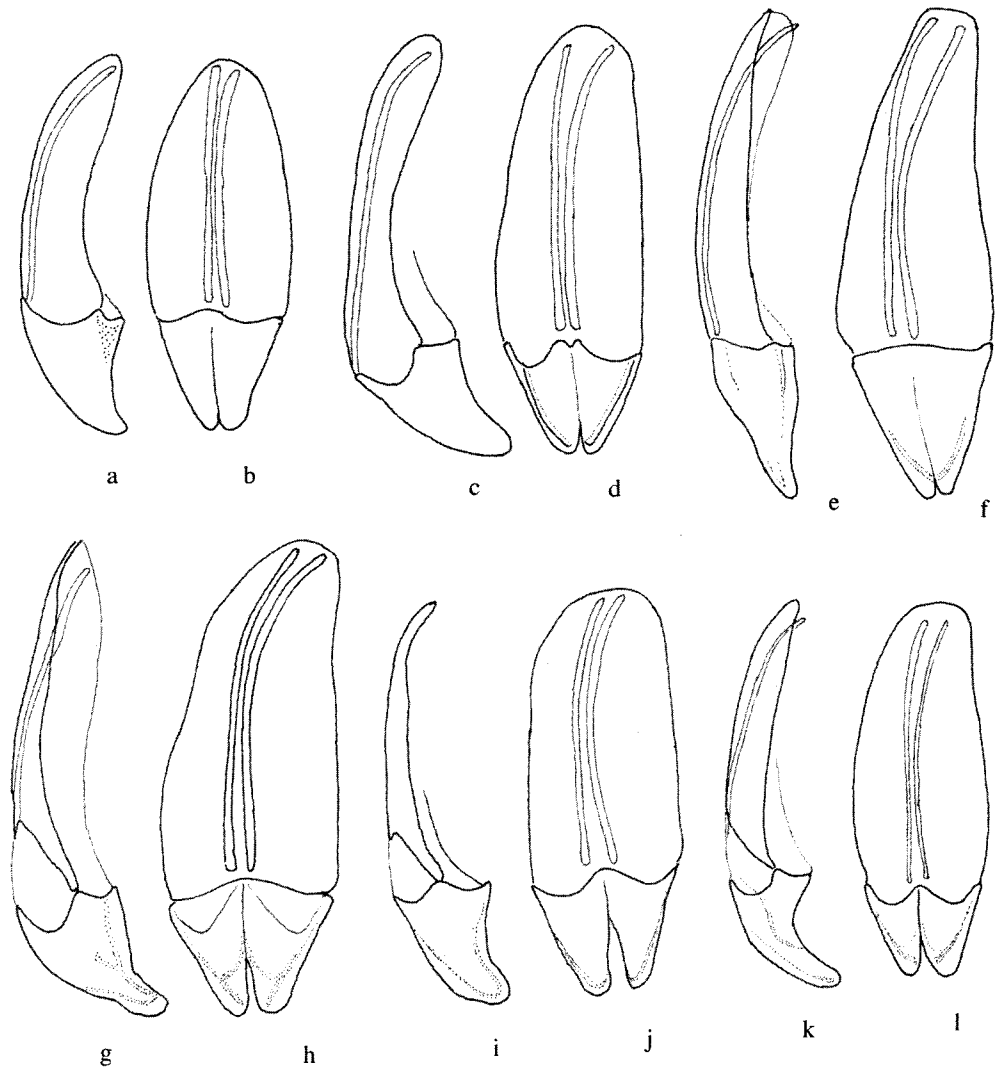


Fig. 18. Male parameres and phallobase of a-b) *Anaides carioca*, c-d) *A. fossulatus*, e-f) *A. laticollis*, g-h) *A. longeciliatus*, i-j) *A. onofrii*, and k-l) *A. ortii*. (a, c, e, g, i, and k lateral and b, d, f, h, j, and l dorsal views).

surface concentrically strigulate. Antennal club with basal segment cupuliform, partially capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 17): Surface convex, 0.64 times as long as wide, surface densely areolate-ocellate, sparsely setose, setae short; with 2 weakly developed, central, longitudinal carinae, interrupted medially. Anterior margin with weak bead; lateral margins denticulate, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular projection medially. Anterior angles acute, posterior

angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 17): Surface densely areolate-ocellate, sparsely setose, setae short. Lateral margin with 1 carina extending from humerus to apical declivity. Base with 1 tubercle between suture and humerus. Humerus with 1 small tubercle. Disc with 2 rows of small tubercles from base to declivous area. Apical declivity with 1 elongated tubercle. Epipleuron shagreened, equal in width from humeral angle to near apex, tapered at apex. *Venter*: Prosternal surface strigulate,

prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Propisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with posteromedial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth and between basal and middle teeth; basal and middle teeth subtriangular; middle and apical teeth jointed at base; dorsal surface with 2 setose, longitudinal carinae; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur reduced to a small, acute process; medial spur present, apex acuminate. Metatibia subequal in width from near base to near apex; apex blunt, with poorly developed outer process. *Parameres*: Figs. 18 k-l.

**Allotype female.** Length 6.30 mm; width 3.80 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved; mesotibia with 2 spurs well-developed, medial spur longer than external spur.

**Paratypes.** 273. Length 6.29-6.70 mm; width 3.51-3.70 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** I take great pleasure in naming this species after my good friend and mentor, Guillermo Ortí.

**Diagnosis.** *Anaides ortii* is distinguished from other *Anaides* species by the presence of one tubercle on the clypeus; pronotum with two, weakly developed, longitudinal carinae (interrupted at middle); elytral sculpture densely areolate-ocellate; elytral base with

one tubercle between suture and humerus; humerus with one small tubercle; epipleuron equal in width from humeral angle to near apex, tapered at apex. The shape of the parameres is also diagnostic (Figs. 18 k-l).

**Distribution** (Fig. 16). Venezuela. 275 specimens examined from FMNH, HAHC, SEMC, UNSM, USNM, and WBWC.

**VENEZUELA** (275): **Aragua**: Los Canales (3); Parque Nacional Henri Pittier, Estación Biol. Rancho Grande (222); Parque Nacional Henri Pittier, El Portochuelo Pass (50).

**Temporal Data.** February (22), March (6), April (6), June (236).

**Natural history.** Adults of *A. ortii* are attracted to dung and carrion. Specimens were collected between 1,100-1,350 m altitude.

### 8. *Anaides parvulus* Ocampo sp. nov.

(Figs. 19, 22, 27 a-b)

**Type material:** Holotype at HAHC labeled: "Ven: Bolivar / 22 km S El Dorado / 25. VI - 12. VII. 87 / S & J Peck, lowland / rainforest FIT"; "*Anaides parvulus* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at HAHC labeled: "Ven: Bolivar / 22 km S El Dorado / 25. VI - 12. VII. 87 / S & J Peck, lowland / rainforest FIT"; "*Anaides parvulus* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Three paratypes at HAHC: "GUYANA: 8 Region / Iwokrama forest Res. 4°10'19"N 58°41'04"W / 100-200 m V-VI. 2001 / R. Brooks & Z. Falin, FIT." One paratype male at FCOC labeled: "Ven: Bolivar / 22 km S El Dorado / 25. VI - 12. VII. 87 / S & J Peck, lowland / rainforest FIT." One paratype male at UNSM labeled: "Ven: Delta Amacuro / 11 km W Piacoa / 14-31 VII -87, S & J Peck, / seasonal humid forest on sand / malaise-FIT." One paratype at CMNC labeled: "VENEZUELA: Bolivar / 20 km N Uputa, 21.VI-12.VII.1987 / S. & J. Peck evergreen / dry forest, ex. f.i.t. 87-39." All paratypes with my yellow paratype label (handwritten): "*Anaides parvulus* / PARATYPE / F. C. Ocampo"



Fig. 19. *Anaides parvulus* Ocampo, male.

**Type locality.** Venezuela, Bolívar, El Dorado (22 km S).

**Description. Holotype male.** Length 5.70 mm; width 3.10 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-

brown. *Head:* Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose; setae sparse, long. Clypeus with medial tubercle; disc slightly concave on sides, shape rounded; apex weakly rounded; surface punctate; punctures dense, large.



Clypeal margins reflexed, denticulate, acute apically; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae, lateral margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, partially capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 19): Surface convex, convexity accentuated medially, 0.64 times as long as wide; surface densely areolate-ocellate, sparsely setose, lacking central, longitudinal carinae. Anterior margin with weak bead; lateral margins denticulate, denticles bearing 1-2 setae; posterior margin with subtriangular, acute projection well-developed medially. Anterior and posterior angles acute. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 19): Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely setose. Lateral margin with 1 carina extending from humerus to apical declivity. Base with 1 elongated tubercle between suture and humerus. Humerus with 1 small tubercle. Apical declivity with 1 elongated tubercle. Epipleuron shagreened, slightly wider at apex. *Venter*: Prosternal surface strigulate, prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with postero-medial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth and between basal and middle teeth; basal and middle teeth subtriangular; dorsal surface with 3 setose, longitudinal carinae; outer carina denticulate. Protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws

shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur reduced to a small truncate process; medial spur present, apex acuminate. Metatibia subequal in width from near base to near apex; apex truncate, with poorly developed outer process. *Parameres*: Figs. 27 a-b.

**Allotype female.** Length 5.50 mm; width 3.10 mm. The female allotype differs from the holotype male in the following respects: protibial spur evenly curved; mesotibia with 2 spurs well-developed, spurs subequal in length with apices acuminate.

**Paratypes. 2.** Length 4.44-4.81 mm; width 2.22-2.96 mm. Paratypes do not differ significantly from the holotype.

**Etymology.** The specific epithet is taken from the Latin "*parvulus*," meaning small, referring to the small size of this species.

**Diagnosis.** *Anaides parvulus* is distinguished from other *Anaides* species by the presence of one tubercle in the middle of the clypeus; pronotum without longitudinal carinae; pronotal lateral margin with well-developed denticles; elytral base with one elongated tubercle between suture and humerus; humerus with one small tubercle; epipleuron slightly wider at apex. The shape of the parameres is also diagnostic (Figs. 27 a-b).

**Distribution** (Fig. 22). Venezuela and Guyana. 8 specimens examined from CMNC, FCOC, HAHC, and UNSM.

**GUYUANA** (3): Iwokrama Forest Reserve (3).

**VENEZUELA** (5): **Bolívar**: El Dorado (20 km S) (3), Upata (20 km N) (1); **Delta Amacuro**: Piacoa (11 km W) (1).

**Temporal Data.** June-July (4).

**Natural history.** Nothing is known about the biology of *A. parvulus*. Specimens were collected at low elevations.

**9. *Anaides planus* Ocampo  
sp. nov.**

(Figs. 20, 22, 27 c-d)

**Type material.** Holotype male at HAHC labeled: "Ecu: Pich. 16 km E / Santo Domingo, Tinalandia / 4. V. 25. VII. 85, S&J Peck, 680 m, malaise-FIT / rainforest"; "*Anaides planus* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at HAHC labeled: "Ecu.: Pich. Pr. 250 m / 47 km S Sto. Domingo / Rio Palenques Station / 17-25.II.1979 / L. Ling"; "*Anaides planus* / ALLOTYPE / F. C. Ocampo" (red allotype label, handwritten). One paratype at FCOC and one paratype at USNM labeled: "Hamburg farm Santa Clara / III 24 46 / Costa Rica"; "Neverman Collection / 1940"; "Paratype / U.S. N. M." One paratype at INBC labeled: "Est. Hitoy-Cerere, Res. / Biol. Hitoy Cerere. R. / Cerere 200m, Prov. Limón / COSTA RICA / G. Carballo, Abr. 1991. L-N-184200, 643300"; "COSTA RICA / INBIO / CR1000 / 480926" (INbio barcode label). One paratype at USNM labeled: "Hamburg farm Santa Clara / III 24 46 / Costa Rica"; "Neverman Collection / 1940"; "Type 590048 / U. S. N. M." One paratype at SEMC labeled: "Ecuador Esmeraldas / Bilsa, 0 20' 0" S, 79 43' 0" W / 5 JUN-7 JUL 1996; P. Hibbs ECU1H96 014 / ex: flight intercept trap"; "SM0091839 / KUNHM-ENT" (SEMEC barcode label). All paratypes with my yellow paratype label (handwritten): "*Anaides planus* / PARATYPE / F. C. Ocampo."

**Type Locality.** Ecuador, Pichincha, Santo Domingo (16 km E).

**Description. Holotype male.** Length 7.70 mm; width 4.80 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose; setae sparse, long. Clypeus without medial tubercle; apex weakly rounded; surface punctate-areolate, punctures dense, large. Clypeal margins weakly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae, lateral margins subparallel. Mandibles

protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment not cupuliform. *Pronotum* (Fig. 20): Surface flat, 0.53 times as long as wide, densely areolate-ocellate, sparsely setose, lacking central, longitudinal carinae. Anterior margin with weak bead; lateral margins slightly denticulate, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular medial projection. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 20): Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely setose. Lateral margin with 1 carina extending from humerus to apical declivity. Base with 1 elongated tubercle between suture and humerus. Humerus with 1 small tubercle. Apical declivity with 2 elongated tubercles. Epipleuron shagreened, slightly wider toward the apex, obsolete at apex. *Venter:* Prosternal surface strigulate, prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Propiternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with posteromedial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and poorly developed denticles near base; basal and middle teeth subtriangular; dorsal surface with 1 setose, longitudinal carina; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur reduced to a small, fused process; medial spur present, with apex acuminate. Metatibia subequal in width from near base to near apex; apex truncate, with poorly developed outer process. *Parameres:* Figs. 27 c-d.

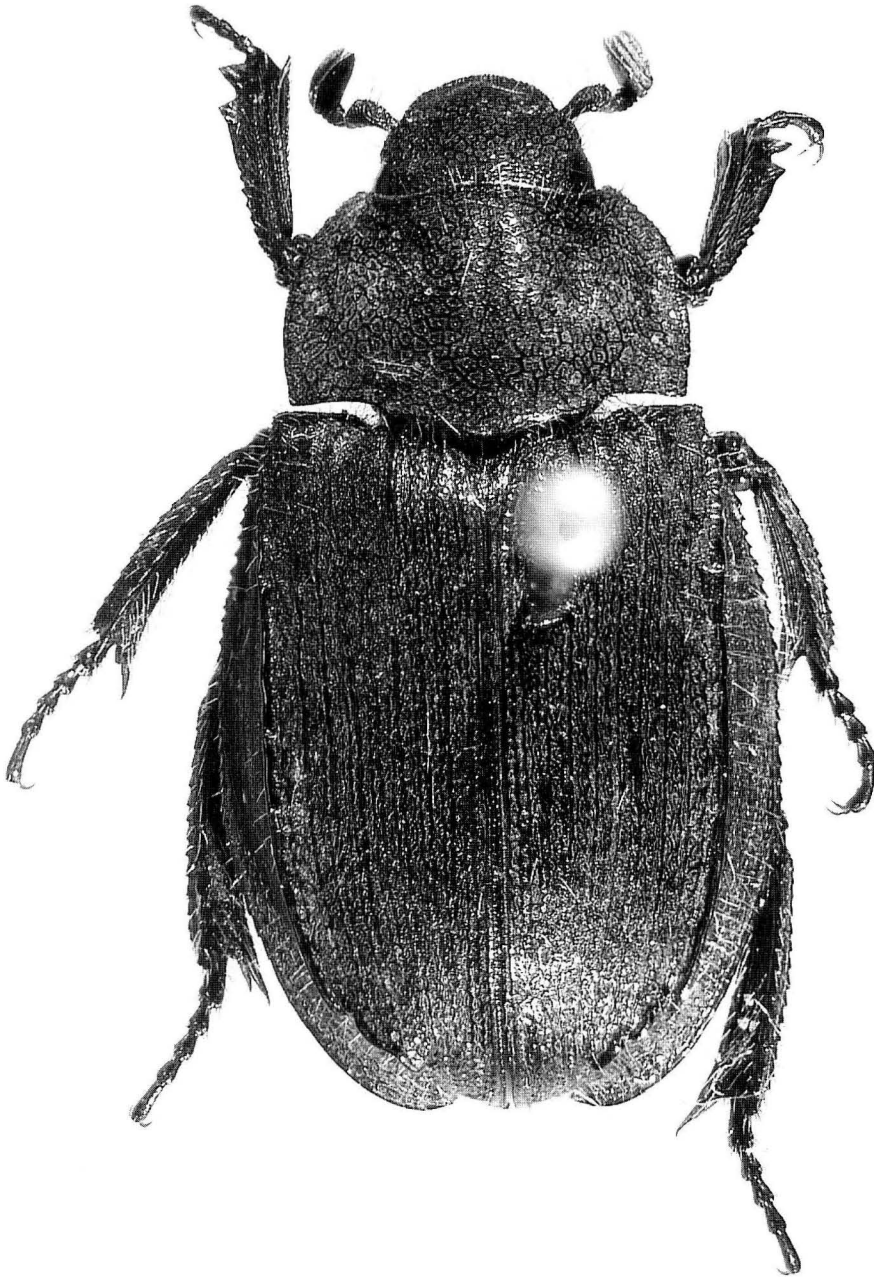


Fig. 20. *Anaides planus* Ocampo, male.

**Allotype female.** Length 8.40 mm; width 4.50 mm. The allotype female differs from the holotype in the following respects: protibial spur evenly curved; mesotibia with 2 spurs, spurs well-developed, subequal in length.

**Paratypes.** 6. Length 7.60-7.85 mm; width 4.65-4.82 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** The specific epithet was taken from the Spanish "*planus*," meaning flat, referring to the flat pronotum of this species.

**Diagnosis.** *Anaides planus* is distinguished from other *Anaides* species by the absence of a tubercle in the middle of the clypeus; antennal club with basal segment not cupuliform; pronotum lacking longitudinal carinae; elytral base with one elongated tubercle between suture and humerus; humerus with one small tubercle; epipleuron wider at apex. The shape of the parameres is also diagnostic (Figs. 27 c-d).

**Distribution** (Fig. 22). Costa Rica and Ecuador. 8 specimens examined from FCOC, HAHC, INBC, SEMC, and USNM.

**COSTA RICA** (4): **Limón:** Reserva Biológica Hitoy Cerere (1); Hamburg Farm (3).

**ECUADOR** (4): **Pichincha:** Esmeraldas (1); Rio Palenques Station (1); Santo Domingo (16 km S) (1), Santo Domingo (47 km S) (1).

**Temporal Data.** February (1), March (3), April (1), May-July (2).

**Natural history.** Adults were collected from near sea level to 680 m altitude.

**Remarks.** Three specimens from the USNM included in the type series were identified as *Anaides planus* by Chapin, but this name was never published or subsequently cited.

### 10. *Anaides quinckeii* Ocampo sp. nov.

(Figs. 21, 22, 27 e-f)

**Type material:** Holotype male at UNSM labeled: "BOLIVIA: La Paz, / Franz Tamayo, / Eslabon Transect, F. / Guerra? IV/7-11/1997"; "*Anaides quinckeii* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at UNSM labeled: "BOLIVIA: La Paz, / Franz Tamayo, / Eslabon Transect, F. / Guerra? IV/7-11/1997"; "*Anaides quinckeii* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Sixteen paratypes at UNSM, three paratypes at FCOC, and two paratypes at HAHC labeled: "BOLIVIA: La Paz, / Franz Tamayo, / Eslabon Transect, F. / Guerra? IV/7-11/1997. All paratypes with my yellow paratype label (handwritten): "*Anaides quinckeii* / PARATYPE / F. C. Ocampo."

**Type locality.** Bolivia, La Paz, Franz Tamayo.

**Description. Holotype male.** Length 6.50 mm; width 3.80 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose, setae sparse. Clypeal disc slightly concave on sides, shape rounded; apex weakly rounded; surface punctate-areolate; punctures dense, large. Clypeal margins slightly reflexed, acute apically; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae; lateral margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, partially capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 21): Surface convex, convexity accentuated medially, 0.78 times as long as wide; surface densely areolate-ocellate, sparsely setose; with 2 central, longitudinal carinae, carinae straight. Anterior margin with weak bead, lateral margins slightly denticulate, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular medial projection. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 21): Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely setose. Lateral margin with 1 carina extending from humerus to apical declivity. Base with 1 elongated tubercle between suture and humerus; area between humerus and tubercle depressed. Humerus lacking small tubercle. Apical declivity with 1 elongated tubercle. Epipleuron shagreened, wider at apex. *Venter:* Prosternal surface strigulate; prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with posteromedial tooth,

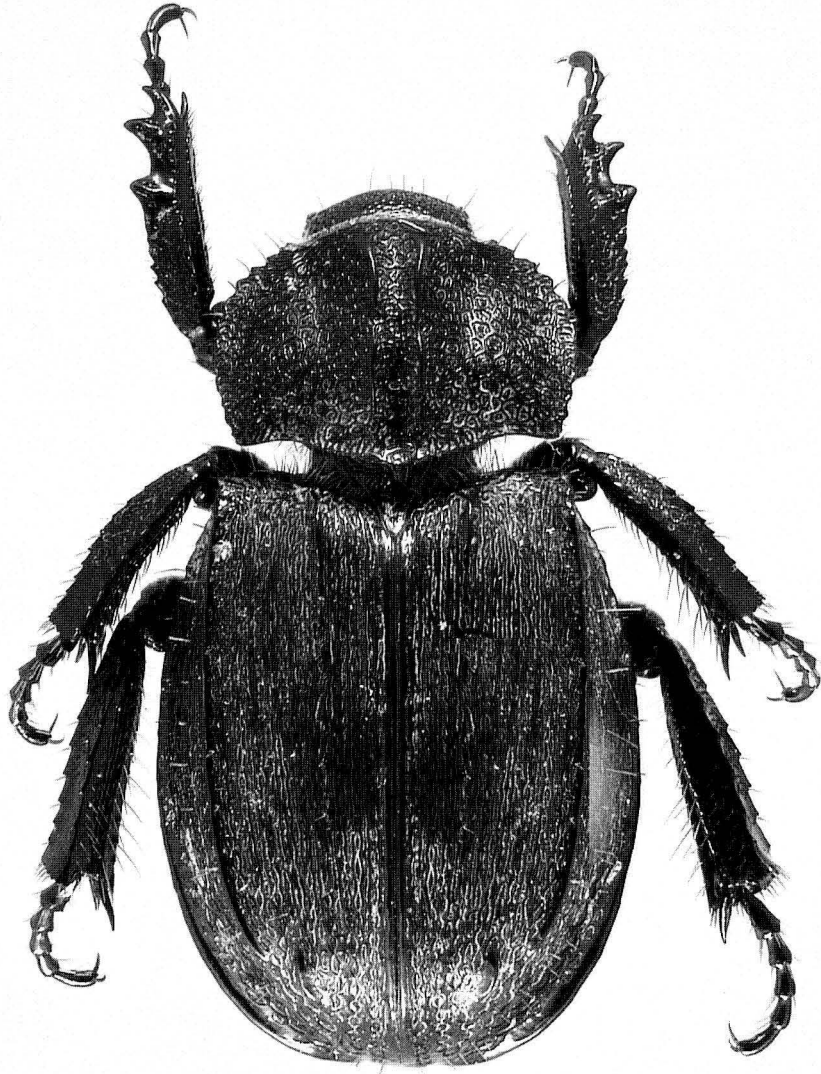


Fig. 21. *Anaides quinckei* Ocampo, female.

tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth; basal and middle teeth subtriangular, basal tooth less developed than medial tooth; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tar-

somere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external



Fig. 22. Distribution of *Anaides parvulus*, *A. planus*, and *A. quinckeii*.

mesotibial spur absent; medial spur present, apex acuminate. Metatibia subequal in width from near base to near apex; apex truncate, with poorly developed outer process. *Parameres*: Figs. 27 e-f.

**Allotype female.** Length 5.30 mm; width 3.35 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved; mesotibia with 2 spurs, spurs subequal in length.

**Paratypes.** 21. Length 6.40-6.53 mm; width 3.75-3.82 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** I take great pleasure in naming this species after my good friend, Andrés Quincke.

**Diagnosis.** *Anaides quincke* is distinguished from other *Anaides* species by the presence of one tubercle in the middle the clypeus; pronotum with two longitudinal carinae; elytral base with one elongated tubercle between suture and humerus; area between humerus and elongated tubercle depressed; humerus without tubercle; and epipleuron wider at apex. The shape of the parameres is also diagnostic (Figs. 27 e-f).

**Distribution** (Fig. 22). Bolivia. 23 specimens from FCOC, HAHC, and UNSM.

**BOLIVIA** (23): **La Paz:** Franz Tamayo (23).

**Temporal Data.** April (27).

**Remarks.** Nothing is known about the biology of this species. The elevation of the type locality for *A. quincke* (Franz Tamayo, Bolivia) is at 4000 m altitude.

### 11. *Anaides rugosus* Robinson, 1948

(Figs. 23, 26, 27 g-h)

*Anaides rugosus* Robinson 1948: 35.

**Type material.** Holotype male at USNM labeled: "HOLOTYPE / *Anaides rugosa* Mark Robinson"; "Iquitos Peru / April 1938 J. Hocking"; "at light"; "M. Robinson / Collection / 1959"; "Type 655 95 / USNM."

**Type locality.** Peru, Loreto, Iquitos.

**Description.** Male. Length 9.80-10.10 mm; width 6.01-6.10 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base slightly convex at middle. Clypeus and frons glabrous. Clypeus without medial tubercle,

shape subtrapezoidal, apex weakly rounded, surface densely rugopunctate. Clypeal margins weakly reflexed, vertical surface of apex weakly blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae, lateral margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed; dorsal, preapical tooth poorly developed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 23): Surface slightly convex; 0.66 times as long as wide, densely rugopunctate, glabrous, lacking central carinae, with 1 low, slightly curved carinae from near posterior angles to disc. Anterior margin with weak bead; lateral margins converging from base to apex, slightly denticulate towards anterior angle, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular medial projection. Anterior and posterior angles acute. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 23): Surface costate to rugose, glabrous. Disc with 1 carina extended from base to half of elytron, then continuing as a line of small tubercles. Lateral margin with 1 carina extending from humerus to apical declivity, with 1 line of small tubercles from near base to declivitous area between discal carina and lateral carina. Humerus with 1 small tubercle. Apical declivity with 1 elongated tubercle. Epipleuron shagreened, equal in width from humeral angle to apex, or slightly narrower at apex. *Venter:* Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Propiternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with posteromedial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth and between teeth; basal and middle teeth subtriangular; dorsal surface with 2



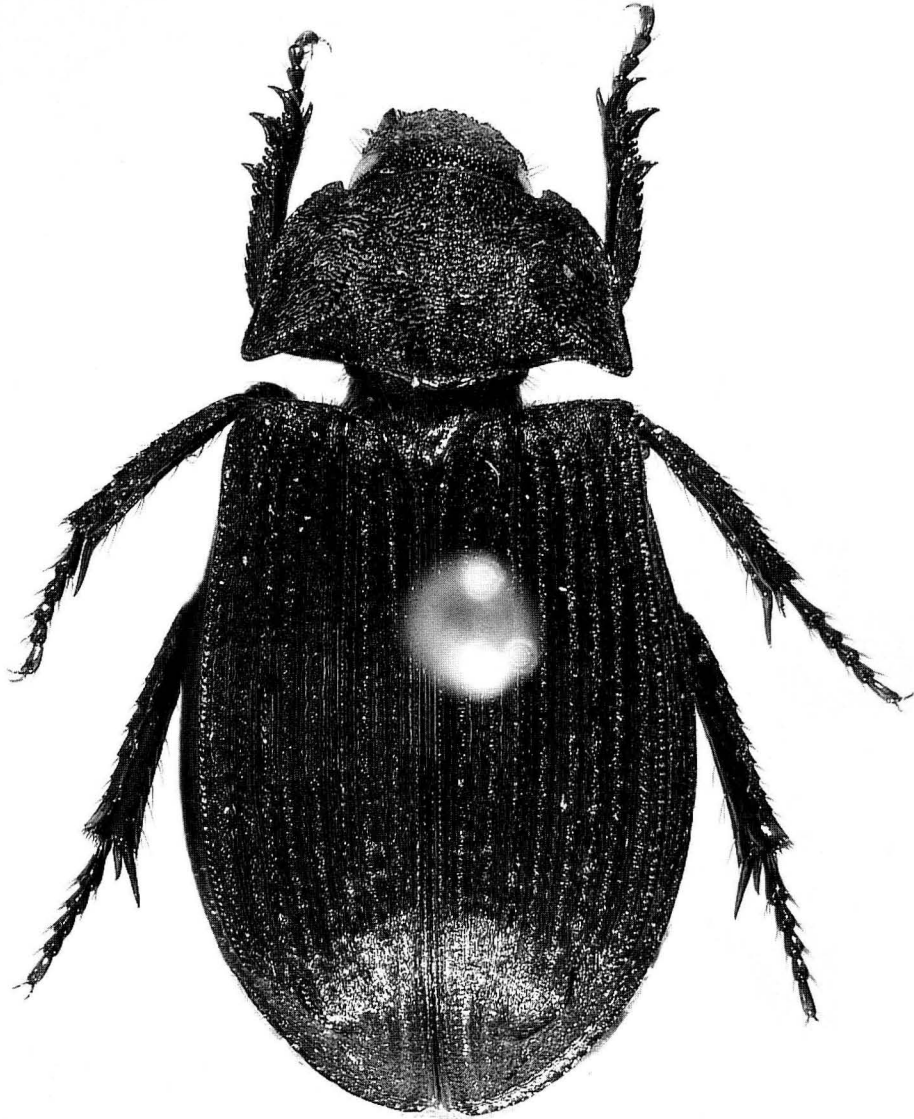


Fig. 23. *Anaides rugosus* Robinson, female.

setose, longitudinal carinae; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5,

simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur reduced, apex acuminate; medial spur with apex acuminate. Metatibia subequal



in width from near base to near apex, apex truncate, with poorly developed outer process. *Parameres*: Figs. 27 g-h.

**Female.** Length 10.10 mm; width 6.10 mm. Females differ from males in the following respects: protibial spur evenly curved, and mesotibia with 2 spurs, spurs well-developed, subequal in length.

**Diagnosis.** *Anaides rugosus* is distinguished from other species of *Anaides* by the clypeus that lacks a median tubercle; pronotum lacking longitudinal carinae, surface rugose and with one low, slightly curved carina from near the posterior angles to the disc; elytral disc with one carina extended from base to middle of elytron, then continuing as a line of small tubercles; elytron with one line of small tubercles from near base to apical declivity between discal carina and lateral carina; humerus with one small tubercle; epipleuron equal in width from humeral angle to apex or slightly narrower at apex. The shape of the parameres is also diagnostic (Figs. 27 g-h).

**Distribution** (Fig. 26). Ecuador and Peru. 3 specimens examined from FCOC, HAHC, and USNM.

**ECUADOR** (2): **Pastaza**: Tungurahua (8 km E Rio Negro) (2).

**PERU** (1): **Loreto**: Iquitos (1).

**Temporal Data.** April (1), July (2).

**Natural history.** Based on label data, specimens of *A. rugosus* are attracted to lights and carrion. Specimens were collected from near 200 m to 1,500 m altitude.

## 12. *Anaides simplicicollis* Bates, 1887

(Figs. 24, 26, 27 i-j)

*Anaides simplicicollis* Bates 1887: 118.

**Type material.** *Anaides simplicicollis* Bates lectotype male at BMNH labeled: "type"; "sp figured"; "Costa Rica / S. Rogers"; "*Anaides simplicicollis* / Bates"; "B. C. A. coll (2) / *Anaides simplicicollis*"; "*Anaides*

*simplicicollis* Bates / LECTOTYPE / F. C. Ocampo 2003" (red lectotype label, handwritten). Lectotype here designated. Five paralectotypes at USNM labeled: "Costa Rica / S. Rogers"; "USNM paratype 49719"; "property of the USNM"; "*Anaides simplicicollis* Bates / PARALECTOTYPE / F. C. Ocampo" (yellow paralectotype label, handwritten).

**Type locality:** Costa Rica.

**Description.** Male. Length 8.40-10.10 mm; width 4.40-5.20 mm. *Color*: Head, pronotum, scutellum, venter, and legs reddish-brown. *Head*: Frons in dorsal view with base nearly flat. Clypeus and frons setose; setae sparse, long. Clypeus with elongated tubercle from middle to apex, shape rounded; surface punctate-areolate, punctures dense, large. Clypeal margins not reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae, lateral margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 24): Surface convex, 0.65 times as long as wide, densely punctate medially to areolate-ocellate on sides, sparsely setose, setae short; central, longitudinal carinae absent. Anterior margin with weak bead; lateral margins slightly denticulate on apical half, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular medial projection. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 24): Surface with chain-like sculpturing alternating with irregularly sculptured lines, sparsely setose. Lateral margin with 1 carina extending from humerus to apical declivity. Disc with 2 longitudinal carinae from base to declivous area, carinae poorly developed. Base with 1 elongated tubercle between suture and humerus. Apical decliv-

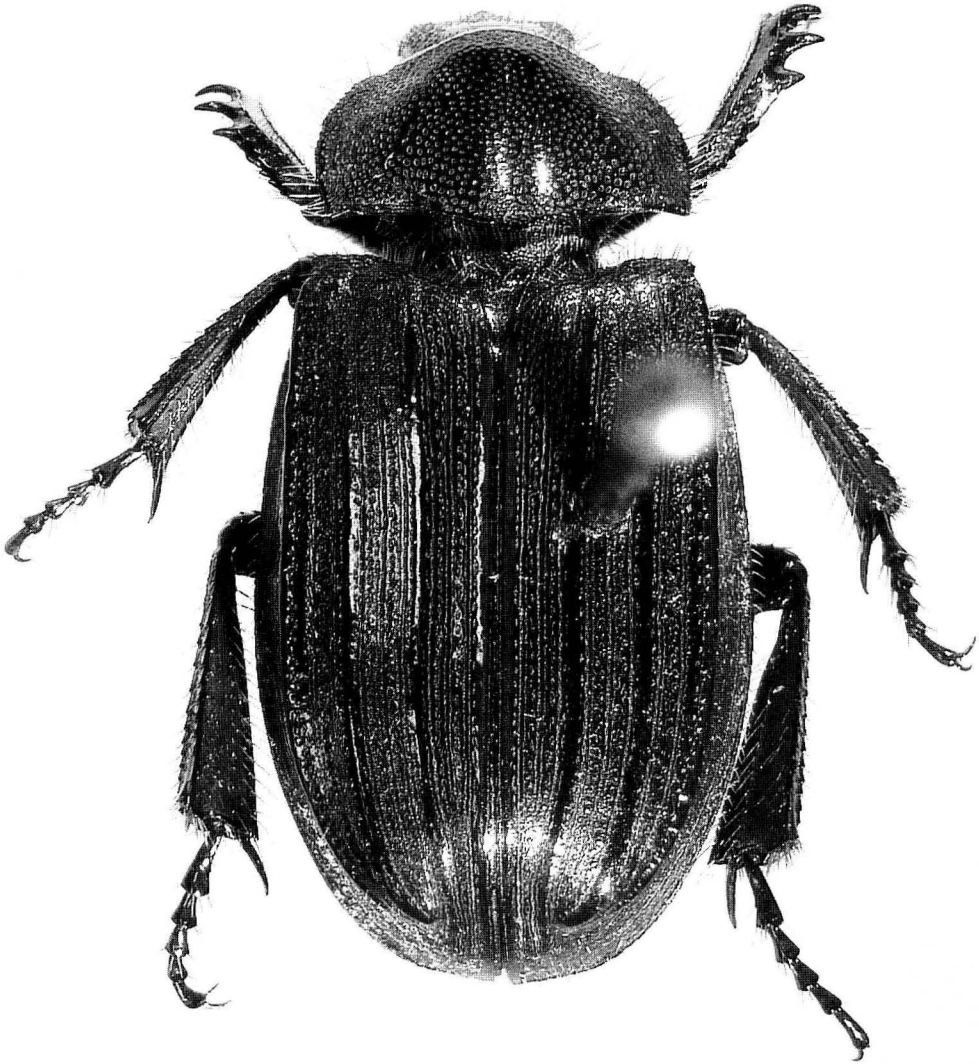


Fig. 24. *Anaides simplicicollis* Bates, male.

ity with 1 elongated tubercle, tubercle poorly developed. Epipleuron shagreened, tapered toward apex. *Venter*: Prosternal surface strigulate, prosternal shield with postero-medial process not developed. Mesosternal surface strigulate. Metasternal surface

strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with postero-medial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with

3 teeth and well-developed denticles near base; basal and middle teeth subtriangular; dorsal surface with 3 setose, longitudinal carinae; outer carina denticulate; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length, tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae robust; outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur absent; medial spur present, apex acuminate. Metatibia wider toward apex, apex truncate, with poorly developed outer process. *Parameres*: Figs. 27 i-j.

**Female.** Length 8.50-10.80 mm; width 4.20-5.50 mm. Females differ from males in the following respects: protibial spur evenly curved; and mesotibia with 2 spurs, medial spur longer than external.

**Diagnosis.** *Anaides simplicicollis* is distinguished from other species of *Anaides* by the clypeus with one elongated tubercle extending from middle to apex; pronotum lacking longitudinal carinae; elytral disc with two longitudinal carinae from base to apical declivity, carinae poorly developed; elytral base with one elongated tubercle between suture and humerus; and epipleuron tapered toward apex. The shape of the parameres is also diagnostic (Figs. 27 i-j).

**Distribution** (Fig. 26). Costa Rica and Panama. 52 specimens examined from AMNH, ANSP, BMNH, EGRC, EMEC, FMNH, HAHC, INBC, SEMC, UNSM, USNM, and ZMHB.

**COSTA RICA** (38): **Cartago**: Rio Grande de Orosi (3); Turrialba (9 Km NW) (1); **Puntarenas**: Reserva Biológica Monteverde, La Casona (16); Reserva Biológica Monteverde, San Luis (1); **San José**: San Isidro (14.4 km N) (1); No data (17).

**PANAMA** (14): **Chiriquí**: Bambito (1); Cerro Pando (10 km NW) (1); Cerro Punta (4); Fortuna Dam (10 km NE) (1); Hartmann's Finca (5).

**Temporal Data.** March-April (3), May (3), June (12), July (4), September (10), October (1), November (2).

**Natural history.** Specimens of *A. simplicicollis* are attracted to dung and carrion. Specimens were collected between 500-1,700 m altitude.

### 13. *Anaides vartorellii* Ocampo sp. nov.

(Figs. 25, 26, 27 k-l)

**Type material.** *Anaides vartorellii* Ocampo holotype male at HAHC labeled: "BWI: Barbados, 250m / Welchman Hall Gully / 20-25. II 79, moist / woods, carrion traps / S. & J. Peck"; "*Anaides vartorellii* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype at HAHC labeled: "BWI: Barbados, 250m / Welchman Hall Gully / 20-25. II 79, moist / woods, carrion traps / S. & J. Peck"; "*Anaides vartorellii* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Two paratypes at AMNH and two paratypes at FCOC labeled: "Barbados / W. Indies." Two paratypes at HAHC and one paratype at UNSM labeled: "BWI: Barbados, 250m / Welchman Hall Gully / 20-25. II 79, moist / woods, carrion traps / S. & J. Peck." One paratype at USNM labeled: "Barbados"; "H. M. Lefroy / Barbados, B. W. I." All paratypes with my yellow paratype label (handwritten): "*Anaides vartorellii* / PARATYPE / F. C. Ocampo."

**Type locality.** Barbados, Welchman Hall Gully.

**Description. Holotype male.** Length 7.00 mm; width 4.20 mm. *Color*: Head, pronotum, scutellum, venter, and legs reddish-brown. *Head*: Frons in dorsal view with base slightly convex at middle. Clypeus and frons setose; setae sparse, long. Clypeus with median tubercle; with slightly concave on sides, shape subtrapezoidal; apex weakly rounded; surface punctate; punctures dense, large. Clypeal margins reflexed, denticulate, acute apically; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, dorsal surface with fringe of setae, lateral

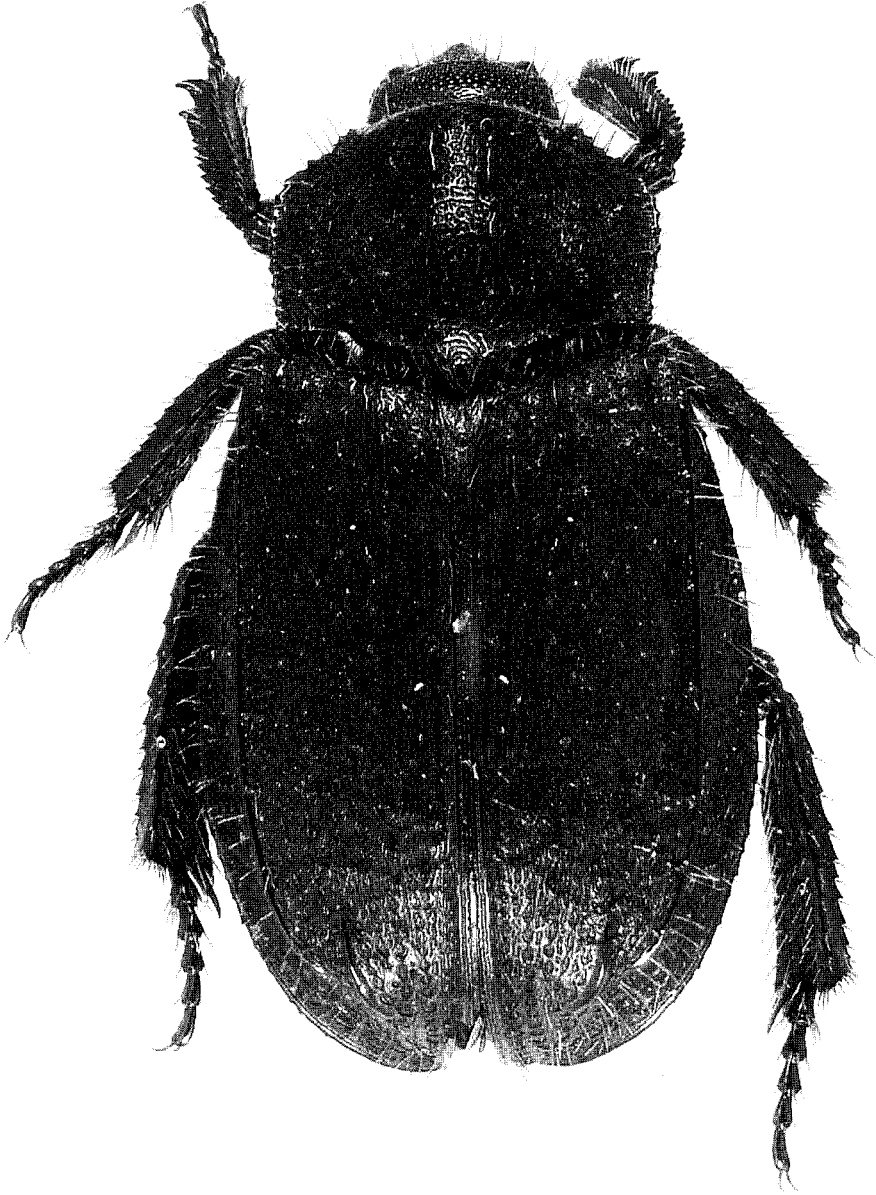


Fig. 25. *Anaides vartorelli* Ocampo, male.

margins subparallel. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, capable

of receiving penultimate and partially receiving ultimate segments. *Pronotum* (Fig. 25): Surface convex; convexity accentuated medially; 0.70 times as long as wide, densely areolate-ocellate, sparsely setose, with 2 central, longitudinal carinae; carinae straight.

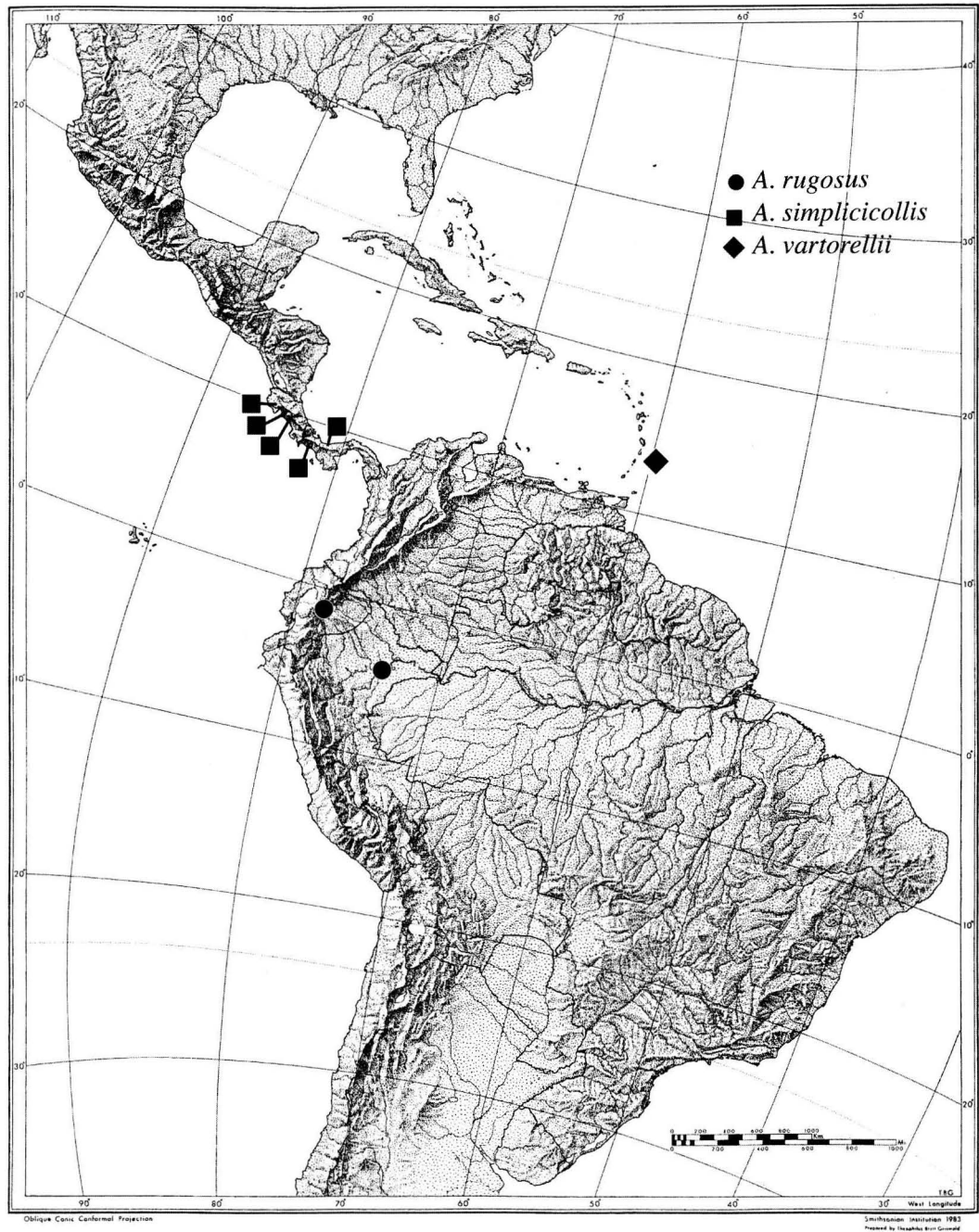


Fig. 26. Distribution of *Anaides rugosus*, *A. simplicicollis*, and *A. vartorellii*.

Anterior margin with weak bead; lateral margins denticulate, denticles bearing 1-2 setae; posterior margin with well-developed, subtriangular median projection. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface

glabrous, apex acute. *Elytron* (Fig. 25): Surface with chain-like sculpturing alternating longitudinally with irregularly sculptured lines, sparsely setose. Lateral margin with 1 carina extending from humerus to apical declivity. Base with 1 elongated tubercle

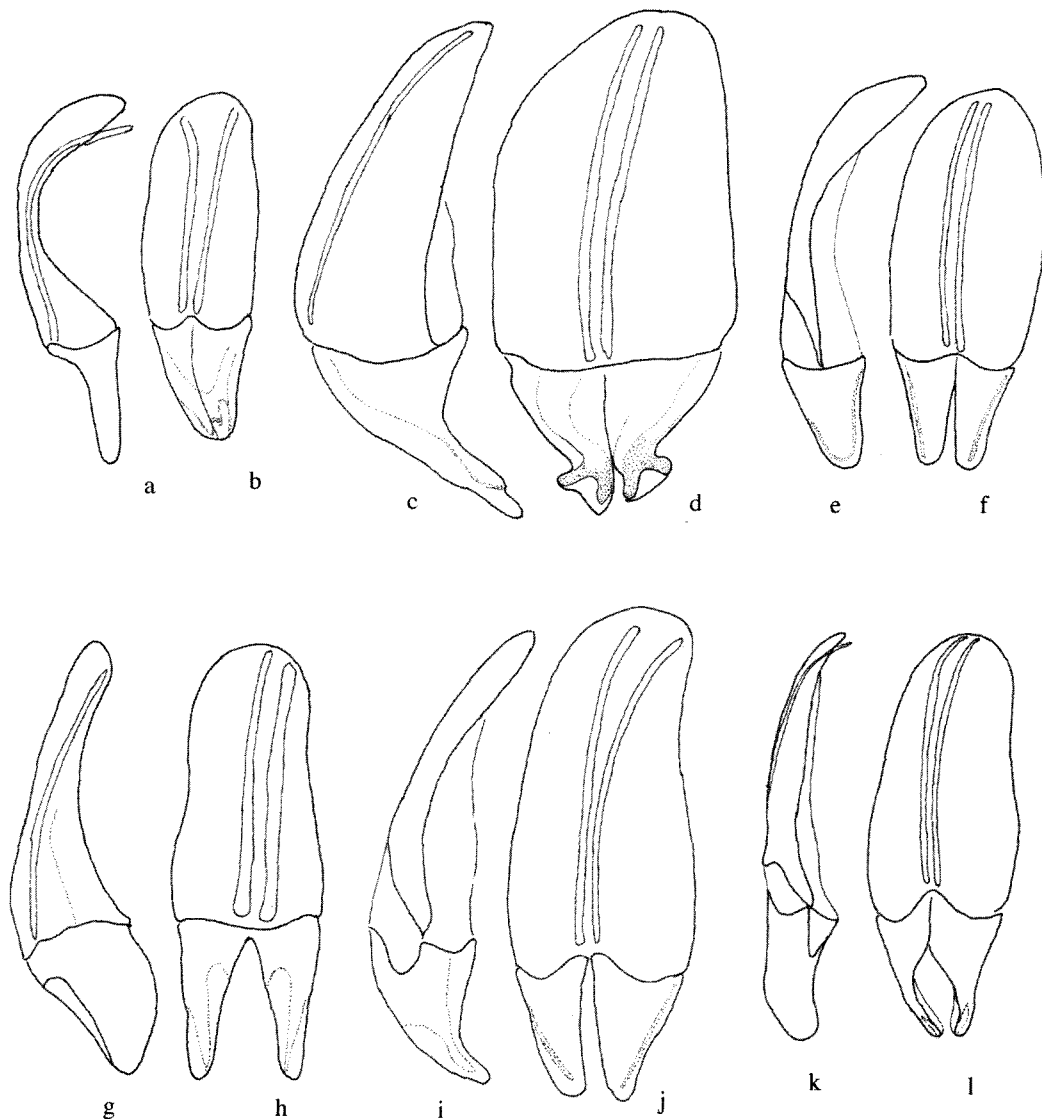


Fig. 27. Male parameres and phallobase of a-b) *Anaides parvulus*, c-d) *A. planus*, e-f) *A. quinckeii*, g-h) *A. rugosus*, i-j) *A. simplicicollis*, and k-l) *A. vartorellii*.

between suture and humerus. Humerus with 1 small tubercle. Apical declivity with 1 elongated tubercle. Epipleuron shagreened, equal in width from humeral angle to apex, or slightly wider at apex. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate, with cross-like sculpture near suture. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior

surface flat. Metatrochanter with posteromedial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and well-developed denticles between base and basal tooth and between basal and middle teeth; basal and middle teeth subtriangular; dorsal surface with 3 setose, longitudinal carinae; outer carina denticulate; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres

2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender; outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex truncate; external mesotibial spur absent; medial spur present, apex acuminate. Metatibia subequal in width from near base to near apex, apex truncate, with poorly developed outer process. *Parameres*: Figs. 27 k-l.

**Allotype female.** Length 6.30 mm; width 3.60 mm. The allotype female differs from the holotype in the following respects: Pro-tibial spur evenly curved; mesotibia with 2 spurs, spurs subequal in length.

**Paratypes.** 8. Length 6.28-6.33 mm; width 3.54-3.61 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** I take great pleasure in naming this species after my good friend, Federico Vartorelli.

**Diagnosis.** *Anaides vartorellii* is distinguished from other species of *Anaides* by the presence of a median tubercle on the clypeus; two pronotal carinae; two basal tubercles on the elytra, the one closer to the suture elongated; and the epipleuron equal in width from humeral angle to apex or slightly wider at apex. The shape of the parameres is also diagnostic (Figs. 27 k-l) and distinguishes this species from *A. fossulatus*.

**Distribution** (Fig. 26). Barbados. 10 specimens examined from AMNH, HAHC, FCOC, and USNM.

**BARBADOS** (10): Welchman Hall Gully (6); No data (4).

**Temporal Data.** February (6).

**Remarks.** Adults of *A. vartorellii* are attracted to carrion. Specimens were collected at 250 m altitude.

## **CALLOSIDES HOWDEN, 1971**

(Figs. 28-30)

*Callosides* Howden 1971: 1468.

**Taxonomic history.** The genus *Callosides* was described by Howden (1971) for one species, *C. campbelli* Howden. Since the description of the genus, two additional species were described (Paulian and Cambefort 1995; Howden 2001). As defined here, the genus *Callosides* includes three species. Two species of *Callosides*, *C. campbelli* and *C. bartolotzzii*, are known only from the holotype specimens.

**Type species.** *Callosides campbelli* Howden, 1971; by original designation.

**Description.** Scarabaeoidea, Hybosoridae, Anaidinae. *Form*: Body elongate, sides subparallel or rounded, dorsum convex, elytral apex rounded. *Head*: Surface with numerous small foveae at base, disc and apex areolate-ocellate. Frons slightly convex. Eye canthus obsolete. Eyes not visible in dorsal view. Frontoclypeal suture obsolete. Clypeus with margins reflexed, apex rounded, vertical surface of apex blunt. Labrum with apex moderately acute or truncate, edges with fringe of setae, lateral margins rounded. Mandibles not protruding beyond labrum, external surface coarsely sculptured, molar area with mycangium. Labium with apex of mentum indented. Antennae 10-segmented. *Pronotum*: Surface convex, areolate-ocellate, with or without tubercles, with 2 short, longitudinal carinae on anterior half, or none. Anterior margin with weak bead; lateral margins rounded or sinuous; posterior margin sinuous, deeply produced medially. *Scutellum*: Reduced, largely concealed under tuft of recumbent setae. *Elytron*: Shape rounded, convex, surface areolate-ocellate, disc tuberculate. Lateral margin with or without longitudinal carina from near humerus to apical declivity. Humerus toothed. Epipleuron with surface flat. *Hind wing*: Reduced. *Venter*: Prosternum biconcave. Mesosternal apex not invaginated between mesocoxae. Metasternum short at middle

(Fig. 9a). Mesepisternum triangular. Abdominal sternites with surface strigulate, posterior margin sclerotized and reflexed. *Legs*: Meso- and metatibia slender, outer margin with 2 longitudinal rows of teeth. *Male genitalia*: Parameres symmetrical, bilobed (Fig. 28).

**Diagnosis.** *Callosides* is easily distinguished from other genera of Hybosoridae by the following combination of characters: pronotum convex, with surface areolate-ocellate and with or without tubercles; with two short, longitudinal carinae on anterior half (or lacking entirely); elytra elongate or globose, convex; surface densely areolate-ocellate; lateral margin with or without longitudinal carina from near humerus to declivous area, base with one elongated tubercle between humerus and suture; hind wings reduced; and abdominal sternites with posterior margin sclerotized and reflexed.

**Distribution.** *Callosides* species are distributed in Colombia and Ecuador in South America. Specimens of *Callosides* species were collected between 1,200 and 2,800 m elevation. Species are primarily found in mid-elevation tropical forests between 10° N and 3° S latitudes.

**Natural history.** Adults of *Callosides* have been collected by sifting leaf litter in humid montane forests. Mouthparts support the hypothesis that the species feed on fungal spores or fungi (Howden 2001).

**Phylogenetic relationships.** According to my phylogenetic analysis, the genus *Callosides* is the sister taxon of *Cryptogenius* (Figs. 5, 6). The genus *Callosides* is monophyletic based on the following synapomorphies: eye canthus obsolete; clypeal anterior margin with vertical surface inverted; elytral disc with tubercles; elytron with areolate-ocellate sculpture, not net-like; elytral humeral tooth present; parameres with lateroapical process present; parameres bilobed.

### Key to species of *Callosides*. Modified from Howden (2001)

1. Pronotum with 4 large tubercles. Head with 2 longitudinal swellings. . . . . 2
- 1'. Pronotum with 2 small tubercles. Head unevenly convex. Male genitalia as Figs. 28 c-d. . . . . *C. campbelli* Howden
2. Elytral disc between suture and lateral carina with 2 irregular rows of small tubercles, tubercles on apical declivity rounded, sides not abruptly elevated. Male genitalia as Figs. 28 e-f, 30. . . . . *C. genieri* Howden
- 2'. Elytral disc between suture and lateral carina lacking rows of tubercles, tubercles on apical declivity abruptly elevated. Male genitalia as in Figs. 28 a-b. . . . . *C. bartolozzii* Paulian and Cambefort

### Clave para las especies de *Callosides*. Modificada de Howden (2001)

1. Pronoto con 4 grandes y obvios tubérculos; cabeza con 2 carenas longitudinales. . . . . 2
- 1'. Pronoto con 2 pequeños tubérculos laterales; cabeza irregularmente convexa. Genitalia del macho como en Figs. 28 c-d. . . . . *C. campbelli* Howden
2. Disco elitral con dos hileras irregulares de pequeños tubérculos entre la sutura y la carina lateral, tubérculos de la región declivital redondeados, márgenes no elevados abruptamente. Parámetros como en Figs 28 e-f. . . . . *C. genieri* Howden
- 2'. Disco elitral sin 2 hileras irregulares de pequeños tubérculos entre la sutura y la carina lateral, tubérculos de la región declivital elevados abruptamente. Parámetros como en Figs. 28 a-b. . . . . *C. bartolozzii* Paulian and Cambefort



**1. *Callosides bartolozzii* Paulian and Cambefort, 1995**

(Figs. 28 a-b, 29)

*Callosides bartolozzii* Paulian and Cambefort 1995: 75.

**Diagnosis.** Length 5.40 mm; width 2.50 mm. This species is distinguished from *C. campbelli* and *C. genieri* by the elytral disc between suture and lateral carina lacking rows of tubercles, tubercles on apical declivity abruptly elevated; and the well-developed humeral tooth. The shape of the parameres is also diagnostic (Figs. 28 a-b). Females of this species are unknown.

**Distribution** (Fig. 29). Ecuador. This species is known only from the type specimen (MLSF).

**ECUADOR** (1): **Napo:** Rio Hollin (1).

**Natural history.** Nothing is known about the biology of this species. The holotype was collected at 1,200 m elevation.

**2. *Callosides campbelli* Howden, 1971**

(Figs. 28 c-d)

*Callosides campbelli* Howden 1971: 1471.

**Diagnosis.** Length 4.40 mm; width 2.10 mm. This species is distinguished from *C. bartolozzii* and *C. genieri* by the pronotum having two, small, lateral tubercles. The shape of the parameres is also diagnostic (Figs. 28 c-d). Females of this species are unknown.

**Distribution** (Fig. 29). Colombia. This species is known only from the type specimen (HAHC).

**COLOMBIA** (1): **Valle:** Saladito (1).

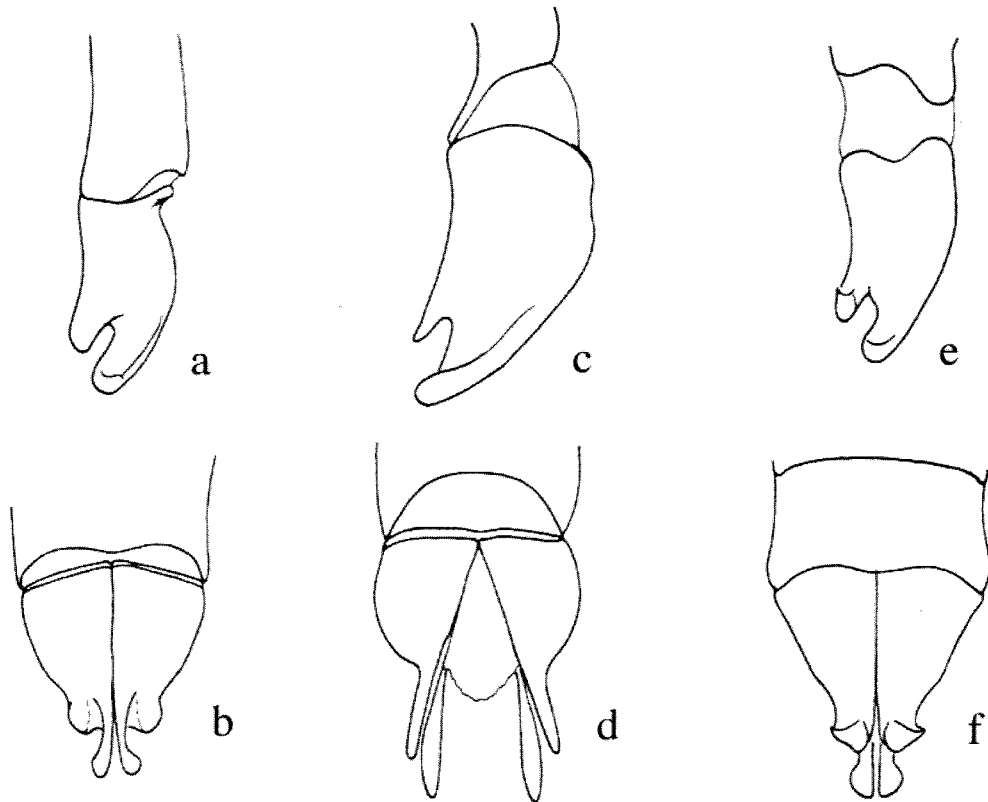


Fig. 28. Male parameres of a-b) *Callosides bartolozzii*, c-d) *C. campbelli*, and e-f) *C. genieri*. (a, c, and e lateral views, b, d, and f dorsal views). (After Howden 2001).



Fig. 29. Distribution of *Callosides* species.

**Natural history.** Nothing is known about the biology of this species. The only specimen known was collected at 1,800 m elevation.

**3. *Callosides genieri* Howden, 2001**

(Figs. 28 e-f, 29, 30)

*Callosides genieri* Howden 2001: 200.

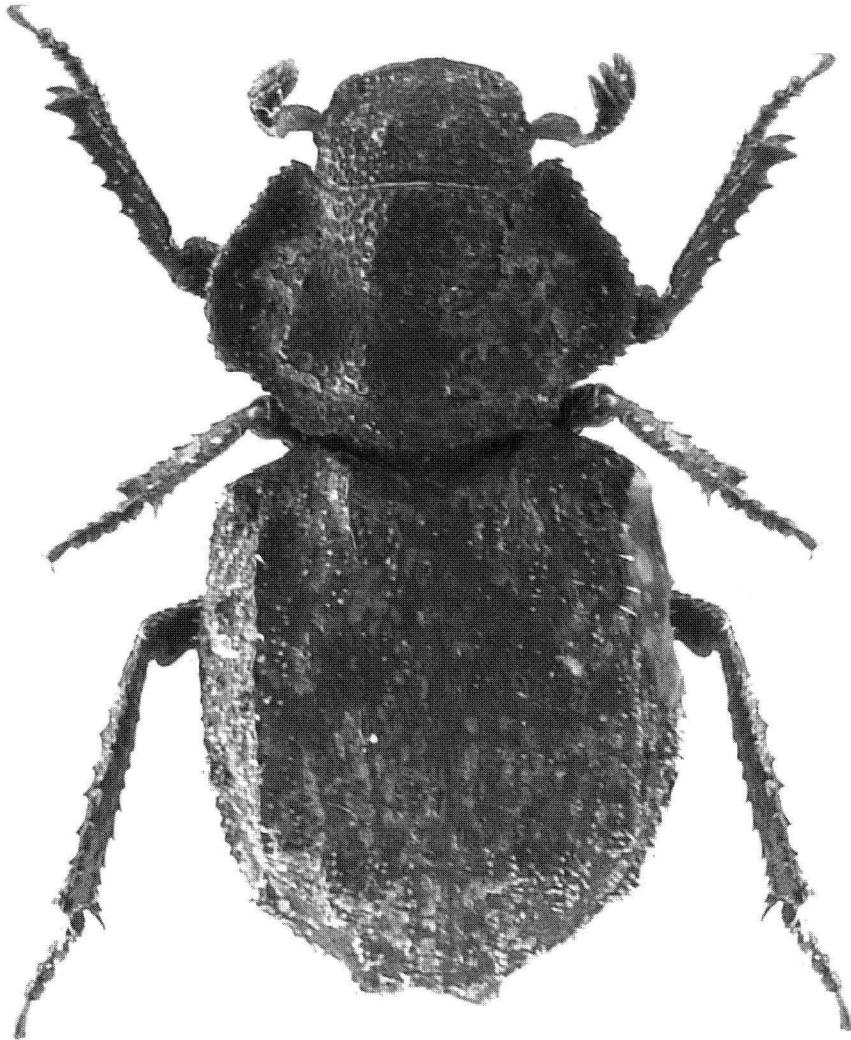


Fig. 30. *Callosides genieri* Howden

**Diagnosis.** Length 4.20-4.60 mm; width 2.10-2.30 mm. This species is distinguished from *C. bartolozzii* and *C. campbelli* by the elytral disc between the suture and lateral carina with 2 irregular rows of small tubercles, tubercles on apical declivity rounded, and the sides not abruptly elevated. The shape of the parameres is also diagnostic (Figs. 28 e-f). Females differ from males in the following respects: mesotibia with spurs subequal in length (external spur reduced in males).

**Distribution** (Fig. 29). Ecuador. 2 specimens examined at UNSM.

**ECUADOR** (2): **Carchí:** San Gabriel (6 km E) (2).

**Natural history.** Specimens of *C. genieri* were collected by sifting leaf litter. Mouthparts support the hypothesis that this species feeds on fungal spores or fungi (Howden 2001). Label data indicates that specimens were collected at 2,830 m elevation from humid montane forests.

**CHAETODUS WESTWOOD, 1845**

(Figs. 31-66)

*Chaetodus* Westwood 1845:157.*Pseudohybosorus* Endrödi 1963: 42. **New Synonymy.**

**Taxonomic history.** The genus *Chaetodus* was described by Westwood (1845), who described three species: *C. piceus* Westwood, *C. irregularis* Westwood, and *C. basalis* Westwood. In his description, Westwood doubted the placement of *C. basalis* in this genus, and he used a “?” after the generic name. This species was later placed in the hybosorine genus *Dicraeodon* by Erichson (1847). Since the time of the original description, 15 additional species have been described in the genus (de Borre 1886b; Arrow 1909; Benderitter 1923; Martínez 1956, 1988, 1994). Martínez (1988) described one subgenus of *Chaetodus*, *Chaetodopsis*, and placed the genera *Pseudohybosorus* Endrödi (1963) and *Borrochrus* Allsopp (1979) as subgenera of *Chaetodus*. Martínez did not provide a clear description of each subgenus nor did he provide a list of species placed in each subgenus. In a posthumous publication, Martínez (1994) described *Chaetodopsis* again as a “new subgenus” of *Chaetodus*. This publication should not be considered the date of description of the subgenus *Chaetodopsis*, since it was published originally in 1988. As defined here, the genus *Chaetodus* includes two subgenera and 33 species (19 of which are new). The genus *Borrochrus* is reestablished, and the subgenus *Pseudohybosorus* Endrödi is placed in synonymy with *Chaetodus* Westwood.

**Type species.** *Chaetodus irregularis* Westwood, 1846.

**Description.** Scarabaeoidea, Hybosoridae, Anaidinae. *Form:* Body elongate, sides subparallel, dorsum convex, elytral apex rounded. *Head:* Frons on surface with numerous small foveae at base, disc punctate or areolate-ocellate. Frons (lateral view) slightly convex at middle. Eye canthus well-developed. Eyes (in dorsal view) slightly visible. Frontoclypeal suture obsolete. Clypeus

with margins slightly reflexed, apex rounded, vertical surface of apex blunt. Labrum rounded, with apex truncate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum, external surface coarsely sculptured. Labium with apex of mentum indented. Antennae 10-segmented. *Pronotum:* Surface convex, punctate or areolate-ocellate, without longitudinal carinae. Anterior margin with bead, lateral margins denticulate, posterior margin rounded, sinuous, or with medial projection. *Scutellum:* Shape subtriangular, apex acute. *Elytron:* Elongate, convex, surface with 10, 12, or 13 striae. Disc and lateral margin with or without longitudinal carinae. Apical declivity without tubercles. Epipleuron with surface flat. *Hind wing:* Surface covered with microscopic setae; MP3 vein absent, MP4 vein present, RA4 vein present, secondary ghost branches present, M-Cu loop present. *Venter:* Prosternum biconcave. Mesosternal apex not invaginated. Metasternum long at middle (Fig. 10b). Mesepisternum triangular. Abdominal sternites 2-4 with medial, longitudinal keel poorly developed; sternites with surface strigulate, posterior margin sclerotized and moderately to strongly reflexed. *Legs:* Meso- and metatibia slender or robust, outer margin with 2 longitudinal rows of teeth. *Male genitalia:* Parameres symmetrical, with dorsal extensions; phallobase with lateral projections, projections variably developed.

**Diagnosis.** *Chaetodus* is easily distinguished from other genera of Hybosoridae by the following combination of characters: pronotum convex, with surface punctate or areolate-ocellate, without longitudinal carinae; elytra elongate, convex, surface with 10, 12, or 13 striae; disc with lateral margin with or without one longitudinal carina from humerus to apical declivity, hind wings covered by microscopic setae, with M-Cu loop absent, MP3 vein absent, MP4 vein present; metasternum long at middle; and abdominal sternites 4-8 with posterior margin sclerotized and reflexed.

**Distribution.** *Chaetodus* is a Neotropical genus whose species are distributed in Central

and South America. The known distribution of this genus includes the following countries: Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Venezuela, Colombia, Ecuador, Suriname, Guyana, French Guiana, Brazil, Peru, Bolivia, Argentina, Paraguay, and Uruguay. *Chaetodus* species are primarily found in low and mid-altitude tropical forests between 20° N and 40° S latitudes, and they have been collected from near sea level to 4,000 m altitude.

**Natural history.** Species of *Chaetodus* are attracted to carrion and dung, which suggests these are their primary food sources.

Adults of *Chaetodus* species are attracted to light. Nothing is known about the biology of the larva. Costa *et al.* (1988) described one larva of this genus.

**Phylogenetic relationships.** My phylogenetic analysis shows that the genus *Chaetodus* is the sister taxon of a clade composed by *Totoia*, *Anaides*, *Cryptogenius*, and *Callosides* (Figs. 5, 6). The genus *Chaetodus* is monophyletic based on the following synapomorphies: pronotum with the posterior projection poorly developed; elytron with 10, 12 or 13 striae present; and meso- and metatibial apex slightly expanded.

### Key to species of *Chaetodus*

1. Elytron with 12 or 13 striae between suture and lateral margin. . . . . 2
- 1'. Elytron with 10 striae between suture and lateral margin . . . . . 14
2. Elytron with 12 striae between suture and lateral margin . . . . . 13
- 2'. Elytron with 13 striae between suture and lateral margin . . . . . 3
3. Protibia with 7 or more well-developed denticles between base and basal tooth. . . . . 4
- 3'. Protibia with 0-5 poorly developed denticles between base and basal tooth . . . . . 6
4. Pronotal setae sparse, more concentrated on anterior margin and on middle of pronotal disc . . . . . 5
- 4'. Pronotal setae sparse, evenly distributed. Venezuela. . . . . *C. pax* Ocampo sp. nov.
5. Elytral apex with tubercle, tubercle with surface strigulate. . . . . *C. exaratus* Arrow
- 5'. Elytral apex without tubercle. . . . . *C. piceus* Westwood
6. Elytral intervals 3, 6, and 9 developed as carinae from base to apical declivity. . . . . Venezuela. . . . . *C. venezolanus* Martínez
- 6'. Elytral intervals 3, 6, and 9 not developed as carinae from base to apical declivity (sometimes slightly developed as carinae on interval 9 but never distinctly developed on intervals 3 and 6). . . . . 7
7. Pronotal posterior margin not beaded, with or without small fovea medially. . . . . 8
- 7'. Pronotal posterior margin beaded, without small fovea medially . . . . . 10
8. Pronotal posterior margin with small fovea medially. Male metatibia with furcal process developed. Male genitalia as in Figs. 44 e-f. . . . . *C. jamesonae* Ocampo sp. nov.
- 8'. Pronotal posterior margin without (rarely with in *C. amazonicus*) small fovea medially. Male metatibia with or without furcal process. Male genitalia different than in Figs. 44 e-f. . . . . 9
9. Length 7 mm or more. Meso- and metafemoral surface strigulate on posterior face . . . . . *C. dato* Ocampo sp. nov.
- 9'. Length 4 mm or less. Meso- and metafemoral surface smooth on posterior face. . . . . *C. amazonicus* de Borre
10. Length 5 mm or more. Shape not distinctly globose. . . . . 11
- 10'. Length less than 4 mm. Shape distinctly globose. Mexico . . . . . *C. globosus* Ocampo sp. nov.
11. Male protibial spur right-angled at apex. . . . . *C. mimi* Ocampo sp. nov.
- 11'. Male protibial spur curved at apex. . . . . 12
12. Protibia with 3-4 poorly developed denticles between base and basal tooth. . . . . *C. allsoppi* Martínez
- 12'. Protibia without denticles between base and basal tooth. . . . . *C. maquipucuna* Ocampo sp. nov.

13. Elytral intervals 3, 6, and 8 developed as carinae from base to apical declivity. Pronotal sculpture areolate-ocellate. . . . . *C. tricarinatus* Ocampo sp. nov.
- 13'. Elytral intervals 3, 6, and 8 not developed as carinae from base to apical declivity. Pronotal sculpture punctate. . . . . *C. ratcliffei* Ocampo sp. nov.
14. Pronotum with posterior margin beaded and / or with distinct small fovea medially (variable and sometimes reduced to 2 fovea on each side of posterior pronotal projection in *C. paulseni* Ocampo) . . . . . 15
- 14'. Pronotum without posterior margin beaded or small fovea medially. . . . . 20
15. Elytral interval 6 developed as carina from base to apical declivity, intervals 2 and 4 slightly developed as carinae on apical half. . . . . 16
- 15'. Elytral interval 2, 4, and 6 not developed as carinae. . . . . 19
16. Meso- and metafemural surface smooth on posterior face. . . . . 17
- 16'. Meso- and metafemural surface strigulate on posterior face . . . . . *C. paulseni* Ocampo sp. nov.
17. Epipleuron tapered at apex . . . . . 18
- 17'. Epipleuron equal in width from base to near apex or slightly wider at apex. . . . . *C. columbicus* Petrovitz
18. Male genitalia as Figs. 44 g-h. Mexico. . . . . *C. lacandonicus* Martínez and Morón
- 18'. Male genitalia as Figs. 50 c-d. Ecuador. . . . . *C. paucarae* Ocampo sp. nov.
19. Epipleuron tapered at apex. Male genitalia as in Figs. 57 g-h . . . . . *C. teamscaraborum* Ocampo sp. nov.
- 19'. Epipleuron equal in width from base to near apex or slightly wider at apex. Male genitalia as Figs. 44 m-n . . . . . *C. nigrifrons* Ocampo sp. nov.
20. Elytral intervals 2, 4, and 6 developed as carinae from base to apical declivity (in *C. octocarinatus* Ocampo intervals 1, 3, 5, 7, and 8 also developed as carinae) . . . . . 21
- 20'. Elytral intervals 2, 4, and 6 not developed as carinae from base to apical declivity . . . . . 23
21. Elytral intervals 1, 3, 5, 7, and 8 not developed as carinae. Pronotum without 2 small fovea on each side of posterior pronotal projection . . . . . 22
- 21'. Elytral intervals 1, 3, 5, 7, and 8 developed as carinae. Pronotum with 2 small fovea on each side of posterior pronotal projection. . . . . *C. octocarinatus* Ocampo sp. nov.
22. Pronotum with surface densely areolate-ocellate. Elytral intervals 1, 3, and 5 rugose. . . . . *C. asuai* Martínez
- 22'. Pronotum with surface punctate. Elytral intervals 1, 3, and 5 smooth. . . . . *C. brancuccii* Martínez
23. Meso- and metafemural surface strigulate on posterior face . . . . . 24
- 23'. Meso- and metafemural surface smooth on posterior face. . . . . 26
24. Length longer than 5.8 mm. Male metatibia with furcal process developed. . . . . 25
- 24'. Length shorter than 4.5 mm. Male metatibia without furcal process. . . . . *C. smithi* Ocampo sp. nov.
25. Pronotum sparsely punctate, punctures small. Males with protibial spur right-angled at apex. . . . . *C. rodolfo* Ocampo sp. nov.
- 25'. Pronotum densely punctate, punctures moderately large. Males with protibial spur curved at apex . . . . . *C. bolivianus* Martínez
26. Pronotal setae evenly distributed or not (in this case not concentrated near anterior margin); setae sparse, moderately dense, or dense. . . . . 28
- 26'. Pronotal setae concentrated near anterior margin, or on anterior margin and as an irregular, curved row on disc; setae sparse. . . . . 27
27. Pronotal setae concentrated near anterior margin. Protibia with 6-7 denticles between base and basal tooth. Male genitalia as Figs. 44 c-d. . . . . *C. irregularis* Westwood
- 27'. Pronotal setae concentrated near anterior margin and as an irregular, curved row on disc. Protibia with 3-4 poorly developed denticles between base and basal tooth. Male genitalia as Figs. 57 c-d. . . . . *C. sagittarius* Ocampo sp. nov.
28. Pronotal setae sparse or moderately dense. Protibia with 0-3 poorly developed denticles between base and basal tooth. . . . . 29

- 28'. Pronotum densely setose, setae long. Protibia with 6-7 denticles between base and basal tooth. Male genitalia as Figs. 66 i-j ..... *C. villosicollis* Benderitter
- 29. Elytral intervals 1-6 evenly convex from base to apical declivity ..... 30
- 29'. Elytral intervals 1-6 developed as carinae on posterior half (sometimes intervals 1, 3 and 5 not developed as carinae, but then case convexity larger than at elytral base). Male genitalia as Figs. 50 k-l ..... *C. platynotus* Ocampo sp. nov.
- 30. Male metatibia without furcal process. Male genitalia different than Figs. 44 a-b . . 31
- 30'. Male metatibia with furcal process developed. Male genitalia as Figs. 44 a-b ..... *C. humerosus* Petrovitz
- 31. Male genitalia with parameres not broadly separated at apex. Figs. 38 k-l, 50 a-b . . 32
- 31'. Male genitalia with parameres broadly separated at apex. Figs. 38 o-p. .... *C. hoffmanni* Ocampo sp. nov.
- 32. Male genitalia as Figs. 50 a-b. Brazil ..... *C. noirregularis* Ocampo sp. nov.
- 32'. Male genitalia as Figs. 39 k-l. Bolivia ..... *C. fraternus* Martínez

**Clave para las especies de *Chaetodus***

- 1. Elitro con 12 o 13 estrias entre la sutura y el margen lateral ..... 2
- 1'. Elitro con 10 estrias entre la sutura y el margen lateral. .... 14
- 2. Elitro con 12 estrias entre la sutura y el margen lateral. .... 13
- 2'. Elitro con 13 estrias entre la sutura y el margen lateral ..... 3
- 3. Protibia con 7 denticulos entre la base y el diente basal. .... 4
- 3'. Protibia con 0-5 denticulos entre la base y el diente basal ..... 6
- 4. Setas del pronoto esparcidas, mas concentradas en el margen anterior o en el centro del pronoto ..... 5
- 4'. Setas del pronoto esparcidas y distribuidas en forma pareja ..... *C. pax* Ocampo sp. nov.
- 5. Elitro con tuberculo apical, tuberculo con la superficie rugosa. .... *C. exaratus* Arrow
- 5'. Elitro sin tuberculo apical ..... *C. piceus* Westwood
- 6. Intervalos elitrales 3, 6 y 9 desarrollados como carenas desde la base hasta el declive apical. Venezuela ..... *C. venezolanus* Martínez
- 6'. Intervalos elitrales 3, 6 y 9 no desarrollados como carenas desde la base hasta el declive apical (a veces ligeramente desarrollados como carenas sobre le intervalo 9 pero nunca sobre los intervalos 3 y 6). .... 7
- 7. Margen posterior del pronoto sin reborde, con o sin pequeña depresión en el medio. . 8
- 7'. Margen posterior del pronoto con reborde, sin pequeña depresión en el medio . . . 10
- 8. Margen posterior del pronoto con un paqueña fovea en el medio. Metatibia del macho con proceso furcal desarrollado. Genitalia del macho con en Figs. 44 e-f. .... *C. jamesonae* Ocampo sp. nov.
- 8'. Margen posterior del pronoto sin un paqueña fovea en el medio (raramente presente ne *C. amazonicus*). Metatibia del macho con o sin proceso furcal. Genitalia del macho diferente a las de las figuras en Figs. 44 e-f. .... 9
- 9. Longitud 7 mm o mayor. Supreficie del meso- and metafemur estrigulada sobre la cara posterior ..... *C. datoii* Ocampo sp. nov.
- 9'. Longitud 4 mm or menor. Supreficie del meso- and metafemur lisa sobre la cara posterior. .... *C. amazonicus* de Borre
- 10. Largo 5 mm o mayor. Forma no globosa ..... 11
- 10'. Largo menor a 4 mm. Forma distintivamente globosa. México. .... *C. globosus* Ocampo sp. nov.
- 11. Espina protibial del macho con ápice en angulo recto. .... *C. mimi* Ocampo sp. nov.
- 11'. Espina protibial del macho curvada ..... 12
- 12. Protibia con 3-4 denticulos poco desarrollados entre la base y el diente basal. .... *C. allsoppi* Martínez
- 12'. Protibia sin denticulos entre la base y el diente basal. .... *C. maquipucuna* Ocampo sp. nov.

13. Intervalos elitrales 3, 6 y 8 desarrollados como carena desde la base hasta el declive apical; escultura elitral areolada-ocelada. . . . . *C. tricarinatus* Ocampo sp. nov.
- 13'. Intervalos elitrales 3, 6 y 8 no desarrollados como carena desde la base hasta el declive apical; escultura elitral punteada. . . . . *C. ratcliffei* Ocampo sp. nov.
14. Pronoto con el margen posterior con reborde y /o con una pequeña depresión en el medio (variable y a veces reducida a dos pequeñas depresiones sobre cada lado de la proyección posterior del pronoto en *C. paulseni* Ocampo). . . . . 15
- 14'. Pronoto con el margen posterior sin reborde o con pequeña depression. . . . . 20
15. Intervalo elitral 6 desarrollado como carena desde la base hasta el declive apical, intervalos 2 y 4 ligeramente desarrollados como carena an la mitad apical. . . . . 16
- 15'. Intervalos elitrales 2, 4 y 6 no desarrollados como carena. . . . . 19
16. Meso- y metafémur con superficie posterior lisa. . . . . 17
- 16'. Meso- y metafémur con superficie posterior estrigulada- o rugosa. . . . .  
. . . . . *C. paulseni* Ocampo sp. nov.
17. Epipleura angostada hacia el ápice. . . . . 18
- 17'. Epipleura de igual ancho desde la base hasta casi el ápice o ligeramente mas ancha en el ápice. . . . . *C. columbicus* Petrovitz
18. Genitalia del macho como en Figs. 44 g-h. Mexico . . . . .  
. . . . . *C. lacandonicus* Martínez and Morón
- 18'. Genitalia del macho como en Figs. 50 c-d. Ecuador . . *C. paucarae* Ocampo sp. nov.
19. Epipleura angostada hacia el ápice. Genitalia del macho como en Figs. 57 g-h. . . . .  
. . . . . *C. teamscaraborum* Ocampo sp. nov.
- 19'. Epipleura de igual ancho desde la base hasta casi el ápice o ligeramente mas ancha en el ápice. Genitalia del macho como en Figs. 44 m-n. . *C. nigrifrons* Ocampo sp. nov.
20. Intervalos elitrales 2, 4 y 6 desarrollados como carena desde la base hasta el declive apical (en *C. octocarinatus* Ocampo los intervalos 1, 3, 5, 7 y 8 también están desarrollados como carena) . . . . . 21
- 20'. Intervalos elitrales 2, 4 y 6 no desarrollados como carena desde la base hasta el declive apical . . . . . 23
21. Intervalos elitrales 1, 3, 5, 7 y 8 no desarrollados como carena. Pronoto sin dos pequeñas depresiones a cada lado de la proyección posterior . . . . . 22
- 21'. Intervalos elitrales 1, 3, 5, 7 y 8 desarrollados como carena. Pronoto con dos pequeñas depresiones a cada lado de la proyección posterior . . . . .  
. . . . . *C. octocarinatus* Ocampo sp. nov.
22. Pronoto con superficie densamente areolada-ocelada. Intervalos elitrales 1, 3 y 5 rugosos . . . . . *C. asuai* Martínez
- 22'. Pronoto con la superficie punteada. Intervalos elitrales 1, 3 y 5 lisos. . . . .  
. . . . . *C. brancuccii* Martínez
23. Meso y metafémur con la superficie posterior estrigulada o rugosa . . . . . 24
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- 32'. Genitalia del macho como en Figs. 38 k-l . . . . . *C. fraternus* Martínez

## I. SUBGENUS *CHAETODUS* WESTWOOD, 1845

*Pseudohybosorus* Endrödi, 1963: 42. Martínez, 1988: 63. **New Synonymy.**

**Type species.** *Chaetodus irregularis* Westwood 1846.

**Diagnosis.** Intervals 2, 4, and 6 or 3, 6, and 9 not developed as carinae from base to apical declivity.

### 1. *Chaetodus allsoppi* Martínez, 1988

(Figs. 31, 34, 38 a-b)

*Chaetodus allsoppi* Martínez 1988: 64.

**Type material:** Holotype male at MACN labeled: "Dept Cuzco, PERU / Santa Isabel, / Cosnipata Valley / Nov. 30 1951 / Felix Woytkowski"; "HOLOTYPO"; "*Chaetodus (Chaetodus) allsoppi* sp. n / A. Martínez Det 1987". Allotype at HAHC labeled: "Hacienda María / Cosnipata Riv. / Saucetambo, Cuzco / Peru II -27 1952 / F. Woytkowski"; "ALLOTYPUS"; "*Chaetodus (Chaetodus) allsoppi* sp. n. / A. Martínez det 1987".

**Description.** Male. Length 5.98-6.32 mm; width 3.66-3.72 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose; setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded; surface punctate, punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 31): Surface convex, 0.64 times as long as wide, smooth, punctate; punctures large and more concentrated on apical half, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 31): Surface convex, with 13 striae between suture and lateral margin, striae



Fig. 31. *Chaetodus allsoppi* Martínez, male.

sparsely setose. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron tapered at apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal

surface strigulate on margins, smooth, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior

half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia slender, with 3 teeth and 2-3 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length, tarsomeres 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, slightly expanded. Metatibia with well-developed, medial, furcal process; furcal process shorter than medial metatibial spur (Fig. 31). External mesotibial spur reduced, 1/2 as long as medial spur, medial spur with apex acuminate. *Parameres*: Figs. 38 a-b.

**Female.** Length 5.95-6.34 mm; width 3.67-3.73. Females differ from the males in the following respects: protibia robust; protibial spur evenly curved; mesotibia with spurs subequal in length; and metatibial furcal process absent.

**Diagnosis.** *Chaetodus allsoppi* is distinguished from other species of *Chaetodus* by the pronotum with large punctures (more concentrated on apical half); elytron with 13 striae between the suture and lateral margin; protibia slender, with 3 teeth and with 2-3 denticles between base and basal tooth; metatibia with well-developed medial, furcal process; and furcal process shorter than the medial metatibial spur (Fig. 31). The shape of the parameres is also diagnostic (Figs. 38 a-b).

**Distribution** (Fig. 34). Peru, 1,715 specimens from AMNH, EMEC, FCOC, HNHM, MACN, SEMC, and UNSM.

**PERU** (1715): **Arequipa**: Vitor (2); **Ayacucho**: Santa Rosa (1); **Cusco**: Mamabama (2), Marcapata (1); Santa Isabel (1); **Huánuco**: Tingo Maria (1); **Junín**: Juaja (1); **Lima**: Lima (8).

**Temporal data.** June (2), August (3), September (8), October (1), November (1).

**Natural history.** Adults of *C. allsoppi* were collected between 700-3,200 m altitude.

## 2. *Chaetodus amazonicus* de Borre, 1886

(Figs. 32, 34, 38 c-d)

*Chaetodus amazonicus* de Borre, 1886a: 117. *Chaetodus amazonicus insperatus* Martínez 1988: 66. **New Synonymy.** *Pseudohybosorus drifti* Endrödi 1963: 43. **New Synonymy.**

**Type material.** Type material of *Chaetodus amazonicus* de Borre was not examined. Holotype male *Chaetodus amazonicus insperatus* Martínez at MACN labeled: "Tapirape, Mt. / 30 .XII. 960 / B. Malkin lg". Three paratypes of *Chaetodus drifti* Endrödi at HNHM labeled: "Suriname / Sidradejo / VII 1959 a"; "Paratypus / *Pseudohybosorus / drifti / Endr*"; "Coll / Dr. S. Endrödi". One paratype at HHC labeled: "Suriname / Sidradejo / VII 1959 a"; "Paratypus / *Pseudohybosorus / Drifty Endr. / det. Dr. Endrödi, 1961*". There are no character-based differences between *C. amazonicus* de Borre, *C. drifti* (Petrovitz) and *C. amazonicus insperatus* Martínez, therefore I place these species and one subspecies in synonymy.

**Description.** Male. Length 3.87-4.44 mm; width 2.29-2.73 mm. *Color*: Head, pronotum, scutellum, venter, and legs brown. *Head*: Frons slightly convex. Clypeus and frons setose; setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded; surface punctate, punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal

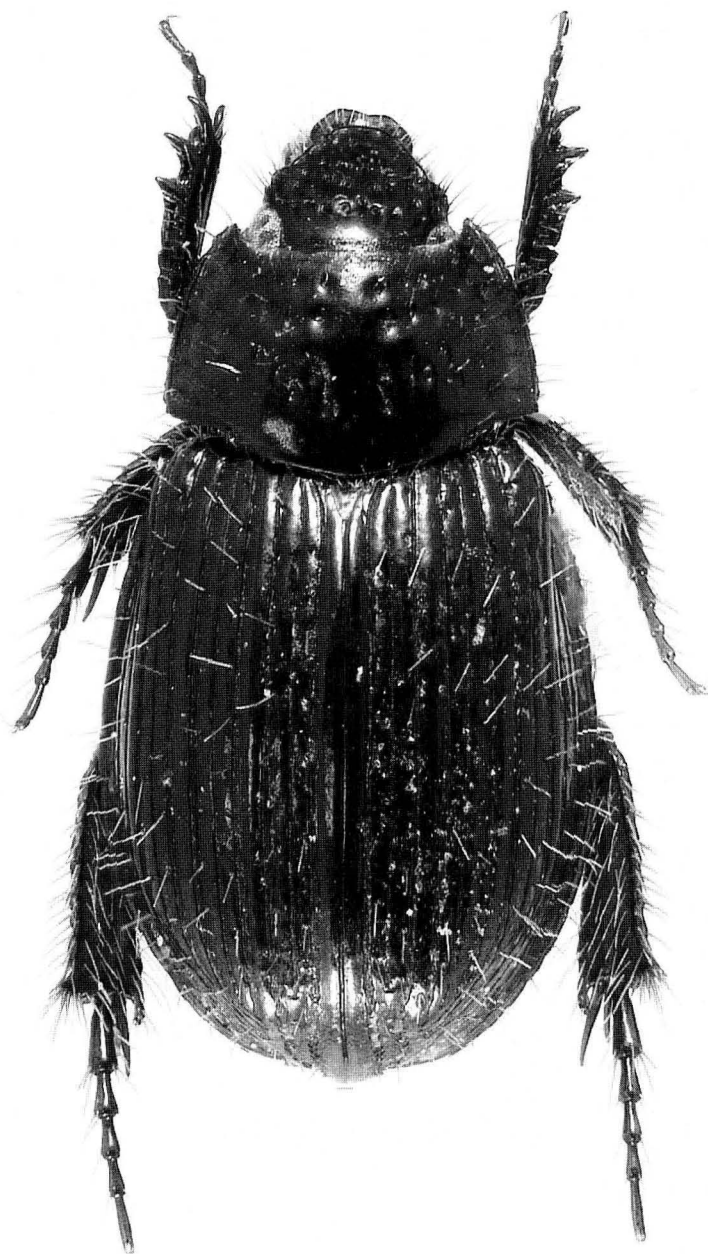


Fig. 32. *Chaetodus amazonicus* de Borre, male.

segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 32): Surface convex, 0.64 times as long as wide, smooth, punctate; punctures large, sparsely setose, setae short. Anterior

margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex

acute. *Elytron* (Fig. 32): Surface convex, with 13 striae between suture and lateral margin, striae sparsely setose. Lateral margin denticulate at humerus, slightly denticulate elsewhere; setose, setae moderately dense. Epipleuron equal in width from humeral angle to near apex, surface smooth. *Venter*: Prosternal surface strigulate, prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins; smooth medially with diamond-shaped; setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso-, and metafemoral surface smooth, sparsely setose. Protibia with 3 teeth and 2-3 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. Metatibia with medial, furcal process; furcal process shorter than medial metatibial spur (Fig. 32). External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 38 c-d.

**Female.** Length 3.85-4.45 mm; width 2.25-2.70 mm. Females differ from the males in the following respects: protibial spur evenly curved; mesotibia with spurs subequal in length; and metatibia without furcal process.

**Diagnosis.** *Chaetodus amazonicus* is distinguished from other species of *Chaetodus* by the pronotum with surface smooth and setose; setae concentrated on anterior margin and on the middle of pronotal disc; elytron with 13 striae between suture and lateral margin; protibia with 3 teeth and 2-3 denticles between base and basal tooth; and metatibia with medial, furcal process, furcal

process shorter than medial metatibial spur (Fig. 32). The shape of the parameres is also diagnostic (Figs. 38 c-d).

**Distribution** (Fig. 34). Brazil, Suriname, and Venezuela. 126 specimens from BDGC, CMNC, FCOC, HAHC, HNHM, MIZA, UNSM, and USNM.

**SURINAME** (4): Sidoredjo (4).

**VENEZUELA** (117): Aragua: El Limón (2); Bolívar: El Dorado (10 km S) (11); El Dorado (22 km S) (12); Lago Guri (1); Las Trincheras (2); Guri (67); Guri (8 km N) (8); Guri (20 km NW) (12); Guárico: Calabozo (1); Monagas: Caripe (1).

**BRAZIL** (5): **Mato Grosso**: Tapirapé (3); **Pará**: Tucuruí (1); No data (1).

**Temporal data.** April (1), May (6), June (22), July (93), November (2), December (1).

**Natural history.** Specimens of *C. amazonicus* were collected between 100–700 m altitude.

### 3. *Chaetodus bolivianus*

Martínez, 1956

(Figs. 33, 34, 38 e-f)

*Chaetodus bolivianus* Martínez 1956: 41.

**Type material:** Holotype male at MACN labeled: "Bolivia / Dto. Cochabamba / Pcia. Chapare / Gral. Román, 450 mts / Coll. Martínez / Feb-952"; "HOLOTYPUS"; "*Chaetodus / bolivianus* / sp.n. / A. Martínez. det. 1956". Allotype female at MACN labeled: "Bolivia / Dto. Cochabamba / Pcia. Chapare / Gral. Román, 450 mts / Coll. Martínez / Feb-952"; "ALLOTYPUS"; "*Chaetodus / bolivianus* / sp.n. / A. Martínez. det. 1956". One paratype at HAHC labeled: "Bolivia / Dto Cochabamba / Pcia. Chapare / Gral. Román, 450 mts / Coll. Martínez / Feb-952"; "PARATYPO"; "*Chaetodus / bolivianus* / sp.n. / A. Martínez. det. 1956".

**Description.** Male. Length 5.96-6.14 mm; width 3.77-3.85 mm. *Color*: Head, pronotum, scutellum, venter, and legs brown. *Head*: Frons slightly convex, densely punctate,



Fig. 33. *Chaetodus bolivianus* Martinez, male.

setose. Clypeus with disc slightly convex, shape rounded; apex weakly rounded; surface densely punctate, sparsely setose, setae long. Clypeal margins slightly reflexed; vertical surface of apex blunt, slightly oblique, with fringe of setae. Labrum subrectangular,

apex truncate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Anten-

nal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 33): Surface convex, 0.61 times as long as wide, sparsely punctate, punctures large, sparsely setose. Anterior margin with weak bead; lateral margin rounded, weakly denticulate, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface setose at base, glabrous at apex, apex acute. *Elytron* (Fig. 33): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Intervals 2-6 each developed as carina on apical half, interval 7 developed as carina from humerus to apical declivity. Lateral margin setose, setae moderately dense. Epipleuron tapered at apex, surface shagreened. *Venter*: Prosternal surface strigulate, prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shaped area. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth and 3 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, expanded. Metatibia with well-developed medial furcal process, furcal process as long as medial metatibial spur (Fig. 33). External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 38 e-f.

**Female.** Length 5.97-6.16 mm; width 3.79-3.86 mm. Females differ from the males in the following respects: protibial spur evenly curved; mesotibia with spurs subequal in length; and metatibial furcal process absent.

**Diagnosis.** *Chaetodus bolivianus* is distinguished from other *Chaetodus* species by the pronotum with punctures large and unevenly distributed, sparsely setose (Fig. 33); elytra with ten striae between suture and lateral margin, striae sparsely setose; intervals 2-6 each developed as carina on apical half; interstria 7 developed as carina from humerus to apical declivity; tibiae with 3 poorly developed denticles between base and basal tooth (Fig. 33). The shape of the parameres is also diagnostic (Figs. 38 e-f).

**Distribution** (Fig. 34). Bolivia. 376 specimens from FCOC, HAHC, and MACN.

**BOLIVIA** (37): **Cochabamba**: General Román (3); Chapare (1); Villa Tunari (67.5 km E) (31); **Santa Cruz**: Guarayos (2).

**Temporal data.** February (34), November (2).

**Natural history.** Specimens of *C. bolivianus* were collected between 300-450 m altitude.

#### 4. *Chaetodus columbicus* Petrovitz, 1970

(Figs. 34, 38 g-h)

*Chaetodus columbicus* Petrovitz 1970: 240.

**Type material:** Holotype male labeled: "Columbien / Las Tibayas / Terra templ. / O. Thieme S"; "TYPUS"; "columbicus"; "*Chaetodus columbicus* / Ptr".

**Description.** Male. Length 5.00 mm; width 2.70 mm. *Color*: Head, pronotum, scutellum, venter, and legs brown. *Head*: Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, rounded; surface punctate, punctures moderately dense, small. Clypeal margins



Fig. 34. Distribution of *Chaetodus allsoppi*, *C. amazonicus*, *C. bolivianus*, *C. exaratus*, *C. fraternus*, and *C. dato*.

slightly reflexed, vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum

slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pro-notum*: Surface convex, 0.58 times as long as wide; sparsely punctate, punctures large and unevenly distributed, sparsely setose.



Anterior margin with weak bead; lateral margin rounded, setose; posterior margin with bead on sides, slightly projected medially, with small, medial fovea. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron*: Surface slightly convex on disc, margins nearly vertical, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6; intervals slightly carinate, interval 7 developed as carina from humerus to apical declivity. Lateral margin setose, setae moderately dense. Epipleuron equal in width from base to near apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shaped area. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Femoral surface smooth, sparsely setose. Protibia with 3 teeth and 3-4 poorly developed denticles between base and basal tooth; basal and middle teeth small subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae robust, laterally flattened, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. Metatibial apex with medial process not developed. External mesotibial spur reduced, less than 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 38 g-h.

**Female.** Unknown.

**Diagnosis.** *Chaetodus columbicus* is distinguished from other *Chaetodus* species by the pronotum with punctures large and unevenly distributed, sparsely setose; pos-

terior margin with bead on sides and with small, medial fovea; elytra with ten striae between suture and lateral margin, striae sparsely setose; intervals slightly carinate, interval 7 developed as carina from humerus to apical declivity; and tibiae with 3-4 poorly developed denticles between base and basal tooth. The shape of the parameres is also diagnostic (Figs. 38 g-h).

**Distribution.** (Fig. 34). Colombia. 1 specimen from MHNG.

**COLOMBIA** (1): Las Tibayas (1).

**Temporal data.** No data.

**Natural history.** Nothing is known about the biology of this species.

**5. *Chaetodus dato* Ocampo,  
sp. nov.  
(Fig. 34)**

**Type material.** Holotype female at CMNC labeled: "BOLIVIA: COCHABAMBA / 109 km E. Cochabamba 1400 m / 17° 08' 52" S 65° 42' 54" W / 1-6.II.1999. F. Génier, transition mountain forest/ yungas forest / ex. f.i.t., 99-027"; "*Chaetodus dato* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). One paratype at CMNC and one paratype at FCOC labeled: "BOLIVIA: Cochabamba / Cochabamba 109 km E., Yungas / (Cochabamba- Villa Tunari Rd.) / 1480 m / 17° 08' 50" S 65° 42' 29" W / 1-6.II.1999, R. Hanley, ex. flight / intercept trap, BOL1H99 026". "*Chaetodus dato* / PARATYPE / F. C. Ocampo" (my yellow paratype label, handwritten).

**Type locality.** Bolivia, Cochabamba, 109 km E.

**Description.** Female. Length 5.1 mm; width 2.8 mm. *Color*: Head, pronotum, scutellum, venter, and legs dark brown. *Head*: Frons slightly convex. Clypeus and frons setose; setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded; surface punctate, punctures moderately dense, moderately large.



Fig. 34. Distribution of *Chaetodus allsoppi*, *C. amazonicus*, *C. bolivianus*, *C. exaratus*, *C. fraternus*, and *C. dato*.

Clypeal margins slightly reflexed, vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium

with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum*: Surface slightly convex, 0.61 times as long as wide, smooth, punctate; punctures relatively large, sparsely setose, setae short

and irregularly distributed. Anterior margin with weak bead; lateral margin slightly rounded, setose; posterior margin slightly projecting medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron*: Surface convex, with 13 striae between suture and lateral margin, striae sparsely setose. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron equal in width from humeral angle to near apex, surface smooth. *Venter*: Prosternal surface strigulate, prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth medially and with diamond-shaped area; setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth and 2-3 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5; simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, apex expanded.

**Male.** Unknown.

**Diagnosis.** *Chaetodus dato* is distinguished from other species of *Chaetodus* by the pronotum with surface smooth, setose, setae irregularly distributed; elytron with 13 striae between suture and lateral margin; without tubercle on apex of elytra; protibia with 2-3 denticles between base and basal tooth; and profemoral surface slightly strigulate on anterior half, smooth

on posterior half, meso- and metafemoral surface strigulate on posterior half, smooth on anterior half.

**Etymology.** I take great pleasure naming this species after my good friend Juan Cruz Dato.

**Distribution** (Fig. 34). Bolivia. 3 specimens from CMNC and FCOC.

**BOLIVIA** (3): **Cochabamba**: Cochabamba (109 km E) (3).

**Temporal data.** February (3).

**Natural history.** Specimens of *C. dato* were collected at 1,400 m altitude.

## 6. *Chaetodus exaratus* Arrow, 1909

(Figs. 34, 35, 38 i-j)

*Chaetodus exaratus* Arrow 1909: 491.

*Chaetodus apicipennis* Petrovitz 1970: 241.

### New Synonymy.

**Type material.** *Chaetodus exaratus* Arrow lectotype female here designated at BMNH labeled: "Type"; "57484"; "Brasilia / Rio Juan"; "Fry coll/ 1905 -100"; "*Chaetodus exaratus* type Arrow"; "*Chaetodus exaratus* Arrow / M. E. Bracchus det 1970"; "*Chaetodus exaratus* Arrow / LECTOTYPE / F. C. Ocampo." One *Chaetodus apicipennis* Petrovitz paratype at MHNG labeled: "Sta Catharina / Nova Teutonia / Brasil 1. 1938 / Fr. Plaumann"; "PARATYPUS"; "*Chaetodus apicipennis* / Petrovitz". One paratype at MHNG labeled: "Brasilien"; "Hetschko 89 / Blumenau"; "PARATYPUS"; "*Chaetodus apicipennis* / Petrovitz". There are no character-based differences between *C. exaratus* Arrow and *C. apicipennis* Petrovitz, therefore I place these species in synonymy.

**Description.** Male. Length 5.85-6.25 mm; width 3.90-4.20 mm. *Color*: Head, pronotum, scutellum, venter, and legs brown. *Head*: Frons slightly convex. Clypeus and frons setose; setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex



Fig. 35. *Chaetodus exaratus* Arrow, male.

weakly rounded; surface punctate, punctures moderately dense, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed.

Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 35): Surface slightly convex, 0.61 times as long as wide, smooth, punctate, punctures small, sparsely setose, setae short, concentrated near anterior margin and on center of pronotal disc. Anterior

margin with weak bead; lateral margin slightly rounded, setose; posterior margin slightly projecting medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 35): Surface convex, with 13 striae between suture and lateral margin, striae sparsely setose. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Elytral apex with tubercle, tubercle with surface strigulate. Epipleuron equal in width from humeral angle to near apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth medially, with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso-, and meta-femoral surface smooth, sparsely setose. Protibia with 3 teeth and 7-10 denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, apex expanded. External mesotibial spur reduced, 1/2 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 38 i-j.

**Female.** Length 5.90-6.50 mm; width 3.85-4.07 mm. Females differ from the males in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Diagnosis.** *Chaetodus exaratus* is distinguished from other species of *Chaetodus* by the pronotum with surface smooth, setose, setae concentrated on anterior margin and

on middle of pronotal disc; elytron with 13 striae between suture and lateral margin; with well-developed tubercle on apex of elytra; tubercle with surface strigulate; and protibia with 7-10 denticles between base and basal tooth. The shape of the parameres is also diagnostic (Figs. 38 i-j).

**Distribution** (Fig. 34). Brazil, Paraguay Argentina. 26 specimens from AMNH, BDGC, BMNH, CMNC, CNCI, EGRC, FCOC, FVMC, HAHC, LACM, MHNG, UMRM, and UNSM.

**BRAZIL** (21): **Espirito Santo**: Linhares (2); **Rio de Janeiro**: Vila do Piño (1); **Santa Catarina**: Nova Teutonia (9); Rio Natal (1); Rio Vermelho (2); no data (1); **Paraná**: Londrina (5).

**PARAGUAY** (1): **Itapuá**: Hohenau (17 km N) (1).

**ARGENTINA** (4): **Misiones**: Deseado (1); Iguazú (1); Puerto Esperanza (2).

**Temporal data.** January (4), July (5), August (2), September (4), October (4), November (5), December (1).

**Natural history.** Specimens of *C. exaratus* are attracted to carrion and were collected at low elevations.

### 7. *Chaetodus fraternus* Martínez, 1994

(Figs. 34, 36, 38 k-l)

*Chaetodus fraternus* Martínez 1994: 230.

**Type material:** Holotype male at MACN labeled: "BOLIVIA Dto. / Santa Cruz, Pcia. Ichilo / Buenavista III-51- / Mart. Leg."; "HOLOTYPO"; "*Chaetodus (Borrochroides) fraternus* / sp.nov. / A. Martínez. Det. 1987". Allotype female at MACN labeled: "BOLIVIA Dto. / Santa Cruz, Pcia. Ichilo / Buenavista III-51- / Mart. Leg."; "ALLOTYPUS"; "*Chaetodus (Borrochroides) fraternus* / sp.nov. / A. Martínez. Det. 1987". Seven paratypes at HAHC labeled: "BOLIVIA Dto. Santa Cruz, Pcia. Ichilo / Buenavista II-51- / Mart. Leg."; "PARATYPO"; "*Chaetodus (Borrochroides) fraternus* / sp.nov. /

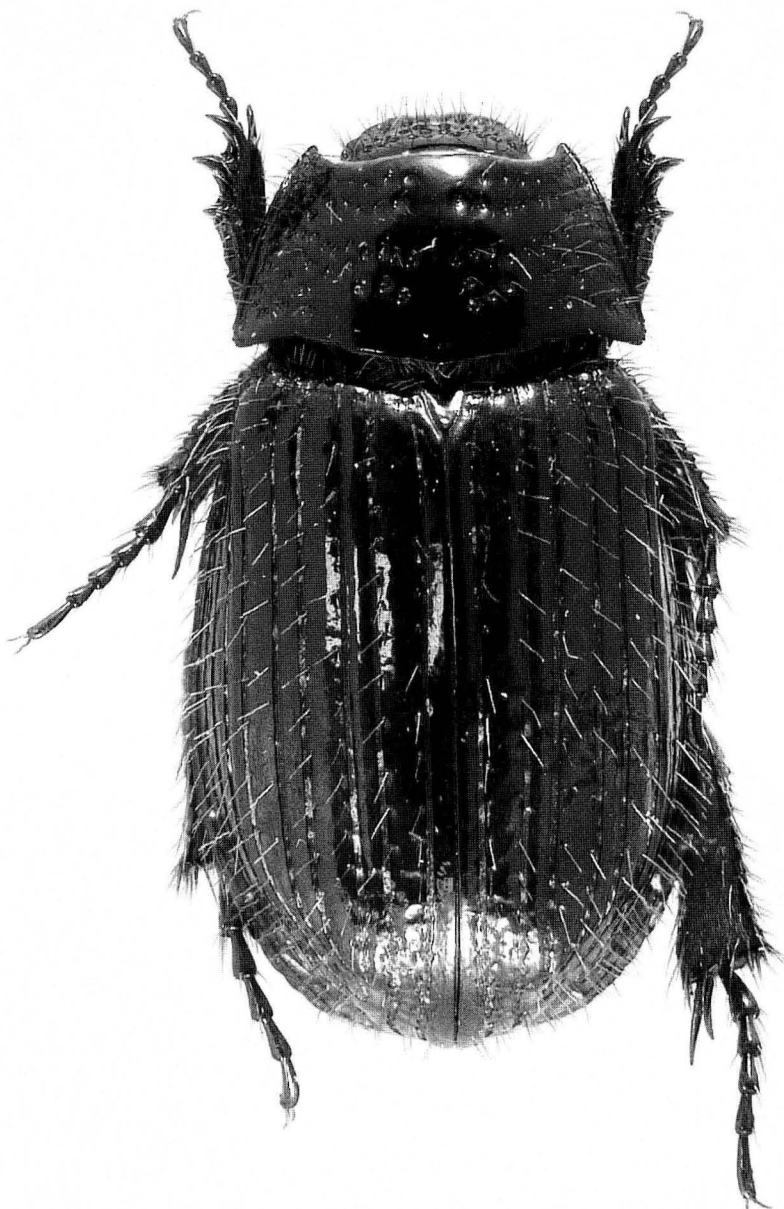


Fig. 36. *Chaetodus fraternus* Martínez, male.

A. Martínez. Det. 1987". One paratype at FCOC labeled: "BOLIVIA/Dto. Santa Cruz, Pcia. Ichilo / Buenavista / Coll. Martínez / Nov. 955"; "PARATYPO"; "*Chaetodus (Borochroides) fraternus* / sp.nov. / A. Martínez. Det. 1987".

**Description.** Male. Length 4.88 mm; width 2.70 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex, densely punctate, setose. Clypeus with disc slightly convex, shape rounded; surface densely punctate, sparsely

setose, setae long. Clypeal margins slightly reflexed; vertical surface of apex blunt, slightly oblique, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. **Pronotum** (Fig. 36): Surface convex, 0.58 times as long as wide, sparsely punctate, punctures large, sparsely setose. Anterior margin with weak bead; lateral margin rounded, smooth, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. **Scutellum**: Shape subtriangular, surface setose at base, glabrous at apex; apex acute. **Elytron** (Fig. 36): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin setose, setae moderately dense. Epipleuron tapered at apex, surface smooth. **Venter**: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shaped area. Propisternal surface strigulate. **Legs**: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Femoral surface smooth, sparsely setose. Protibia with 3 teeth, without denticles between base and basal tooth; basal and middle teeth subtriangular, denticles poorly developed; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, expanded. External mesotibial spur reduced, 1/3 as long as medial

spur; medial spur with apex acuminate. **Parameres**: Figs. 38 k-l).

**Female**. Length 4.63 mm; width 2.59 mm. Females differ from the males in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Diagnosis**. *Chaetodus fraternus* is distinguished from other *Chaetodus* species of by the pronotum sparsely punctate, punctures moderately large (Fig. 36); elytra with ten striae between suture and lateral margin, striae sparsely setose; and protibia without denticles between base and basal tooth (Fig. 36). The shape of the parameres is also diagnostic (Figs. 38 k-l).

**Distribution** (Fig. 34). Bolivia and Argentina. 35 specimens from FCOC, HAHC and MACN.

**BOLIVIA** (31): **Santa Cruz**: Buenavista (20); Parque Nacional Amboro (11).

**ARGENTINA** (4): **La Rioja**: El Rosillo (4).

**Temporal data**. February (1), March (2), October (10), November (18).

**Natural history**. Nothing is known about the biology of this species.

### 8. *Chaetodus globosus* Ocampo, sp. nov.

(Figs. 38 m-n, 40)

**Type material**: Holotype male at CNCI labeled: "MEXICO: Gro. / 45 km Ixtapa / 10-12. VIII.87 / B. Gill"; "*Chaetodus globosus* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at CNCI labeled: "MEXICO: Gro. / 45 km Ixtapa / 10-12. VIII.87 / B. Gill"; "*Chaetodus globosus* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). One paratype at FCOC labeled: "MEXICO: Gro. / 45 km Ixtapa / 10-12. VIII.87 / B. Gill"; "*Chaetodus globosus* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality**. Mexico, Guerrero, Ixtapa (45 km NE).

**Description. Holotype male.** Length 3.48 mm; width 2.2 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose; setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded; surface punctate, punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum:* Surface convex, 0.58 times as long as wide, smooth, punctate; punctures large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron:* Surface convex, with 13 striae between suture and lateral margin, striae setose, setae moderately dense. Lateral margin rounded, denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron tapered at apex, surface smooth. *Venter:* Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shaped area; setose, setae long. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso- and meta-femoral surface smooth, sparsely setose. Protibia with 3 teeth and 3 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4.

Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/2 as long as medial spur; medial spur with apex acuminate. *Parameres:* Figs. 38 m-n.

**Allotype female.** Length 3.81 mm; width 2.40 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratype.** Length 3.82 mm; width 2.40 mm. The single paratype does not differ from the holotype.

**Etymology.** From the Latin *globosus*, meaning globular, in reference to the shape of the body of this species.

**Diagnosis.** *Chaetodus globosus* is distinguished from other species of *Chaetodus* by the pronotum strongly convex and with large punctures; elytron with 13 striae between suture and lateral margin; the elytral margin rounded; and protibia slender, with 3 denticles between base and basal tooth. The shape of the parameres is also diagnostic (Figs. 38 m-n).

**Distribution** (Fig. 40). Mexico. 3 specimens from CNCI and FCOC.

**MEXICO** (3): **Guerrero:** Ixtapa (45 km NE) (3).

**Temporal data.** August (3).

**Natural history.** Nothing is known about the biology of this species.

### 9. *Chaetodus hoffmanni* Ocampo, sp. nov.

(Figs. 37, 38 o-p, 40)

**Type material.** Holotype male at UNSM labeled: "PANAMA: Panamá prov./ Altos



(Isla) de Majé / 9° 08' N. 78° 49' W / V-14-16-1976, at BL / B.C. Ratcliffe"; "*Chaetodus hoffmanni* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at UNSM labeled: "PANAMA: Panamá prov./ Altos (Isla) de Majé / 9° 08' N. 78° 49' W / V-14-16-1976, at BL / B.C. Ratcliffe"; "*Chaetodus hoffmanni* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Eight paratypes at UNSM and four paratypes at FCOC with same data as primary types. Six paratypes at EGRC labeled: "Panamá: Canal Zone / Fort Kobbe / 15 June, 1976 / Coll. E. G. Riley." Four paratypes at HAHC labeled: "VENEZUELA, Tach. 1200 m. 20 km NE / San Cristobal / V. 20-22.1974". Three paratypes at CASC labeled: "Gamboa / C.Z. V. 44"; "Pres. By / K. E. Frick". Three paratypes at EGRC labeled: "Panamá: Canal Zone / Fort Kobbe / 16 June, '76 / Coll. E. G. Riley". Three paratypes at MIZA labeled: "Venezuela- Ar / El Limon / 450 m 31-VII-1965"; "F. Fernandez Y. / E. Osuna". Two paratypes at HAHC labeled: "PANAMA, Pan / Las cumbres / J. Wolda, at wall / lights, 14-V-1980". Two paratypes at HAHC labeled: "Venezuela / Tachira / La Alomada / Palo Grande / Daniela leg. / coll. Martínez / May. 986". Two paratype at EGRC labeled: "PANAMA: Panamá / Parq Nac. Soberanía / Pipeline Rd. at km 2 / V-16-1993, E. Riley / UV lights". Two paratypes at SEMC labeled: "PANAMA: Panama / Gamboa / Old Gamboa Rd. / 20 June 1993, C. Michalski, D. Windsor / ex. flight intercept trap". Two paratypes at BCRC labeled: "Venezuela / Tachira Prov. / San Cristobal / IV-16-982 / D. Havranek". Two paratypes at MIZA labeled: "Venezuela. Tachira / carete vieja / Cordero-sn. Cristobal -1000m. / 3-V 1983". One paratype at EGRC labeled: "Panamá: Canal Zone / Fort Kobbe / 15 June, '76 / Coll. E. G. Riley". One paratypes at HAHC labeled: "PANAMA, Pan., Las / Cumbres at wall lights J. Wolda / May 7, 1979". One paratype at HAHC labeled: "PANAMA, Pan. / Las Cumbres / wall lights May / 14, 1973 Wolda". One paratype at HAHC labeled: "PANAMA C. Zone Madden Forest / 10, vi. 1977 / H. & A. Howden". One paratype at EGRC labeled: "Panama: Canal Zone / Mad-

den Dam / 16 June, 76: E. G. Riley / at lights". One paratype at CASC labeled: "Madden Dam / V-18-36 C. Z. / M. M. Saylor"; "L.W. Saylor / Collection". One paratype at CASC labeled: "Gamboa / Panama C.Z. / VI-44". One paratype at CASC labeled: "Gamboa, C. Z. V-24-44 / K. E. Frick". One paratype at BDGC labeled: "PANAMA: Canal / area Gamboa / 15-20 VI 1983 / B. Gill". One paratype at CMNC labeled: "VEN: Miranda; 600m / 35 km N Altigracia / Guatopo NP, Puente Bucaral / 14.VI-5.VIII. 87, S&J Peck / forest streamside FIT". One paratype at HAHC labeled: "VENEZ: Maracay / El Limon / 28.VI. 1964 / Niilo Virkki". One paratype at MIZA labeled: "Venezuela Zulia / El Tucuco. 420. / 21-27-V-1971". One paratype at UNSM labeled: "VENEZUELA: Aragua / Parq. Nac. Henri Pittier / Portochuelo Pass / VI-21-24-1999, 1200 m / Ratcliffe, Jameson, Smith, Villatoro". All paratypes labeled: "*Chaetodus hoffmanni* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Panama, Panamá province, Altos (Isla) de Majé.

**Description. Holotype male.** Length 4.41 mm; width 2.88 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose; setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal, apex rounded; surface punctate, punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 37): Surface convex, 0.64 times as long as wide, smooth, punctate; punctures moderately large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, pos-

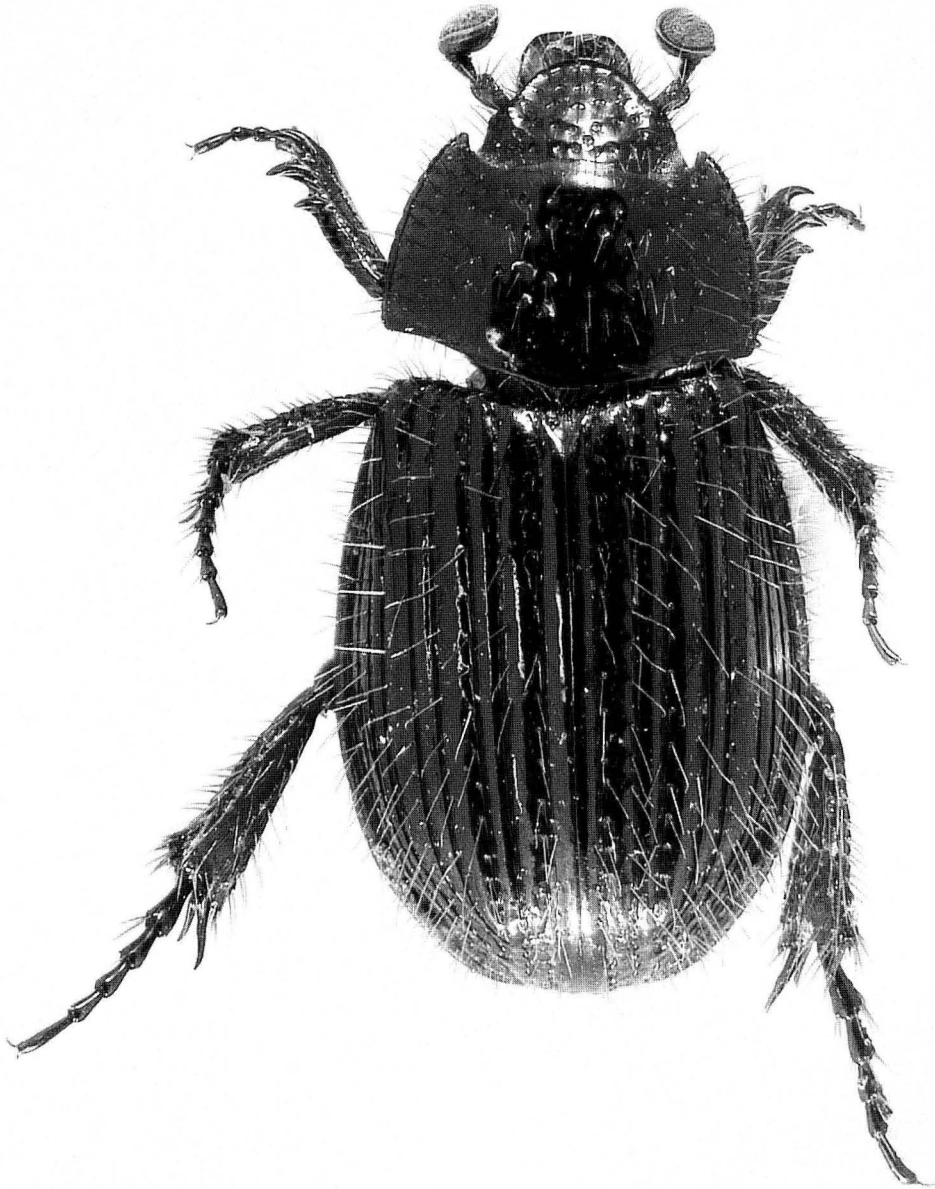


Fig. 37. *Chaetodus hoffmanni* Ocampo, male.

terior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 37): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae

3-4 and 5-6. Lateral margin setose, setae moderately dense. Epipleuron equal in width from humerus to apex, surface shagreened. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal

surface strigulate on margins, smooth medially, with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with posteromedial tooth, tooth large. Pro-, meso- and metafemoral surface smooth, sparsely setose. Protibia with 3 teeth, denticles absent between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae robust, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, apex expanded. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 38 o-p.

**Allotype female.** Length 4.48 mm; width 2.77 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 3.88-4.92 mm; width 2.44-2.81 mm. Paratypes do not differ significantly from the primary types. Some variation is observed in the number and distribution of pronotal punctures.

**Etymology.** I take great pleasure naming this species after my good friend, Federico Hoffmann.

**Diagnosis.** *Chaetodus hoffmanni* is distinguished from other species of *Chaetodus* by the pronotum punctate, punctures moderately large, sparsely setose, setae short; elytra with ten striae between the suture and lateral margin; and the absence of protibial denticles between the base and basal tooth (Fig. 37). The shape of the parameres is also diagnostic (Figs. 38 o-p).

**Distribution** (Fig. 40). Panama and Venezuela. 66 specimens from: BDGC, BCRC,

CASC, CMNC, EGRC, FCOC, HAHC, MIZA, SEMC, UNSM, and WBWC.

**PANAMA** (48): **Colón**: Gatún Locks (1); **Panama**: Albrook Forest (4); Altos (Isla) de Majé (14); Fort Kobbe (10); Gamboa (9); Lago Bayano (1); Las Cumbres (5); Madden Dam (1); Madden Forest (1); Parque Nacional Soberanía (2).

**VENEZUELA** (18): **Aragua**: El Limón (4); Parque Nacional Henri Pittier (1); **Maracay**: El Limón (1); **Miranda**: Altigracia (35 km N) (1); **Tachira**: La Alomada (2); San Cristóbal (4); San Cristóbal (20 km NE) (4); **Zulia**: El Tucuco (1).

**Temporal data.** May (38), June (25), December (1).

**Natural history.** Adults of *C. hoffmanni* are attracted to light. Specimens of *C. hoffmanni* were collected from near sea level to 1,200 m altitude.

## 10. *Chaetodus humerosus* Petrovitz, 1970

(Figs. 40, 44 a-b)

*Chaetodus humerosus* Petrovitz 1970: 239.

**Type material:** Holotype male at MHNG labeled: "Merida/Venezuela"; "1884"; "*Chaetodus humerosus* / Petrovitz"; "HOLOTYPUS"; "Coll. Petrovitz". Allotype female with same data except: "*Chaetodus humerosus* / Petrovitz"; "ALLOTYPUS".

**Description.** Male. Length 4.18 mm; width 2.51 mm. *Color*: Head, pronotum, scutellum, venter, and legs brown. *Head*: Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, rounded, surface punctate; punctures sparse, small. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal

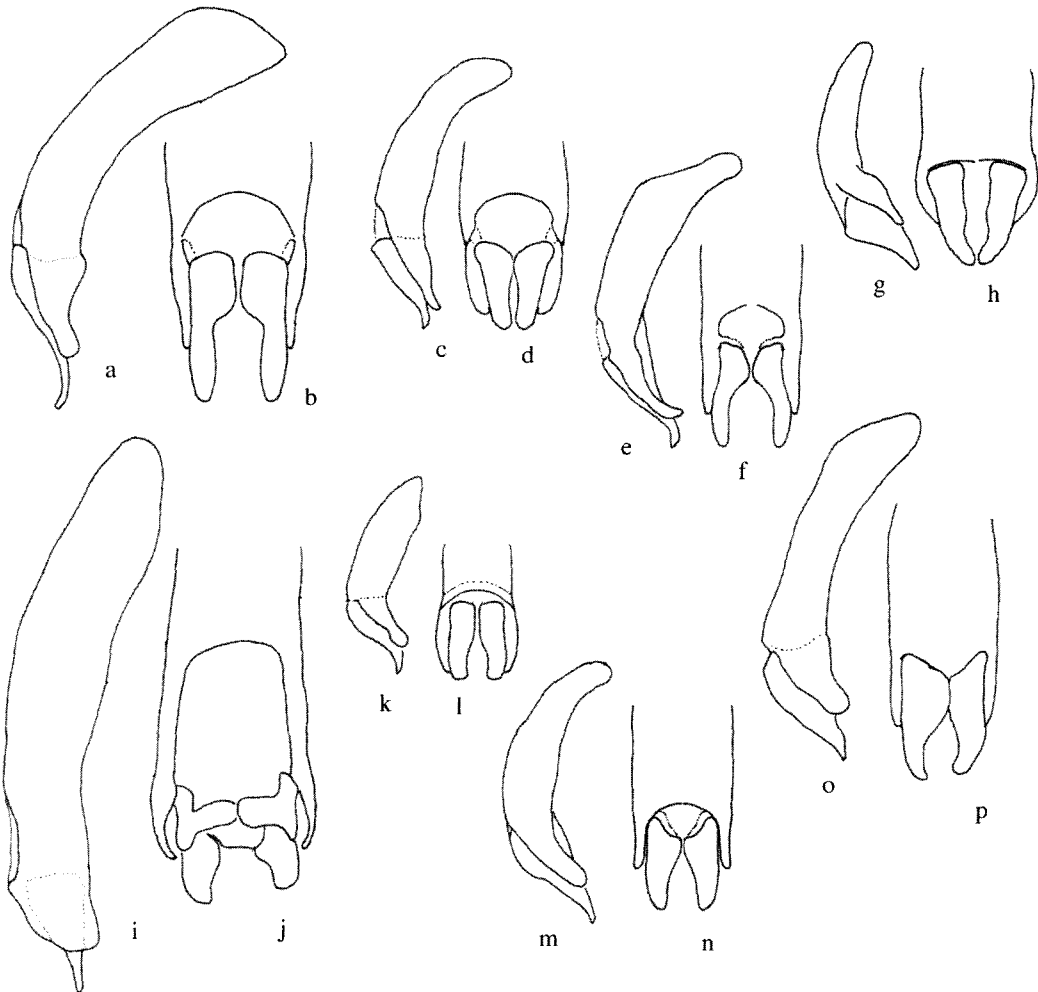


Fig. 38. Male parameres and phallobase of a-b) *Chaetodus allsoppi*, c-d) *C. amazonicus*, e-f) *C. bolivianus*, g-h) *C. columbicus*, i-j) *C. exaratus*, k-l) *C. fraternus*, m-n) *C. globosus*, and o-p) *C. hoffmanni*.

club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum*: Surface convex, 0.62 times as long as wide, sparsely punctate, punctures large. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron*: Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin setose,

setae moderately dense. Epipleuron tapered toward apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth medially, with diamond-shaped area. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Femoral surface smooth, sparsely setose. Protibia with 3 teeth and poorly developed denticles between base and basal tooth; basal and middle teeth small subtriangular, denticles poorly

developed; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae robust, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. Metatibial apex with medial furcal process well-developed, furcal process shorter than medial spur. External mesotibial spur reduced, less than 1/2 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 44 a-b.

**Female.** Length 4.70 mm; width 2.77 mm. The allotype female differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Diagnosis.** This species is distinguished from other *Chaetodus* species by the pronotum sparsely punctate, punctures large; elytra with 10 striae between the suture and lateral margin, striae sparsely setose; and tibiae with 3-4 poorly developed denticles between the base and basal tooth. The shape of the parameres is also diagnostic (Figs. 44 a-b).

**Distribution** (Fig. 40). Venezuela. 2 specimens from MHNG.

**VENEZUELA** (2): Mérida (2).

**Temporal data.** No data.

**Natural history.** Nothing is known about the biology of this species.

### 11. *Chaetodus irregularis*

**Westwood, 1846**

(Figs. 39, 40, 44 c-d)

*Chaetodus irregularis* Westwood 1846: 166.

*Chaetodus striatus* de Borre 1886: 117. **New**

**Synonymy.**

**Description.** Male. Length 4.07-5.37 mm; width 2.22-3.14 mm. *Color*: Head, pronotum,

scutellum, venter, and legs brown. *Head*: Frons slightly convex. Clypeus and frons setose; setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded; surface punctate, punctures sparse, small. Clypeal margins slightly reflexed; vertical surface of apex blunt, slightly oblique, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum slightly indented at apex, surface slightly rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 39): Surface convex, 0.58 times as long as wide, smooth; anterior margin with 2-3 rows of setae, middle with 1-2 transverse rows of setae, setae sometimes missing. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 39): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin setose, setae moderately dense. Epipleuron tapered toward apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth medially, with diamond-shaped area. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Femoral surface smooth, sparsely setose. Protibia with 3 teeth and 7-9 well-developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws

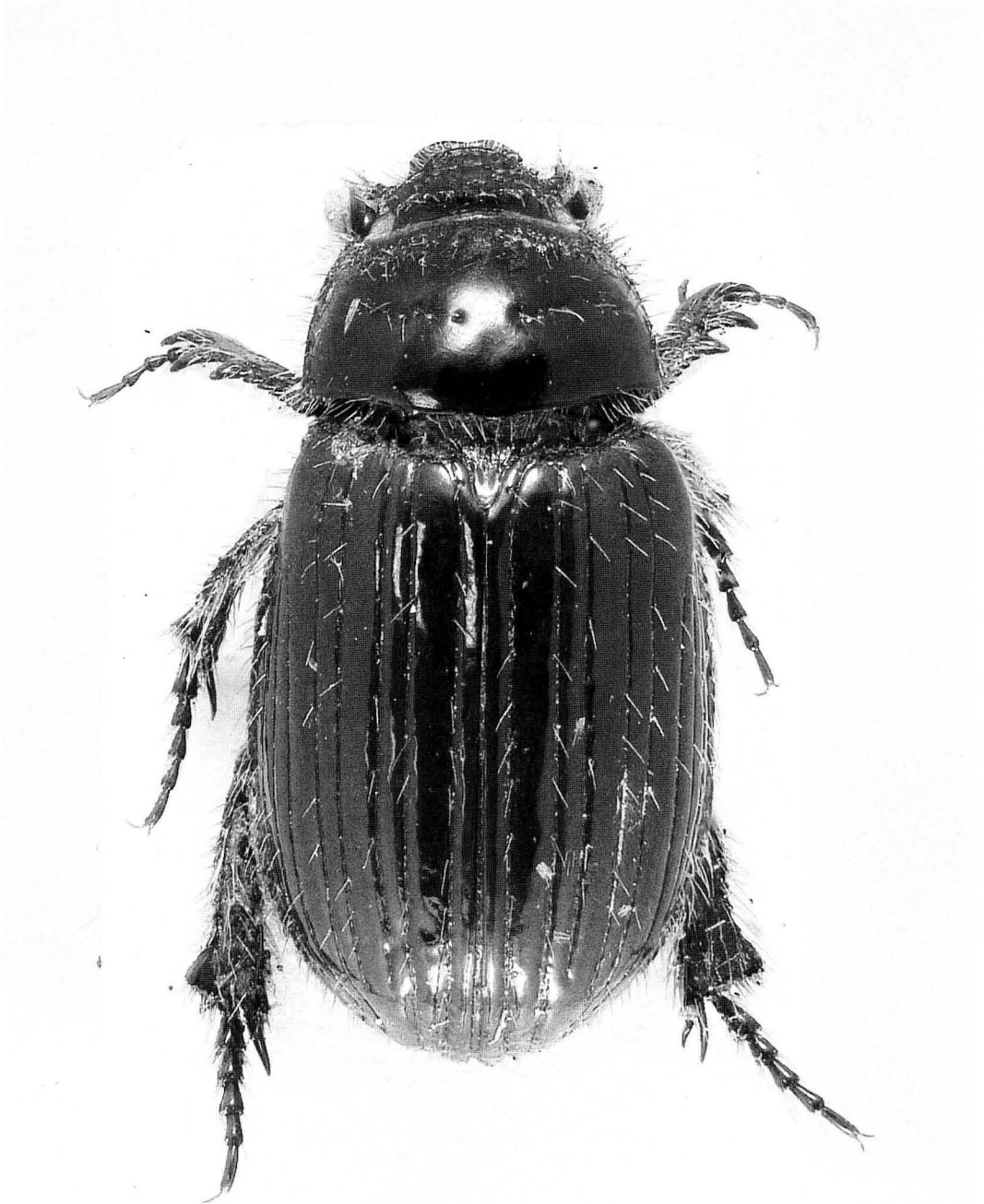


Fig. 39. *Chaetodus irregularis* Westwood, male.

shorter than tarsomere 5, simple, curved. Meso- and metatibiae robust, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, apex expanded. External mesotibial spur reduced, 1/2 as

long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 44 c-d.

**Female.** Length 4.10-5.41 mm; width 2.23-3.17 mm. Females differ from males in the following respects: protibial spur evenly

curved and mesotibia with spurs subequal in length.

**Diagnosis.** *Chaetodus irregularis* is distinguished from other *Chaetodus* species by the pronotum with anterior margin with 2-3 rows of setae; elytra with ten striae between the suture and lateral margin; and protibia with 7-9 well-developed denticles between the base and basal tooth (Fig. 39). The shape of the parameres is also diagnostic (Figs. 44 c-d).

**Distribution** (Fig. 40). Brazil, Bolivia, Paraguay, Argentina, and Uruguay. 210 specimens from BMNH, CMNC, CNCI, FMNH, FCOC, HAHC, MHNG, MLPC, UNSM, and ZMHV.

**BRAZIL** (69): **Distrito Federal:** Estação Forestal Cabeça do Veado (37); **Mato Grosso do Sul:** Corumbá (1); **Minas Gerais:** Lavras (4); **Santa Catarina:** Nueva Teutonia (24); **São Paulo:** Regente Feijo (1); Rio Claro (1); No data (1).

**BOLIVIA** (23): **Santa Cruz:** Buena Vista (5); Buena Vista (3.7 km SSE) (1); Buena Vista (5 km SSE) (6); Potrerillos de Guenda (2); Santa Cruz (2); Santa Cruz de la Sierra (1); No data (6).

**PARAGUAY** (18): Asunción (1); **Guaíra:** Villarica (1); **La Cordillera:** San Bernardino (13); **San Pedro:** Rio Ypané (3).

**ARGENTINA** (97): **Buenos Aires:** Altavista (1); Atlántida (4); Estación Felipe Solá (10); Haedo (22); Las Flores (1); Pehuajó (1); Rosas (3); Suipacha (12 km S) (1); Tandil (13); Tigre (2); no data (22); **Córdoba:** Colón (2); no data (4); **Corrientes:** Ituzaingó (3); **Salta:** El Rey National Park (1); Pampa Grande (1); **Santa Fé:** Carcarañá (5); Rosario de Santa Fé (1).

**URUGUAY** (3): Montevideo (3).

**Temporal data.** January (1), February (25), March (2), April (3), May (1), September (21), October (41), November (20), December (23).

**Natural history.** Specimens of *Chaetodus irregularis* were collected from near sea level to 1,000 m altitude.

**Remarks.** Three specimens labeled from "Colombia" in the MHNG collection belong to this species and most probably were mislabeled. This species, based on all the available information and records, does not occur in Colombia. The species is variable in some respects throughout its distribution range and even within the same locality. Differences in the pronotal, and elytral punctures, pilosity, depth of the striae, differences in the length and width of the parameres and in the size of the tibial teeth and denticles were noted within the material that I studied.

## 12. *Chaetodus jamesonae* **Ocampo, sp. nov.**

(Figs. 40, 44 e-f)

**Type material.** Holotype male at MNHN labeled: "MUSEUM PARIS / VENEZUELA / SARARE / F. CEAY 1899"; "*Chaetodus jamesonae* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten).

**Type locality.** Venezuela, Sarare.

**Description. Holotype male.** Length 5.48 mm; width 3.33 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded, surface punctate; punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum:* Surface convex, 0.66 times as long as wide, smooth, punctate, punctures large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin medially with bead and small fovea. Anterior angles



Fig. 40. Distribution of *Chaetodus globosus*, *C. hoffmanni*, *C. humerosus*, *C. irregularis* and *C. jamesonae*.

acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron*: Surface convex, with 13 striae between suture and lateral margin, striae sparsely setose. Lateral margin denticulate at humerus, slightly denticulate

elsewhere, setose, setae moderately dense. Epipleuron tapered at apex, surface smooth. *Venter*: Prosternal surface strigulate. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth medially, with diamond-shaped area, setose,



setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth and 2 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. Metatibial apex with furcal process developed, furcal process shorter than medial metatibial spur. External mesotibial spur reduced, 1/2 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 44 e-f.

**Female.** Unknown.

**Etymology.** I take great pleasure in naming this species after my good friend and mentor, Mary Liz Jameson.

**Diagnosis.** *Chaetodus jamesonae* is distinguished from other species of *Chaetodus* by the areolate-ocellate frons; pronotal disc punctate, punctures large, with cross-like smooth area medially; elytron with 13 striae between suture and lateral margin, striae and intervals sparsely setose; profemoral surface slightly strigulate on anterior half, smooth on posterior half; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half; protibia with two poorly developed denticles between base and basal tooth; metatibia with well-developed medial, furcal process; and the furcal process shorter than medial metatibial spur. The shape of the parameres is also diagnostic (Figs. 44 e-f).

**Distribution** (Fig. 39). Venezuela. 1 specimen from MNHN.

**VENEZUELA** (1): Sarare (1).

**Temporal data.** No data.

**Natural history.** Nothing is known about the biology of this species

### 13. *Chaetodus lacandonicus* Martínez and Morón, 1990

(Figs. 41, 44 g-h, 46)

*Chaetodus lacandonicus* Martínez and Morón 1990: 32.

**Type material.** One paratype at HAHC labeled: "MEXICO / Chiapas / Boca del Chajul / Villalobos coll. / Bosq. Trop. 110 m / Coll Martínez"; "PARATYPO"; "Chaetodus lacandonicus / Morón y Martínez 1983". Holotype at Miguel Ángel Morón Collection, not studied.

**Description.** Male. Length 3.90-3.96 mm; width 2.58-2.61 mm. *Color*: Head, pronotum, scutellum, venter, and legs brown. *Head*: Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded; surface punctate, punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 41): Surface convex, 0.63 times as long as wide, smooth, punctate; punctures large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin with bead, slightly denticulate, rounded, setose; posterior margin projected, medially with well-developed bead and medial fovea. Anterior angles acute, posterior angles right-

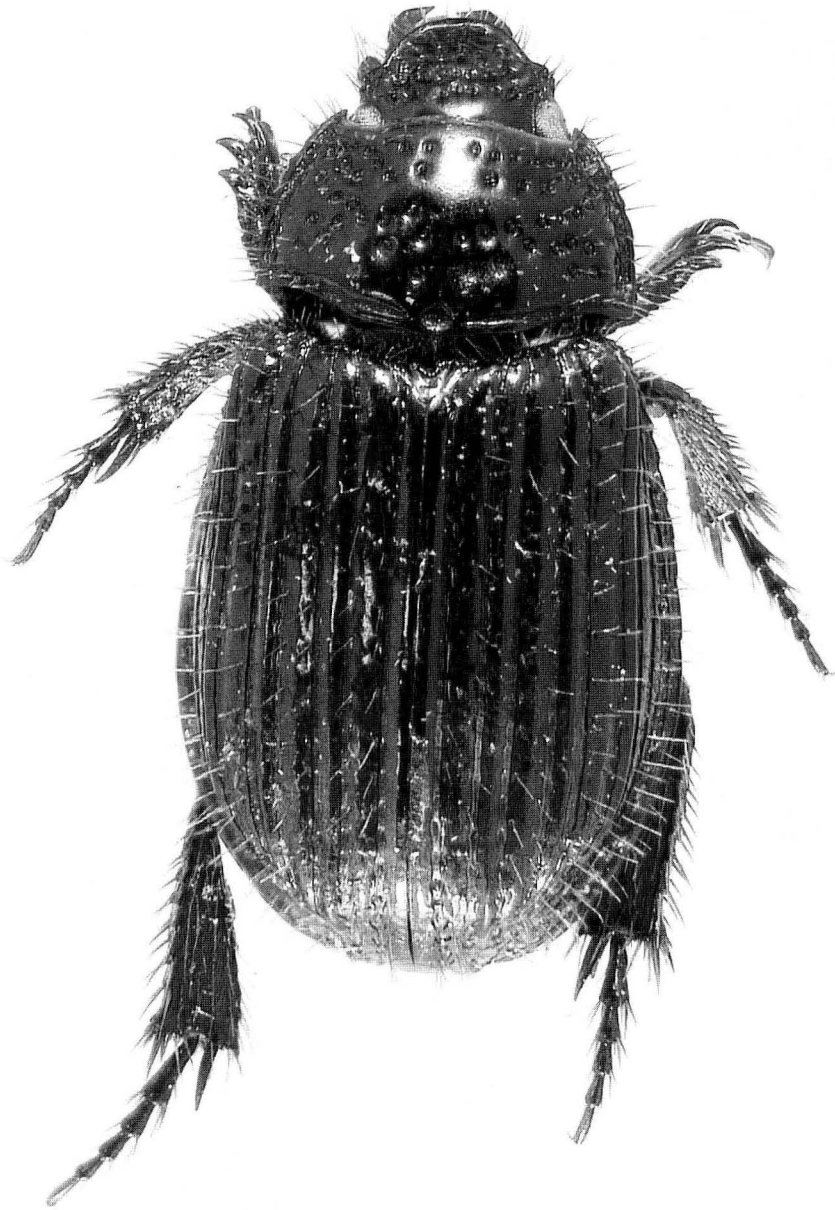


Fig. 41. *Chaetodus lacandonicus* Martínez and Morón, male.

angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 41): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and

5-6. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Intervals 2, 4, and 6 each slightly developed as carina. Epipleuron tapered at apex, surface smooth. *Venter*: Prosternal surface strigulate, prosternal

shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth medially, with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso-, and metafemoral smooth, sparsely setose. Protibia with 3 teeth and 2-4 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae robust, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 44 g-h.

**Female.** Length 4.60-4.63 mm; width 3.11-3.14 mm. Females differ from the males in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Diagnosis.** *Chaetodus lacandonicus* is distinguished from other species of *Chaetodus* by the pronotum with beaded lateral margin that is slightly denticulate; the posterior margin with a well-developed bead, medially with fovea; elytron with ten striae between the suture and lateral margin; and protibia with 2-4 poorly developed denticles between the base and basal tooth. The shape of the parameres is also diagnostic (Figs. 44 g-h).

**Distribution** (Fig. 46). Mexico. 6 specimens from HAHC, BDGC, FCOC, and UNSM.

**MEXICO** (6): **Veracruz**: Catemaco (1); Lago Catemaco (3); **Chiapas**: Boca del Chajul (1); Cacaohatán (1).

**Temporal data.** January (1), April (1), July (4).

**Natural history.** Specimens of *C. lacandonicus* are attracted to carrion and were collected between 110-600 m altitude.

#### 14. *Chaetodus maquipucuna* **Ocampo, sp. nov.**

(Figs. 42, 44 i-j, 46)

**Type material.** Holotype male at SEMC labeled: "ECUADOR: Pichincha / Maquipucuna For. Res. / 50 km NW Quito, 1720 m / 23 Dec. 1991, C Carlton / R. Leschen"; "*Chaetodus maquipucuna* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype at SEMC with same label as holotype except: "*Chaetodus maquipucuna* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Two paratypes at FCOC, two paratypes at UNSM, and 14 paratypes at SEMC with same label data as holotype except "*Chaetodus maquipucuna* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Ecuador, Maquipucuna.

**Description. Holotype male.** Length 5.62 mm; width 3.12 mm. *Color*: Head, pronotum, scutellum, venter, and legs reddish-brown. *Head*: Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex rounded; surface punctate, punctures sparse and moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 42): Surface convex, 0.62 times as long as wide, smooth, punctate, punctures large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin projected medially, beaded. Anterior angles acute, posterior angles right-

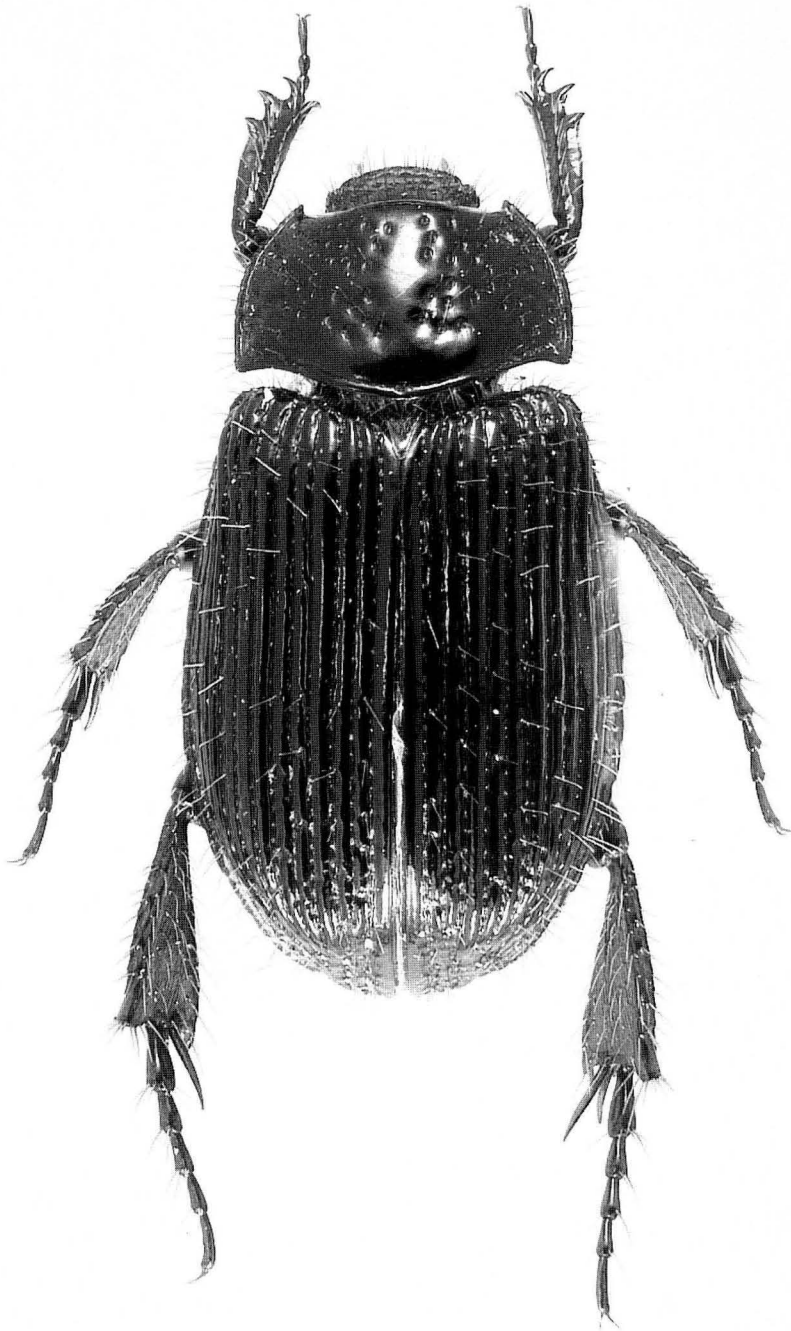


Fig. 42. *Chaetodus maquipucuna* Ocampo, female.

angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 42): Surface convex, with 13 striae between suture and lateral margin, striae sparsely setose. Lateral margin denticulate at humerus, slightly denticulate elsewhere; setose,

setae moderately dense. Epipleuron tapered at apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle,

medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia slender, with 3 teeth, denticles absent between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, right-angled at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, slightly expanded. Metatibia with well-developed medial, furcal process; furcal process shorter than medial metatibial spur. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 44 i-j.

**Allotype female.** Length 5.62 mm; width 3.12 mm. The female allotype differs from the holotype in the following respects: protibia robust; protibial spur evenly curved; mesotibia with spurs subequal in length; and metatibial furcal process absent.

**Paratypes.** Length 5.51-6.68 mm; width 3.10-3.15 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** I name this species "*maquipucuna*" for the Ecuadorian locality Maquipucuna, here used as a noun in apposition.

**Diagnosis.** *Chaetodus maquipucuna* is distinguished from other species of *Chaetodus* by the pronotum with large punctures, with posterior margin beaded; the elytron with 13 striae between suture and lateral margin; with intervals 3, 6, and 9 not developed as carina; protibia slender, with three teeth and denticles absent between base and

basal tooth; metatibia with well-developed medial, furcal process (males); and the furcal process shorter than medial metatibial spur. The shape of the parameres is also diagnostic (Figs. 44 i-j).

**Distribution** (Fig. 46). Ecuador. 20 specimens from FCOC, SEMC, and UNSM.

**ECUADOR** (20): **Pichincha**: Maquipucuna (20).

**Temporal data.** December (20).

**Natural history.** Specimens of *C. maquipucuna* were collected at 1,720 m altitude.

### 15. *Chaetodus mimi* Ocampo, sp. nov.

(Figs. 43, 44 k-l, 46)

**Type material.** Holotype male at SEMC labeled: "PERU: 15 km NE Pto. Maldonado / 22 June 1989, D. Silva / # 198, ex: pit fall trap"; "*Chaetodus mimi* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at SEMC labeled: "PERU: Tambopata Prov. / Madre de Dios dpto. / 15 km NE Puerto"; "Maldonado Reserva / Cuzco Amazónico / 12°33'S 69°03'W / 200 m, Plot #Z2U4"; "28 June 1989, J. S. Ashe / R. A. Leschen #317 / ex: pitfall trap"; "*Chaetodus mimi* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Nineteen specimens from USNM labeled: "BOLIVIA: La Paz Dpt. / Rio Tuchi, Chalalan / 14°25.6'S 67°55.3'W / VIII 10-20 1995 320 m S. Spector". Seventeen paratypes at USNM labeled: "PERU, Madre de Dios Rio / Amiguillos, small / river flood / plain, 260 m flight intercept trap / 12°22'25.4" S 70°22'13.2"; "W/ T. Larsen, V. 2000". Five paratypes at USNM labeled: "BOLIVIA, Pando Prov. / Manuripi, Rio Manuripi, primary terra firme forest, pitfall human / dung 11°09'097"S 67°33'693"W / F. Guerra & F. Villarte. XI, 1996". Five paratypes at WBWC labeled: "BRAZIL: Rondonia. 62 / km SW Ariquemes, nr / Fzda. Rancho Grande / 5-17-X-1993 JE Eger / Black Light Trap". Three paratypes at SEMC and two paratypes at FCOC with same label data as allotype. Four paratypes at CMNC



Fig. 43. *Chaetodus mimi* Ocampo, male.

labeled: "PERU: MADRE DE DIOS: Cocha Cashu Bio. Sta., Manu / Nat. Park, 350m 11°53'45"S / 71°24'24"W, 17-19.X.2000 / R. Brooks ex. f.i.t. RB 2000-042". Four paratypes at CMNC labeled: "PERU: MADRE DE DIOS / 15 km N. E. Puerto Maldonado / Reserva Cuzco Amazónica / 200m, 12°33'S 69°03'W / 15.VI.1989, R. Leschen / terraform forest, pitfall". Two paratypes at UNSM and two paratypes at USNM labeled; "PERU: Madre de Dios; / Rio Tambopata Res. 30 air

km. SW Pto Maldonado, 290m. / 2-5 XI 1979 J. B. Heppner / subtropical moist forest". Two paratypes at FMNH labeled: "ECUADOR: Pastaza; Ashuara / Rio Macuma, 10 km from / Rio Marona, 300 m. VII: / 7-16-1971, leg. B. Malkin". Two paratypes at UNSM labeled: "BRASIL: Rondonia / 62 km Ariquemes / Faz. Rancho Grande / 10°32'S. 62°48'W. / X-5-15-1993 / C. & K. Messenger". One paratype at UNSM labeled: "BRASIL: Rondonia / 62 km S. Ariquemes / Faz. Rancho Grande

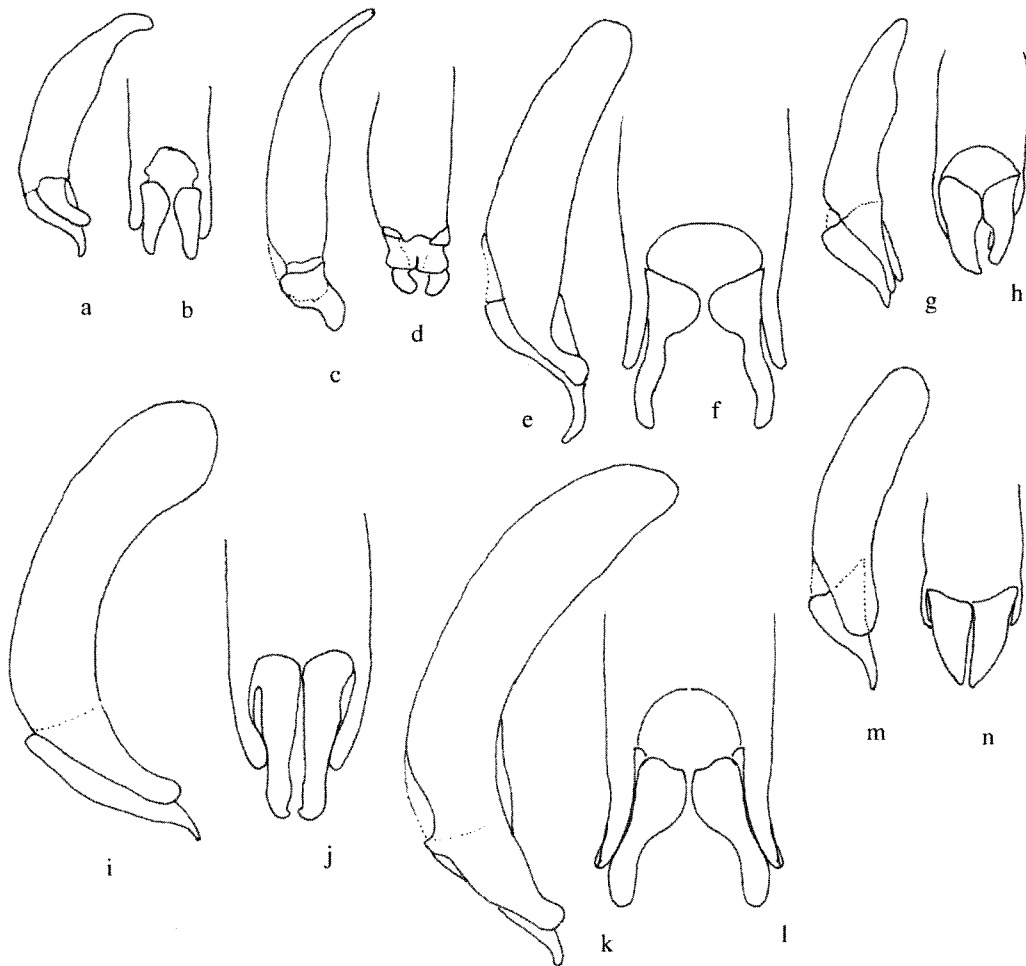


Fig. 44. Male parameres and phallobase of a-b) *Chaetodus humerosus*, c-d) *C. irregularis*, e-f) *C. jamesonae*, g-h) *C. lacandonicus*, i-j) *C. maquipucuna*, k-l) *C. mimi*, and m-n) *C. nigrifrons*.

10°32' S. 62°48' W. / XI-11-22-1991 / B.C. Ratcliffe"; "habitat: tropical / evergreen forest". One paratype at MNHN labeled: "MUSEUM PARIS / Front, PERU-BOLIVIE / Bassin de l'Amazonie / Capit. Mailles 1912". All paratypes labeled: "*Chaetodus mimi* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Peru, Madre de Dios, Puerto Maldonado (15 km NE).

**Description. Holotype male.** Length 6.32 mm; width 3.70 mm. *Color:* Frons black, rest of head, pronotum, scutellum, venter, and

legs brown. *Head:* Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex rounded, surface punctate; punctures moderately dense and moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with

basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 43): Surface convex, 0.60 times as long as wide, smooth, punctate; punctures large and more concentrated on apical half, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 43): Surface convex, with 13 striae between suture and lateral margin, striae sparsely setose. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Intervals 3, 6, and 9 each slightly developed as carina. Epipleuron tapered at apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia slender, with 3 teeth and without denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, right-angled at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, slightly expanded. Metatibia with well-developed medial, furcal process; furcal process longer than medial metatibial spur (Fig. 43). External mesotibial spur reduced, 1/2 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs 44-k-l.

**Allotype female.** Length 6.03 mm; width 3.85 mm. The female allotype differs from the holotype in the following respects: protibia robust; protibial spur evenly curved; mesotibia with spurs subequal in length; and the metatibial furcal process absent.

**Paratypes.** Length 5.87-6.35 mm; width 3.70-4.15 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** I name this species "*mimi*," for one of the main characters of Puccini's opera "La Bohème," here used as a noun in apposition.

**Diagnosis.** *Chaetodus mimi* is distinguished from other species of *Chaetodus* by the pronotum with punctures large and more concentrated on apical half; the elytron with 13 striae between suture and lateral margin; with intervals 3, 6, and 9 each slightly developed as carina; protibia slender, denticles absent between the base and basal tooth; protibial spur right-angled at apex (males); metatibia with well-developed, medial furcal process (males); and the furcal process longer than medial metatibial spur. The shape of the parameres is also diagnostic (Figs. 44 k-l).

**Distribution** (Fig. 46). Ecuador, Bolivia, and Brazil. 71 specimens from CMNC, EGRC, FCOC, FMNH, SEMC, UNSM, USNM, and WBWC.

**ECUADOR** (2): **Pastaza:** Ashuara (2).

**PERU** (35): **Madre de Dios:** Cocha Cashu Biological Station (4); Puerto Maldonado (15 km NE) (10); Puerto Maldonado (30 km SW) (4); Rio Amiguillos (17).

**BOLIVIA** (24): **La Paz:** Rio Tuichi, Chala-lán (19); **Pando:** Manuripi (5).

**BRAZIL** (9): **Rondonia:** Ariquemes (62 km SW) (9).

**Temporal data.** May (17), June (10), July (2), August (19), November (4).

**Natural history.** Specimens of *C. mimi* were collected between 200-320 m altitude.



**16. *Chaetodus nigrifrons*  
*Ocampo, sp. nov.***

(Figs. 44 m-n, 45, 46)

**Type material.** Holotype male at HAHC labeled: "ECUADOR: Pichincha / 16km Santo Domingo / 750 m, Tinalandia / 27.III. 1999, R. Brooks"; "*Chaetodus nigrifrons* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at HAHC labeled: "ECU: Pich. 16 km E / Santo Domingo, Tinilandia / 4.V.25.VII. 85, S&J Peck 680 m. malaise-FIT / rainforest"; "*Chaetodus nigrifrons* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Two paratypes at UNSM and two paratypes at CMNC with same label as allotype. Four paratypes at HAHC labeled: "ECU: Pich. 3000' / km.5, Pichijal Rd / 104 km NW Quito 24-29 viii.1976 / J. Cohen, dung trap". Two paratypes at FCOC labeled: "ECU: Pich, 3000' / 109 km NW Quito / on Pto. Quito Rd, / 24-29. viii 1976 / J. Cohen, carrion". Two paratypes at SEMC labeled: "ECUADOR: Pichincha 45 km NNW Quito / Maquipucuna Station / 1600-1650 m / 3-18 Abr 1996 / ECU1H96 012; P Hibbs / ex: flight intercept trap". One paratype at BDGC labeled: "ECUADOR: Pichincha / prov., 15 km E. Sto. / Domingo, Tinilandia / 23-26.II.1981 / 700 m, B. D. Gill". One paratype at HAHC with same label as holotype. One paratype at HAHC labeled: "ECU: Pich. / 700 m / Tinilandia 16 km SE / Sto. Domingo, Ber328 / 5.VI.76, S.& J. Peck / brkn. Termite nests". One paratype at SEMC labeled: "ECUADOR: Napo, 2300 m / Sierra Azul, Hacienda Aragon / 0°40'0" S. 77°55'0" W / 17 FEB-26 MAR 1996 / ECU1H96 009; P. Hibbs / ex: flight intercept trap". All paratypes labeled: "*Chaetodus nigrifrons* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Ecuador, Pichincha, Tinalandia (16 km East Santo Domingo).

**Description. Holotype male.** Length 4.33 mm; width 2.37 mm. *Color:* Frons black, rest of head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose, setae sparse, long.

Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded, surface punctate; punctures moderately dense, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 45): Surface convex, 0.62 times as long as wide, smooth punctate, punctures moderately large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially, with well-developed bead and small fovea on medial projection. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 45): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin setose, setae sparse. Epipleuron wider at apex, surface smooth. *Venter:* Prosternal surface strigulate; prosternal shield with posteromedial process not developed. Meso-sternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso- and meta-femoral surface, sparsely setose. Protibia with 3 teeth and 3 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows

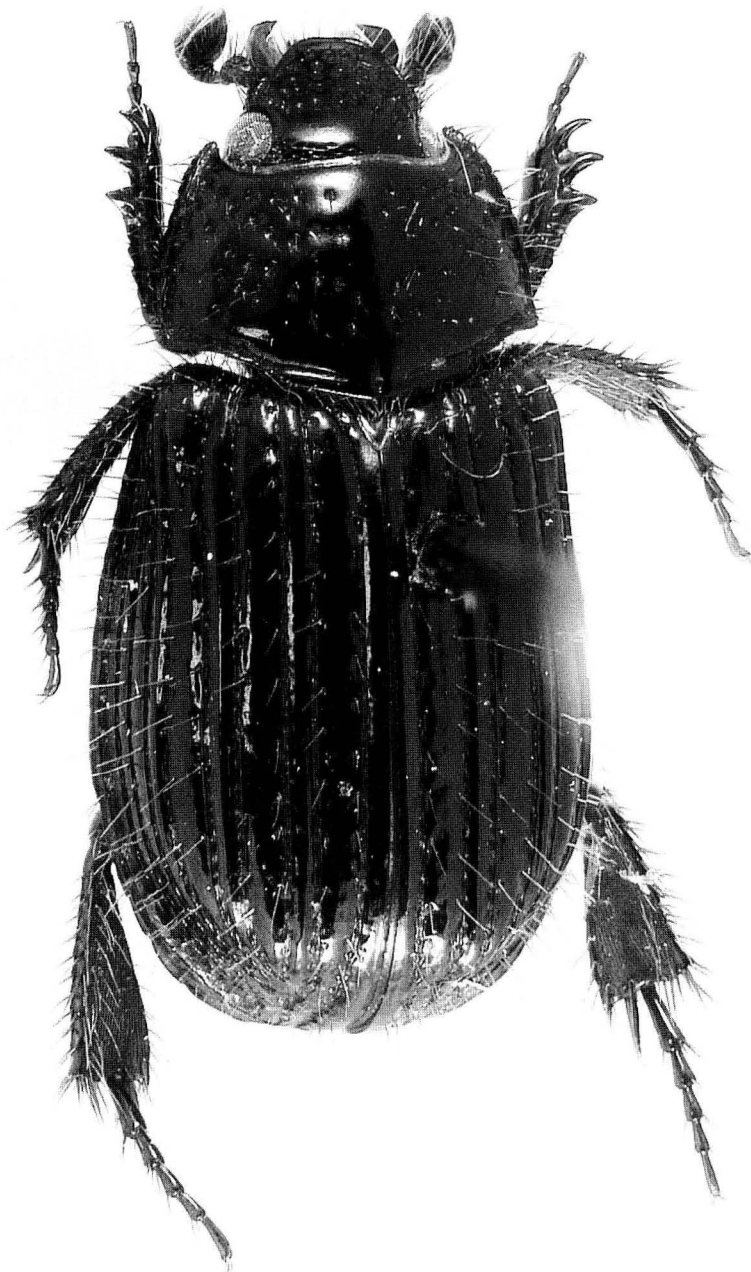


Fig. 45. *Chaetodus nigrifrons* Ocampo, male.

of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/3 as long as medial spur, medial spur with apex acuminate. *Parameres*: Figs. 44 m-n.

**Allotype female.** Length 4.51mm; width 2.37 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 4.27-4.44 mm; width 2.59-2.62 mm. Paratypes do not differ significantly from the primary types. Variation is seen on the pronotal margin; some specimens have the medial bead incomplete in middle, and the medial fovea reduced to a small pit.

**Etymology.** The specific epithet was taken from the Latin "*nigris*," meaning black and "*frons*," referring to the black frons of this species.

**Diagnosis.** *Chaetodus nigrifrons* is distinguished from other *Chaetodus* species by the black frons; pronotum with a small fovea and well-developed bead on posterior margin of the pronotum (Fig. 45); elytra with ten striae between suture and lateral margin; epipleuron wider at apex; and protibia with 2-3 poorly developed denticles between base and basal tooth. The shape of the parameres is also diagnostic (Figs. 44 m-n).

**Distribution** (Fig. 46). Ecuador. 18 specimens from BDGC, FCOC, HAHC, SEMC and UNSM.

**ECUADOR** (18): **Napo:** Sierra Azul (1); **Pichincha:** Maquipucuna Station (2); Pichijal Rd (4); Santo Domingo (16 km E.) (10); Santo Domingo (15 km E.) (1).

**Temporal data.** February (1), March (2), April (2), June (2), July (4), August (4).

**Natural history.** Specimens of *C. nigrifrons* were collected between 700-2,300 m altitude. One specimen was found in a termite nest.

### 17. *Chaetodus noirregularis* Ocampo, sp. nov.

(Figs. 46, 50 a-b)

**Type material:** Holotype male at CNCI labeled: "BRAZIL, Distrito Federal / Estação Florestal / Cabeça do Veado, 1100 m. / 23-27 Oct-1971 / E.G., I. & E.A.Munroe"; "*Chaetodus noirregularis* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at CNCI labeled:

"BRAZIL, Distrito Federal / Estação Florestal / Cabeça do Veado, 1100 m. / 17-18 Oct-1971 / E.G., I. & E.A.Munroe"; "*Chaetodus noirregularis* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Forty three paratypes at CNCI with same label as holotype. Five paratypes at CNCI with same label as allotype. Five paratypes at CNCI labeled: "BRAZIL, Distrito Federal / Estação Florestal / Cabeça do Veado, 1100 m. / 17-18 Oct-1971 / E.G., I. & E.A.Munroe". Six paratypes at UNSM labeled: "BRAZIL, Distrito Federal / Estação Florestal / Cabeça do Veado, 1100 m. / 19 Oct-1971 / E.G., I. & E.A.Munroe". Five paratypes at CNCI and five paratypes at FCOC labeled: "BRAZIL, Distrito Federal / Estação Florestal / Cabeça do Veado, 1100 m. / 27 Oct-1971 / E.G., I. & E.A.Munroe". One paratype at HAHC labeled: "Brazil / Brasilia-DF / XI.2002 / 1100 m at light / N. Degallier". Four paratypes at CMNC labeled: "BRAZIL: DF / Brasilia 1100 m / XI. 1999, at light / N. Degallier". All paratypes labeled: "*Chaetodus noirregularis* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Brazil, Distrito Federal, Estação Florestal Cabeça do Veado.

**Description. Holotype male.** Length 3.62 mm; width 2.22 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded, surface punctate; punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, slightly oblique, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface slightly rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum:* Surface convex, 0.56 times as long as wide, smooth, punctate, punctures mod-



Fig. 46. Distribution of *Chaetodus lacandonicus*, *C. maquipucuna*, *C. mimi*, *C. nigrifrons*, and *C. noirregularis*.

erately large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron*: Surface convex, with 10

striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin setose, setae moderately dense. Epipleuron tapered toward apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield

with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface weakly strigulate on margins, smooth in middle, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Femoral surface smooth, sparsely setose. Protibia with 3 teeth and 2 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/2 as long as medial spur, medial spur with apex acuminate. *Parameres*: Figs. 50 a-b.

**Allotype female.** Length 3.81 mm; width 2.22 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 3.40-4.11 mm; width 1.92-2.33 mm. Paratypes do not differ significantly from the primary types. Within the studied specimens, there are minor differences in the distribution and number of punctures on pronotum.

**Etymology.** I name this species "*noirregularis*" meaning that is not *C. irregularis*, despite the overall similarity of these two species.

**Diagnosis.** *Chaetodus noirregularis* is distinguished from other *Chaetodus* species by the punctate pronotum, punctures moderately large, sparsely setose, setae short; elytra with 10 striae between the suture and lateral margin; protibiae with 2-3 poorly developed denticles between the base and basal tooth. The shape of the parameres is also diagnostic (Figs. 50 a-b).

**Distribution** (Fig. 46). Brazil. 76 specimens from CMNC, CNCI, FCOC, HAHC and UNSM.

**BRAZIL** (76): **Distrito Federal**: Estação Forestal Cabeça do Veado (71), Brasilia (5)

**Temporal data.** October (71).

**Natural history.** Specimens of *C. noirregularis* were collected at 1,100 m altitude

### 18. *Chaetodus paucarae* Ocampo, sp. nov.

(Figs. 47, 50 c-d, 52)

**Type material:** Holotype male at QCAZ labeled: "ECUADOR LOS RIOS / CCRP / 6 DEC 1980 S Sandoval"; "*Chaetodus paucarae* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at QCAZ labeled: "ECUADOR LOS RIOS / CCRP / 28 FEB 1981 S Sandoval"; "*Chaetodus paucarae* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Seven paratypes at HAHC labeled: "ECU: Pich.: 1250m / 47 km S Sto. Domingo / Rio Palenque Sta."; "S.A. Marshall / dung trap / 16-27-II-79". Three paratypes at QCAZ labeled: "ECUADOR PICHINCHA / CCRP 21 FEB 1983 / S Sandoval". Two paratypes at HAHC labeled: "ECU: Pich.: 230m / 47 km S. Sto. Domingo / Rio Palenque Sta. / 28-31.vii. 1976 / S. Peck, dung trap". Two paratypes at HAHC labeled: "ECUADOR: Pichincha 16kmE Santo Domingo / 750m, Tinalandia / 27.III.1999, R. Brooks". One paratype at BDGC labeled: "ECUADOR: Pichincha / prov. 15 km E. Sto / Domingo, Tinalandia / 23-26.II. 1981 / 700m B. D. Gil". One paratype at FCOC, one paratype at FVMC, and one paratype at UNSM labeled: "ECUADOR LOS RIOS / CCRP / 28 FEB 1981 S Sandoval". One paratype at QCAZ labeled: "ECUADOR LOS RIOS / CCRP / 7 JUN 1980 S Sandoval". One paratype at QCAZ labeled: "ECUADOR / Rio Palenque / 12-02-77 / legit. T. DE Urtet". One paratype at FVMC labeled: "ECUADOR LOS RIOS / CCRP / 4 JUN 1980 S Sandoval". One paratype at MNHN labeled: "W. ECUADOR / Quevedo A. M. / Jan. 8 F. v. B". All paratypes labeled:

"*Chaetodus paucarae* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Ecuador, Los Ríos.

**Description. Holotype male.** Length 4.29 mm; width 2.29 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded, surface punctate; punctures moderately dense, large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 47): Surface convex, 0.65 times as long as wide, densely punctate, punctures large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, with rugose area and well-developed bead, setose; posterior margin slightly projected, medially with well-developed bead and medial fovea. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 47): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin weakly denticulate at humerus, setose, setae moderately dense. Intervals 2-6 weakly developed as carinae. Epipleuron tapered at apex, surface smooth. *Venter:* Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with

small, posteromedial tooth. Pro-, meso- and metafemoral surface smooth, sparsely setose. Protibia with 3 teeth and 2 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. Metatibial with apical process developed. External mesotibial spur reduced 1/2 as long as medial spur, medial spur with apex acuminate. *Parameres:* Figs. 50c-d.

**Allotype female.** Length 4.37 mm; width 2.22 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved; mesotibia with spurs subequal in length; and metatibial apical process not developed.

**Paratypes.** Length 4.18-4.44 mm; width 2.22-2.33 mm. Paratypes do not differ significantly from the primary types. Protibial denticles between base and basal tooth sometimes moderately developed.

**Etymology.** I take great pleasure in naming this species after my good friend and colleague, Aura Paucar-Cabrera who has contributed to our knowledge of Ecuadorian Rutelinae.

**Diagnosis.** *Chaetodus paucarae* is distinguished from other *Chaetodus* species by the pronotum with large and dense punctures; posterior margin with a well-developed bead and fovea medially; the elytra with 10 striae (Fig. 47); and protibia with 2 poorly developed denticles between the base and basal tooth. The shape of the parameres is also diagnostic (Figs. 50 c-d).

**Distribution** (Fig. 52). Ecuador. 24 specimens from BDGC, FCOC, FVMC, HAHC, MNHN, QCAZ, and UNSM.

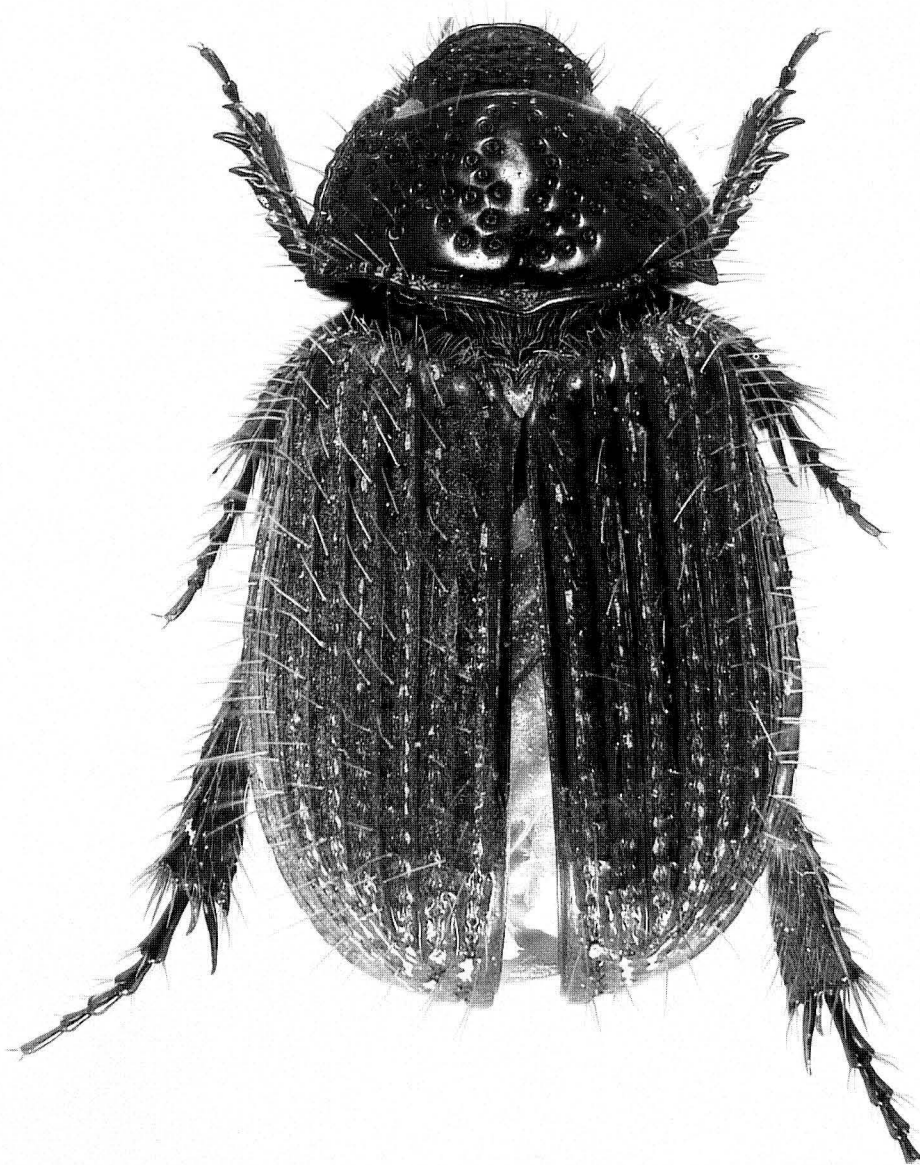


Fig. 47. *Chaetodus paucarae* Ocampo, male.

**ECUADOR** (24): **Los Rios:** Quevedo (1); no data (6); **Pichincha:** No data (3); Rio Palenque (2); Santo Domingo (15 km E) (1); Santo Domingo (16 km E) (2); Santo Domingo (47 km S) (9).

**Temporal data.** January (1), February (16), March (2), June (2), July (2), December (1).

**Natural history.** Nothing is known about the biology of this species.

**19. *Chaetodus paulseni* Ocampo,  
sp. nov.**

(Figs. 48, 50 e-f, 52)

**Type material:** Holotype male at UNSM labeled: "BRASIL: Rondonia / 62 km S. Ariquemes / Faz. Rancho Grande 10° 32' S. 62° 48' W. / XI-11-22-1991 / B.C Ratcliffe"; "habitat: tropical / evergreen forest"; "*Chaetodus paulseni* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at UNSM with same label as holotype except: "*Chaetodus paulseni* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Seven paratypes at WBWC labeled: BRAZIL: Rondonia. 62 / km SW Ariquemes, nr / Fzda. Rancho Grande / 5-17-X-1993 JE Eger / Black Light Trap". Three paratypes at UNSM and two paratypes at FCOC with same label as holotype. Two paratypes at PKLC labeled: "BRAZIL: RO 160-350 m / vic. CAUCALANDIA / 10 deg 32' S 62 deg 48' W / 30 OCT 1991 LEG. J. R. MACDONALD". Two paratypes at FSCA labeled: "BRAZIL: Rondonia 62 km / S. Arequimes, Fzda. Rancho / Grande; 18-IX-1994 / C. W. & L. O'Brien / UV light trap". One paratype at PKLC labeled: "BRAZIL: Rondonia / Fazenda Rancho Grande / 62 km. S. Arequimes / 12-22 November 1991". One paratype at CMNC labeled: "BRASIL: MATO GROSSO / Mun. Diamantino, 22.2 km S / Posto do Gil on BR-364 180 m, / 14° 40'58"S 56°17'57"W / 13.1.2001, Génier & Vaz de Mello / gall. for., ex. carrion trap, 2001-27". All paratypes labeled: "*Chaetodus paulseni* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Brazil, Rondonia, Fazenda Rancho Grande (62 km S. Ariquemes).

**Description. Holotype male.** Length 5.18 mm; width 3.33 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded, surface punctate; punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex

blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 48): Surface convex, 0.66 times as long as wide, smooth, punctate; punctures large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected, medially with small fovea on each side of medial projection. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 48): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Intervals 2-6 each developed as carina on apical half. Epipleuron tapered at apex, surface smooth. *Venter:* Prosternal surface strigulate; prosternal shield with postero-medial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth and 2 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slen-



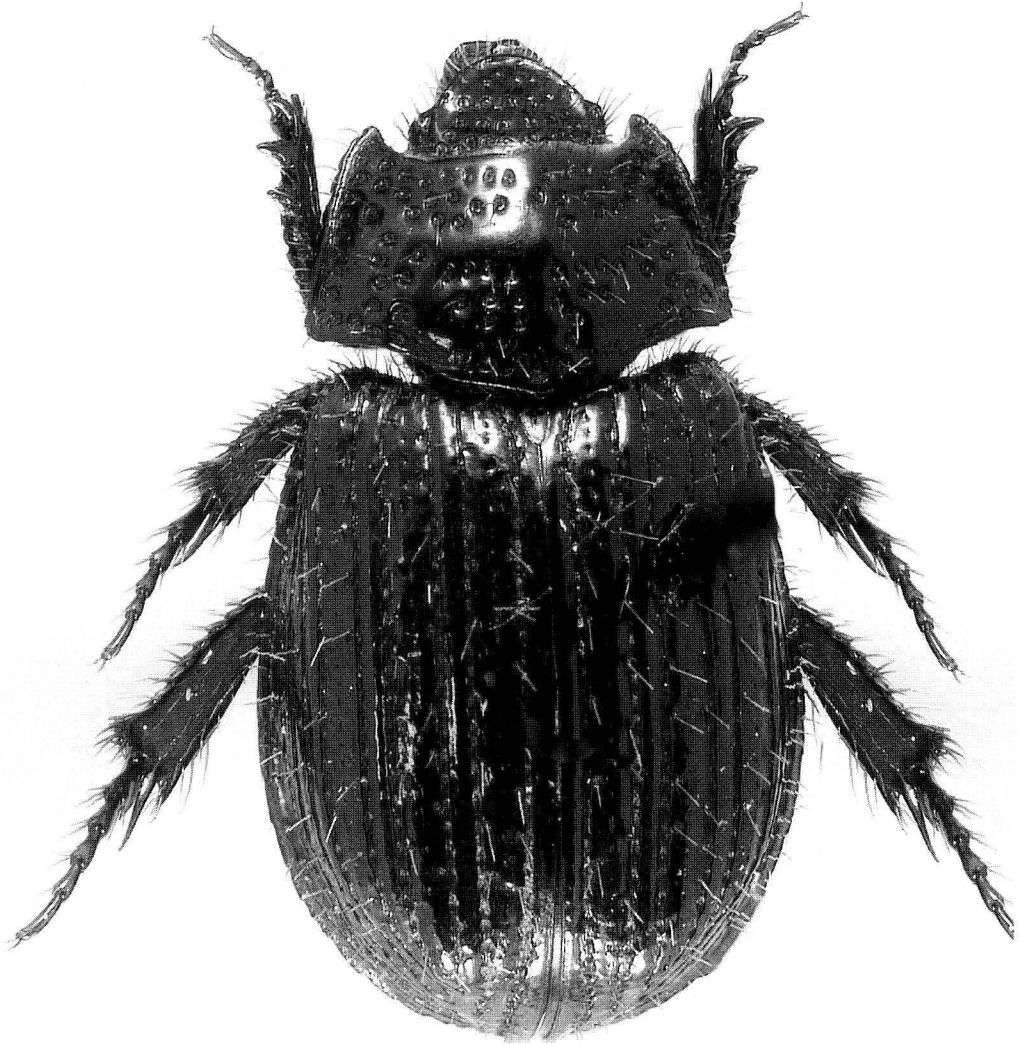


Fig. 48. *Chaetodus paulseni* Ocampo, male.

der, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/2 as long as medial spur, medial spur with apex acuminate. *Parameres*: Figs. 50 e-f.

**Allotype female.** Length 4.92 mm; width 3.33 mm. The female allotype differs from

the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 4.07-4.88 mm; width 2.77-3.29 mm. Paratypes do not differ significantly from the primary types. Variation occurs in the pronotal sculpture and elytra. Small fovea on each side of medial projection

sometimes elongated as small sulcus on posterior margin; interestria 2-6 sometimes poorly developed as carinae.

**Etymology.** I take great pleasure in naming this species after my colleague and enthusiastic scarabaedeologist colleague, Matt Paulsen.

**Diagnosis.** *Chaetodus paulseni* is distinguished from other species of *Chaetodus* by a small fovea and well-developed bead on posterior margin of the pronotum, with punctures large and unevenly distributed, sparsely setose (Fig. 48); elytra with ten striae between suture and lateral margin; epipleuron tapered at apex; and tibiae with three poorly developed denticles between base and basal tooth. The shape of the parameres is also diagnostic (Figs. 50 e-f).

**Distribution** (Fig. 52). Brazil. 20 specimens from CMNC, FCOC, FSCA, PKLC, UNSM, and WBWC.

**BRAZIL** (20; **Mato Grosso:** Diamantino (1); **Rondonia:** Ariqueemes (62 km SW) (17); Caucalandia (2).

**Temporal data.** January (1), September (2), October (9), November (8).

**Natural history.** Adults of *C. paulseni* are attracted to light.

## 20. *Chaetodus pax* Ocampo,

**sp. nov.**

(Figs. 49, 50 g-h, 52)

**Type material.** Holotype male at HAHC labeled: "VEN: Merida, 25 km NW / Merida, Jaji Road, 1800 m / Chorrera Gonzales / 28.VI- 3.VIII. 89, forest / carrion tps, S&J Peck"; "*Chaetodus pax* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female with same label as holotype and "*Chaetodus pax* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Three paratypes at CABC, one paratype at FCOC, and one paratype at UNSM labeled: "La Trampa m. 1700 / Lagunillas, MERIDA"; "VENEZ.

Bordón / leg. 10 III 1978". Two paratypes at CABC labeled: "El Joque, m. 2000 / Jaji. Edo, MERIDA"; "VENEZ. Bordon / leg. 1-15 III 1978". Two paratypes at HAHC labeled: "La Trampa m. 1700 / Lagunillas. MERIDA / VENEZ. Bordon / leg. 10 III 1978"; "*Chaetodus (Chaetodus) humerosus* / A. Martínez det. 1987". One paratype at UNSM labeled: "VEN. TACH 38 km. / San Cristobal / 5000' V.20-22, 1974 / S. Peck malt". One paratype at HAHC labeled: "VENEZUELA, Tach. / 2000m. 30 km NE San Cristobal / V. 20-22, 1974;" "S. Peck / T37D". One paratype at MTEC labeled: "VENEZUELA: Mérida / Las Cruces / 08 JULY 1986 / W. F. Abeles colr / uv light". All paratypes labeled: "*Chaetodus pax* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Description. Holotype male.** Length 5.29 mm; width 3.33 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose; setae moderately dense, long. Clypeus with disc slightly convex, shape subtrapezoidal, apex weakly rounded, surface punctate, punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 49): Surface convex, 0.60 times as long as wide, smooth, punctate; punctures large, setose; setae moderately dense, short. Anterior margin with weak bead; lateral margin rounded, slightly denticulate, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 49): Surface convex, with 13 striae between suture and lateral margin, striae setose, setae moderately dense. Apical declivity slightly

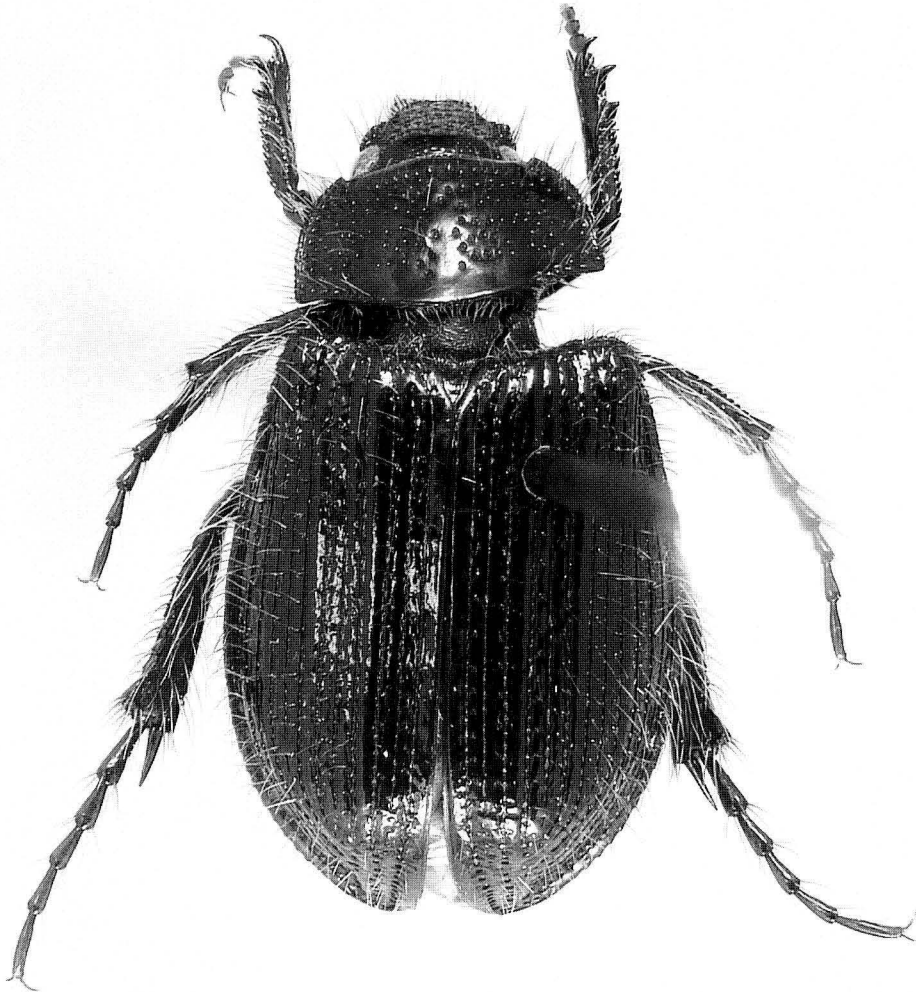


Fig. 49. *Chaetodus pax* Ocampo, male.

tuberculate. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron equal in width from humeral angle to near apex, surface smooth. *Venter*: Prosternal surface strigulate, prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shaped area, setose,

setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso-, and meta-femoral surface smooth, sparsely setose. Protibia with 3 teeth and 8 developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than

second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/2 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 50 g-h.

**Allotype. Female.** Length 5.44 mm; width 3.14 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 5.41- 5.44 mm; width 3.11-3.25 mm. Paratypes do not differ significantly from the primary types. The number of protibial denticles between base and basal tooth varies from 7-9.

**Etymology.** From the Latin *pax*, meaning peace, in honor of those who uphold it.

**Diagnosis.** *Chaetodus pax* is distinguished from other species of *Chaetodus* by the pronotum with surface smooth and setose; setae moderately dense; elytron with 13 striae between the suture and lateral margin; and protibia with 3 teeth and 7-9 denticles between the base and basal tooth. The shape of the parameres is also diagnostic (Figs. 50 g-h).

**Distribution** (Fig. 52). Venezuela. 14 specimens from CABC, FCOC, HAHC, MTEC, and UNSM.

VENEZUELA (14): Mérida: El Joque (2); Las Cruces (1); La Trampa (7); Mérida (25 km NW) (2); Tachira: San Cristóbal (36 km) (1); San Cristóbal (38 km NE) (1).

**Temporal data.** March (9), May (2), July (1), August (2).

**Natural history.** Specimens of *C. pax* were collected between 1,200-2,000 m altitude.

## 21. *Chaetodus piceus* Westwood, 1846

(Figs. 50 i-j, 51, 52)

*Chaetodus piceus* Westwood 1846: 166.

**Type material.** *Chaetodus piceus* Westwood lectotype female here designated at BMNH labeled: "Type"; "Brasilia / Capta / D. Swainson"; "5957 / Vigers coll"; "*Chaetodus piceus* / West"; "*Chaetodus piceus* Westwood / LECTOTYPE / F. C. Ocampo" (my red lectotype label, handwritten). This single specimen is the only type material I could study because a holotype was not designated by Westwood.

**Description. Male.** Length 5.62-6.10 mm; width 3.53-4.03 mm. *Color*: Head, pronotum, scutellum, venter, and legs brown. *Head*: Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal, apex weakly rounded, surface punctate; punctures moderately dense, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 51): Surface slightly convex, 0.62 times as long as wide, smooth, punctate; punctures small, sparsely setose, setae short, concentrated near anterior margin and on center of pronotal disc. Anterior margin with weak bead; lateral margin slightly rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 51): Surface convex, with 13 striae between suture and lateral margin, striae sparsely setose. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae mod-

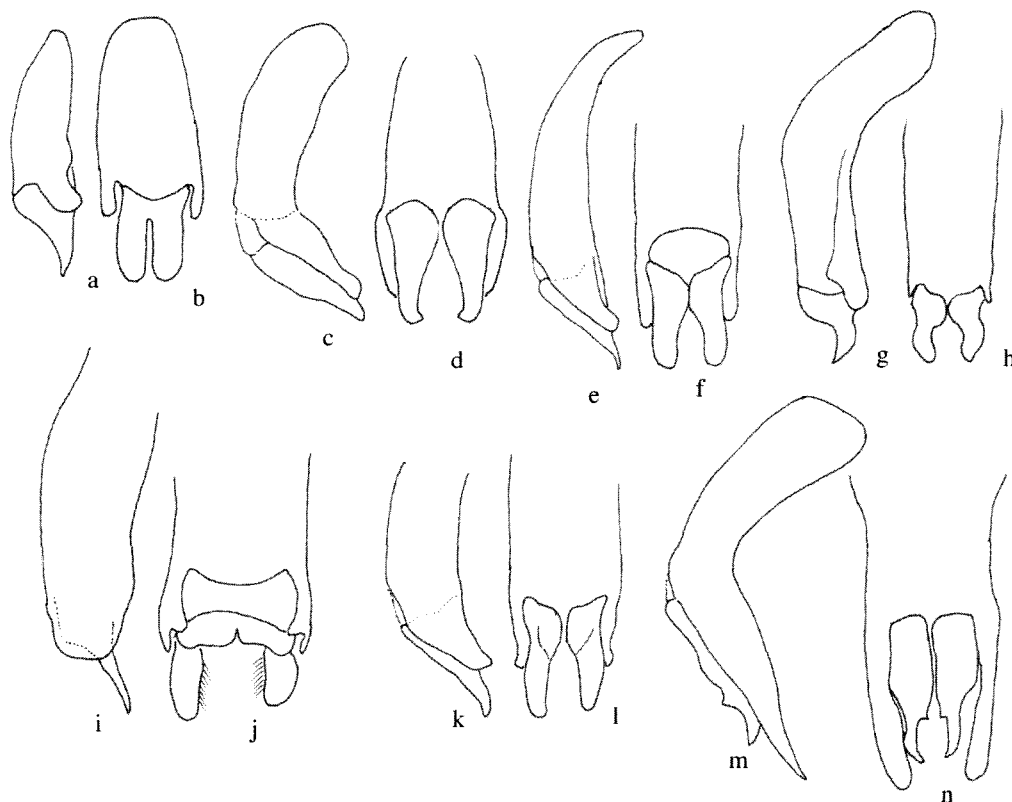


Fig. 50. Male parameres and phallobase of a-b) *Chaetodus noirregularis*, c-d) *C. paucarae*, e-f) *C. paulseni*, g-h) *C. pax*, i-j) *C. piceus*, k-l) *C. platynotus*, and m-n) *C. ratcliffei*.

erately dense. Epipleuron tapered toward apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso-, and metafemoral surface smooth, sparsely setose. Protibia with 3 teeth and 7-10 denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae

slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/2 as long as medial spur, medial spur with apex acuminate. *Parameres*: Figs. 50 i-j.

**Female.** Length 5.29-6.41 mm; width 3.40-3.92 mm. Females differ from the males in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Diagnosis.** *Chaetodus piceus* is distinguished from other species of *Chaetodus* by the pronotum with surface smooth setose, setae concentrated on anterior margin and on middle of pronotal disc; elytron with 13 striae between the suture and lateral margin, tubercle on apex absent; and protibia

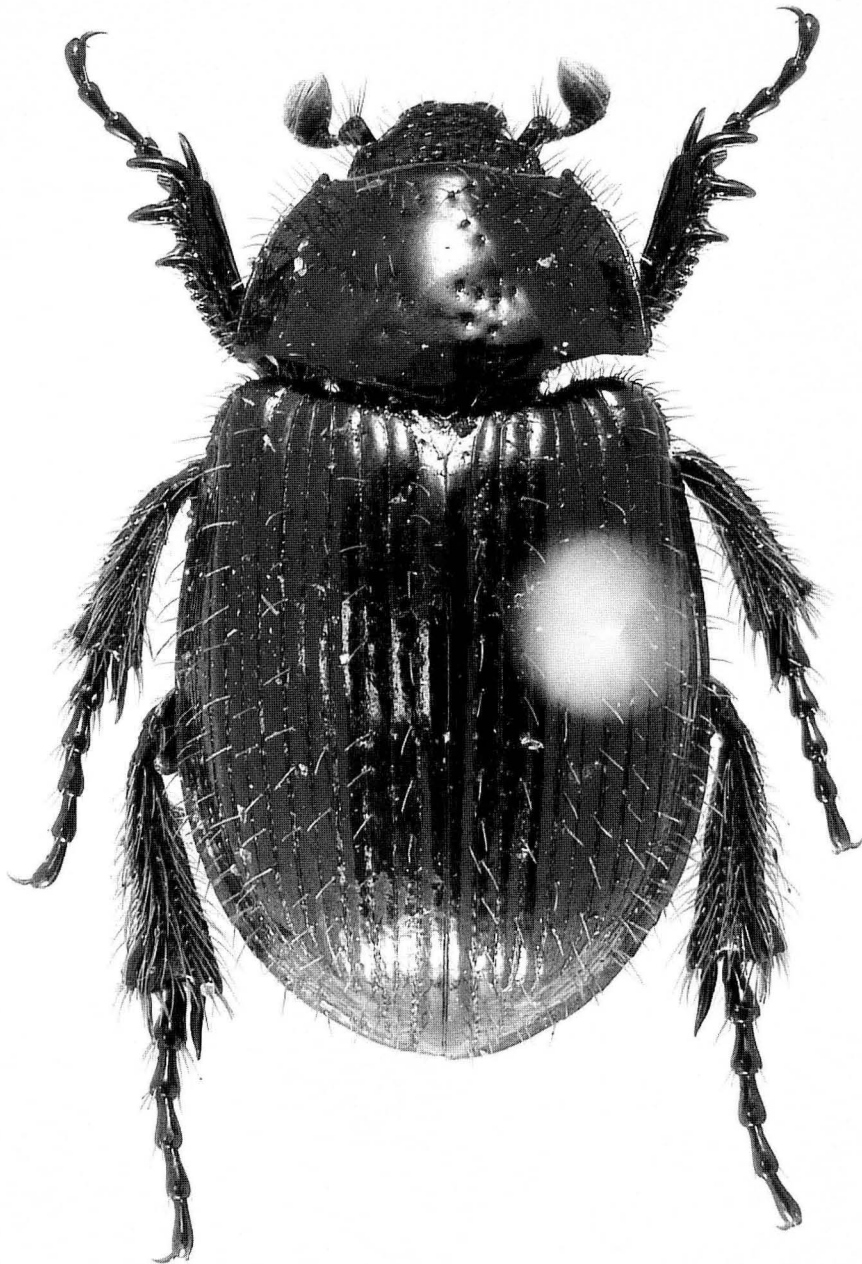


Fig. 51. *Chaetodus piceus* Westwood, female.

with 7-10 denticles between the base and basal tooth. The shape of the parameres is also diagnostic (Figs. 50 i-j).

**Distribution** (Fig. 52). Brazil, Bolivia, Paraguay and Argentina. 92 specimens from AMNH, BDGC, BMNH, CMNC, CNCI,

EGRC, FCOC, FMNH, FVMC, HAHC, LACM, MHNG, UMRM, UNSM, USNM and WBWC.

**BOLIVIA** (12): **Santa Cruz:** Santa Cruz (8); Buenavista (2); **Tarija:** Villa Montes (2).

**BRAZIL** (36): **Bahia**: Encruzilhada (4); **Distrito Federal**: Brasilia (3); **Goiás**: Aragarças (1); Goiania (1) Río Verde (3); Vi-anópolis (2); **Mato Grosso**: Campo Grande (2); Guaycurús (1); Tapirapé (2); Unaí (1); **Mato Grosso do Sul**: Bodoquema (1); **Minas Gerais**: Belo Horizonte (1); Bocarayuba (1); Centralina (1); Cordisburgo (2); Lassance (8); **Pernambuco**: Serras Dois Irmões (1); **São Paulo**: Rebeirão Preto (1). **PARAGUAY** (9): **Boquerón**: Filadelfia (1); **Central**: Asunción (7); **Itapuá**: El Tirol (1).

**ARGENTINA** (35): **Chaco**: Fuerte Esperanza (2); **Jujuy**: San Pedro (1); **Salta**: Departamento de Anta (5); General Ballivián (19); Orán (1); Joaquín V. González (2); Pocitos (1); Tartagal (2); Tonono (2).

**Temporal data.** January (8), May (1), September (1), October (4), November (29), December (11).

**Natural history.** Specimens of *C. piceus* were collected between 355-600 m altitude.

## 22. *Chaetodus platynotus* *Ocampo, sp. nov.*

(Figs. 50 k-1, 52, 53)

**Type material.** Holotype male at UNSM labeled: "ECUADOR: Napo Province / Misahualli Jungle lodge area, jct. of / Rio Napo & Rio Misahualli. 1650- / 1990' elev. S 1° 2' 4.2" W 77° 39' / 49.2". 13-20; IX; 1998, C. & H. Messenger. "*Chaetodus platynotus* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at UNSM labeled: "ECUADOR: Napo pro. / Jatun Sacha Biological Station 77°37'W, 1°04'S, VII 24-26-1998 / lowland rain forest, 450 m / Ratcliffe, Jameson, Smith, Villatoro". Five paratypes at UNSM and two paratypes at FCOC labeled as allotype. Three paratypes at UNSM labeled as holotype. Fourteen paratypes at HAHC labeled: "ECU: Napo, 250 m Limoncocha 22- / 28.vi. 76 s. Peck / dng. Tps. 22-24 / virg, for. 2km N". Two paratypes at HAHC labeled: "ECU: Napo, 250 m / Limoncocha 18- / 24 vi. 76 S. Peck / 3 dng. Tps. (14-16) / nature

trail for". Four paratypes at HAHC labeled: "ECU: Limoncocha / 10-15.III. 1975 / J. M. Campbell". Two paratypes at CNCI labeled: "ECU: Limoncocha / Napo 800' / II.III. 1976 / J. M. Campbell". Two paratypes at FMNH labeled: "ECUADOR: Pastaza; 10km, / Rio Morona Ashuara / village, Rio Macuma; 300m. / VII: 5-17: 1971 B. Malkin"; "night sweeping / forest trail". One paratype at QCAZ labeled: "ECUADOR: PASTAZA / VILLANO / 3 JUL 1996 J Naranjo"; "ex: pit fall / bosque". One paratype at USNM labeled: "ECUADOR - Napo / PUCE Yasuni 3/3-6/95 / 76°23'W 0°40'S, 250 m / Mbassi & N Pitman (A Forsyth)"; "Primary forest, noct. / Pitfall - Human dung / E border of 50 ha plot / Tran Y2: trap 1:12 hrs". All paratypes labeled: "*Chaetodus platynotus* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Ecuador, Napo, Misahualli.

**Description. Holotype male.** Length 4.81 mm; width 2.96 mm. *Color*: Head, pronotum, scutellum, venter, and legs brown. *Head*: Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded; surface punctate, punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 53): Surface convex, 0.61 times as long as wide, smooth, punctate, punctures large and more concentrated on apical half, sparsely setose, setae short. Disc flattened medially. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex



Fig. 52. Distribution of *Chaetodus paucarae*, *C. paulseni*, *C. pax*, *C. piceus*, and *C. platynotus*.

acute. *Elytron* (Fig. 53): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin denticulate at humerus, slightly denticulate

elsewhere, setose, setae moderately dense. Intervals 2-6 each developed as carina on apical half; intervals 2 and 3 converging and with convexity accentuated at apical declivity. Epipleuron tapered at apex, surface smooth. *Venter*: Prosternal surface strigulate,



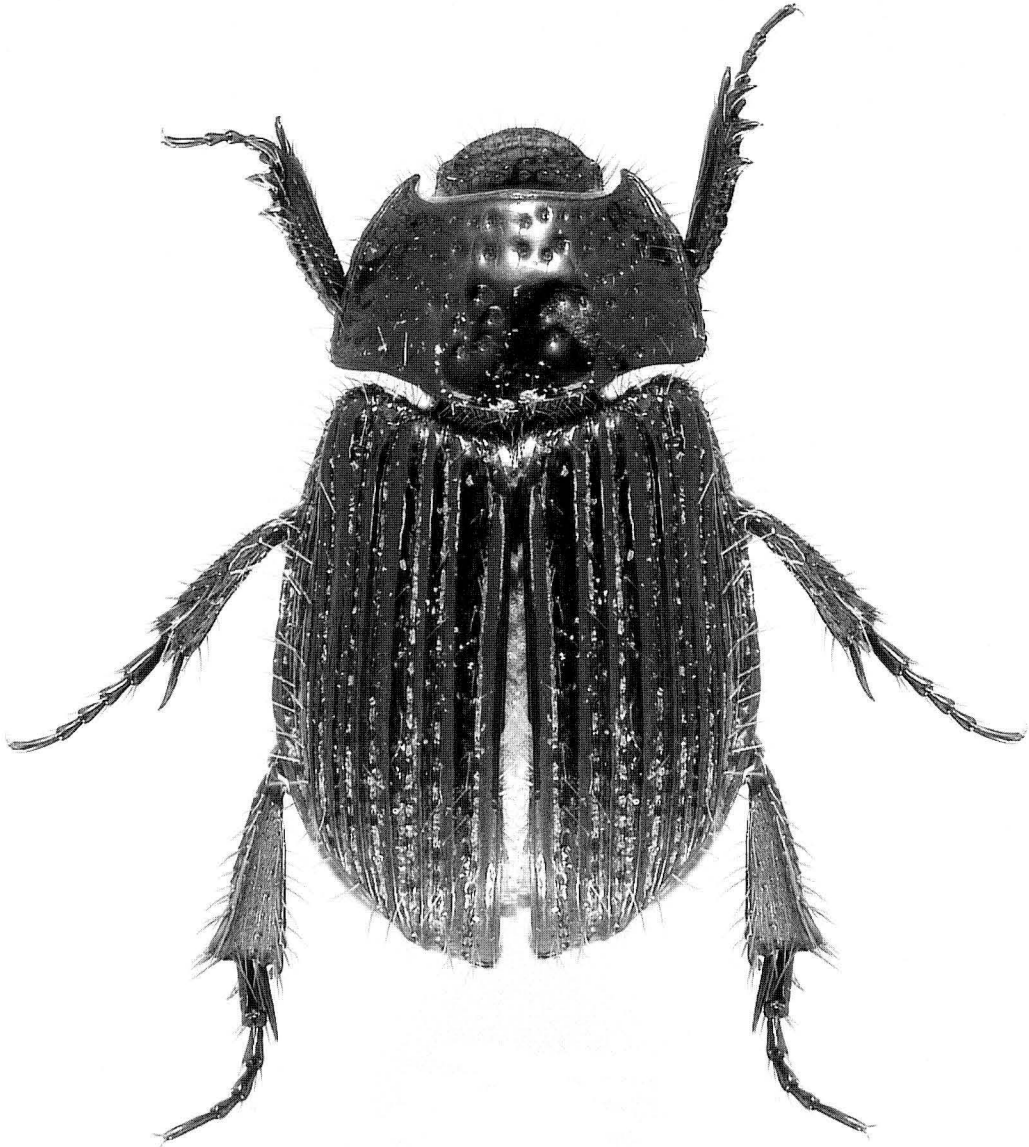


Fig. 53. *Chaetodus platynotus* Ocampo, male.

prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half,

smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth and 2 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4

subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. Metatibia with well-developed medial, furcal process; furcal process shorter than medial metatibial spur (Fig. 53). External mesotibial spur reduced, 1/2 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 50 k-l.

**Allotype female.** Length 4.77 mm; width 2.96 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved; mesotibia with spurs subequal in length; and metatibial furcal process absent.

**Paratypes.** Length 4.65-4.88 mm; width 2.78-3.20 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** The name "*platynotus*," from the Latin *platys* and *notum*, meaning flat pronotum, in reference to the flattened pronotal disc of this species.

**Diagnosis.** *Chaetodus platynotus* is distinguished from other species of *Chaetodus* by the pronotum with surface smooth between punctures, punctures large and more concentrated on apical half; pronotal disc flattened medially; elytron with 10 striae; intervals 2-6 developed as carina on apical half, intervals 2 and 3 converging and protruding at apical declivity; protibia with two poorly developed denticles between the base and basal tooth; and metatibia with well-developed, medial furcal process (males); and furcal process shorter than medial metatibial spur. The shape of the parameres is also diagnostic (Figs. 50 k-l).

**Distribution** (Fig. 52). Ecuador. 38 specimens from CNCI, FCOC, FMNH, HAHC, QCAZ, UNSM and USNM.

**ECUADOR** (38): **Napo:** Jatún Sacha Biological Station (7); Misahualli Jungle Lodge area (4); Limoncocha (21); **Pastaza:** Ashuara (2); Villano (1).

**Temporal data.** March (5), June (16), July (11), September (4).

**Natural history.** Adults of *C. platynotus* are attracted to carrion and dung, and they live in lowland rainforests. Specimens were collected between 250-600 m altitude.

### 23. *Chaetodus ratcliffei* Ocampo, sp. nov.

(Figs. 50m-n, 59)

**Type material.** Holotype male at MIZA labeled: "1500 / m"; Brasil- AM / Tucano / 24-IV-1964"; J.&B. Bechyne / leg"; "*Chaetodus ratcliffei* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at UNSM with same label as holotype except: "*Chaetodus ratcliffei* / ALLOTYPE / F. C. Ocampo" (my red allotype label handwritten).

**Type locality.** Brazil, Amazonas, Tucano.

**Description. Holotype male.** Length 5.22 mm; width 3.22 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal, apex weakly rounded, surface punctate, punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum:* Surface convex, 0.64 times as long as wide, smooth, punctate; punctures large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex

acute. *Elytron*: Surface convex, with 12 striae between suture and lateral margin, striae sparsely setose. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Intervals 2-7 each developed as carina at apical declivity. Epipleuron with same width from humeral angle to near apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process well-developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter without posteromedial tooth. Pro-, meso-, and metafemoral surface smooth, sparsely setose. Protibia with 3 teeth and 2 poorly developed denticles between base and basal tooth; basal and medial teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/2 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 50 m-n.

**Allotype female.** Length 5.22 mm; width 3.22 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Etymology.** I take great pleasure in naming this species after my good friend and mentor, Brett Ratcliffe.

**Diagnosis.** *Chaetodus ratcliffei* is distinguished from other species of *Chaetodus* by the sparsely punctate pronotum with large punctures; elytron with 12 striae between suture and lateral margin; with two poorly

developed denticles between base and basal tooth. The shape of the parameres is also diagnostic (Figs. 50 m-n).

**Distribution** (Fig. 59). Brazil. 2 specimens from MIZA and UNSM.

**BRAZIL (2): Amazonas:** Tucano (2).

**Temporal data.** April (2).

**Natural history.** Nothing is known about the biology of this species.

#### 24. *Chaetodus rodolfo* Ocampo, sp. nov.

(Figs. 54, 57 a-b, 59)

**Type material.** Holotype male at HAHC labeled: "ECU: Tungurahua / 6 km E Rio Negro 1500m / 13-17. vii.76 S. Peck / for. car. tps. 49-50"; "*Chaetodus rodolfo* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at HAHC labeled: "ECU: Pastaza 900m / 22km SE Puyo 12- / 16.vii.76 S. Peck / for. car. tps. 42-43"; "*Chaetodus rodolfo* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Nineteen paratypes at HAHC, one paratype at CMNC, one paratype at FCOC, and one paratype at UNSM labeled: "ECU: Tungurahua / 8kmE Rio Negro 1400 m / 10km W Pastaza (=Shell) 13-17.vii.76 S. Peck / for.dng. tps". Three paratypes at HAHC labeled as holotype. Three paratypes at CDAE labeled: "ECUADOR: Napo Prov. / Huahua Samuco, km 45 on Hollin-Loeto Rd. / XII-17-1989 Malaise Trap / MS/JS Wasbauer, H. Real". Two paratypes at HAHC labeled: "ECU: Tungurahua / 8 km E Rio Negro 1400m / 13-17. vii.76 S. Peck / for. car. tps. 46-47". One paratype at UMRM and one paratype at PKLC labeled: "ECUADOR: Napo Prov. / 2km N. Pununo / 3 January, 1989 / coll; R. W. Sites / mercury vapor light". One paratype at USNM labeled: "ECUADOR, Past. / Puyo (22 kms. W.) / 5 February 1976 / Blacklight / Spangler, et. al". One paratype at HAHC labeled as allotype". All paratypes labeled: "*Chaetodus rodolfo* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

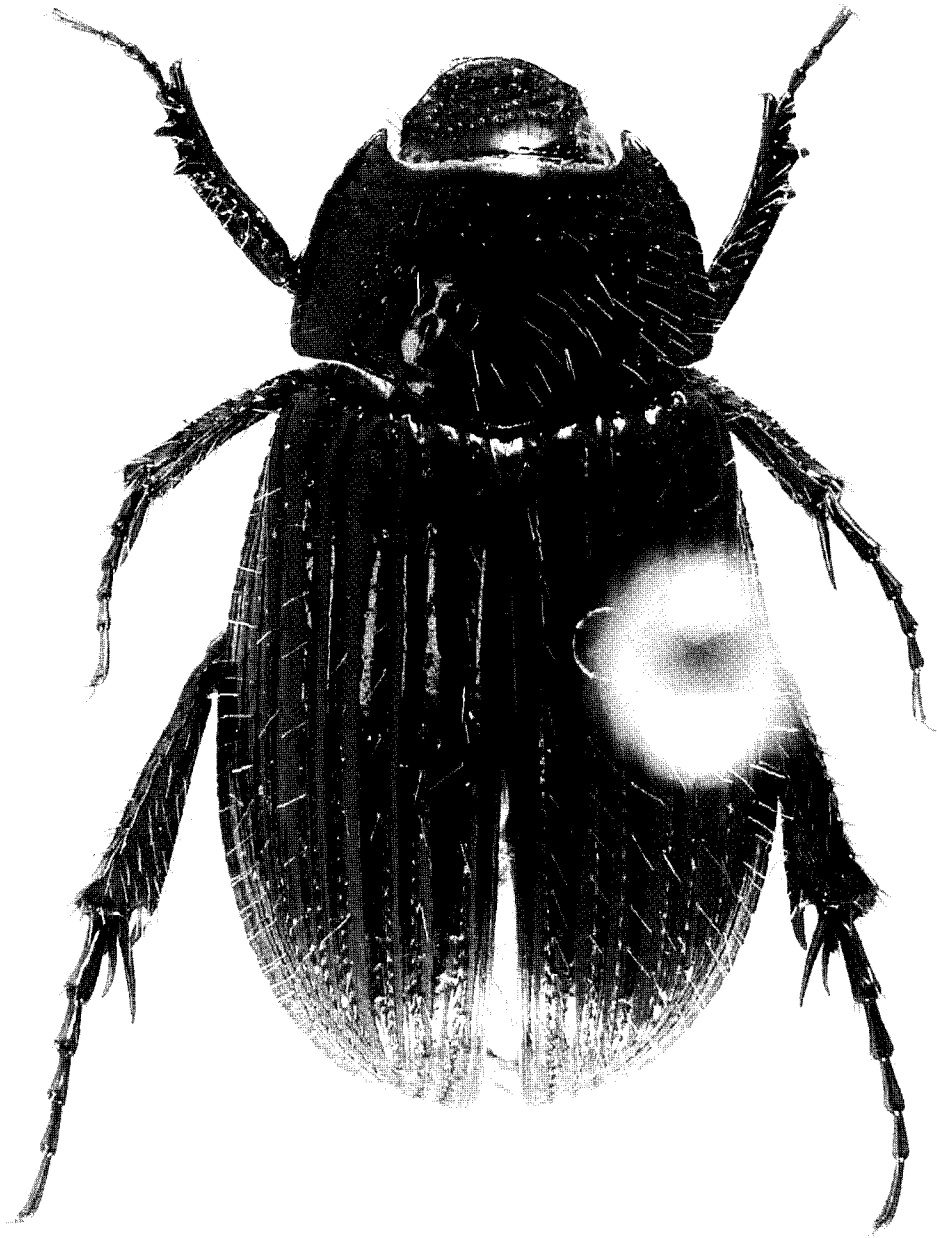


Fig. 54. *Chaetodus rodolfo* Ocampo, male.

**Type locality.** Ecuador, Tungurahua, Rio Negro (6 km E).

**Description. Holotype male.** Length 7.22 mm; width 3.48 mm. *Color:* Frons black; rest of head, pronotum, scutellum, venter,

and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded, surface punctate; punctures moderately dense and moderately large. Clypeal margins slightly

reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 54): Surface convex, 0.64 times as long as wide, smooth, punctate, punctures large and more concentrated on apical half, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 54): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin slightly denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron tapered at apex, surface smooth. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process well-developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth, denticles absent between base and basal tooth; basal and teeth subtriangular; protibial spur as long as apical tooth, right-angled at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth.

Meso- and metatibial apex truncate, oblique, slightly expanded. Metatibia with well-developed medial, furcal process; furcal process longer than medial metatibial spur (Fig. 53). External mesotibial spur reduced, 1/2 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 57 a-b.

**Allotype female.** Length 4.92 mm; width 3.33 mm. The female allotype differs from the holotype in the following respects: protibia robust; protibial spur evenly curved; mesotibia with spurs subequal in length; and the metatibial furcal process absent.

**Paratypes.** Length 4.70-5.07 mm; width 2.98-3.46 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** I name this species "*rodolfo*," for one of the main characters of Puccini's opera "La Bohème".

**Diagnosis.** *Chaetodus rodolfo* is distinguished from other species of *Chaetodus* by the pronotum with large punctures and more concentrated on the apical half; elytron with 10 striae between the suture and lateral margin; protibia slender, denticles absent between the base and basal tooth; protibial spur right-angled at apex; metatibia with well-developed medial, furcal process; and furcal process longer than medial metatibial spur (Fig. 54). The shape of the parameres is also diagnostic (Figs. 57 a-b).

**Distribution** (Fig. 59). Ecuador and Peru. 36 specimens from CDAE, CMNC, FCOC, HAHC, PKLC, UMRM, UNSM and USNM. **ECUADOR** (36): **Napo**: Huahua Sumaco (3); Pununo (1); **Pastaza**: Puyo (22 km SE) (3); **Tungurahua**: Rio Negro (6 km W) (3); Rio Negro (8 km W) (22).

**Temporal data.** January (2), February (1), July (30), December (3).

**Natural history.** Adults of *C. rodolfo* are attracted to light, carrion, and dung. Specimens of *C. rodolfo* were collected between 900-1,500 m altitude.

**25. *Chaetodus sagittarius*  
*Ocampo* sp. nov.**

(Figs. 55, 57 c-d, 59)

**Type material:** Holotype male at MZSP labeled: "BRASIL: RIO DE JANEIRO / 17 km E Nova Friburgo / 22°23'04"S 42°33'30"W, 750 m / 29.I.2000, F. Génier & S. Ide, secondary mountain Atlantic for. / ex car. Tp. 1-3 day 4-9, FG2000-57"; "*Chaetodus sagittarius* Ocampo / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at CMNC labeled: "BRASIL: RIO DE JANEIRO / 17 km E Nova Friburgo / 22°23'04"S 42°33'30"W, 750 m / 29.I.2000, F. Génier & S. Ide, secondary mountain Atlantic for. / ex car. Tp. 1-3 day 4-9, FG2000-57"; "*Chaetodus sagittarius* Ocampo / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Fifty paratypes at CMNC, five paratypes at MZSP, three paratypes at UNSM, and two paratypes at FCOC with same label as primary types except: "*Chaetodus sagittarius* Ocampo / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Brazil: Rio de Janeiro, Nova Friburgo (17 km E).

**Description. Holotype male.** Length 4.85 mm; width 2.59 mm. *Color:* Head, pronotum, scutellum, venter, and legs dark brown. *Head:* Frons slightly convex, glabrous at base punctate and setose at apex. Clypeus with disc slightly convex, shape subtrapezoidal; apex weakly rounded, surface sparsely punctate; punctures setose, setae long. Clypeal margins slightly reflexed; vertical surface of apex blunt, slightly oblique, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 55): Surface convex, 0.60 times as long as wide, surface smooth, sparsely punctate, punctures large. Ante-

rior margin with weak bead; lateral margin rounded, weakly denticulate, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface setose at base, glabrous at apex, apex acute. *Elytron* (Fig. 55): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Lateral margin setose, setae moderately dense. Apex with rugose area on margin. Epipleuron tapered toward apex, surface smooth. *Venter:* Prosternal surface strigulate; prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shape area. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Femoral surface smooth, sparsely setose. Protibia with 3 teeth and 3-4 denticles between base and basal tooth; basal and middle teeth subtriangular, protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, expanded. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres:* Figs. 57 c-d.

**Allotype.** Female. Length 4.62 mm; width 2.59 mm. The allotype female differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 4.50-4.72 mm; width 2.47-2.65 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** The specific epithet *sagittarius*, from the Latin *sagitta* meaning arrow, refers to the shape of the parameres of this species.

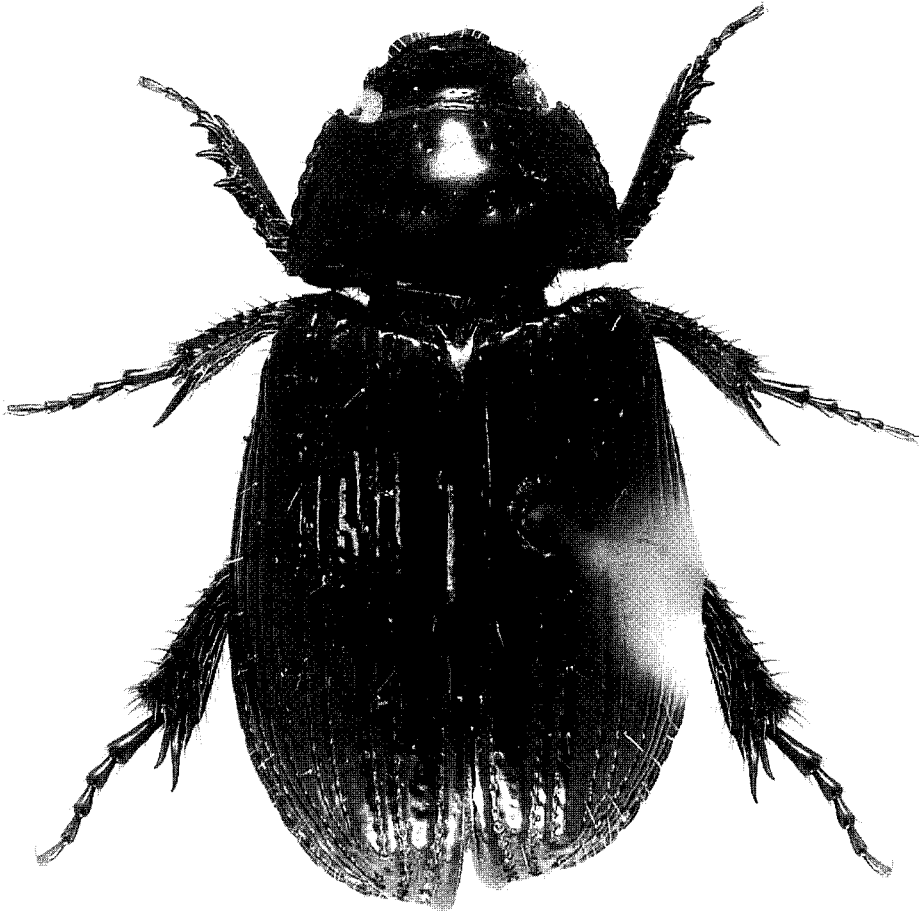


Fig. 55. *Chaetodus sagittarius* Ocampo, male.

**Diagnosis.** *Chaetodus sagittarius* is distinguished from other species of *Chaetodus* by the sparsely punctate pronotum; elytra with 10 striae between the suture and lateral margin; and protibiae with 3-4 poorly developed denticles between the base and basal tooth (Fig. 55). The shape of the parameres is also diagnostic (Figs. 57 c-d).

**Distribution** (Fig. 59). Brazil. 62 specimens from CMNC, FCOC, and UNSM.

**BRAZIL (62): Rio de Janeiro:** Nova Friburgo (17 km E) (62).

**Temporal data.** January (62).

**Natural history.** Specimens of *Chaetodus sagittarius* were collected at 750 m altitude. Adults are attracted to carrion.

**26. *Chaetodus smithi* Ocampo  
sp. nov.**

(Figs. 56, 57 e-f, 59)

**Type material:** Holotype male at CMNC labeled: "PERU: Madre de Dios / 15 km N.E. Puerto Maldonado / Reserva Cuzco Amazónica / 200m. 12°33'S. 69°03'W / 13.VI.1989. Ashe & Leschen / swamp forest, F.I.T."; "*Chaetodus smithi* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at CMNC labeled: "PERU: Madre de Dios / 15 km N.E. Puerto Maldonado / Reserva Cuzco Amazónica / 200m. 12°33'S. 69°03'W / 13.VI.1989. Ashe & Leschen / swamp forest, F.I.T."; "*Chaetodus smithi* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Two paratypes at FCOC, one paratype at CMNC, with same label as holotype. Two paratypes at FSCA labeled: "PERU: Loreto; 80 km / NE Iquitos, Explorama / lodge, Rio Yanamono / 1km from Amazon R. / 25-28-VIII-1992; P.E. / Skelley, window trap". Two paratypes at USNM labeled: "PERU: Cuzco Huayllchumbre / town 2° forest / pasture, 650 m, flight intercept trap / 13°11'42.5"S 70°39'27.7" W / T.Larsen, VI-2000". One paratype at SEMC labeled: "PERU: Tambopata Prov. Madre de Dios Dpto. / 15 km NE Puerto"; "Maldonado, Reserva / Cusco Amazónico 12°33'S, 69°03'W / 200m, Plot#Z1E9"; "30 June 1989, J. S. Ashe, / R. A. Leschen #331 / ex pitfall trap". One paratype at SEMC labeled: "PERU: Tambopata Prov. Madre de Dios Dpto. / 15 km NE Puerto"; "Maldonado, Reserva / Cusco Amazónico 12°33'S, 69°03'W / 200m, Plot#Z1E9"; "30 June 1989, J. S. Ashe, / R. A. Leschen #381 / ex pitfall trap". One paratype at AMNH labeled: "Tingo Maria / Huan., Peru / X. 12. 1946 / Alt. 2200 ft."; "J. C. Pallister / Coll. Donor / Frank Johnson". One paratype at UNSM labeled: "PERU Cachieto / Aug. 1965 / J. C. H. Hitchcock". One paratype at USNM labeled: "17 IX 1965 Cachicoto / HUANUCO. PERU 177 / coll. J. C. Hitchcock jr". Two paratypes at FVMC labeled: "BRAZIL: Acre / Rio Branco. Faz. Catuaba / II-1997 Primary forest / F.Z. Vaz-de-Mello". All paratypes labeled: "*Chaetodus smithi* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Peru, Madre de Dios, Reserva Cuzco Amazónica (15 km N.E. Puerto Maldonado).

**Description. Holotype male.** Length 4.55 mm; width 2.73 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex, densely punctate on apical half, punctures large, setose. Clypeus with disc slightly convex, shape rounded, apex weakly rounded; surface punctate, punctures sparse, setose. Clypeal margins slightly reflexed; vertical surface of apex blunt, slightly oblique, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 56): Surface convex, 0.66 times as long as wide, sparsely punctate; punctures large, sparsely setose. Anterior margin with weak bead; lateral margin rounded, weakly denticulate, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface setose at base, glabrous at apex; apex acute. *Elytron* (Fig. 56): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Intervals 2-6 each developed as carina on apical half; intervals 7-9 each developed as carinae from humerus to apical declivity. Lateral margin setose, setae moderately dense. Epipleuron tapered at apex, surface medially shagreened, externally smooth. *Venter:* Prosternal surface strigulate, prosternal shield with posteromedial process well-developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shape area. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, postero-medial tooth. Profemoral surface strigulate





Fig. 56. *Chaetodus smithi* Ocampo, male

on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth, denticles absent between base and basal tooth; basal and middle teeth subtriangular, denticles poorly developed; protibial

spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal

rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, expanded. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 57 e-f.

**Allotype female.** Length 4.51 mm; width 2.74 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 4.37-4.92 mm; width 2.51-3.14 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** I take great pleasure in naming this species after my good friend and colleague, Andrew Smith.

**Diagnosis.** *Chaetodus smithi* is distinguished from other species of *Chaetodus* by the sparsely punctate pronotum, punctures large, sparsely setose; elytra with ten striae between the suture and lateral margin; intervals 2-6 each developed as carina on apical half; intervals 7-9 each developed as carinae from base to apical declivity; protibia without (or rarely poorly developed) denticles between the base and basal tooth; and meso- and metafemoral surface strigulate on posterior half. The shape of the parameres is also diagnostic (Figs. 57 e-f).

**Distribution** (Fig. 58). Brazil, Bolivia (not included in type series since they were not available at the time of writing the manuscript), and Peru. 35 specimens from AMNH, CMNC, FCOC, FSCA, FVMC, SEMC, UNSM, and USNM.

**BOLIVIA** (21): **La Paz**: Chalachán (3); **Pando**: Villa Bella (18).

**BRAZIL** (2): **Acre**: Rio Branco (2).

**PERU** (14): **Cuzco**: Huayllcumbre (2); **Huanuco**: Tingo María (1), Cachicoto (2); **Loreto**: Iquitos (80 km NE) (2); **Madre de Dios**: Reserva Cuzco Amazónico, Puerto Maldonado (15 km NE) (7).

**Temporal data.** February (20), June (7), August (6), September (1), October (1).

**Natural history.** Specimens of *C. smithi* were collected at 200 m altitude.

## 27. *Chaetodus teamscaraborum* **Ocampo, sp. nov.**

(Figs. 57 g-h, 58, 59)

**Type material:** Holotype male at UNSM labeled: "PANAMA, Chiriqui / dist. Renacimiento / Oeste Clara 5000' / 28-29 May, 1976 / Engleman & Thurman"; "*Chaetodus teamscaraborum* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at UNSM labeled: PANAMA: Chiriqui / dist. Renacimiento / Santa Clara, 4500' / VI-4-7-1986 / B. C. Ratcliffe & party"; "*Chaetodus teamscaraborum* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Two paratypes at SEMC labeled: "PANAMA: Darién, Cana / Biological Station, 530 m / 7°45'18"N, 77°41'6"W / 04-07 Jun 1996; S. Ashe, R. Brooks, PAN 1AB96 065 / ex: flight intercept trap". Ten paratypes at SEMC and nine paratypes at FCOC labeled: "PANAMA: Darién / Cana Biological Station / Serranía de Pirre, 1200 m / 7°45'18"N, 77°41'6"W / 04-07 Jun 1996; S. Ashe, / R. Brooks, PAN1AB96 105 / ex: flight intercept trap". Two paratypes at SEMC labeled: "PANAMA: Colón / Parque Nac. Soberanía / Pipeline Rd. / 09°07'N, 79°45'W, 40m 7-21 June 1995 / J. Ashe, R. Brooks # 265 / ex: flight intercept trap". One paratype at SEMC labeled: "PANAMA: Coclé Prov. / El Copé, Atlantic Slope / 08°3'N, 80°35'W / 730 m, 19-20 Nov. 1994 / D. Windsor, C. Edwards / ex: flight intercept trap". One paratype at SEMC labeled: "PANAMA: Colón / 6.1 km on Pipeline rd. / nr. Gamboa, 40 m / 09°06'N, 79°45'W, 27-29 / V 1995, J. Ashe #089b / ex: flight intercept trap". One paratype at CMNC labeled: "PANAMA: CHIRIQUI / 12km N.E. Santa Clara / Cerro Pando, 8°54.74'N / 82°43.29'W, 1850m, 96-139A / 18.VI.1996, R. Anderson / oak forest litter". Nine paratypes at EGRC labeled: "PANAMA: Chiriqui / Prov Santa Clara / May 23-25 1980 / E. Riley and & LeDoux". One paratype at EGRC labeled: "Panama: Canal Zone / Fort Kobbe / 15 June 1976 / Coll. E. G. Riley". One para-

type at UNSM labeled: "PANAMA: Canal Zone / Gamboa-Pipeline Rd Km7 / Flight Intercept Trap / May 20-June 11, 1996 / Steve Lingafelter, Coll". One paratype at UNSM labeled: "Panama Prov. / Gamboa-Pipeline rd area / recently fallen tree: June 1, / 1996 Steve Lingafelter". Two paratypes at USNM labeled: "Panamá: Panama Pr. / Cerro Campana 850 m / 8°40'N 79°56'W / 28 Jun. 74 Stockwell". One paratype at CMNC labeled: "PANAMA: DARIEN / Estación Ambiental Cana / 07°45.32'N 77°41.07'W / 500 m, 5.VI.1996 / R. S. Anderson 96-107 / human dung traps, PM". Two paratypes at UNSM labeled: "PANAMA: Chiriqui / Dist. Renacimiento / Hartmann's Finca Sta Clara / Ojo de Agua 1340 m / VI.14-17-1993 / B. Ratcliffe & M. Jameson". One paratype at UNSM labeled: "PANAMA: Chiriqui / Dist. Renacimiento / Santa Clara, 4000' / V-22-25-1982 / B. C. Ratcliffe". Seven paratypes at BDGC labeled: "PANAMA: Chiriqui / Cerro Pelota / 4 km N. Sta. Clara / 8-12 VIII 1982 / B. Gill 1500 m". Twelve paratypes at BDGC labeled: "COSTA RICA: Punt. SnVito, Las Cruces / 28 VI- 5 VII, 1981 / B. Gill 1500 m". Four paratypes at BDGC labeled: "PANAMA: Chiriqui / 4 km N. Sta. Clara / Hartmann's Finca / 27.VI - 3.VII.1981 / B. Gill 1500". Four paratypes at UVGC labeled: "GUATEMALA: Izabal, Cerro San Gil, cerca de / Carboneras. / 15 XII 1996 (puesta 08:00-15:30); recogidas el / 16 XII 1996 (8:00 11:30hrs) / Col. J. Ordoñez Bosque alto, Z. usos mult. 340-360 msnm". Two paratypes at INBC labeled: "Los Tuxtlas, Me / xico, 5 oct. 1997 / Col. A. Solís". Two paratypes at UVGC labeled: "GUATEMALA. Izabal / Livingston Biotopo / Chocón Machacas. 17-23 VI 1997. col. / C. Avendaño B. tropical / húmedo inundable". Two paratypes at UVGC labeled: "GUATEMALA: Petén / Parque Nac. Tikal / area 6885 / 19-20-IX 1996 / G. Orellana / Pescado podrido". Two paratypes at HAHC labeled: "Brit. Honduras / 6 mi. S. Belmopán, 20 Aug. 1972 / S. and J. Peck, litter-carrion". Two paratypes at HAHC labeled: "Guatemala, / Tikal, 23-26 VIII / 1972 S. & J. Peck / Dung Trap". Two paratypes at HAHC labeled: "GUAT: Izabal; Cayaga / Gruta el Silvino /

20.vii.1969. S. & J. Peck."; "Epigeal / carrion trap". Two paratypes at HAHC labeled: "GUAT: Alta Verapaz / Languin. 1000 m 28-30.viii. 1969 / S. & J. Peck, trop. for". Four paratypes at HAHC labeled: "Brit. Honduras / 6 mi. Belmopan, 20 Aug. 1972, S. and J. Peck, litter-carrion". One paratype at CMNC labeled: "HOND: Dpt. Cortés / Lago Yojoa. 650 m FIT / Deerls., trop. evergreen / for. 23-28. VIII.94 / S&J Peck 94-57". One paratype at HAHC labeled: "MEX: Chis; 600' / 4 I S Palenque / VIII.15.71 / A. Newton 326". Nineteen paratypes at WBWC labeled: "Belize: Orange Wallak Distr. / Rio Bravo conservat. Area / vic. La Milpa Field Station / vii.8-13.1996; W. B. Warner / J. Shuey, P. Kovanik & O'Brien". Four paratypes at CMNC labeled: "PANAMA: CHIRIQUI / 30.7 km W Volcan Hart- / mann's Finca, 1450 m 14 / VI. 1995-28D, R. S. Anderson, mixed oak for. litt". Four paratypes at CMNC labeled: "PANAMA: CHIRIQUI: / 12 km N.E. Santa Clara / Cerro Pando, 8°54.74' N / 82°43.29'W, 1850 m 96-139B / 18.VI.1996, R. Anderson / oak forest litter". One paratype at CNCI labeled: "MEX Veracruz / 2.5 mi. w. Sonte / Comapán 100' / IX. 20&26.65"; "George E. Ball / D. R. Whitehead / collectors". All paratypes labeled: "*Chaetodus teamscaaborum* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Type locality.** Panama, Chiriqui, Renacimiento, Oeste Clara.

**Description. Holotype male.** Length 4.22 mm; width 2.33 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons setose, setae sparse, long. Clypeus with disc slightly convex, shape subtrapezoidal, apex weakly rounded, surface punctate; punctures sparse, moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically ru-

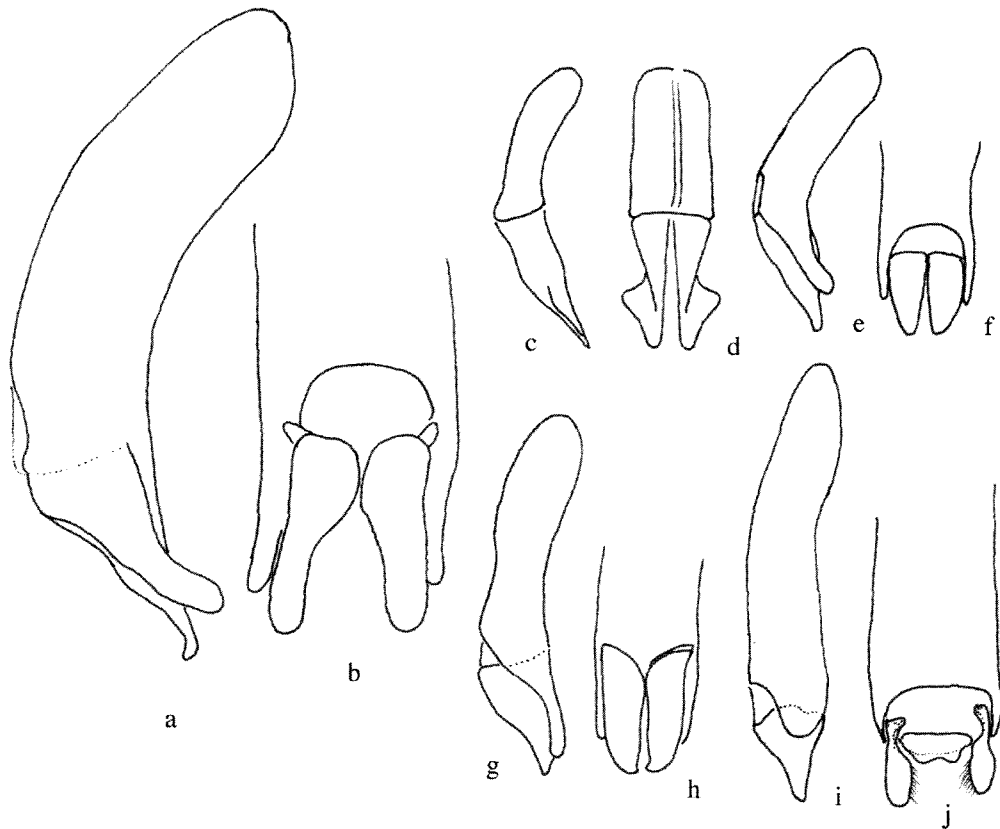


Fig. 57. Male parameres and phallobase of a-b) *Chaetodus rodolfo*, c-d) *C. sagittarius*, e-f) *C. smithi*, g-h) *C. teamscaraborum*, and i-j) *C. villosicollis*.

gose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 58): Surface convex, 0.62 times as long as wide, smooth punctate, punctures moderately large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected, medially with well-developed bead and small fovea on middle of medial projection. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 58): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Epipleuron tapered at apex, surface smooth. *Venter*: Prosternal surface strigulate, prosternal shield with posteromedial process

poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially with diamond-shape area, sparsely setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso- and metafemoral surface smooth, sparsely setose. Protibia with 3 teeth and with or without 2 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth.

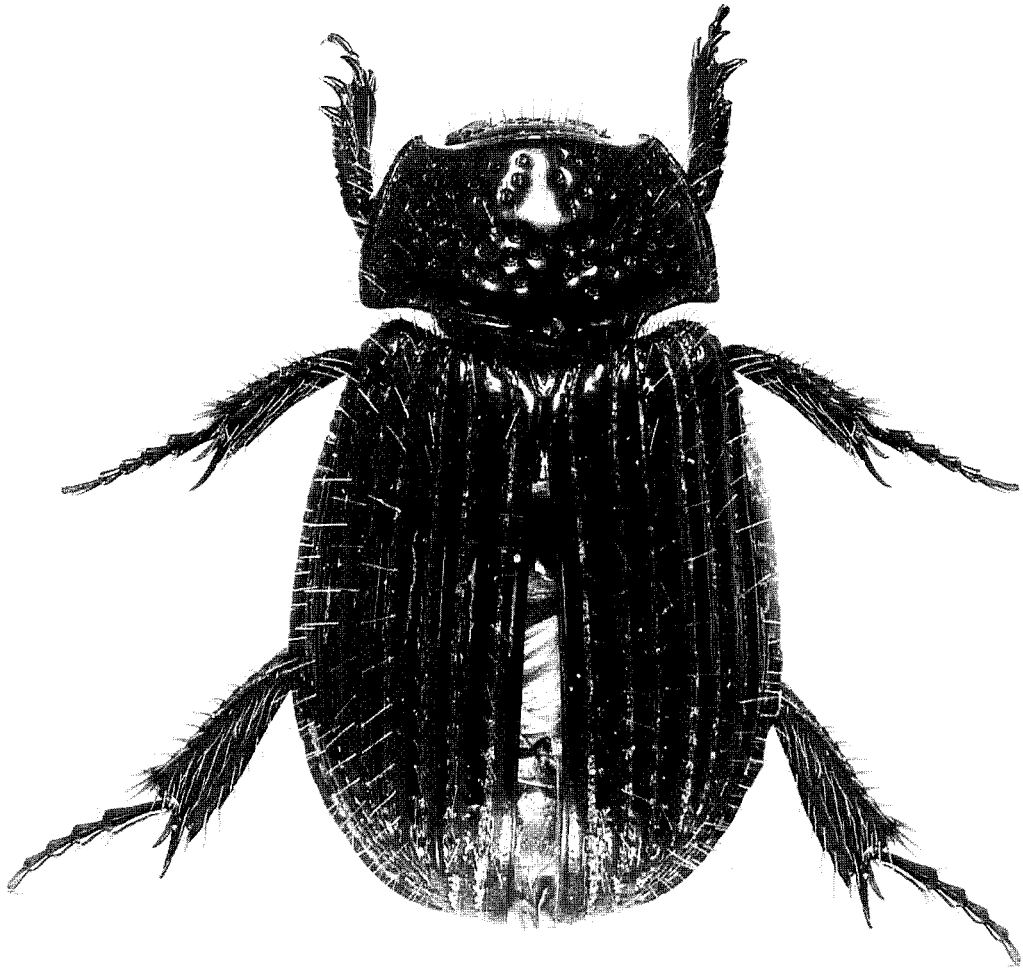


Fig. 58. *Chaetodus teamscaraborum* Ocampo, female.

Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 57 g-h.

**Allotype female.** Length 4.22 mm; width 2.47 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 3.92-5.55 mm; width 2.22-2.59 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** I take great pleasure naming this species in honor of Team Scarab at the University of Nebraska State Museum and to its past and present members.

**Diagnosis.** *Chaetodus teamscaraborum* is distinguished from other *Chaetodus* species by the presence of a small fovea and well-developed bead on the posterior margin of the pronotum (Fig. 58); elytra with 10 striae between the suture and lateral margin; epipleuron tapered at apex; and protibia with or without 2 poorly developed denticles between base and basal tooth. The shape

of the parameres is also diagnostic (Figs. 57 g-h).

**Distribution** (Fig. 59). Mexico, Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama. 214 specimens (123 types) from BDGC, CMNC, CNCI, EGRC, FCOC, HAHC, INBC, SEMC, UNSM, USNM, UVGC, and WBWC. Some specimens were not included in the type series because they were not available at the time to write the description.

**BELIZE** (31): Belmopán (6 mi S) (8); Blue Creek Village (2); Caves Branch (2); Rio Bravo Conservation area (19).

**COSTA RICA** (80): **Alajuela**: Peñas Blancas (8); **Guanacaste**: Estación Cacao (2); Estación Maritza (1); Rincón de la Vieja (6); Tilarán (1); Volcán Miravalles (2); Punta Arenas, Las Cruces (15); Monteverde (38); Rancho Quemado (7).

**EL SALVADOR** (5): Parque Nacional El Imposible (5).

**GUATEMALA** (14): **Alta Verapáz**: Lanquín (2); **Izabal**: Cayuga (2) Cerro San Gil (4); Livingston (2); **Petén**: Tikal (4).

**HONDURAS** (1): **Cortés**: Lago Yojoa (1).

**MEXICO** (3): **Chiapas**: Palenque (4 km S) (1); **Veracruz**: Sontecomapán (2.5 mi N) (1); Lago Catemano (15 mi S) (1); Los Tuxtlas (2).

**NICARAGUA** (4): **Matagalpa**: Montaña Selva Negra (4).

**PANAMA** (76): **Chiriquí**: Boquete (5 km W) (2); Cerro Punta (4); Hartmann's Finca (6); Renacimiento (2); Santa Clara (10); Santa Clara (2 km N) (2); Santa Clara (4 km N) (11); Santa Clara (12 km E.) (4); **Coclé**: El Copé (1); **Darién**: Cana Biological Station (22); **Panamá**: Cerro Campana (3); El Llano-Carti Rd. (1); Fort Kobbe (1); Gamboa (5 mi NW) (2); Parque Nacional Soberanía (2); Pipeline Rd. near Gamboa (3).

**Temporal data.** January (1), April (6), May (73), June (78), July (59), August (33), September (9), October (3), November (3), December (5).

**Natural history.** Adults of *C. teamsca-raborum* are attracted to light, carrion, and

dung. Specimens were collected from near sea level to 1,500 m altitude.

## 28. *Chaetodus villosicollis* Benderitter, 1923

(Figs. 57 i-j, 59, 60)

*Chaetodus villosicollis* Benderitter 1923: 5. **Type material:** Holotype female at MNHN labeled: "Paraguay"; "TYPE"; "*Chaetodus villosicollis* / type / Benderitter, det".

**Description. Male.** Length 5.81 mm; width 3.11 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons slightly convex, punctate, punctures moderately dense, setose; setae moderately dense, long. Clypeus with disc slightly convex, shape rounded; surface punctate; punctures moderately dense, setose, setae, long. Clypeal margins reflexed, vertical surface of apex slightly blunt, with fringe of setae. Labrum with apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 60): Surface convex, 0.63 times as long as wide, surface densely punctate, setose, setae moderately dense, long. Anterior margin with weak bead; lateral margin rounded, weakly denticulate, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface setose at base, glabrous at apex, apex acute. *Elytron* (Fig. 60): Surface convex, with 10 striae between suture and lateral margin, striae sparsely setose. Distance between striae 2-3 and 4-5 slightly smaller than distance between striae 3-4 and 5-6. Lateral margin setose, setae moderately dense. Epipleuron tapered near apex, surface smooth. *Venter:* Prosternal surface strigulate, prosternal shield with posteromedial process not developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially with



Fig. 59. Distribution of *Chaetodus ratcliffei*, *C. rodolfo*, *C. sagittarius*, *C. smithi*, *C. teamscaraborum*, and *C. villosicollis*.

diamond-shape area. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Femoral surface smooth, sparsely setose. Protibia with 3 teeth and 6-7 denticles between base and basal

tooth; basal and middle teeth subtriangular; denticles well-developed, projected toward tibial apex; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer

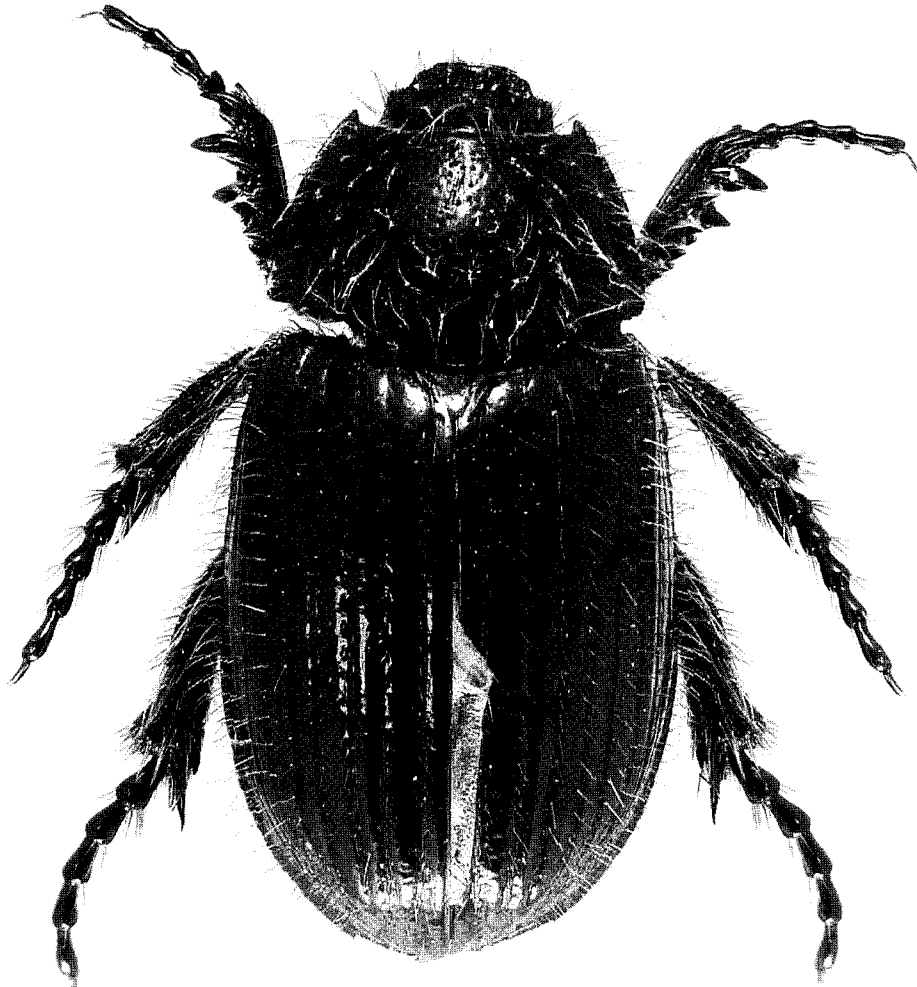


Fig. 60. *Chaetodus villosicollis* Benderitter, male.

than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae robust, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, expanded. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: (Figs. 57 i-j).

**Female.** Length 4.25-4.37 mm; width 3.14-3.44 mm. Females differ from males in the

following respects: Protibial spur evenly curved and mesotibia with spurs subequal in length.

**Diagnosis.** *Chaetodus villosicollis* is distinguished from the other species of *Chaetodus* by the densely setose pronotum, with setae long (Fig. 60); elytra with 10 striae between the suture and lateral margin, striae setose; and tibiae with 6-7 denticles between the base and basal tooth (Fig. 60). The shape of the parameres is also diagnostic (Figs. 57 i-j).



**Distribution** (Fig. 59). Argentina and Paraguay. 3 specimens from EGRC, HAHC, and MNHN.

**ARGENTINA** (1): **Chaco**: Pampa del Infierno (1).

**PARAGUAY** (2): **Paraguarí**: Parque Nacional Paraguarí (1); No data (1).

**Temporal data.** January (1), September (1).

**Natural history.** Nothing is known about the biology of this species.

## II. SUBGENUS *CHAETODOPSIS* MARTÍNEZ, 1988

*Chaetodus* (*Chaetodopsis*) Martínez 1988: 63.

**Type species.** *Chaetodus asuai* Martínez, 1956.

**Diagnosis.** Intervals 2, 4 and 6 or 3, 6, and 9 developed as carina from base to apical declivity.

### 1. *Chaetodus asuai* Martínez, 1956

(Figs. 61, 64 e-f, 66)

*Chaetodus asuai* Martínez, 1956: 43.

**Type material.** Holotype male at MACN labeled: "BOLIVIA: Dto. Cochab / Pcia. Chapare-S.F. del / Chipiriri 400m, IV-53 / Martínez-col"; "HOLOTYPUS"; "*Chaetodus asuai* / sp. n. / A. Martínez. Det 1956".

**Description. Male.** Length 4.76-4.83 mm; width 2.98-3.15 mm. **Color:** Head, pronotum, scutellum, venter, and legs brown. **Head:** Frons slightly convex. Clypeus and frons setose, setae sparse, long. Frons densely areolate-ocellate. Clypeus with disc slightly convex, shape rounded; surface densely punctate, punctures moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral

margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. **Pronotum**(Fig. 61): Surface convex, 0.61 times as long as wide; disc densely areolate-ocellate, medially with cross-like smooth area, strigulate on margins; sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. **Scutellum:** Shape subtriangular, surface glabrous, apex acute. **Elytron** (Fig. 61): Surface convex, with 10 striae between suture and lateral margin, striae and intervals sparsely setose. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Intervals 2, 4, and 6 developed as carina; intervals 1, 3, and 5 with surface rugose, and with small medial carinae; intervals 7, 8, and 9 with surface rugose. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron equal in width from humeral angle to near apex, surface shagreened. **Venter:** Prosternal surface strigulate; prosternal shield with posteromedial process well-developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially diamond-shaped area, setose, setae long. Proepisternal surface strigulate. **Legs:** Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth and 3-4 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws

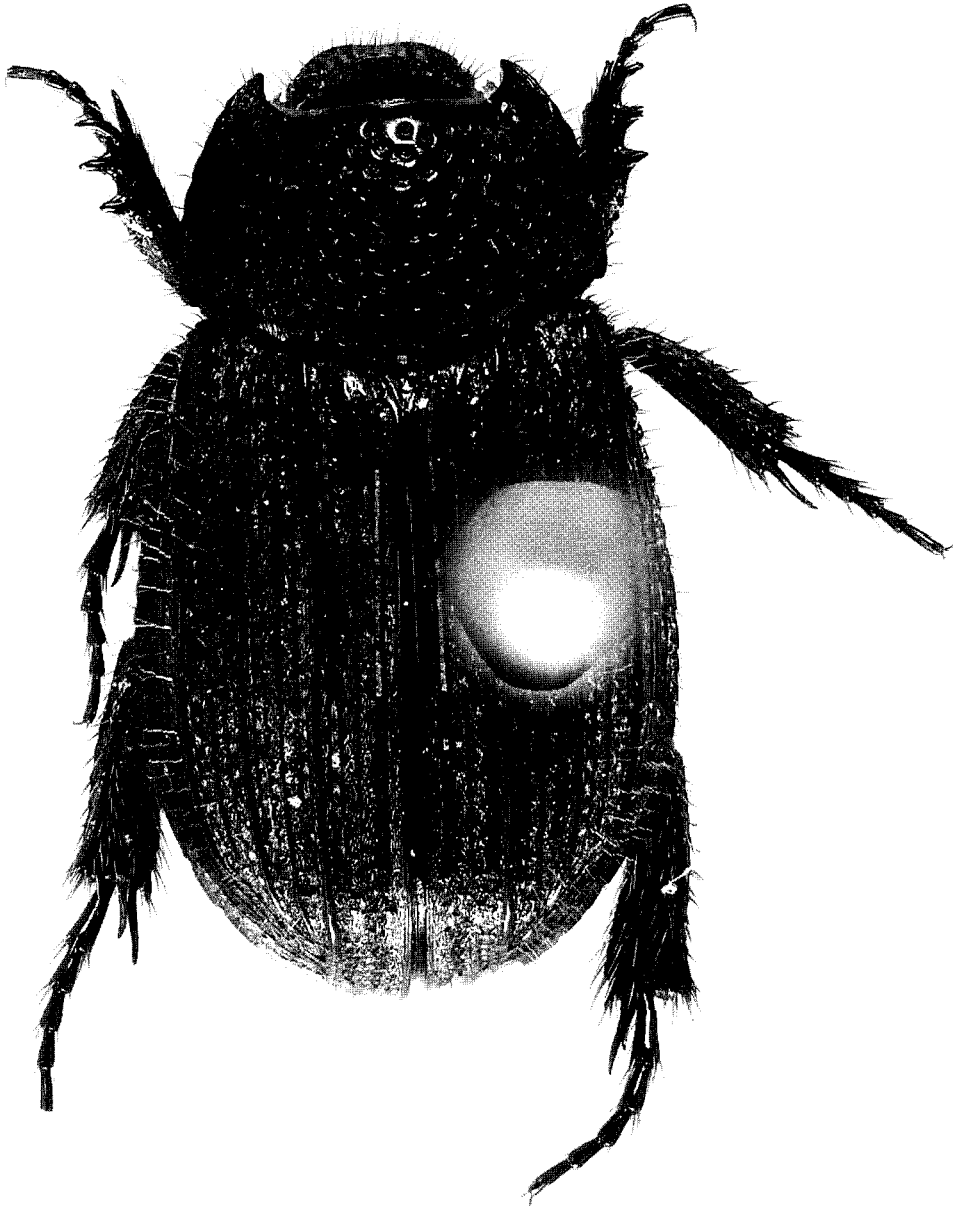


Fig. 61. *Chaetodus asuai* Martinez, male.

shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/2 as long

as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 64 e-f.

**Female.** Length 4.77-4.85 mm; width 3.02-3.15 mm. Females differ from the males in the following respects: protibial spur evenly

curved and mesotibia with spurs subequal in length.

**Diagnosis.** *Chaetodus asuai* is distinguished from other species of *Chaetodus* by the densely areolate-ocellate frons; pronotal disc densely areolate-ocellate, with a cross-like smooth area in middle, and strigulate on margins; elytron with 10 striae between the suture and lateral margin, striae and intervals sparsely setose; intervals 2, 4, and 6 developed as carina; intervals 1, 3, and 5 with surface rugose, and with small carinae medially; intervals 7, 8, and 9 with surface rugose; profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and meta-femoral surface strigulate on posterior half, smooth on anterior half, sparsely setose; and protibia with 3 teeth and 3-4 poorly developed denticles between base and basal tooth. The shape of the parameres is also diagnostic (Figs. 64 e-f).

**Distribution** (Fig. 66). Bolivia, Colombia, Ecuador and Peru. 133 specimens from CMNC, FCOC, FMNH, FSCA, HAHC, HNHM, MACN, PKLC, QCAZ, SEMC, UMRM, UNSM, and USNM.

**BOLIVIA** (1): **Cochabamba**: Chapare (1).

**COLOMBIA** (6): **Putumayo**: Santa Rosa (6).

**ECUADOR** (93): **Napo**: Jatún Sacha Biological Station (21 km N Puerto Napo) (2); Limoncocha (68); Misahualli Jungle Lodge area (4); Puerto Misahualli (1); Tena (3); Yasuní National Park (8); **Pastaza**: Ashuara (6); Villano (1).

**PERU** (33): **Loreto**: Teniente López (1.5 km N) (20); Iquitos (80 km NE, Explorama Lodge) (13).

**Temporal data.** January (1), February (13), March (6), May (5), June (57), July (34), August (13), September (1), October (5), December (1).

**Natural history.** Adults of *C. asuai* are attracted to dung, carrion, and light and were collected between 200-600 m altitude.

## 2. *Chaetodus brancuccii* Martínez, 1994

(Figs. 62, 64 c-d, 66)

*Chaetodus brancuccii* Martínez 1994: 224.

**Type material.** Holotype male at MACN labeled: "VENEZUELA / T. F. Amazonas / Dto. Atures / El Infierno / km 25 a Gavilán / Coll. Martínez / Jul. 979"; "HOLOTYPUS"; "*Chaetodus* / (*chaetodopsis*) / *brancuccii* / sp.n. / A. Martínez det. 1987." Allotype at MACN labeled: "VENEZUELA / T. F. Amazonas / Dto. Atures / El Infierno / km 25 a Gavilán / Coll. Martínez / Jul. 979"; "ALLOTYPUS"; "*Chaetodus* / (*Chaetodopsis*) / *brancuccii* / sp.n. / A. Martínez det. 1987". Two paratypes at HAHC and one paratype at FCOC with same label as holotype except: "PARATIPO".

**Description. Male.** Length 4.85-5.15 mm; width 2.68-2.78 mm. *Color*: Head, pronotum, scutellum, venter, and legs brown. *Head*: Frons slightly convex. Clypeus and frons setose, setae sparse, long. Frons densely areolate-ocellate. Clypeus with disc slightly convex, shape rounded, surface densely punctate, punctures moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 62): Surface convex, 0.61 times as long as wide; disc punctate, with cross-like smooth area; punctures large, sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 62): Surface convex, with 10 striae between suture and lateral

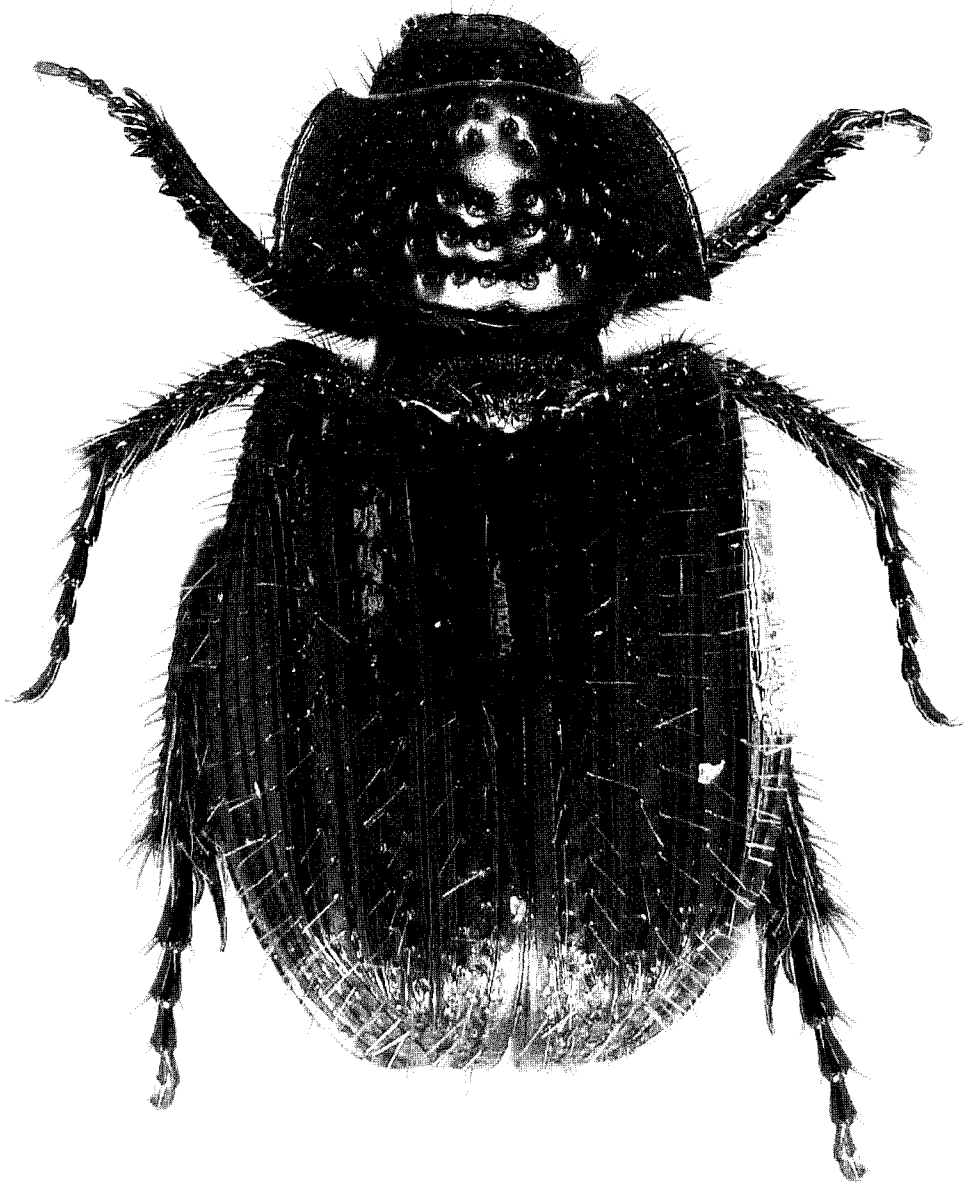


Fig. 62. *Chaetodus brancuccii* Martínez, male.

margin, intervals setose, setae moderately dense. Distance between striae 2-3 and 4-5 smaller than distance between striae 3-4 and 5-6. Intervals 2, 4, and 6 each developed as carina. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron equal in width from humeral angle to near

apex, surface shagreened. *Venter*: Prosternal surface strigulate; prosternal shield with posteromedial process well-developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior

surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso-, and meta-femoral smooth, sparsely setose. Protibia with 3 teeth and 3-4 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 64 c-d.

**Female.** Length 4.75-5.20 mm; width 2.58-2.82 mm. Females differ from the males in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Diagnosis.** *Chaetodus brancuccii* is distinguished from other species of *Chaetodus* by the frons densely areolate-ocellate; pronotal disc areolate-ocellate, with a cross-like smooth area, margins strigulate; elytron with 10 striae between the suture and lateral margin, intervals setose; intervals 2, 4, and 6 each developed as carina; intervals 1, 3, and 5 with surface smooth and without small medial carinae; intervals 7, 8, and 9 with surface smooth; and protibia with 3-4 poorly developed denticles between the base and basal tooth. The shape of the parameres is also diagnostic (Figs. 64 c-d).

**Distribution** (Fig. 66). Venezuela. 16 specimens from CAB, FCOC, HAHC, MACN and UNSM.

VENEZUELA (16): Amazonas: Puerto Ayacucho (11); Apure: El Infierno (5).

**Temporal data.** June (11), July (5).

**Natural history.** Specimens of *C. brancuccii* were collected at 100 m in elevation.

### 3. *Chaetodus octocarinatus* *Ocampo, sp. nov.*

(Figs. 63, 64 a-b, 66)

**Type material.** Holotype male at HAHC labeled: "SURINAM: Brokopondi / Brownsburg Nat. Reserve / 4°56'55"N, 55°10'53"W / 23.VI. 1999. 450 m / Z. Falin, FIT #097"; "*Chaetodus octocarinatus* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at HAHC labeled: "SURINAM: Saramacca, 30 m / W. Suriname Rd. 108 km / WSW Zanderij Airport / 5°13'137"N, 55°52'54"W / 10.VI.99 Z. Falin, FIT"; "*Chaetodus octocarinatus* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Nineteen paratypes at CMNC labeled: "FRENCH GUIANA (18.4 km SSE), 200m / 4°40'41"N 52°13'25"W / 25-26 VI-1997, J. Ashe & R. Brooks, F. G. 1AB97 / #088, ex. flight int. trap". Twelve paratypes at CMNC labeled: "FRENCH GUIANA: / Saul (7 km N), Les Eux Claires. Mt. La Fumee, 330, 3° 39'46"N / 53 13'19"W, 4-8 VI 1997 / J. Ashe & R. Brooks, FG1AB / 97,#165 ex malaise trap". Six paratypes at HAHC labeled: "SURINAM: Commewijne / Akintoscela, CELOS / camp, rd to Redi Doli 5°16'17" N; 54°55'15"W / 50m, 3 VII, 1999 Z. Falin". Three paratypes at BCRC labeled: "Brasil: Amapa / Serra do Navio / 22-V-1980 Penny & Elias". Two paratypes at FCOC, two paratypes at HAHC, and two paratypes at UNSM labeled: "SURINAME: Brokopondo / Brownsberg Nat. Pre. / 4°56'55"N, 55°10'53"W / 440 m 25.VI.1999 / Z. Falin FIT 121". Three paratypes at HAHC labeled as allotype. Three paratypes at HAHC labeled: "SURINAM / Commewijne 40 m / 5°16'17"N, 54°55'15"W / 29 VI- 3 VII 1999 / Z.H. Falin, FIT 153". Three paratypes at UNSM labeled: "BRAZIL: Para / Redenção / X-1999 / F. Vaz de Mello". Two paratypes at HAHC labeled: "SURINAM: Marowjine / Nassau Mt. 480 m 4°48'56"N, 54°36'20"W / 3.VI.. 1999 Z. Falin, FIT". Two paratypes at HAHC labeled: "BRAZIL: Pará / Tucurui / 49°40'W 3°45'S / 13-21.VI. 1985 / N. Degallier / FIT, carrion, dung". Two paratypes at HAHC labeled: "BRAZIL: Pará / Altamira, V. 1985 / N. Degellier, FIT". One paratype

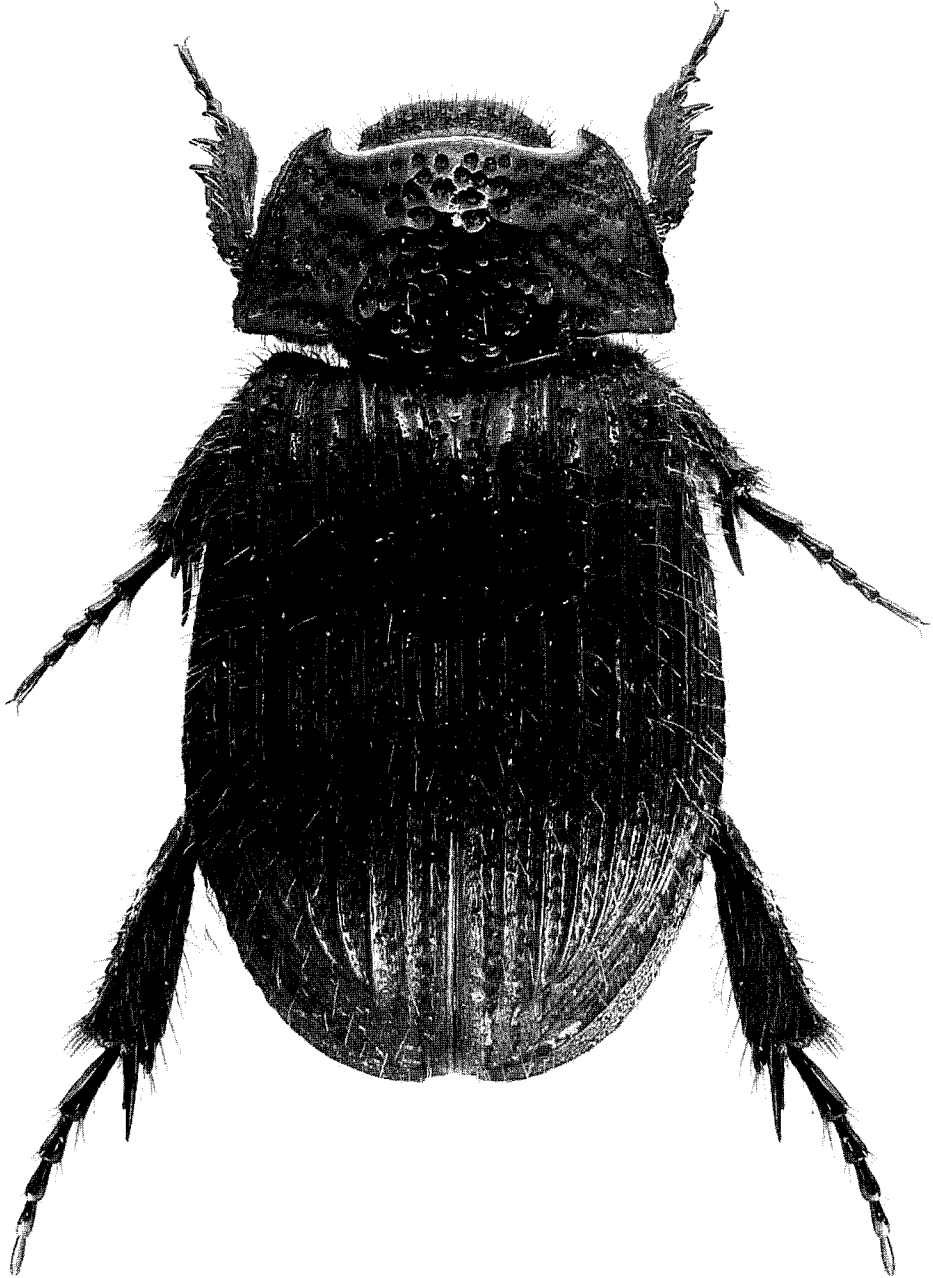


Fig. 63. *Chaetodus octocarinatus* Ocampo, male.

at FCOC labeled: "Dd. Saramaca / Mgnes des Singes / Guyane Fse / VII 1986 / M. Duranton Recolt". One paratype at HAHC labeled: "SURINAM: Commewijne / Akin-tosccla, 40 m FIT / 5°16'17"N, 54°55'15"W / 3.VII.1999, Z. Falin 154". One paratype

at HAHC labeled: "FRENCH GUIANA / Wanaboo (near Nason) / Marowijne River, 40 m / 4°43'35"N, 54°26'36"W / 5.VI.1999, Z. Falin, FIT". One paratype at HAHC labeled: "GUYANA: Region 8 / Iwokrama Forest Res / 4°40'19"N, 58°41'04"W / 100-200 m

V-VI.2001/ R. Brooks & Z. Falin, FIT". All paratypes labeled: "*Chaetodus octocarinatus* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Description. Holotype male.** Length 5.37 mm; width 3.33 mm. *Color:* brown. *Head:* Clypeus and frons setose, setae sparse, long. Frons densely areolate-ocellate. Clypeus with disc slightly convex, shape rounded; surface densely punctate, punctures moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 63): Surface convex, 0.66 times as long as wide; disc densely areolate-ocellate, with cross-like smooth area; sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially with small fovea on each side of medial projection. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 63): Surface convex, with 10 striae between suture and lateral margin, striae and intervals sparsely setose. Intervals 1-8 each developed as carina, with surface rugose; elytral base with small tubercle near humerus. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron equal in width from humeral angle to near apex, surface shagreened. *Venter:* Prosternal surface strigulate; prosternal shield with posteromedial process well-developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with small,

posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth and 4 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres:* Figs. 64 a-b.

**Allotype female.** Length 5.00 mm; width 2.96 mm. The female allotype differs from the holotype in the following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 4.95-5.40 mm; width 2.87-3.38 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** From the Latin "*octo*," meaning eight, and "*carinatus*," meaning with carinae, referring to the presence of eight carinae on the elytron of this species.

**Diagnosis.** *Chaetodus octocarinatus* is distinguished from other species of *Chaetodus* by the frons densely areolate-ocellate; pronotal disc densely areolate-ocellate, with cross-like smooth area medially; elytron with 10 striae between the suture and lateral margin, striae and intervals sparsely setose; intervals 1-8 developed as carina; profemoral surface slightly strigulate on anterior half, smooth on posterior half; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half; and protibia with 4 poorly developed denticles between the base and basal tooth. The

shape of the parameres is also diagnostic (Figs. 64 a-b).

**Distribution** (Fig. 66). Brazil, French Guiana, Guyana and Surinam. 67 specimens from BCRC, CMNC, HAHC, FCOC and UNSM.

**BRAZIL** (11): **Pará:** Altamira (2); Redenção (3); Tucuruí (3); **Amapá:** Serra do Navio (3).

**FRENCH GUIANA** (32): Wanaboo (1); Roura (8.4 km SSE) (19); Saul (7 km N) (12).

**SURINAM** (20): **Brokopondo:** Brownsberg Nataural Reserve (8); **Commewijne:** Akintosoela (6); **Marowijne:** Nassau Mt. (2); **Saramacca:** W. Suriname Road (108 km SW Zanderij Airport) (4).

**Temporal data.** April (2), June (17), July (9), August (1), October (3), December (1).

**Natural history.** Adults of *C. octocarinatus* are attracted to dung and carrion and were collected between 40-500 m altitude.

#### 4. *Chaetodus tricarinatus* *Ocampo, sp. nov.*

(Figs. 64 i-j, 65, 66)

**Type material.** Holotype male at HAHC labeled: "Leticia, Amazonas / Colombia 700m ft. / Feb. 24-74"; "S. Peck pan / traps (for)". "*Chaetodus tricarinatus* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten). Allotype female at HAHC with same label as holotype except: "*Chaetodus tricarinatus* / ALLOTYPE / F. C. Ocampo" (my red allotype label, handwritten). Twentytwo paratypes at HAHC, two paratypes at FCOC, and two paratypes at UNSM with same data as holotype. Nine paratypes at HAHC labeled: "Leticia, Amazonas / Colombia 700' / Feb. 20-25, 72 / Peck and Howden / carrion traps". Five paratypes at SEMC, two paratypes at FCOC, and two paratypes at UNSM labeled: "PERU: Dept Loloreto / 1.5 km N. Teniente leopez / 2°35.66'S, 76°06.92'W / 18 July 1993, 210-240 m / Richard Leschen #121 / ex: flight intercept trap". Eight paratypes at SEMC and

four paratypes at CMNC labeled: "PERU: Dept Loloreto / 1.5 km N. Teniente leopez / 2°35.66'S, 76°06.92'W / 26 July 1993, 210-240 m / Richard Leschen #213 / ex: flight intercept trap". Two paratypes at SEMC labeled: "PERU: Dept Loloreto / 1.5 km N. Teniente López / 2°35.66'S, 76°06.92'W / 24 July 1993, 210-240 m / Richard Leschen #189 / ex; flight intercept trap". Four paratypes at BDGC labeled: "COLOMBIA: Vaupés / Rio Apaporis, Caparú / Biol. Stn, 1.1° S 69.5'W / 27-XI-1.XII 1995 / B.D. Gill 200m". Two paratypes at FMNH labeled: "COLOMBIA: Putumayo; / Santa Rosa (Kofan Indian / village), headwaters of / Rio San Miguel X:10-23: 1970 / leg B. Malkin & P. Burchard". One paratype at SEMC labeled: "PERU: Dept Loloreto / 1.5 km N. Teniente López / 2°35.66'S, 76°06.92'W / 20 July 1993, 210-240 m / Richard Leschen #135 / ex: flight intercept trap". One paratype at AMNH labeled: "Peru-Brazil / frontier / I-10-28 / F 6109". All paratypes labeled: "*Chaetodus tricarinatus* / PARATYPE / F. C. Ocampo" (my yellow paratype label).

**Description. Holotype male.** Length 4.94 mm; width 2.88 mm. *Color:* dark brown *Head:* Clypeus and frons setose, setae sparse, long. Frons densely areolate-ocellate. Clypeus with disc slightly convex, shape rounded, surface densely punctate; punctures moderately large. Clypeal margins slightly reflexed; vertical surface of apex blunt, with with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum* (Fig. 65): Surface convex, 0.63 times as long as wide; disc densely areolate-ocellate; sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially with small fovea on each side of medial projec-



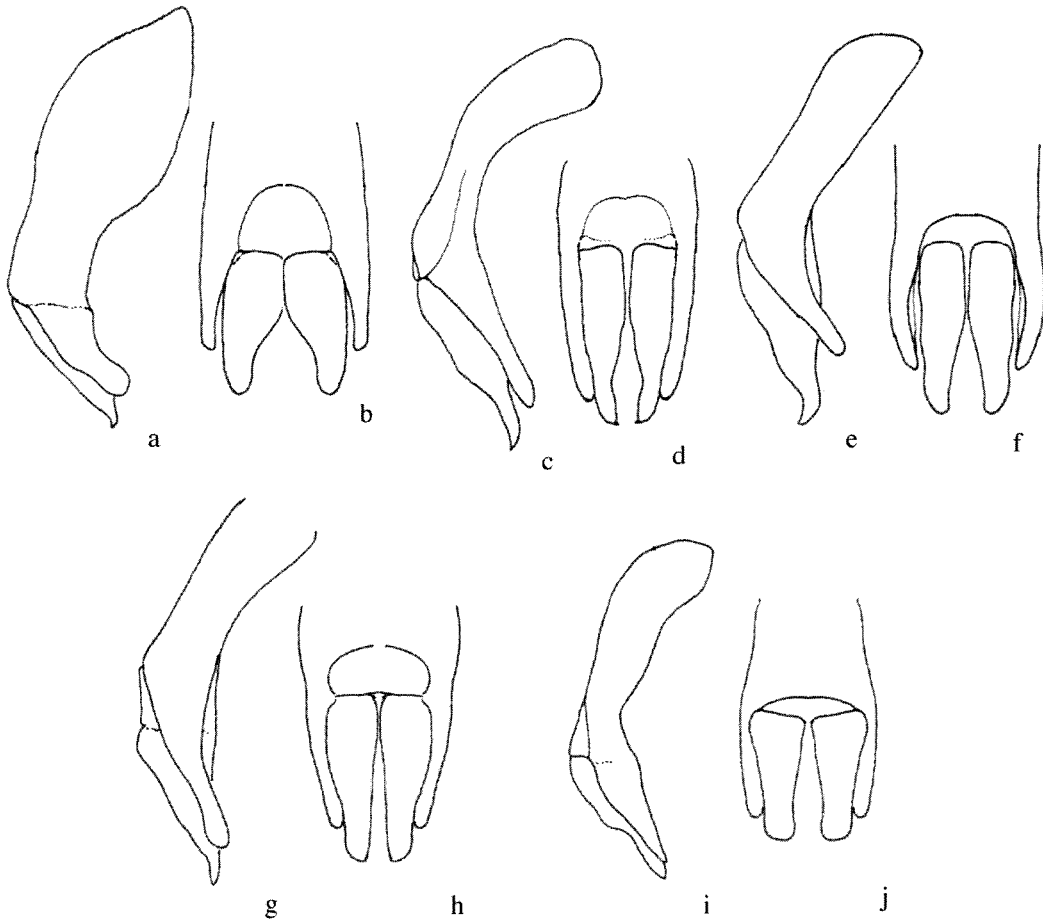


Fig. 64. Male parameres and phallobase of a-b) *Chaetodus octocarinatus*, c-d) *C. brancuccii*, e-f) *C. asuai*, g-h) *C. venezolanus*, and i-j) *C. tricarinatus*.

tion. Anterior angles acute, posterior angles right-angled. *Scutellum*: Shape subtriangular, surface glabrous, apex acute. *Elytron* (Fig. 65): Surface convex, with 12 striae between suture and lateral margin, striae and intervals sparsely setose. Intervals 3, 6, and 8 each developed as carina, surface rugose; elytral base with small tubercle near humerus. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron equal in width from humeral angle to near apex, surface shagreened. *Venter*: Prosteral surface strigulate; prosternal shield with posteromedial process developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth, medially with diamond-shaped area, setose,

setae long. Proepisternal surface strigulate. *Legs*: Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half, sparsely setose. Protibia with 3 teeth and 3 poorly developed denticles between base and basal tooth; basal and medial teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved. Meso- and metatibiae slender, outer surface with

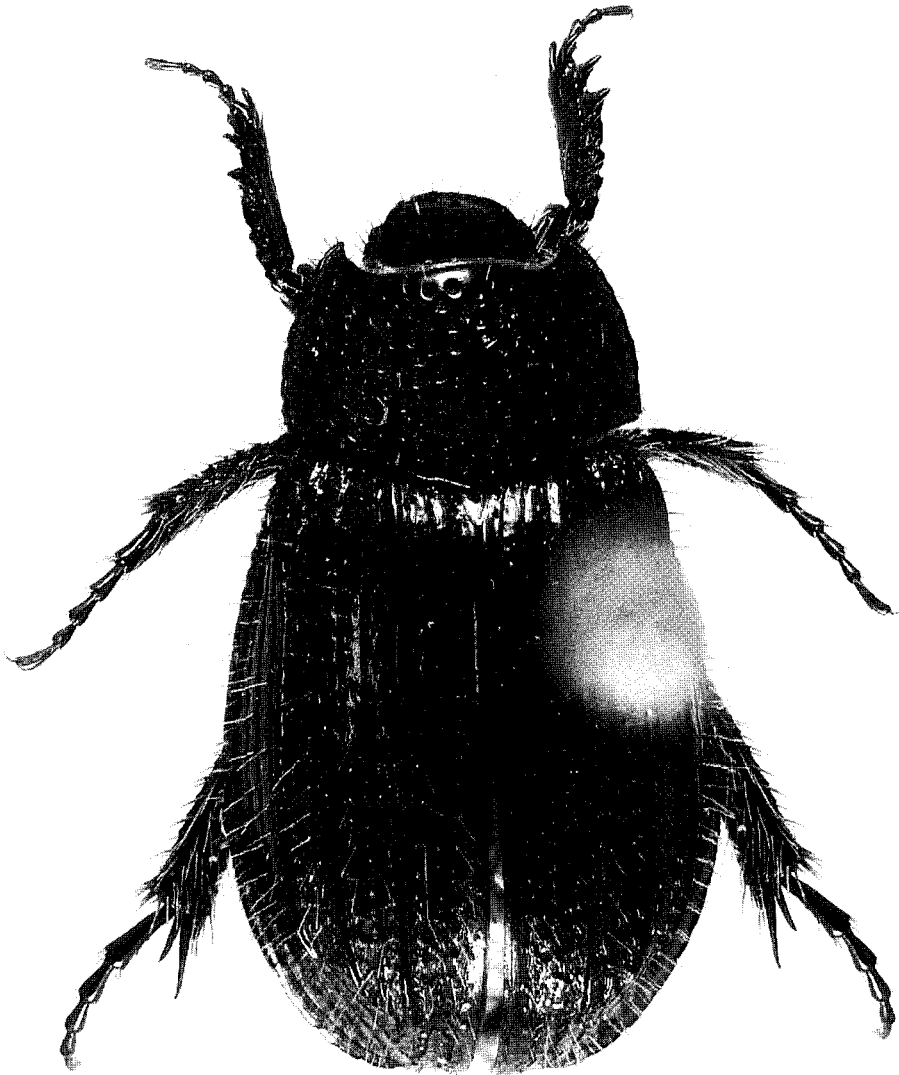


Fig. 65. *Chaetodus tricarinatus* Ocampo, male.

2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, expanded. External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 64 i-j.

**Allotype female.** Length 5.37 mm; width 2.59 mm. The female allotype differs from the holotype in the following respects: pro-

tibial spur evenly curved and mesotibia with spurs subequal in length.

**Paratypes.** Length 4.90-5.42 mm; width 2.45-2.90 mm. Paratypes do not differ significantly from the primary types.

**Etymology.** From the Latin "*tri*," meaning three, and "*carinatus*," meaning with carinae, referring to the presence of three distinctive carinae on the elytra of this species.

**Diagnosis.** *Chaetodus tricarinatus* is distinguished from other species of *Chaetodus* by the frons densely areolate-ocellate; pronotal disc densely areolate-ocellate, without a cross-like smooth medial area in middle; elytron with 12 striae between the suture and lateral margin, striae and intervals sparsely setose; intervals 3, 6, and 8 each developed as carina; profemoral surface slightly strigulate on anterior half, smooth on posterior half, sparsely setose; meso- and metafemoral surface strigulate on posterior half, smooth on anterior half; and protibia with 3 teeth and 3 poorly developed denticles between the base and basal tooth. The shape of the parameres is also diagnostic (Figs. 63 i-j).

**Distribution** (Fig. 66). Colombia and Peru. 68 specimens from AMNH, BDGC, CMNC, FCOC, FMNH, HAHC, SEMC and UNSM. **COLOMBIA** (45): **Amazonas:** Leticia (39); **Putumayo:** Santa Rosa (2); **Vaupés:** Rio Apaporis, Caparú Biological Station (4). **PERU** (22): **Loreto:** Teneinte López (1.5 km N) (22).

**Temporal data.** January (1), February (37), July (24), October (2), November (4).

**Natural history.** Adults of *C. tricarinatus* are attracted to dung and carrion and were collected at 200 m in elevation.

### 5. *Chaetodus venezolanus* Martínez, 1994

(Figs. 64 g-h, 66)

*Chaetodus venezolanus* Martínez 1994: 227.

**Type material.** Holotype male at MACN labeled: "VENEZUELA / Edo. Aragua / Maracay / El Limón / Coll. Martínez / Jun. 984"; "HOLOTIPO"; "*Chaetodus* (???) / *venezolanus* / sp. n. / A. Martínez det. 1987".

**Description. Male.** Length 4.85-5.15 mm; width 2.68-2.78 mm. *Color:* Head, pronotum, scutellum, venter, and legs brown. *Head:* Frons slightly convex. Clypeus and frons

setose, setae sparse, long. Frons sparsely areolate-ocellate. Clypeus with disc slightly convex, shape subtrapezoidal, surface punctate, punctures large. Clypeal margins slightly reflexed, vertical surface of apex blunt, with fringe of setae. Labrum subrectangular, apex truncate, dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acuminate, slightly reflexed. Labium with mentum indented at apex, surface concentrically rugose. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum:* Surface convex, 0.61 times as long as wide; disc punctate, punctures large, with cross-like smooth area medially sparsely setose, setae short. Anterior margin with weak bead; lateral margin rounded, setose; posterior margin slightly projected medially. Anterior angles acute, posterior angles right-angled. *Scutellum:* Shape subtriangular, surface glabrous, apex acute. *Elytron:* Surface convex, with 13 striae between suture and lateral margin, intervals setose, setae moderately dense. Intervals 3, 6, and 9 each developed as carina. Lateral margin denticulate at humerus, slightly denticulate elsewhere, setose, setae moderately dense. Epipleuron equal in width from humeral angle to near apex, surface shagreened. *Venter:* Prosternal surface strigulate; prosternal shield with posteromedial process poorly developed. Mesosternal surface strigulate. Metasternal surface strigulate on margins, smooth in middle, medially with diamond-shaped area, setose, setae long. Proepisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with small, posteromedial tooth. Pro-, meso-, and metafemoral smooth, sparsely setose. Protibia with 3 teeth and 3-4 poorly developed denticles between base and basal tooth; basal and middle teeth subtriangular; protibial spur as long as apical tooth, curved at apex, apex acuminate. First tarsomere longer than second; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomere 5, simple, curved.

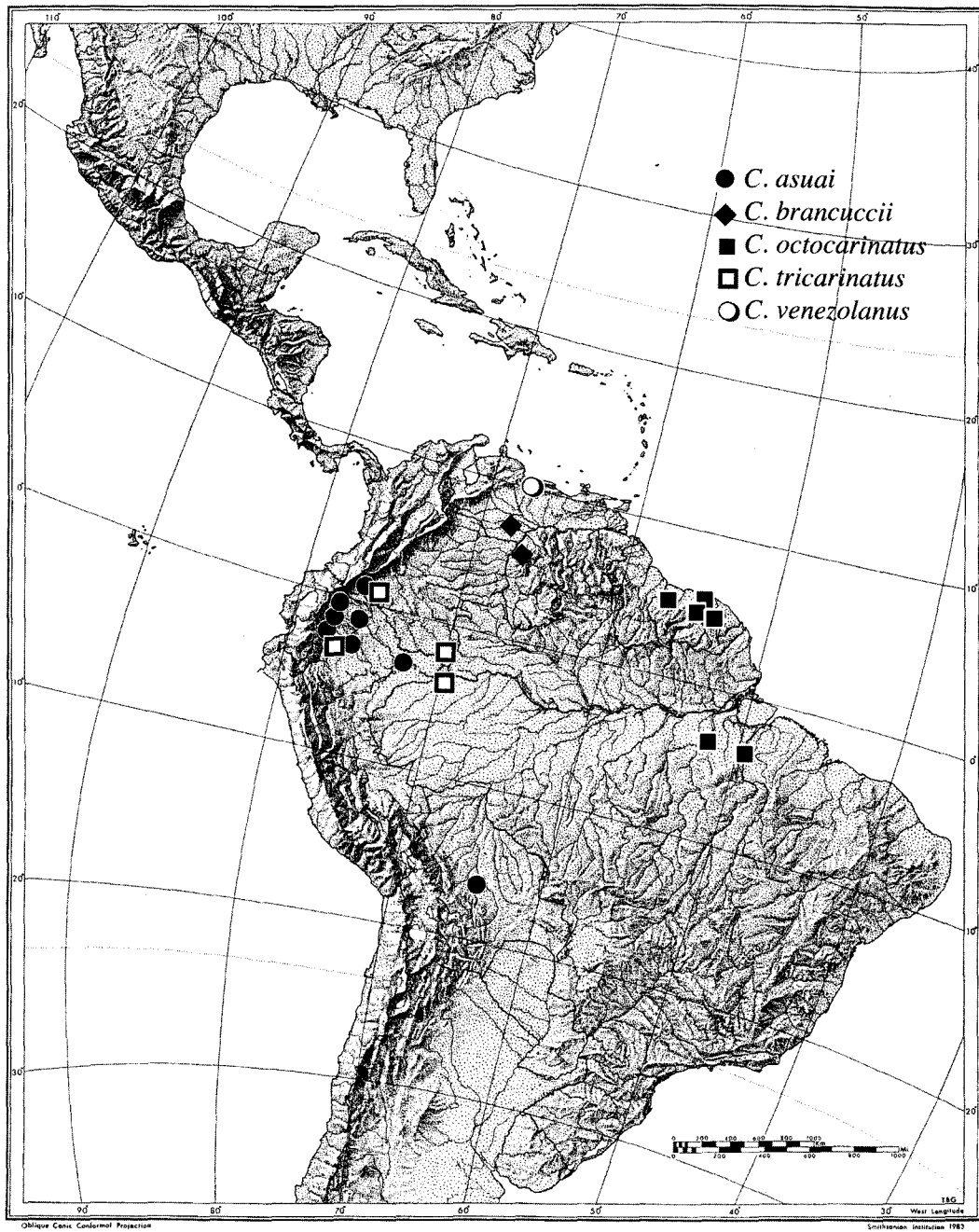


Fig. 66. Distribution of *Chaetodus asuai*, *C. brancuccii*, *C. octocarinatus*, *C. tricarinatus*, and *C. venezolanus*.

Meso- and metatibiae slender, outer surface with 2 longitudinal rows of small teeth, 1 seta at base of each tooth. Meso- and metatibial apex truncate, oblique, apex expanded. Metatibia with medial furcal process; furcal process shorter than medial metatibial spur.

External mesotibial spur reduced, 1/3 as long as medial spur; medial spur with apex acuminate. *Parameres*: Figs. 64 g-h.

**Female.** Length 4.75-5.20 mm; width 2.58-2.82 mm. Females differ from the males in the

following respects: protibial spur evenly curved and mesotibia with spurs subequal in length.

**Diagnosis.** *Chaetodus venezolanus* is distinguished from other species of *Chaetodus* by the pronotal disc punctate, with cross-like smooth area medially; elytron with 13 striae between the suture and lateral margin, intervals 3, 6, and 9 each developed as a carina from the base to the apical declivity; and protibia with 3-4 poorly developed denticles between the base and basal tooth. The shape of the parameres is also diagnostic (Figs. 64 g-h).

**Distribution** (Fig. 66). Venezuela. 18 specimens from BDGC, FCOC, MACN, MIZA, SEMC, and UNSM.

**VENEZUELA** (18): **Aragua:** El Limón (3); Maracay (1); Parque Nacional Henri Pittier, Rancho Grande (14).

**Temporal data.** May (1), June (5), July (3), August (9).

**Natural history.** Adults of *C. venezolanus* are attracted to light and were collected between 450-1200 m altitude.

### **CRYPTOGENIUS WESTWOOD, 1845**

(Figs. 67-69)

*Cryptogenius* Westwood 1845: 158.

*Cremastochilodius* Krikken 1975: 190.

Synonym (Krikken, 1987).

**Taxonomic history.** The genus *Cryptogenius* was described by Westwood (1845), who described one species, *C. miersianus*. He placed *Cryptogenius* in the scarabaeoid family Trogidae. In 1909, Arrow described a second species of *Cryptogenius*, *C. fryi*, and maintained the systematic placement of the genus in the Trogidae. In 1975, Krikken described the genus *Cremastochilodius* for one species, *C. tristis* Krikken (1975). In 1987 Krikken synonymized *Cremastochilodius* with *Cryptogenius*. Scholtz *et al.* (1987) discussed the systematic position of *Cryptogenius* and placed it in the family Hybosoridae,

based on characters shared with the genus *Anaides*. Ide *et al.* (1990) redescribed *C. fryi* and provided information on sexual dimorphism and biological data. Howden (2001) described the tribe Cryptogeniini and placed in it two genera, the nominotypic *Cryptogenius* and *Callosides* Howden. As defined here, the genus *Cryptogenius* includes two species.

**Type species.** *Cryptogenius*: *Cryptogenius miersianus* Westwood, 1846, by monotypy. *Cremastochilodius*: *Cremastochilodius tristis* Krikken, 1975 by original designation.

**Description.** Scarabaeoidea, Hybosoridae, Anaidinae. *Form* (Fig. 68): Body elongate, sides subparallel, dorsum flat, elytral apex rounded. *Head*: Surface with numerous densely areolate-ocellate. Frons (lateral view) convex medially. Eye canthus not developed. Eyes not visible in dorsal view. Frontoclypeal suture obsolete, with frontoclypeal juncture forming a sharp angle (Fig. 8b). Clypeus with lateral margins reflexed; vertical surface of apex not blunt. Labrum with apex acuminate, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum, external surface coarsely sculptured. Labium with apex of mentum strongly indented. Antennae 10-segmented; antennal club with first segment not cupuliform. *Pronotum*: Surface slightly convex or flat, densely areolate-ocellate. Anterior margin with bead, lateral margins denticulate, posterior margin with distinctive medial projection. *Scutellum*: Shape subtriangular, apex acute. *Elytron*: Elongate, flat, sculpture variable. Lateral margin with longitudinal carinae from humerus to declivous area. Declivous area with 2-3 tubercles. Epipleuron with surface flat. *Hind wing*: Surface covered with microscopic setae, MP3 vein absent and MP4 present, RA4 vein absent, secondary ghost branches present, M-Cu loop present. *Venter*: Prosternum biconcave. Mesosternal apex not invaginated between mesocoxae. Metasternum long at middle. Mesepisternum triangular. Abdominal sternites 2-4 lacking medial longitudinal keel; abdominal sternites 4-8 with surface strigulate, posterior margin not sclerotized or strongly reflexed.

*Legs:* Mesotibia and metatibia slender, outer margin with 2 longitudinal rows of teeth. *Male genitalia:* Parameres symmetrical, with dorsal extensions (Figs. 69 a-b).

**Diagnosis.** The genus *Cryptogenius* is easily distinguished from other genera of Hybosoridae by the following combination of characters: head with frontoclypeal juncture forming a sharp angle (Fig. 8b); mandibles not visible in dorsal view (at rest); elytra flat and with longitudinal carinae from humerus to declivous area; hind wings covered by microscopic setae, with M-Cu loop present, MP3 vein absent, MP4 vein present; and abdominal sternites with posterior margin normally sclerotized and not strongly reflexed.

**Distribution.** *Cryptogenius* is a Neotropical genus, and its species are distributed in Central and South America. Its distribution includes Costa Rica, Panama, Colombia, Ecuador, Argentina, and Brazil. Specimens of *Cryptogenius* species have been collected in the lowlands and up to 2,800 m in elevation. Spe-

cies are primarily found in mid-elevation tropical forests between 10° N and 27° S latitudes.

**Natural history.** Specimens of *Cryptogenius* species were collected under bark and in leaf litter. Krikken (1975) found a large amount of fungal material, including hyphomycetes, in the alimentary tract of adult *Cryptogenius* specimens. This confirms the function of mycangium on the ventral side of the mandibular mola (Ide *et al.* 1990; Howden 2001).

**Phylogenetic relationships.** According to my phylogenetic analysis, *Cryptogenius* is the sister taxon of *Callosides* (Figs. 5-6). *Cryptogenius* is monophyletic based on the following synapomorphies: head with frontoclypeal juncture forming a sharp angle; frons with horn or tubercle; frontoclypeal suture evident; clypeal form prismatic or quadrangular; pronotal form flat; setae on scutellum absent; elytral disc flat; elytron with areolar-ocellate sculpture present (not net-like); three tubercles on elytral declivous area; and male external mesotibial spur present.

### Key to species of *Cryptogenius*

1. Pronotal disc flat with a distinct, diagonal carinae from posterior angles to near center of pronotal disc. Parameres as in Fig. 69 b. . . . . *C. miersianus* Westwood
- 1'. Pronotal disc slightly convex without a distinct, diagonal carinae from posterior angles to near center of pronotal disc. Parameres as in Fig. 69 a. . . . . *C. fryi* Arrow

### Clave para las especies de *Cryptogenius*

1. Disco del pronoto achatado, con una carina diagonal desde el ángulo posterior hacia el centro del disco. Parámetros como el la Fig. 69 b. . . . . *C. miersianus* Westwood
- 1'. Disco del pronoto ligeramnte convexo achatado, sin carina diagonal desde el ángulo posterior hacia el centro del disco. Parámetros como el la Fig. 69 a. . . . . *C. fryi* Arrow

#### 1. *Cryptogenius fryi* Arrow, 1909 (Figs. 67, 68, 69 a)

*Cryptogenius fryi* Arrow 1909: 501.

*Cremastochilodius trisits* Krikken 1975: 190. Synonym, Krikken (1987).

**Diagnosis.** This species can be recognized from *C. miersianus* by the following combination of characters: pronotal disc convex

without a distinct, diagonal carinae from posterior angles to near center of pronotal disc; and metatibia with less than nine teeth on each dorsal carinae (Fig. 68). The shape of the parameres is also diagnostic (Fig. 69 a).

**Distribution** (Fig. 67). Argentina, Brazil.

**Natural history.** Specimens of *Cryptogenius fryi* were collected under bark and in leaf litter.



Fig. 67. Distribution of *Cryptogenius* species.

**2. *Cryptogenius miersianus***  
**Westwood, 1846**

(Figs. 67, 69 b)

*Cryptogenius miersianus* Westwood 1846:  
171.

**Diagnosis.** This species can be recognized from *C. fryi* by the following combination of characters: pronotal disc flat with a distinct, diagonal carinae from posterior angles to near center of pronotal disc; and metatibia with more than nine teeth on each dorsal

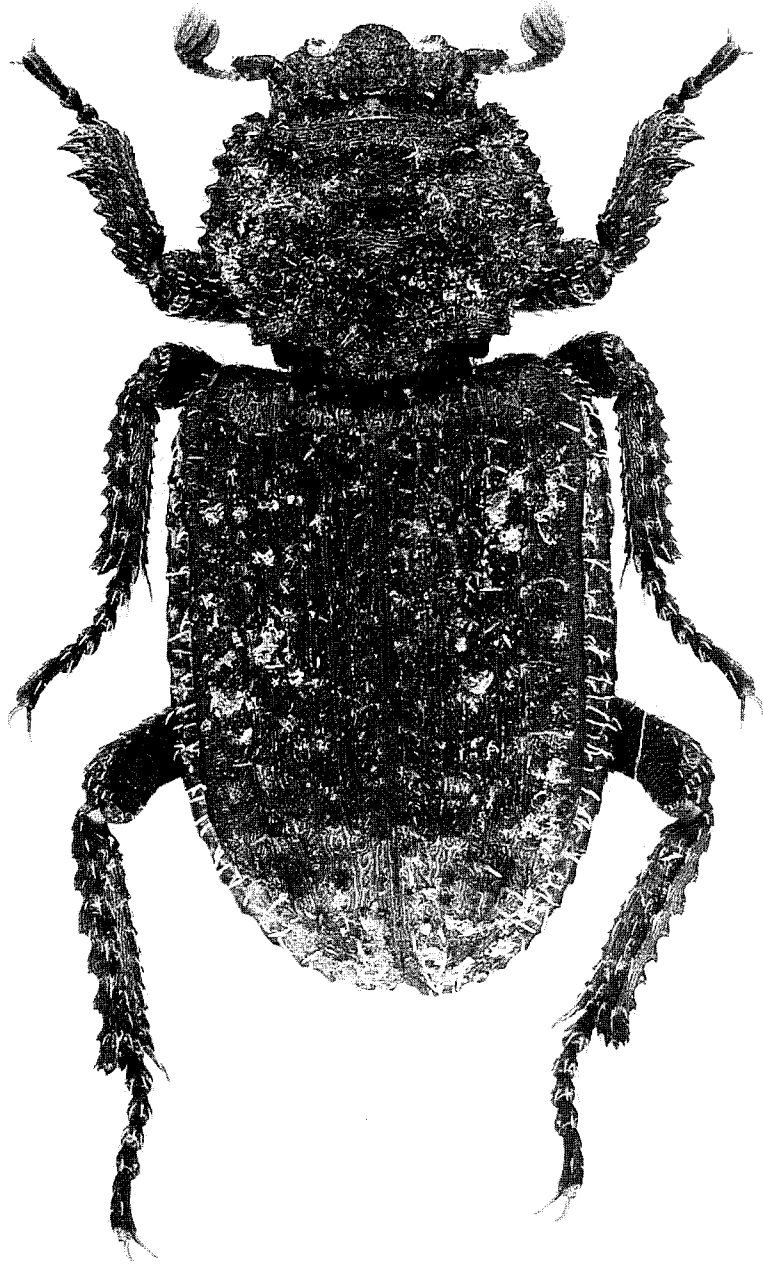


Fig. 68. *Cryptogenius fryi* Arrow, male.

carinae. The shape of the parameres is also diagnostic (Fig. 69 b).

**Distribution** (Fig. 67). Colombia, Panama, and Costa Rica.

**Natural history.** Specimens of *Cryptogenius miersianus* were collected under bark and in leaf litter.



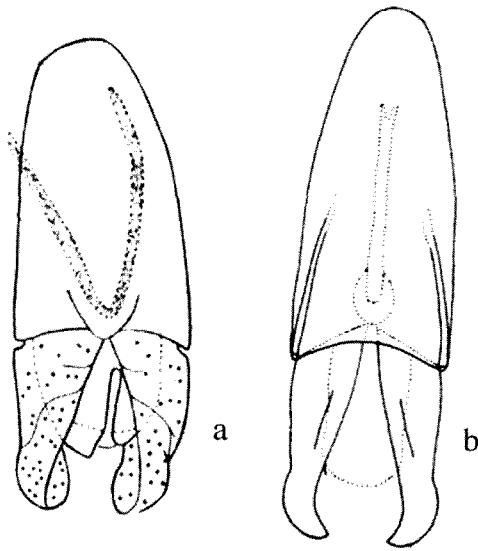


Fig. 69. Male parameres and phallobase of a) *Cryptogenius fryi* and b) *C. miersianus*.

### **HYBOCHAETODUS ARROW, 1909**

(Figs. 70-73)

*Hybochaetodus* Arrow 1909: 500.

**Taxonomic history.** The genus *Hybochaetodus* was described by Arrow (1909) for one species, *H. obscurus* Arrow (1909). Ocampo (2002c) described a second species of the genus, *H. flaco*. As defined here, the genus *Hybochaetodus* includes two species.

**Type species.** *Hybochaetodus obscurus* Arrow, 1909.

**Description.** Scarabaeoidea, Hybosoridae, Anaidinae. *Form* (Figs. 71-73): Body elongate, sides subparallel, dorsum convex, elytral apex rounded. *Head*: Surface with disc and apex areolate-ocellate or punctate. Frons (lateral view) slightly convex. Eye canthus developed. Eyes slightly visible in dorsal view. Frontoclypeal suture obsolete. Clypeus with apical margin slightly reflexed, apex rounded, vertical surface of apex blunt. Labrum rounded, apex acute, dorsal surface with fringe of setae, lateral margins

rounded. Mandibles protruding beyond labrum, external surface coarsely sculptured. Labium with apex of mentum slightly indented. Antennae 10-segmented. *Pronotum*: Surface convex, rugo-punctate with large posteriomedial fovea (Figs. 71-73). Anterior margin with bead, lateral margins smooth, posterior margin sinuous. *Scutellum*: Shape subtriangular, apex pointed. *Elytron*: Elongate, convex, surface costate. Lateral margin with or without longitudinal carinae. Epipleuron with surface flat, slightly everted. *Hind wing*: Obsolete. *Venter*: Prosternum biconcave. Mesosternal apex not invaginated between mesocoxae. Mesepisternum triangular. Abdominal sternites 2-4 with medial longitudinal keel poorly developed; abdominal sternites with surface strigulate, posterior margin not sclerotized and not reflexed. *Legs*: Mesotibia and metatibia slender, outer margin with 2 longitudinal rows of teeth. *Male genitalia*: Parameres symmetrical, with dorsal extensions (Fig. 70).

**Diagnosis.** *Hybochaetodus* is easily distinguished from other genera of Hybosoridae by the following combination of characters: pronotum with basiomedial fovea, lacking dorsal carinae (Figs. 71-73); elytra convex; and metasternum short at middle (Fig. 9a).

**Natural History.** *Hybochaetodus* species are attracted to dung.

**Distribution.** Based on the available locality data, the two known species of *Hybochaetodus* occur in the highlands of Peru between 2,900-4,000 m in elevation. *Hybochaetodus flaco* is known only from the type locality where it occurs in sympatry with *H. obscurus*.

**Phylogenetic relationships.** According to my phylogenetic analysis, the genus *Hybochaetodus* is the basal lineage within the Anaidinae (Figs. 5-6). The genus *Hybochaetodus* is monophyletic based on the following synapomorphies: eye shape semicircular, with posterior half reduced; pronotum with baso-medial depressions present; and scutellum longer than wide.

### Key to the species of *Hybochaetodus*

1. Elytron with carina from humerus to declivous area. Pronotal posterior angles rounded. Male genitalia as Fig. 70 c-d. . . . . ***H. obscurus* Arrow**
- 1'. Elytron lacking carina from humerus to declivous area. Pronotal posterior angles nearly right-angled. Male genitalia as Fig. 70 a-b. . . . . ***H. flaco* Ocampo**

### Clave para las especies de *Hybochaetodus*

1. Elitro con carina desde el húmero hasta el área declivital. Ángulos posteriores del pronoto redondeados. Genitalia del macho como el la Fig. 70 c-d. . . . . ***H. obscurus* Arrow**
- 1'. Elitro sin carina desde el húmero hasta el área declivital. Ángulos posteriores del pronoto casi rectos. Genitalia del macho como el la Fig. 70 a-b. . . . . ***H. flaco* Ocampo**

#### 1. *Hybochaetodus flaco* Ocampo, 2002

(Figs. 70 a-b, 71, 72)

*Hybochaetodus flaco* Ocampo 2002c: 448.

**Diagnosis.** This species is distinguished from *H. obscurus* Arrow by the presence of the elytral carina and by the nearly right-angled pronotal posterior angles (Fig. 71) (*H. obscurus* lacks elytral carinae and its posterior angles are rounded). The shape of the parameres is also diagnostic (Figs. 70 a-b).

**Distribution** (Fig 72). Peru. 1 specimen examined from USNM.

**PERU** (1): **Cuzco:** Esperanza (1).

**Temporal data.** November (1).

**Natural history.** The biology of this species is unknown. The only known specimen of *H. flaco* was collected in a pitfall trap baited with human dung. Label data indicate that the specimen was found in Elfin forest at 2,900 m in elevation. *Hybochaetodus flaco* is known from the type locality only where it occurs in sympatry with *H. obscurus*.

#### 2. *Hybochaetodus obscurus* Arrow, 1909

(Figs. 70 c-d, 72, 73)

*Hybochaetodus obscurus* Arrow 1909: 500.

**Diagnosis.** This species is distinguished from *H. flaco* Ocampo by the absence of

elytral carinae and the pronotal posterior angles rounded (Fig. 73) (*H. flaco* has nearly right-angled pronotal posterior angles). The shape of the parameres is also diagnostic (Figs. 70 c-d).

**Distribution** (Fig. 72). Peru. 11 specimens examined from CNCI, FCOC, IADIZA, USNM and ZMHB.

**PERU** (10): **Cuzco:** Cuzco (5); Machu Pichu (2); Puerto Málaga (1); No data (2).

**Temporal data.** January (2), April (1), May (1), October (2).

**Natural history.** Specimens of this species were collected at elevations of 2,900- 4,000 m.

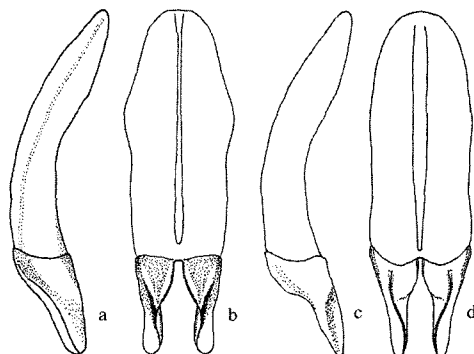


Fig. 70. Male parameres and phallobase of a-b) *Hybochaetodus flaco*, c-d) *H. obscurus* (a, c lateral and b, d dorsal views).

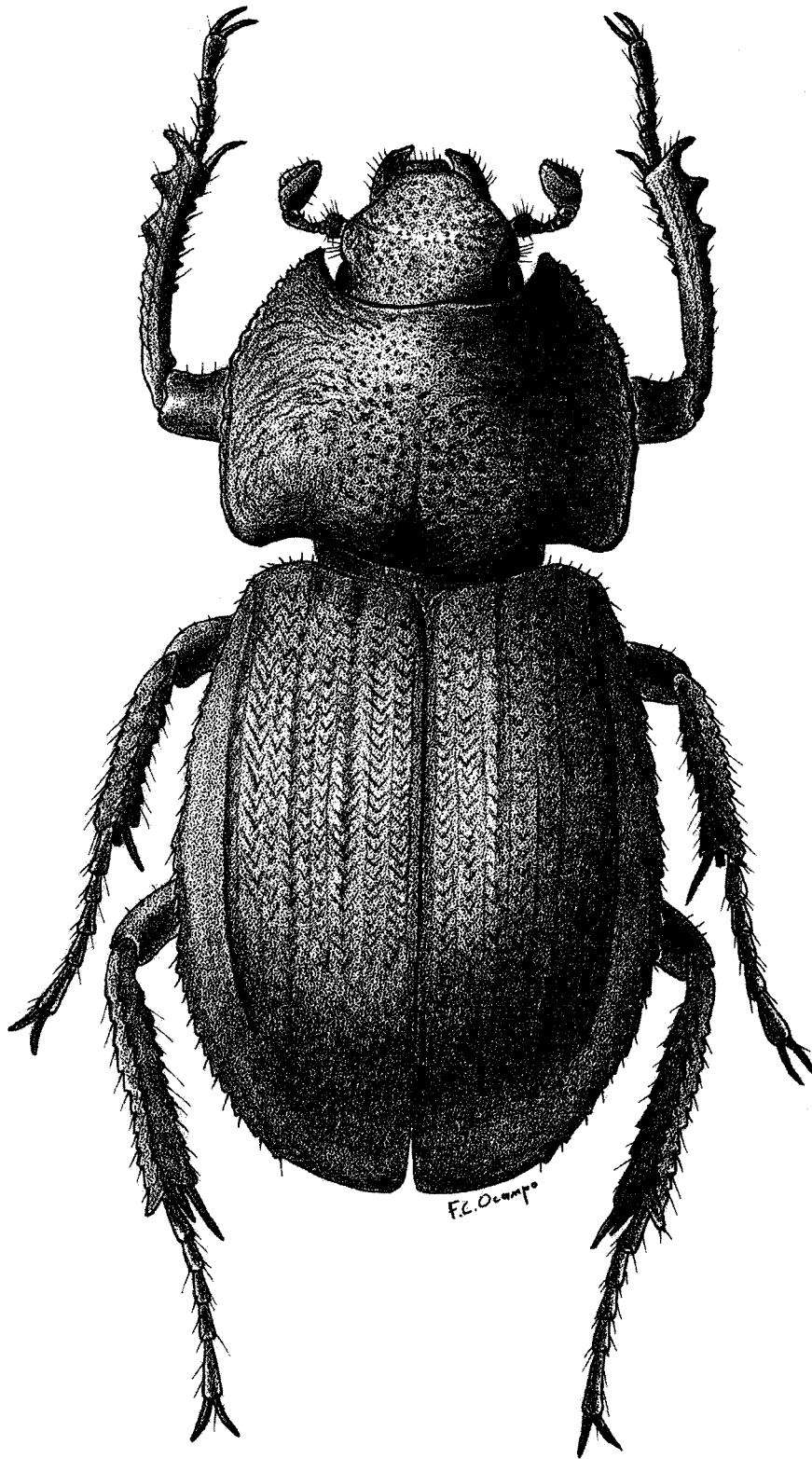


Fig. 71. Habitus of *Hybochaetodus flaco* Ocampo, male.



Fig. 72. Distribution of *Hybochaetodus* and *Totoia* species.

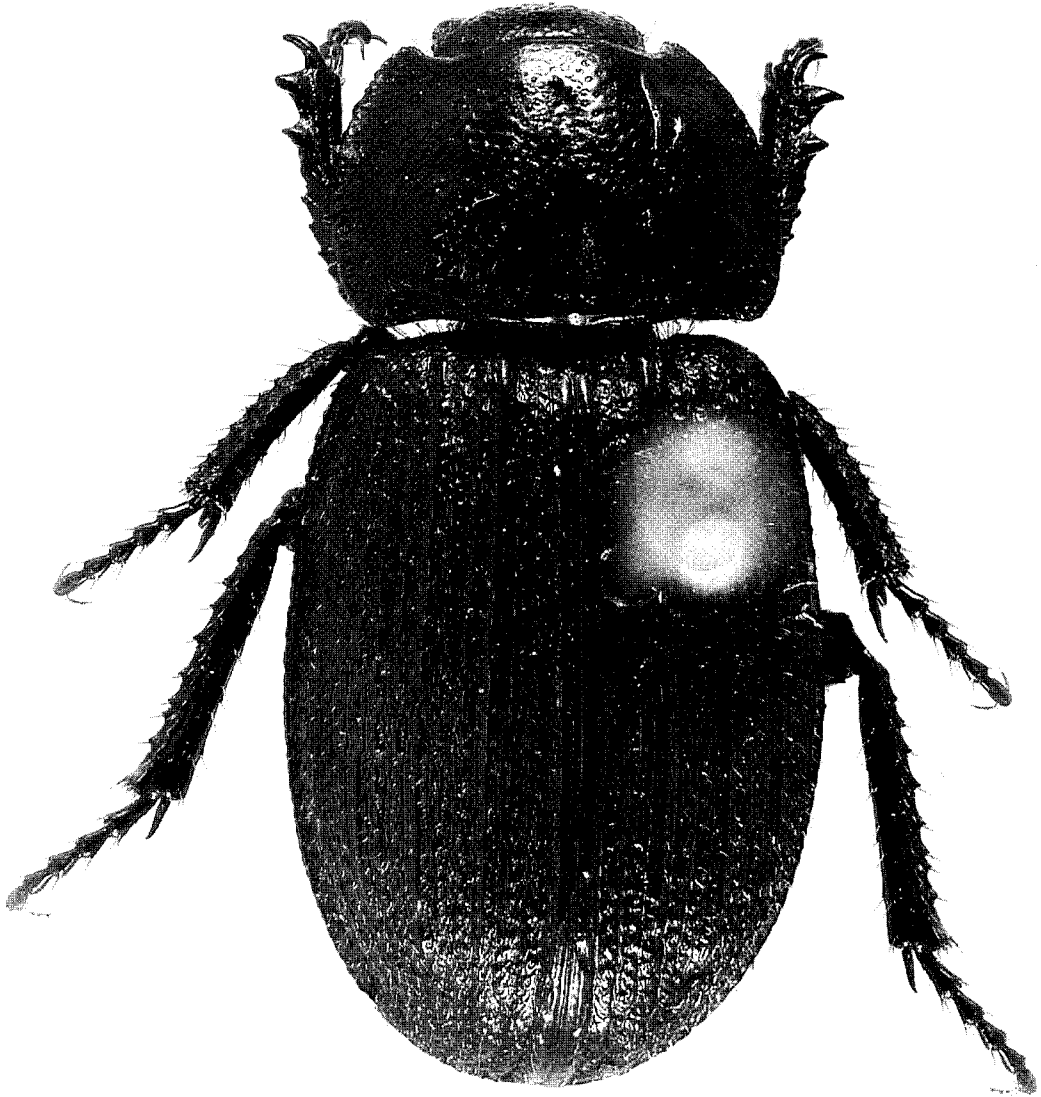


Fig. 73. *Hybochaetodus obscurus* Arrow, male.

**TOTOIA OCAMPO, 2003**

(Figs. 72, 74-76)

*Totoia* Ocampo 2003: 42.

**Taxonomic history.** The genus *Totoia* was described by Ocampo (2003), who described two species, *T. brachycarina* Ocampo and *T. splendida* Ocampo. As defined here, the genus *Totoia* includes three species (one new).

**Type species.** *Totoia splendida* Ocampo, 2003, by original designation.

**Description.** Scarabaeoidea, Hybosoridae, Anaidinae. *Form* (Fig. 75): Body elongate, sides subparallel, dorsum convex, elytral apex rounded. *Head*: Surface with numerous small foveae at base, disc and apex areolate-ocellate. Frons (lateral view) with base slightly concave on sides, convex medially. Eye canthus developed. Eyes slightly visible in dorsal view. Frontoclypeal suture obsolete. Clypeus with margins reflexed, apex acutely produced, vertical surface of apex blunt. Labrum rounded, apex acute, dorsal surface with fringe of setae, lateral margins rounded. Mandibles protruding beyond labrum, external surface coarsely sculptured. Labium with apex of mentum slightly indented. Antennae 10-segmented. *Pronotum*: Surface convex, areolate-ocellate (Fig. 75), with or without 6 longitudinal carinae. Anterior margin with bead, lateral margins denticulate, posterior margin sinuous. *Scutellum*: Shape subtriangular, apex pointed. *Elytron*: Elongate, convex, surface costate. Disc and lateral margin with longitudinal carinae. Declivous area with small, elongated tubercles. Epipleuron with surface flat. *Hind wing*: Surface covered with microscopic setae; MP3 and MP4 veins present, not fused; RA4 vein absent; secondary ghost branches present; M-Cu loop absent. *Venter*: Prosternum bi-

concave. Mesosternal apex not invaginated between mesocoxae. Mesepisternum triangular. Abdominal sternites 2-4 with medial longitudinal keel; abdominal sternites with surface strigulate, posterior margin sclerotized and strongly reflexed. *Legs*: Mesotibia and metatibia slender, outer margin with 2 longitudinal rows of teeth. *Male genitalia*: Parameres symmetrical, with dorsal extensions (Figs. 74 a-d).

**Diagnosis.** *Totoia* is easily distinguished from other genera of Hybosoridae by the following combination of characters: pronotum convex, with surface areolate-ocellate (Fig. 75) and with or without six longitudinal carinae; elytra elongate, convex, surface costate, disc and lateral margin with longitudinal carinae; hind wings covered by microscopic setae, with M-Cu loop absent, MP3 and MP4 veins present, not fused; and abdominal sternites with posterior margin sclerotized and strongly reflexed.

**Natural history.** *Totoia* species are attracted to lights and dung. Specimens were collected from near sea level up to elevations of 850 m in Central and South American rainforests.

**Distribution** (Fig. 72). Colombia, Costa Rica, Nicaragua, and Panama. Based on the available locality data, the three known species of *Totoia* occur in a narrow region of sympatry on Barro Colorado and Bruja Islands, Panama.

**Phylogenetic relationships.** According to my phylogenetic analysis, *Totoia* is the sister taxon of the clade composed by *Anaides* and *Callosides* + *Cryptogenius* (Figs. 5-6). *Totoia* is monophyletic based on the following synapomorphies: pronotal disc with four longitudinal carinae; pronotal marginal carinae present; elytral disc costate; and hind wing with M-Cu loop absent.

**Key to species of *Totoia***

1. Pronotum with 6 longitudinal carinae. . . . . 2
- 1'. Pronotum without longitudinal carinae. . . . . *Totoia magnifica* Ocampo sp. nov
2. Humeral carina as long or longer than distance between base of elytron and the second discal carina (Fig. 75). Male genitalia as Figs. 74 a-b. . . . . *T. splendida* Ocampo
- 2'. Humeral carina shorter than distance between base of elytron and the second discal carina. Male genitalia as Figs. 74 c-d. . . . . *T. brachycarina* Ocampo

**Clave para les especies de *Totoia***

1. Pronotum con 6 longitudinal carinae. . . . . 2.
- 1'. Pronotum sin longitudinal carinae. . . . . *Totoia magnifica* Ocampo sp. nov
2. Carina humeral tan larga o mas larga que las distancia entre la base del élitro y la segunda carina discal (Fig. 75). Genitalia del macho como en la Figs. 74 a-b. . . . . *T. splendida* Ocampo
- 2'. Carina humeral mas corta que la distancia entre la base del élitro y la segunda carina discal. Genitalia del macho como en la Figs. 74 c-d. . . . . *T. brachycarina* Ocampo

**1. *Totoia splendida* Ocampo, 2003**

(Figs. 72, 74 a-b, 75)

*Totoia splendida* Ocampo 2003: 47.

**Diagnosis.** Length 3.70 mm; width 2.03 mm. This species is distinguished from *T. brachycarina* by the short, humeral carina that is as long or longer than the distance between the base of the elytron and the second discal carina (Fig. 74). The shape of the parameres with the apical third reflexed in lateral view and tapered toward the apex is also diagnostic (Figs. 74 a-b). Males differ from females in the following respects: protibial spur not curved at apex, apex acuminate; mesotibial spurs subequal in length, external spur with apex acuminate; and metatibial apex with outer process well-developed, densely setose (Fig. 75).

**Distribution** (Fig. 72). Costa Rica, Nicaragua (Ocampo and Barbero 2003), and Panama. 85 specimens examined from BDGC, EBCI, EMEC, FCOC, HAHC, UNSM and USNM.

**COSTA RICA** (8): **Limón:** Estación Hitoy Cerere (3); Sector Cerro Cocori (Finca de Rojas) (2). **Heredia:** Estación Magsasay, Parque Nacional Braulio Carrillo (1); La Selva Biological Station (1). **Guanacaste:** Rincón de la Vieja (1).

**NICARAGUA** (1): **Zelaya Norte:** Reserva de la Biósfera Bosawas (1).

**PANAMA** (76): **Bocas del Toro:** Almirante (1). **Colón:** Gatún Lake, Bruja Islands (39). **Panamá:** Barro Colorado Island (34); Fort Kobbe (1); Gamboa (1).

**Temporal Data.** March (3), April (2), May (45), June (3), July-August (20), September (1), October (2).

**Natural history.** Adults of *Totoia splendida* are attracted to lights and dung. Specimens were collected from near sea level up to 850 m altitude.

**2. *Totoia brachycarina* Ocampo, 2003**

(Figs. 72, 74 c-d)

*Totoia brachycarina* Ocampo 2003: 49.

**Diagnosis.** Length 3.34-3.88 mm; width 1.67-2.88 mm. This species is distinguished from *T. splendida* by the humeral carina being shorter than the distance between the elytral base and the second discal carina. The shape of the parameres with the apical third not reflexed in lateral view and wider toward the apex is also diagnostic (Figs. 73 c-d). Females differ from males in the following respects: protibial spur not curved at apex, apex acuminate; mesotibial spurs subequal in length, external spur with apex acuminate; and metatibial apex with outer process well-developed, densely setose.

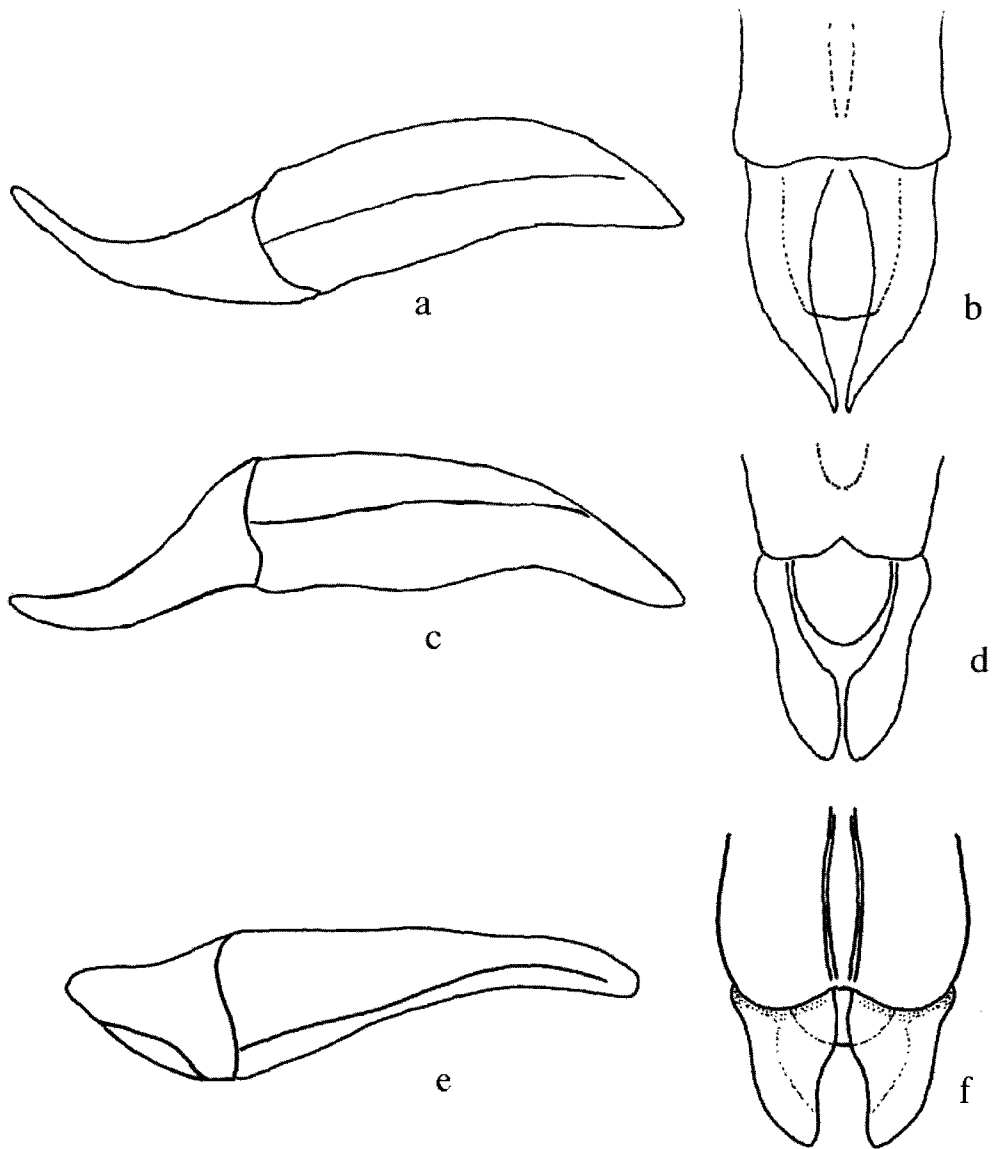


Fig. 74. Parameres and phallobase of a-b) *Totoia splendida*, c-d) *T. brachycarina*, and e-f) *T. magnifica* (a, c, e lateral and b, d, f dorsal views).

**Distribution** (Fig. 72). Colombia and Panama. 21 specimens examined from BDGC, EGRC, FCOC, UNSM and USNM,

**COLOMBIA** (1): **Valle**: Bajo Calima (1).

**PANAMA** (20): **Panamá**: Barro Colorado Island (15). **Colón**: Gatún Lake, Bruja Islands (5).

**Temporal data.** February (1), April (1), May (4), June (2), July (8), September (1).

**Natural history.** Specimens of *Totoia brachycarina* were collected at light or at dung traps near sea level.



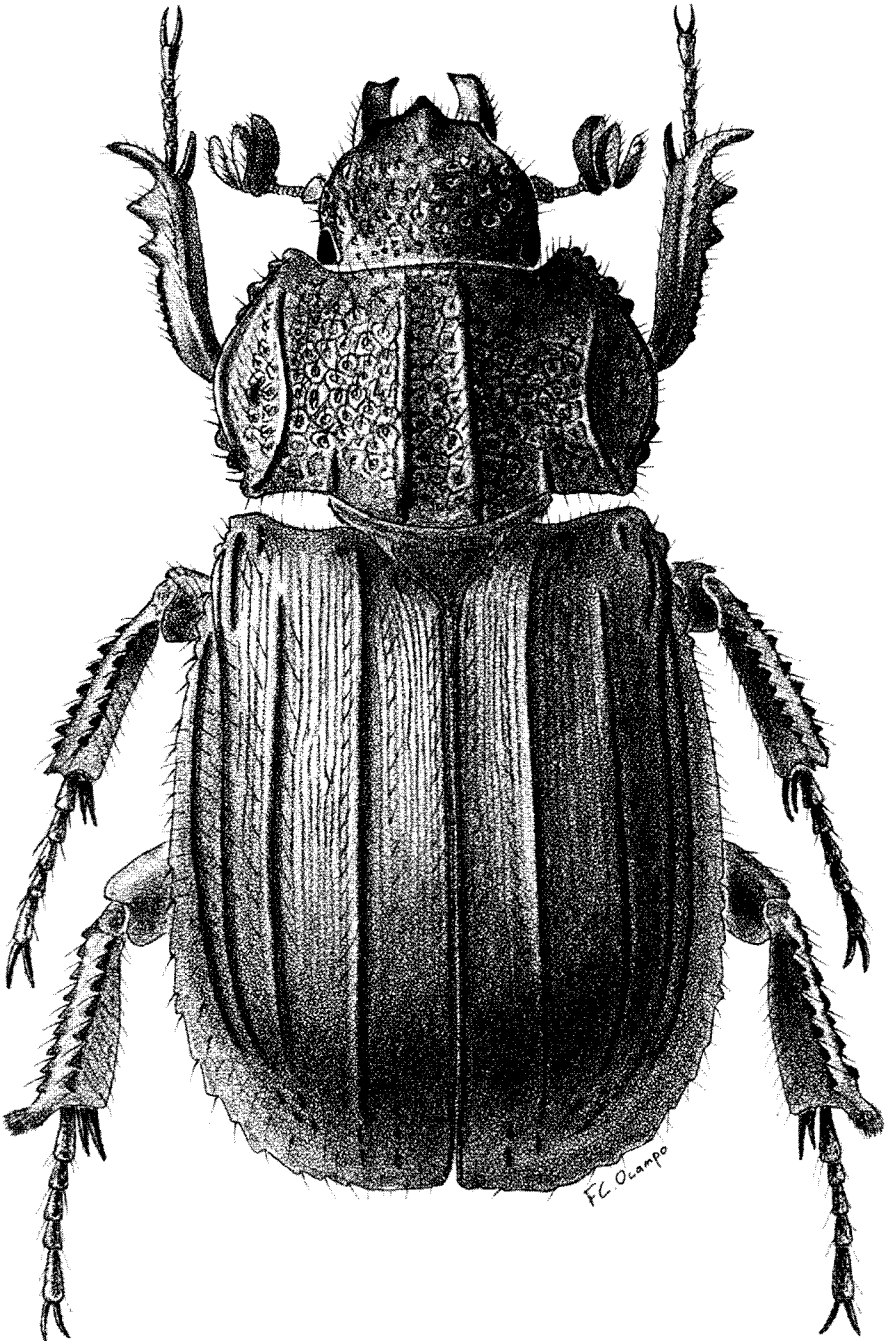


Fig. 75. Habitus of *Totoia splendida* Ocampo, female.

### 3. *Totoia magnifica* Ocampo sp. nov.

(Figs. 74 e-f, 76)

**Type material.** Holotype male at CMNC labeled: "PANAMÁ: DARIÉN / Cana Station, 550 m / 7° 45'N 77° 41'W, 3-7-VI. / 1996, J. Ashe and R. Brooks / #066, ex flight int. trap"; "*Totoia magnifica* / HOLOTYPE / F. C. Ocampo" (my red holotype label, handwritten).

**Description. Holotype male.** Length 6.25 mm; width 3.70 mm. *Color:* Head, pronotum, scutellum, venter, and legs reddish-brown. *Head:* Frons in dorsal view with base slightly concave on sides, convex medially. Clypeus in dorsal view with disc slightly concave on sides, convex medially, shape subtrapezoidal, apex weakly rounded, surface punctate; punctures sparse, large. Clypeal margins reflexed, acute apically; vertical surface of apex blunt. Labrum rounded, apex acute; dorsal surface with fringe of setae; lateral margins rounded. Mandibles protruding beyond labrum; external surface sparsely setose; apex acute, slightly reflexed; scissorial area with small, preapical tooth. Labium with mentum slightly indented at apex, surface concentrically strigulate. Antennal club with basal segment cupuliform, capable of receiving penultimate and ultimate segments. *Pronotum:* Surface convex, 0.66 times as long as wide, surface densely areolate-ocellate, sparsely setose; pronotal disc depressed on basal half, with depressed area apical to posterior margin. Anterior margin with weak bead; lateral margins denticulate, denticles bearing 1-2 setae; posterior margin projected medially. Anterior angles acute, posterior angles perpendicular. *Scutellum:* Shape subtriangular, surface moderately setose, apex acute. *Elytron* (Fig 76): Surface costate, sparsely setose. Disc with 3 longitudinal carinae, first carina extends from base to declivous area, second carina extends from near base to declivous area, third carina extends from humerus to declivous area. Lateral margin with 1 carina extending

from humerus to declivous area. Surface between third carinae and lateral margin and declivous area rugose or with chain-like sculpture. Humerus with 1 small tubercle and 1 short carina, carina as long or longer than distance between base and second discal carina. Declivous area with small, elongate tubercles and 1 short carina; tubercles aligned with discal and lateral carinae. Epipleuron shagreened, equal in width from humeral angle to apex. *Venter:* Prosternal surface strigulate, prosternal shield with posteromedial process poorly developed. Mesosternal surface moderately punctate at base, strigulate at apex. Metasternal surface areolate-ocellate. Propisternal surface strigulate. *Legs:* Procoxal surface strigulate, anterior surface flat. Metatrochanter with posteromedial tooth, tooth small. Femoral surface vermiculate to strigulate. Protibia with 3 teeth and 4 poorly developed denticles; basal and middle teeth subtriangular; dorsal surface with 2 setose, longitudinal carinae; protibial spur as long as apical tooth, curved at apex, apex blunt. First tarsomere of all legs longer than second tarsomere; tarsomeres 2-4 subequal in length; tarsomere 5 longer than 4. Pro-, meso-, and metatarsal claws shorter than tarsomeres 5, simple, curved. Meso- and metatibiae slender, outer surface with 2 longitudinal rows of teeth, 1 seta at base of each tooth. Mesotibial apex with 1 spine on outer margin; external mesotibial spur with apex blunt; medial spur with apex acuminate, longer than external spur. Metatibial apex with moderately developed outer process, blunt. *Parameres:* Figs. 74 e-f.

**Female.** Unknown.

**Etymology.** From the Latin word *magnifica*, meaning magnificent, referring to this proportionally large and very pretty species of the genus *Totoia*.

**Diagnosis.** *Totoia magnifica* is distinguished from other *Totoia* species by the pronotal surface with a depressed area at the base and without longitudinal carinae.

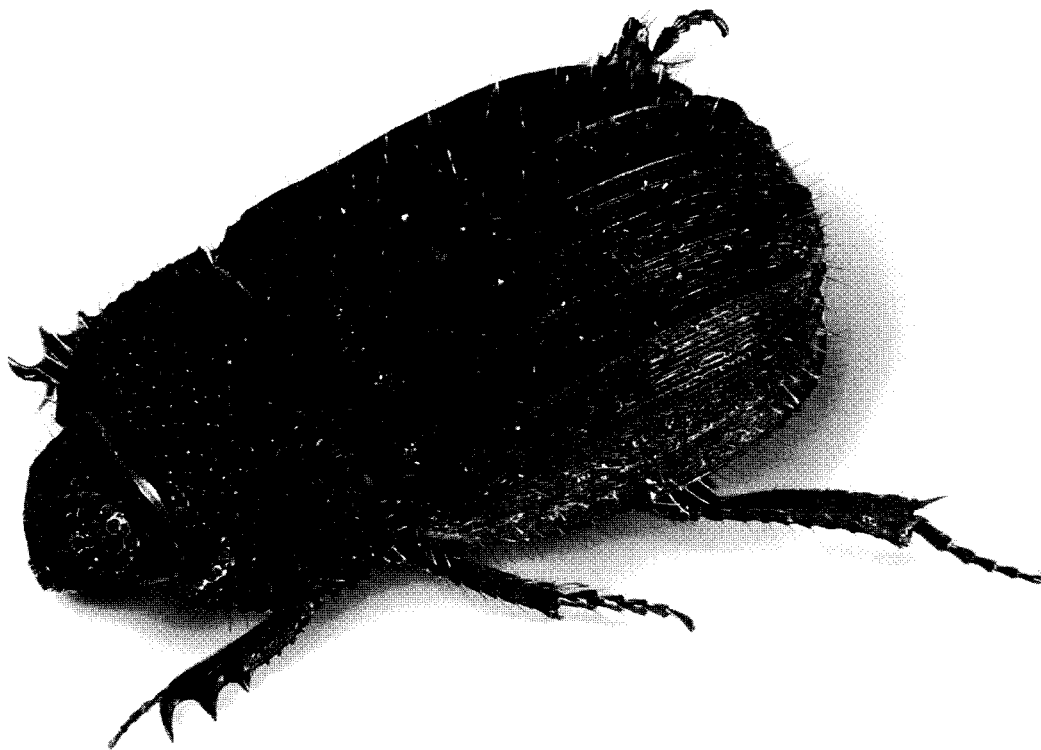


Fig. 76. Habitus of *Totoia magnifica* Ocampo, male.

The shape of the parameres is also diagnostic (Figs. 74 e-f).

**Distribution.** Panama. One specimen examined from CMNC.

**PANAMA (1): Darién:** Cana Station (1).

**Temporal data.** June (1).

**Natural history.** The specimen of *T. magnifica* was collected at 550 m in elevation.

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## Appendix 1. Character matrix used in the phylogenetic analysis of Anaidinae

Characters 1 through 30

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
<i>Anaides fossulatus</i>	0	0	1	2	0	0	0	1	1	1	0	1	0	1	2	1	1	1	0	1	1	0	0	1	0	1	0	1	1	1		
<i>Anaides laticollis</i>	0	0	1	3	0	0	0	1	1	1	0	1	0	1	2	0	1	1	0	1	1	0	0	1	0	1	0	1	1	1		
<i>Anaides longeciliatus</i>	0	0	1	3	0	0	0	1	1	1	0	1	0	1	2	1	1	1	0	1	1	0	0	1	0	1	0	1	1	1		
<i>Anaides simplicicollis</i>	0	0	1	3	0	0	0	1	1	1	0	1	0	1	2	1	1	1	0	1	1	0	0	1	0	1	0	1	0	1		
<i>Anaides ortii</i>	0	0	1	2	0	0	0	1	1	1	0	1	0	1	2	?	1	1	0	1	1	0	0	1	0	1	0	1	1	1		
<i>Anaides vartorellii</i>	0	0	1	2	0	0	0	1	1	1	0	1	0	1	2	1	1	1	0	1	1	0	0	1	0	1	0	1	1	1		
<i>Anaides onofrii</i>	0	0	1	2	0	0	0	1	1	1	0	1	0	1	2	1	1	1	0	1	1	0	0	1	0	1	0	1	1	1		
<i>Anaides howdeni</i>	0	0	1	?	0	0	0	1	1	1	0	1	0	1	2	?	1	?	0	1	1	0	0	1	0	1	0	1	1	1		
<i>Totoia splendida</i>	0	0	1	2	0	0	0	1	1	1	1	1	0	1	2	1	1	1	0	1	1	0	0	1	0	1	0	1	0	1		
<i>Totoia brachycarina</i>	0	0	1	2	0	0	0	1	1	1	1	1	0	1	2	1	1	1	0	1	1	0	0	1	0	1	0	1	0	1		
<i>Cryptogenius miersianus</i>	0	0	0	0	1	0	0	1	1	0	1	0	1	1	0	0	0	1	0	0	1	0	0	1	0	1	1	1	3	1		
<i>Cryptogenius fryi</i>	0	0	0	0	1	0	0	1	1	0	1	0	1	1	0	0	0	1	0	0	1	0	0	1	0	1	0	1	1	3	1	
<i>Callosides genieri</i>	0	0	0	0	0	1	1	1	1	1	1	0	1	1	0	0	1	0	0	1	0	0	1	0	1	0	1	1	1	3	1	
<i>Callosides bartolozzii</i>	0	0	0	0	0	1	1	1	1	1	1	0	1	1	0	0	1	0	0	1	0	0	1	0	1	0	1	1	1	3	1	
<i>Callosides campbelli</i>	0	0	0	0	0	1	1	1	1	1	1	0	1	1	0	0	1	0	0	1	0	0	1	0	1	0	1	1	1	3	1	
<i>Borrochrus ciliatus</i>	0	0	1	3	0	0	0	0	0	1	?	1	0	3	0	1	0	0	1	1	?	0	0	1	0	0	1	0	0	1	1	1
<i>Borrochrus mutilus</i>	0	0	1	3	0	1	0	0	0	1	1	?	1	0	3	0	1	0	0	1	1	?	0	0	1	0	0	1	1	1	1	
<i>Chaetodus (Cdopsis.) assuai</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	?	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Chaetodus (Cdopsis.) brancuccii</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	?	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Chaetodus (Cdopsis.) venezolanus</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	?	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Chaetodus (C.) exaratus</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	0	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Chaetodus (C.) irregularis</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	0	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Chaetodus (Pseudo.) amazonicus</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	0	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Chaetodus (Pseudo.) allsoppii</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	0	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Chaetodus (Pseudo.) piceus</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	0	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Chaetodus (C.) teamscaraborum</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	0	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Chaetodus (C.) villisicollis</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	0	2	0	1	0	0	1	1	0	0	0	0	1	0	1	1	1	1	
<i>Hybochaetodus obscurus</i>	0	0	1	3	0	0	0	0	1	1	1	1	0	1	2	0	0	1	1	1	1	0	0	1	0	1	0	1	1	1	1	
<i>Hybochaetodus flaco</i>	0	0	1	3	0	0	0	0	1	1	1	1	1	0	2	0	0	1	1	1	1	0	0	1	0	1	0	1	1	1	1	
<i>Antiochrous brunneus</i>	1	0	1	3	0	0	0	1	1	1	1	1	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	
<i>Antiochrous aberrans</i>	1	0	1	3	0	0	0	1	1	1	1	1	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	
<i>Liparoichrous geminatus</i>	1	0	1	3	0	0	0	1	1	1	1	1	2	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0	?	1	1	
<i>Liparoichrous multistriatus</i>	1	0	0	0	0	0	0	1	1	1	1	1	2	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0	?	1	1	
<i>Ceratocanthus vicarius</i>	1	0	1	1	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	1	1	0	0	?	0	1	0	1	0	1	1	
<i>Germarostes globosus</i>	1	0	1	1	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	1	1	0	0	?	0	1	0	1	0	1	1	
<i>Pachyplectrus laevis</i>	0	0	1	3	0	0	0	0	0	0	0	1	0	0	?	0	0	1	0	1	1	0	0	0	0	0	0	1	1	1	1	
<i>Brenskea coronata</i>	0	1	1	3	0	0	0	0	0	1	1	1	?	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	0	1	
<i>Coilodes gibbus</i>	0	0	1	3	0	0	0	0	0	0	1	1	1	0	3	0	0	1	0	1	0	0	1	0	1	0	1	0	1	0	1	
<i>Coilodes castaneus</i>	0	0	1	3	0	0	0	0	0	0	1	1	1	0	3	0	0	1	0	1	0	0	1	0	1	0	1	0	0	1	0	1
<i>Hybosorus illigeri</i>	0	0	1	3	0	0	0	0	0	1	1	1	0	0	3	0	0	0	0	1	1	0	0	0	0	0	0	0	1	2	1	



Appendix 1. Continued.

Characters 31 through 60

	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
<i>Anaides fossulatus</i>	2	1	?	2	0	1	0	2	1	2	1	3	1	1	0	0	2	0	1	1	0	1	1	0	1	0	1	1	0	0
<i>Anaides laticollis</i>	2	1	?	2	0	1	0	2	1	2	1	3	1	1	0	0	2	0	1	1	0	1	1	0	1	0	1	1	0	0
<i>Anaides longeciliatus</i>	2	1	?	2	0	1	0	2	1	2	1	3	1	1	0	0	0	0	1	12	0	1	1	0	1	0	1	1	0	0
<i>Anaides simplicicollis</i>	2	1	?	2	0	1	0	1	1	2	1	3	0	1	0	0	0	0	1	0	0	1	1	0	1	0	1	1	1	1
<i>Anaides ortii</i>	2	1	?	2	0	1	0	2	1	2	1	3	1	1	0	0	12	0	2	1	0	1	1	0	1	0	1	1	0	0
<i>Anaides vartorellii</i>	2	1	?	2	0	1	0	2	1	2	1	3	1	1	0	0	2	0	1	1	0	1	1	0	1	0	1	1	0	0
<i>Anaides onofrii</i>	2	1	?	2	0	1	0	2	1	2	1	3	1	1	0	0	1	0	1	1	0	1	1	0	1	0	1	1	0	0
<i>Anaides howdeni</i>	?	?	?	2	0	1	0	2	1	2	1	3	?	1	0	0	2	0	1	1	0	1	1	?	1	0	1	1	1	1
<i>Totoia splendida</i>	?	1	?	0	0	1	0	2	1	2	1	3	1	0	0	0	3	1	1	1	1	1	0	0	0	1	1	1	1	1
<i>Totoia brachycarina</i>	?	1	?	0	0	1	0	2	1	2	1	3	1	0	0	0	3	1	1	1	1	1	1	0	0	0	1	1	1	1
<i>Cryptogenius miersianus</i>	2	1	1	1	0	1	0	2	1	2	1	3	1	3	0	0	0	0	1	1	0	1	1	1	1	0	1	1	0	0
<i>Cryptogenius fryi</i>	2	1	1	1	0	1	0	2	1	2	1	3	1	3	0	0	0	0	1	1	0	1	1	1	1	0	1	1	0	0
<i>Callosides genieri</i>	2	1	1	0	0	1	0	2	1	2	1	3	1	1	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0
<i>Callosides bartolozzii</i>	2	1	1	0	0	1	0	2	1	2	1	3	1	3	0	0	1	0	0	0	1	1	1	0	0	0	1	1	0	0
<i>Callosides campbelli</i>	2	1	1	0	0	1	0	2	1	2	1	3	1	1	0	0	0	0	0	1	1	1	0	0	0	1	1	0	0	0
<i>Borrochrus ciliatus</i>	1	0	?	0	0	1	0	1	0	3	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0
<i>Borrochrus mutilus</i>	1	0	?	0	0	1	0	1	0	3	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0
<i>Chaetodus (Cdopsis.) assuai</i>	2	1	?	0	3	1	0	2	1	2	1	3	0	2	0	0	0	0	1	1	0	1	1	0	0	1	1	1	1	1
<i>Chaetodus (Cdopsis.) brancuccii</i>	2	1	?	0	3	1	0	2	1	2	1	3	0	2	0	0	0	0	1	1	0	1	1	0	0	1	1	1	1	1
<i>Chaetodus (Cdopsis.) venezolanus</i>	2	1	?	0	3	1	0	2	1	2	1	3	0	2	0	0	0	0	1	1	0	1	1	0	0	1	1	1	1	1
<i>Chaetodus (C.) exaratus</i>	2	1	?	0	0	1	0	2	0	3	1	2	0	2	0	0	0	0	1	1	0	1	1	0	0	1	0	0	0	0
<i>Chaetodus (C.) irregularis</i>	2	1	?	0	0	1	0	2	0	3	1	2	0	2	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0
<i>Chaetodus (Pseudo.) amazonicus</i>	2	1	?	0	0	1	0	2	0	3	1	2	0	2	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0
<i>Chaetodus (Pseudo.) allsoppii</i>	2	1	?	0	0	1	0	2	0	3	1	3	0	2	0	0	0	0	1	1	0	1	1	0	0	1	0	0	0	0
<i>Chaetodus (Pseudo.) piceus</i>	2	1	?	0	0	1	0	2	0	3	1	2	0	2	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0
<i>Chaetodus (C.) teamscaraborum</i>	2	1	?	0	3	1	0	2	0	3	1	2	0	2	0	1	0	0	0	1	0	1	1	0	0	1	0	0	0	0
<i>Chaetodus (C.) villisicollis</i>	2	1	?	0	0	1	0	2	0	3	1	1	0	2	0	0	0	0	0	2	0	1	1	0	0	1	0	0	0	0
<i>Hybochaetodus obscurus</i>	2	1	?	0	2	1	0	2	0	3	0	2	0	0	1	0	0	0	0	0	1	0	1	0	0	0	1	1	0	0
<i>Hybochaetodus flaco</i>	2	1	0	0	2	1	0	2	0	3	2	2	0	0	1	0	0	0	1	0	1	0	1	0	1	0	1	1	0	0
<i>Antiochrous brunneus</i>	0	0	?	0	2	1	1	0	0	3	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0
<i>Antiochrous aberrans</i>	0	1	?	0	2	1	1	0	0	3	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0
<i>Liparoichrous geminatus</i>	1	?	0	0	2	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
<i>Liparoichrous multistriatus</i>	1	1	0	0	2	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
<i>Ceratocanthus vicarius</i>	2	1	0	0	2	1	1	0	0	0	2	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	01	0	0	0
<i>Germarostes globosus</i>	2	1	0	0	2	1	1	0	0	0	2	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	01	0	0	0
<i>Pachyplectrus laevis</i>	1	0	0	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	01	0	0	0	0	0	0	0
<i>Brenskaea coronata</i>	0	0	0	0	2	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
<i>Coilodes gibbus</i>	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
<i>Coilodes castaneus</i>	1	0	?	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
<i>Hybosorus illigeri</i>	0	0	0	0	1	1	0	1	0	0	2	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0

Appendix 1. Continued.

Characters 61 through 90

	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	
Anaides fossulatus	0	1	1	0	2	1	0	0	0	0	0	1	3	1	0	1	1	0	1	1	1	1	0	0	3	0	0	1	1	0	
Anaides laticollis	0	0	0	0	2	1	0	0	0	1	0	1	3	1	0	0	1	0	1	1	1	1	0	0	3	0	0	1	01	0	
Anaides longeciliatus	0	0	1	0	2	1	0	0	0	0	0	1	3	1	0	0	1	0	1	1	1	1	0	0	2	0	0	1	0	0	
Anaides simplicicollis	1	0	0	0	2	1	0	1	0	0	0	1	3	1	0	1	1	0	1	1	1	1	0	0	2	0	0	1	0	0	
Anaides ortii	0	1	1	0	2	0	2	0	0	1	0	1	3	1	0	0	1	0	1	1	1	1	1	0	0	23	1	0	1	1	0
Anaides vartorellii	0	1	1	0	2	1	0	0	0	0	0	1	3	1	0	1	1	0	1	1	1	1	0	0	3	0	0	1	01	0	
Anaides onofrii	0	1	1	0	2	1	0	0	0	0	0	1	4	1	0	1	1	0	1	1	1	1	0	0	3	0	0	1	01	0	
Anaides howdeni	1	0	0	0	2	1	0	0	0	0	0	1	3	1	0	1	1	0	1	1	1	1	0	0	2	0	0	1	1	0	
Totoia splendida	1	0	1	0	2	0	0	0	3	0	0	1	3	1	0	0	1	0	1	0	1	1	0	2	2	0	0	1	0	0	
Totoia brachycarina	1	0	1	0	2	1	0	0	3	0	0	1	3	1	0	0	1	0	1	0	1	1	0	2	2	0	0	1	0	0	
Cryptogenius miersianus	0	1	1	0	2	0	1	0	2	1	0	1	3	1	0	1	1	0	1	0	1	1	1	0	2	1	0	1	0	0	
Cryptogenius fryi	0	1	1	0	2	0	1	0	2	1	0	1	3	1	0	1	1	0	1	0	1	1	1	0	2	1	0	1	0	0	
Callosides generi	0	1	0	1	2	0	2	0	0	1	1	1	1	1	0	0	1	1	1	0	1	1	1	0	2	1	0	1	0	0	
Callosides bartolozzii	0	1	0	1	2	0	2	0	1	1	1	1	1	1	0	?	1	1	1	0	1	1	1	0	2	1	0	1	0	0	
Callosides campbelli	0	1	0	1	2	0	2	0	1	1	1	1	1	1	0	?	1	1	1	0	1	1	1	0	2	1	0	1	0	0	
Borrochrus ciliatus	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	
Borrochrus mutilus	0	0	0	0	1	0	0	0	3	0	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
Chaetodus (Cdopsis.) assuai	1	0	1	0	2	0	0	0	3	0	0	1	3	1	0	2	1	0	1	0	1	1	0	2	2	0	0	1	0	0	
Chaetodus (Cdopsis.) brancuccii	0	0	0	0	2	0	0	0	3	0	0	1	3	1	0	2	1	0	1	0	1	1	0	1	2	0	0	1	0	0	
Chaetodus (Cdopsis.) venezolanus	0	0	0	0	2	0	0	0	3	0	0	1	3	1	0	2	1	0	1	0	1	1	0	1	2	0	0	1	0	0	
Chaetodus (C.) exaratus	0	0	0	0	1	0	0	0	3	0	0	1	3	1	0	01	1	0	1	0	1	1	0	1	3	0	0	1	0	0	
Chaetodus (C.) irregularis	0	0	0	0	1	0	0	0	3	0	0	1	1	1	0	0	1	0	1	0	1	1	0	1	2	0	0	1	0	0	
Chaetodus (Pseudo.) amazonicus	0	0	0	0	1	0	0	0	3	0	0	1	3	1	0	01	1	0	1	0	1	1	0	1	2	0	0	1	0	0	
Chaetodus (Pseudo.) allsoppii	0	0	0	0	1	0	0	0	3	0	0	1	3	1	0	12	1	0	1	0	1	1	1	0	2	2	0	0	1	0	0
Chaetodus (Pseudo.) piceus	0	0	0	0	1	0	0	0	3	0	0	1	3	1	0	0	1	0	1	0	1	0	1	3	0	0	1	0	0	0	
Chaetodus (C.) teamscaraborum	0	0	0	0	1	0	0	0	3	0	0	1	3	1	0	1	1	0	1	0	1	0	1	2	0	0	1	0	0	0	
Chaetodus (C.) villisicollis	0	0	0	0	1	0	0	0	3	0	0	1	3	1	0	0	1	0	1	0	1	0	1	2	0	0	1	0	0	0	
Hybochaetodus obscurus	0	0	0	0	2	0	0	1	3	0	0	1	1	1	0	1	1	1	1	1	1	1	?	0	2	0	0	1	0	0	
Hybochaetodus flaco	0	0	0	0	2	0	0	1	3	0	0	1	1	1	0	1	1	1	1	1	1	1	1	0	2	0	0	1	0	0	
Antiochrous brunneus	0	0	0	0	1	0	0	0	3	0	0	1	0	1	0	0	1	0	0	1	0	0	1	1	0	1	0	0	1	0	0
Antiochrous aberrans	0	0	0	0	1	0	0	0	3	0	0	1	0	1	0	0	1	0	0	0	1	1	0	1	0	0	1	1	0	0	
Liparoichrous geminatus	0	0	0	0	2	0	0	0	3	0	0	1	1	1	0	0	1	0	0	0	1	1	0	0	01	0	0	1	01	0	
Liparoichrous multistriatus	0	0	0	0	2	0	0	0	3	0	0	1	3	1	0	0	1	0	0	0	1	1	0	0	1	0	0	?	01	0	
Ceratocanthus vicarius	0	0	0	0	1	0	0	1	3	0	0	1	2	1	0	0	1	0	0	0	?	1	0	0	2	0	?	1	0	0	
Germarostes globosus	0	0	0	0	01	0	0	1	3	0	0	1	2	1	0	0	1	0	0	0	?	1	0	0	2	0	?	1	0	0	
Pachyplectrus laevis	0	0	0	0	0	0	0	1	3	0	0	0	0	0	2	0	1	0	0	1	0	1	1	1	0	0	1	0	0	2	
Brenskaea coronata	0	0	0	0	1	0	0	1	3	0	0	0	0	0	2	0	1	0	0	1	0	0	1	1	0	0	1	0	0	2	
Coilodes gibbus	0	0	0	0	1	0	0	1	3	0	0	1	1	0	0	1	0	0	0	1	0	1	1	1	12	0	0	0	1	2	
Coilodes castaneus	0	0	0	0	1	0	0	1	3	0	0	1	1	0	0	1	0	0	0	1	0	1	1	1	12	0	0	0	1	2	
Hybosorus illigeri	0	0	0	0	1	0	0	1	3	0	0	1	1	0	0	1	0	0	0	1	0	1	1	1	1	0	1	0	0	2	



# Catalog of the Subfamilies Anaidinae, Ceratocanthinae, Hybosorinae, Liparochninae, and Pachyplectrinae (Scarabaeoidea: Hybosoridae)

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This catalog provides a list of the genera and species of the world Hybosoridae. The last catalog of the family was published by Allsopp (1984). As a result of phylogenetic analyses provided herein, the Ceratocanthinae is now a member of the Hybosoridae. Allsopp (1984) did not include ceratocanthids in his catalog because they were then considered a separate family. The last catalog of world Ceratocanthinae was Arrow (1912). In recent years, a number of papers dealing with new classification schemes, descriptions of genera and species, and synonymy of established names, have appeared. This catalog reflects the most recent update of all known family, genus, and species names for the family Hybosoridae. We propose a new classification based on phylogenetic analyses to reflect the historical relationships among taxa.

The Ceratocanthinae number a total of 341 species divided into 40 genera and it is the largest subfamily. The subfamily Hybosorinae is the second largest with 133 species (five fossil species) and 21 genera (four with only fossil species known). Next are the Anaidinae with 57 species (two fossil) and 7 genera (one with only a fossil species known), the Liparochninae with 48 species and two genera, and the Pachyplectrinae with three species and two genera. Two genera and six species remain *incertae sedis* (although clearly not belonging to the Ceratocanthinae).

The Ceratocanthinae list has been compiled by Alberto Ballerio, while Federico Ocampo compiled the list of the remaining subfamilies. In order to check original spellings and relevant data concerning species

and genera descriptions, all the primary literature has been checked personally by the authors. This has sometimes provided unexpected surprises, as in the case of the original description of *Germarostes aphodioides* (Illiger 1800), commonly quoted as described by Illiger in Olivier or Illiger in Wiedmann, and which has proved to have been described by Illiger in a paper different from those above.

As the checklist was compiled, we came across many problems that have been dealt with in the following way:

a) **Homonyms.** During the review of all generic names, we came across a new case of homonymy. *Glyptopterus* Paulian, 1982 turned out to be a junior homonym of *Glyptopterus* de Chaudoir, 1838 (Coleoptera Carabidae). We therefore here introduce a *nomen novum*, i.e., *Glyptogermarostes nom. nov.* for *Glyptopterus* Paulian, 1982. The etymology is the union of the prefix of the name by Paulian (*Glypto-*) with the name *Germarostes*, this in order to stress the close similarities of this genus with *Germarostes* Paulian, 1982.

b) **Gender of genus group names.** In some instances we found that the current gender of some species was not in agreement with the gender of the respective genus, this is for instance the case of *Ceratocanthopsis* Paulian, 1982, which is feminine in gender but which has been always treated as masculine. In all such cases the gender agreement has been made.

c) **Authorship.** Following recommendation 51E of the ICZN (1999), when a species has been described by an author in the paper

of another author, the authorship should be quoted as "B in A". Such is the case of the many species described by Erichson in Germar's paper (1843).

d) **Misspellings.** We found a large number of misspellings among the genus group names (some still in use in current literature), and these are listed under the correct genus name as "incorrect subsequent spelling". According to Art. 50.5 of ICZN, an unjustified emendation must be attributed to the author who first published it, but "incorrect subsequent spellings" are not emendations and, therefore, in order to avoid confusion with emendations, we decided to not quote the author of the subsequent spelling. The responsibility for the incorrect spelling is stated as "incorrect subsequent spelling by . . ."

e) **"Varieties" described before 1960.** According to Art. 45.6.4 of the ICZN, these have to be considered as species group names, unless it is apparent that the author wanted to treat them as infrasubspecific names. Therefore, all the varieties described by Bates (1887) are here considered as subspecies. It is apparent that he did not describe them as simple color variations, because he always provided the typical locality data as well as several morphological characters in order to distinguish them. Hence, they were not treated as infrasubspecific names (this does not necessarily mean that we agree that they are subspecies). *Cloeotus grandis* Petrovitz, 1973, was downgraded by Paulian (1982) to a form of *Haroldostes nigerrimus* (Blanchard). However, "formes" in 1982 were not covered by the rules of zoological nomenclature and, therefore, we consider this act as a statement of synonymy.

f) **"Varieties" described after 1960 and nomina nuda.** These names, which comprise also the *nomina nuda* created by Dejean (1836), are not considered as available names by the ICZN and, therefore, have been omitted in the catalog.

g) **The problem of Martínez's African Ceratocanthinae species.** Martínez (1970) described four species of *Astaenomoechus* from Africa. Types of these species were deposited in the Museu do Dundo (Angola) and

their availability to researchers was (and still is) very difficult. Paulian (1977a), on the basis of the descriptions and drawings provided by Martínez, suggested new combinations and synonymies, although these acts were not formal. The expressions "semble être un synonyme de *Philharmostes adam*;" (for *Astaenomoechus caffer*) and "paraît être un synonyme de *Philharmostes umbilicatus*" (for *Astaenomoechus garciabesi*) are conditionally proposed nomenclatural acts and are not available, since they were proposed after 1960 (Art. 15.1 ICZN). Nevertheless, judging from the descriptions provided by Martínez, there is little doubt that the two species of Martínez belong to the genus *Philharmostes* (subg. *Philharmostes*) (a key character in the original descriptions is the shape of the protibiae, which are curved outwards). Accordingly we here state the following new combinations: *Philharmostes (Philharmostes) caffer* (Martínez, 1970) **n. comb.** for *Astaenomoechus caffer*, and *Philharmostes (Philharmostes) garciabesi* (Martínez, 1970) **n. comb.** for *Astaenomoechus garciabesi*. As for the remaining two species described by Martínez, we consider as valid the new combinations suggested by Paulian ("est un *Melanophilharmostes*", referred to *Astaenomoechus carvalhoi* and "est un *Pseudopterorthochaetes*" referred to *Astaenomoechus machadoi*).

h) **The problem of the name *Sphaerelytrus* Blanchard, 1841.** The genus *Sphaerelytrus* Blanchard is generally dated 1846 (e.g., Arrow 1912; Blackwelder 1944) and considered as a lapsus calami for *Sphaeromorphus* Germar, 1843 (e.g., Martínez, 1968) or a synonym of *Cloeotus* Germar, 1843 (e.g., Arrow 1912). The *Voyage dans l'Amérique Méridionale* was issued over a span of several years and, although the formal description of *Sphaerelytrus nigerrimus* by Blanchard was published in 1847, the plate number 10 of *Insectes* illustrating *S. nigerrimus* was published in 1841. Since the plate contains also the full name of the genus and species, the plate must be considered as a valid description (description by indication, see Art. 12.2.7 of ICZN), and the date of description must be the one for the

plate, 1841. With a date of 1841, we cannot consider *Sphaerelytrus* as a *lapsus calami* for *Sphaeromorphus*. Instead, *Sphaerelytrus* Blanchard, 1841 should be considered as a valid genus and, since the type species *nigerrimus* is now placed in the genus *Haroldostes* Paulian, 1982, *Sphaerelytrus* Blanchard, 1841 should be considered as a senior synonym of *Haroldostes* Paulian, 1982 with *S. nigerrimus* as the type species by original monotypy. Nevertheless it must be stressed that the name *Sphaerelytrus* has never been used as a valid name in the literature, hence an application has been sent to the International Commission on Zoological Nomenclature in order to suppress this name, being a *nomen oblitum*.

i) **References.** Primary literature is here used in the broad sense, *i.e.*, the literature including not only descriptions of new taxa, but also new combinations and other relevant nomenclatorial acts (synonymies, etc.). For that reason, there are a few references listed in the literature that are not quoted in the catalog. These papers are: Chalumeau (1980), which contains new combinations for *Acanthocerus chalceus* (Germar, 1843) and *Acanthocerus semistriatus* (Germar, 1843); Fujioka (2001), which contains a new status for *Madrasostes hisamatsui* Ochi, 1990; and Ivie (1991), which contains a new combination for *Acanthocerus turquinensis* Zayas, 1988.

j) **Catalog structure and conventions.** Subfamilies, genera, subgenera, species, and subspecies are listed alphabetically. Type species are indicated by an asterisk (\*), and “†” denotes fossil taxa. References to original descriptions, misspellings, invalid names, and known species distributions are also provided. The number of species (excluding subspecies) in each genus is indicated between parentheses. Generic names between parentheses and next to species names denote original combination for the species. For country distributions, we followed the *National Geographic World Atlas* (2004). The closing date for this catalog is 1 August 2005.

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## HYBOSORIDAE ERICHSON, 1847

### Anaidinae Nikolajev, 1996

Cryptogeniinae Howden, 2001 (synonym).  
Type genus *Anaides* Westwood, 1845.

*Anaides* Westwood, 1845 (13).

*Anaides* (Incorrect subsequent spelling by Balthasar 1838).

*Anaides carioca* Ocampo, 2006. Brazil.

\**Anaides fossulatus* Westwood, 1846.

Panama, Colombia, Venezuela, Guyana, Trinidad and Tobago, Suriname.

*Anaides reticulatus* Endrödi, 1962. (synonym).

†*Anaides howdeni* Ocampo, 2006. Dominican Republic.

*Anaides laticollis* Harold, 1863. Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama.

*Anaides longeciliatus* Balthasar, 1938. Costa Rica, Panama.

- Anaides onofrii* Ocampo, 2006. Colombia, Ecuador, Peru, Bolivia.
- Anaides ortii* Ocampo, 2006. Venezuela.
- Anaides parvulus* Ocampo, 2006. Venezuela.
- Anaides planus* Ocampo, 2006. Costa Rica, Ecuador.
- Anaides quinckeii* Ocampo, 2006. Bolivia.
- Anaides rugosus* Robinson, 1948. Ecuador, Peru.
- Anaides simplicicollis* Bates, 1887. Costa Rica, Panama.
- Anaides vartorellii* Ocampo, 2006. Barbados.
- Callosides** Howden, 1971 (3).
- \**Callosides campbelli* Howden, 1971. Colombia.
- Callosides bartolozzii* Paulian and Camberfort, 1995. Ecuador.
- Callosides genieri* Howden, 2001. Ecuador.
- Chaetodus** Westwood, 1845 (33).
- Subgenus **Chaetodus** Westwood, 1845.
- Pseudohybosorus* Endrödi, 1963. (synonym).
- Chaetodus allsoppi* Martínez, 1988. Peru.
- Chaetodus amazonicus* de Borre, 1886. Brazil, Suriname, Venezuela.
- Pseudohybosorus drifti* Endrödi, 1963 (synonym).
- Chaetodus amazonicus inesperatus* Martínez, 1988 (synonym).
- Chaetodus bolivianus* Martínez, 1956. Bolivia.
- Chaetodus columbicus* Petrovitz, 1970. Colombia.
- Chaetodus datoii* Ocampo, 2006. Bolivia
- Chaetodus exaratus* Arrow, 1909. Brazil, Argentina, Brazil, Paraguay.
- Chaetodus apicipennis* Petrovitz, 1970. (synonym).
- Chaetodus fraternus* Martínez, 1994. Bolivia.
- Chaetodus globosus* Ocampo, 2006. Mexico.
- Chaetodus humerosus* Petrovitz, 1970. Venezuela.
- Chaetodus hoffmanni* Ocampo, 2006. Panama, Venezuela.
- Chaetodus irregularis* Westwood, 1846. Bolivia, Brazil, Paraguay, Argentina, Uruguay.
- Chaetodus striatus* de Borre, 1886 (synonym).
- Chaetodus jamesonae* Ocampo, 2006. Venezuela.
- Chaetodus lacandonicus* Martínez and Morón, 1990. Mexico, Guatemala.
- Chaetodus maquipucuna* Ocampo, 2006. Ecuador.
- Chaetodus mimi* Ocampo, 2006. Ecuador, Peru, Bolivia, Brazil.
- Chaetodus nigrifrons* Ocampo, 2006. Ecuador.
- Chaetodus noirregularis* Ocampo, 2006. Brazil.
- Chaetodus paucararae* Ocampo, 2006. Ecuador.
- Chaetodus paulseni* Ocampo, 2006. Brazil.
- Chaetodus pax* Ocampo, 2006. Venezuela.
- \**Chaetodus piceus* Westwood, 1846. Argentina, Bolivia, Brazil, Paraguay.
- Chaetodus platynotus* Ocampo, 2006. Ecuador.
- Chaetodus ratcliffei* Ocampo, 2006. Brazil.
- Chaetodus rodolfo* Ocampo, 2006. Ecuador.
- Chaetodus sagittarius* Ocampo, 2006. Brazil.
- Chaetodus smithi* Ocampo, 2006. Peru, Bolivia, Brazil.
- Chaetodus teamscaraborum* Ocampo 2006. Belize, Colombia, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, Venezuela.
- Chaetodus villosicollis* Benderitter, 1923. Argentina, Paraguay.
- Subgenus **Chaetodopsis** Martínez, 1988.
- \**Chaetodus asuai* Martínez, 1956. Colombia, Ecuador, Peru, Bolivia.
- Chaetodus brancuccii* Martínez, 1994. Venezuela.
- Chaetodus octocarinatus* Ocampo, 2006. Brazil, Guyana, Suriname.
- Chaetodus tricarinatus* Ocampo, 2006. Colombia, Ecuador, Peru.
- Chaetodus venezolanus* Martínez, 1994. Venezuela.
- Cretanaides** Nikolajev, 1996 (1).
- \* †*Cretanaides trogopterus* Nikolajev, 1996. Siberia (Russia).
- Cryptogenius** Westwood, 1845 (2).
- Cremastochilodius* Krikken, 1975. (synonym, type species *Cremastochilodius trisits* Krikken 1975).
- \**Cryptogenius miersianus* Westwood, 1846. Costa Rica, Panama, Colombia, Ecuador.

*Cryptogenius fryi* Arrow, 1909. Brazil, Argentina.  
*Cremastochilodius tristis* Krikken, 1975. (synonym).

***Hybochaetodus*** Arrow, 1909 (2).

*Hybochaetodus flaco* Ocampo, 2002. Peru.  
 \**Hybochaetodus obscurus* Arrow, 1909. Peru.

***Totoia*** Ocampo, 2003 (3).

*Totoia brachycarina* Ocampo, 2003. Nicaragua, Costa Rica. Panama.  
 \**Totoia splendida* Ocampo, 2003. Panama, Colombia.  
*Totoia magnifica* Ocampo, 2006. Panama.

**Ceratocanthinae Martínez, 1968**

Acanthocerinae Lacordaire, 1856 (synonym, see below under *Ceratocanthus*)

**Tribe Ceratocanthini Martínez, 1968**

***Acanthocerodes*** Péringuey, 1901 (3).

*Acanthocerodes endroedyi* Paulian, 1980. South Africa.  
*Acanthocerodes martini* Paulian, 1992. South Africa.  
 \**Acanthocerodes singularis* Péringuey, 1901. South Africa.

***Afrocloetus*** Petrovitz, 1968 (1).

*Afrocloetus* (incorrect subsequent spelling by Paulian, 1977).  
 \**Afrocloetus gibbosus* Petrovitz, 1968. Tanzania.

***Aneilobolus*** Hesse, 1948 (4).

*Aneilobolus endroedyyoungai* Paulian, 1983. South Africa.  
*Aneilobolus gigas* Paulian, 1977. South Africa.  
 \**Aneilobolus lawrencei* Hesse, 1948. South Africa.  
*Aneilobolus leleupi* Paulian, 1977. South Africa.

***Anopsiostes*** Paulian, 1982 (1)

\**Anopsiostes punctatus* Paulian, 1982. Ecuador, Peru.

***Astaenomoechus*** Martínez and Pereira, 1959 (22).

*Belloanopsiostes* Vaz de Mello, 1996. (synonym). (type species: *B. gilli* Vaz de Mello, 1996).

*Astaenomoechus americanus* (Boucomont, 1936) (*Philharmostes*). Colombia, Costa Rica, Ecuador, French Guiana, Mexico, Peru, Trinidad.

*Astaenomoechus termitophilus* Petrovitz, 1976 (synonym).

*Astaenomoechus andersoni* Howden and Gill, 2000. Venezuela.

*Astaenomoechus cavei* Howden and Gill, 2003. Belize, Honduras.

*Astaenomoechus cicheroi* Martínez, 1969. Bolivia.

*Astaenomoechus criberrimus* Paulian, 1982. Peru.

*Astaenomoechus estriatus* Paulian, 1982. Ecuador.

*Astaenomoechus gilli* (Vaz de Mello, 1996) (*Belloanopsiostes*). Brazil.

*Astaenomoechus hispidus* Howden and Gill, 2003. Costa Rica.

\**Astaenomoechus hospes* (Wasmann, 1902) (*Sphaeromorphus*). Argentina, Brazil.

*Astaenomoechus luniferus* Petrovitz, 1973. Colombia, Ecuador.

*Astaenomoechus mixtus* Howden and Gill, 2003. Costa Rica, Panama.

*Astaenomoechus multipunctatus* Howden and Gill, 2003. Nicaragua, Costa Rica, Panama.

*Astaenomoechus nevermanni* (Boucomont, 1936) (*Philharmostes*). Costa Rica.

*Astaenomoechus redtenbacheri* (Harold, 1874) (*Acanthocerus*). Colombia, Venezuela.

*Astaenomoechus paniculus* Howden and Gill, 2003. Costa Rica, Panama.

*Astaenomoechus parvosetosus* Howden and Gill, 2003. Costa Rica, Panama.

*Astaenomoechus punctifrons* Howden and Gill, 2003. Nicaragua, Costa Rica.

*Astaenomoechus setosus* (Boucomont, 1936) (*Philharmostes*). Brazil, Colombia, Costa Rica, Ecuador, Guyana.

*Astaenomoechus setulosus* (Harold, 1874) (*Acanthocerus*). Colombia, French Guiana, Venezuela.



- Astaenomoechus solisi* Howden and Gill, 2003. Nicaragua, Costa Rica.  
*Astaenomoechus strigulosus* Howden and Gill, 2003. Costa Rica.  
*Astaenomoechus unidentatus* Petrovitz, 1973. Colombia, Ecuador.
- Aulisostes** Howden and Gill, 2000 (2).  
*Aulisostes paradoxus* (Paulian, 1982) (*Germarostes*). Brazil.  
 \**Aulisostes pseudoparadoxus* Howden and Gill, 2001. Colombia.
- Baloghianestes** Paulian, 1968 (1).  
 \**Baloghianestes lissoubai* Paulian, 1968. Cameroon, Congo.
- Besuchetostes** Paulian, 1972 (11).  
*Besuchetostes besucheti* (Paulian, 1972) (*Cyphopisthes*). Sri Lanka.  
*Philharmostes carinatus* Paulian, 1975 (synonym).  
*Besuchetostes dubium* Paulian, 1975. India.  
*Besuchetostes hindu* Paulian, 1975. India.  
*Besuchetostes howdeni* Paulian, 1979. Malaysia.  
*Besuchetostes jaccoudi* Paulian, 1977. Malaysia.  
*Besuchetostes keralae* Paulian, 1975. India.  
*Besuchetostes kodaikanalense* Paulian, 1975. India.  
*Besuchetostes loebli* Paulian, 1972. Sri Lanka.  
*Besuchetostes mussardi* Paulian, 1972. Sri Lanka.  
*Besuchetostes peradeniyae* Paulian, 1972. Sri Lanka.  
 \**Besuchetostes taprobanae* Paulian, 1972. Sri Lanka.
- Callophilharmostes** Paulian, 1968 (1).  
*Philharmostes (Callophilharmostes)* Paulian, 1968.  
 \**Callophilharmostes fleutiauxii* (Paulian, 1943) (*Philharmostes*). Cameroon, Gabon, Guinea, Ivory Coast.
- Carinophilharmostes** Paulian, 1968 (1).  
*Philharmostes (Carinophilharmostes)* Paulian, 1968.  
 \**Carinophilharmostes vadoni* (Paulian, 1937) (*Philharmostes*). Cameroon, Central African Republic, Congo, Zaire, Equatorial Guinea, Guinea, Ivory Coast, Uganda.  
*Pterorthochaetes multigibber* Petrovitz, 1967 (synonym).
- Ceratocanthoides** Paulian, 1982 (1).  
 \**Ceratocanthoides undatus* (Petrovitz, 1973) (*Acanthocerus*). Brazil, Colombia, Peru.
- Ceratocanthopsis** Paulian, 1982 (3).  
 \**Ceratocanthopsis fulgida* (Martínez, 1967) (*Acanthocerus*). Brazil.  
*Ceratocanthopsis pernitida* Paulian, 1982. Bolivia, Brazil, French Guiana, Trinidad.  
*Ceratocanthopsis pygmaea* (Harold, 1874) (*Acanthocerus*). Brazil, French Guiana, Venezuela, Suriname.
- Ceratocanthus** White, 1842 (53).  
*Acanthocerus* MacLeay, 1819. (synonym) (junior homonym of *Acanthocerus* Palisot de Beauvois, 1818, Hemiptera).  
*Gymnoropterus* Gestro, 1899 (synonym). (type species *Synarmostes striatulus* Lansberge, 1887).  
*Sphaeromorphus* Germar, 1843 (synonym).  
 \**Ceratocanthus aeneus* (MacLeay, 1819) (*Acanthocerus*). USA.  
*Sphaeromorphus volvox* Erichson in Germar, 1843 (synonym).  
*Ceratocanthus amazonicus* Paulian, 1982. Brazil, Colombia, French Guiana.  
*Ceratocanthus aureolus* (Harold, 1874) (*Acanthocerus*). Brazil.  
*Ceratocanthus baniensis* Howden, 1978. Hispaniola.  
*Ceratocanthus basilicus* (Germar, 1843) (*Sphaeromorphus*). Brazil.  
*Ceratocanthus bicinctoides* Paulian, 1982. Brazil.  
*Ceratocanthus bicinctus* (Germar, 1843) (*Sphaeromorphus*). Brazil.  
*Ceratocanthus bonfilsii* Chalumeau, 1977. Guadeloupe.  
*Ceratocanthus brasiliensis* (Lansberge, 1887) (*Acanthocerus*). Brazil.  
*Ceratocanthus chalceus* (Germar, 1843) (*Sphaeromorphus*). Cuba.  
*Ceratocanthus clypealis* (Lansberge, 1887) (*Acanthocerus*). Brazil, French Guiana, Peru.  
*Ceratocanthus ebeninus* (Erichson in Germar, 1843) (*Sphaeromorphus*). Brazil.

- Ceratocanthus eberti* Paulian, 1982. Brazil.
- Ceratocanthus eulampros* (Bates, 1887) (*Acanthocerus*). Costa Rica, Nicaragua, Panama.
- Ceratocanthus fuscoviridis* (Ohaus, 1911) (*Acanthocerus*). Argentina.
- Ceratocanthus globulus* (Erichson in Germar, 1843) (*Sphaeromorphus*). Brazil, Colombia, French Guiana.
- Ceratocanthus gundlachi* (Harold, 1874) (*Acanthocerus*). Cuba.
- Ceratocanthus humeralis* (Erichson in Germar, 1843) (*Sphaeromorphus*). Brazil, Panama, Suriname.
- Ceratocanthus inca* Paulian, 1982. Peru.
- Ceratocanthus major* Paulian, 1982. French Guiana.
- Ceratocanthus mathani* Paulian, 1982. Peru.
- Ceratocanthus micans* (Harold, 1874) (*Acanthocerus*). Brazil.
- Ceratocanthus micros* (Bates, 1887) (*Acanthocerus*). Costa Rica, Mexico.
- Ceratocanthus monrosi* (Martínez and Pereira, 1959). Bolivia, Brazil.
- Ceratocanthus nanus* (Germar, 1843) (*Sphaeromorphus*). Brazil, Paraguay.
- Ceratocanthus niger* Paulian, 1982. Brazil.
- Ceratocanthus nitidus* (Germar, 1843) (*Sphaeromorphus*). Bolivia, Brazil.
- Ceratocanthus parareluces* Howden, 1978. St. Vincent.
- Ceratocanthus pauliani* (Delgado and Hernandez, 1998) (*Anopsiostes*). Mexico.
- Ceratocanthus pecki* Paulian, 1982. Ecuador.
- Ceratocanthus perpunctatus* Paulian, 1982. Ecuador, Peru.
- Ceratocanthus politus* (Erichson in Germar, 1843) (*Sphaeromorphus*). Argentina, Bolivia, Brazil, Peru.
- Ceratocanthus pseudosuturalis* Paulian, 1982. Brazil.
- Ceratocanthus punctolineatus* Paulian, 1982. Brazil, Colombia.
- Ceratocanthus punctulatus* (Lansberge, 1887) (*Acanthocerus*). Brazil, Peru.
- Ceratocanthus pyritosus* (Erichson in Germar, 1843) (*Sphaeromorphus*). St. Thomas.
- Ceratocanthus quadristriatus* Paulian and Vaz de Mello, 1998. Brazil.
- Ceratocanthus relucens mexicanus* (Bates, 1887) (*Acanthocerus*). Belize, Mexico.
- Ceratocanthus relucens relucens* (Bates, 1887) (*Acanthocerus*). Belize, Costa Rica, Guatemala, Mexico, Nicaragua, Panama.
- Ceratocanthus rotundicollis* (Bates, 1887) (*Acanthocerus*). Panama.
- Ceratocanthus semipunctatus carioca* (Martínez, 1967) (*Acanthocerus*). Brazil.
- Ceratocanthus semipunctatus semipunctatus* (Germar, 1843) (*Sphaeromorphus*). Brazil, Colombia, Paraguay.
- Ceratocanthus semistriatus* (Germar, 1843) (*Sphaeromorphus*). Cuba.
- Ceratocanthus seriatus* (Erichson in Germar, 1843) (*Sphaeromorphus*). Brazil, French Guiana, Peru.
- Ceratocanthus sesquistriatus* (Germar, 1843) (*Sphaeromorphus*). Brazil.
- Ceratocanthus sexstriatus* Paulian, 1982. Brazil.
- Ceratocanthus spinicornis* (Fabricius, 1792) (*Trox*). Unknown distribution.
- Ceratocanthus steinbachi* Paulian, 1982. Bolivia.
- Ceratocanthus striatulus* (Lansberge, 1887) (*Synarmostes*). Unknown distribution.
- Ceratocanthus suturalis* (Lansberge, 1887) (*Acanthocerus*). Bolivia, Brazil, Ecuador, French Guiana, Peru, Surinam, Trinidad.
- Ceratocanthus suturaloides* Paulian, 1982. Venezuela.
- Ceratocanthus termiticola* (Wasmann, 1894) (*Acanthocerus*). Bolivia, Brazil, Colombia, Ecuador.
- Ceratocanthus turquinensis* (Zayas, 1988) (*Acanthocerus*). Cuba.
- Ceratocanthus undulatus* (Harold, 1874) (*Acanthocerus*). Brazil, French Guiana.
- Ceratocanthus vicarius* (Bates, 1887) (*Acanthocerus*). Belize, Guatemala, Mexico.
- Chaetophilharmostes*** Paulian, 1977 (1).
- \**Chaetophilharmostes chevalieri* (Paulian, 1937) (*Philharmostes*). Congo, Guinea, Ivory Coast, Liberia.
- Pterorthochaetes termitophilus* Petrovitz, 1968 (synonym).

- Cloeotus** Germar, 1843 (3).  
 \**Cloeotus latebrosus* Germar, 1843. Colombia.  
*Cloeotus petrovitzi* Paulian, 1982. Brazil.  
*Cloeotus semicostatus* Germar, 1843. Colombia.
- Congomostes** Paulian, 1968 (2).  
 \**Congomostes baloghi* Paulian, 1968. Congo (=former Zaire).  
*Congomostes janssensi* (Basilewsky, 1955) (*Philharmostes*). Congo (=former Zaire).
- Cryptophilharmostes** Ballerio, 2000 (2).  
 \**Cryptophilharmostes mahunkai* Ballerio, 2000. Tanzania.  
*Cryptophilharmostes merkli* Ballerio, 2005. Tanzania.
- Cyphopisthes** Gestro, 1899 (10).  
 \**Cyphopisthes amphicyllis* (Sharp, 1875) (*Synarmostes*). Indonesia, New Guinea.  
*Cyphopisthes crux* (Sharp, 1875) (*Synarmostes*). Borneo.  
*Cyphopisthes descarpentriesi* Paulian, 1977. Australia.  
*Cyphopisthes dohertyi* Paulian, 1942 (*Philharmostes*). India.  
*Cyphopisthes inexpectatus* Paulian, 1981. Philippines.  
*Cyphopisthes krikkeni* Paulian, 1980. Indonesia.  
*Cyphopisthes luzonicus* Paulian, 1978. Philippines.  
*Cyphopisthes minutus* Paulian, 1978. Malaysia.  
*Cyphopisthes szentivanyi* (Paulian, 1973) (*Philharmostes*). Papua New Guinea.  
*Cyphopisthes wallacei* (Pascoe, 1860) (*Sphaeromorphus*). Malaysia, Indonesia.  
*Cyphopisthes humeralis* Gestro, 1899 (synonym).
- Ebbrittoniella** Martínez, 1962 (2).  
*Ebbrittoniella* (incorrect subsequent spelling by Paulian, 1978).  
*Ebbrittoniella gestroi* (Paulian, 1942) (*Philharmostes*). Indonesia, Malaysia.  
 \**Ebbrittoniella ignita* (Westwood, 1883) (*Acanthocerus* [*Sphaeromorphus*]). Indonesia, Malaysia.
- Eusphaeropeltis** Gestro, 1899 (16).  
*Eusphaeropeltis aureola* Gestro, 1899. Indonesia (Sumatra).  
 \**Eusphaeropeltis aurora* (Lansberge, 1887) (*Synarmostes*). Indonesia (Sumatra).  
*Eusphaeropeltis borneensis* Paulian, 1978. Borneo.  
*Eusphaeropeltis boucomonti* Paulian, 1978. Indonesia (Sumatra).  
*Eusphaeropeltis celebicus* Paulian, 1978. Indonesia (Sulawesi).  
*Eusphaeropeltis corruscus* Gestro, 1899. Malaysia.  
*Eusphaeropeltis drescheri* Paulian, 1942. Indonesia (Java).  
*Eusphaeropeltis iris* Gestro, 1899. Indonesia (Sumatra).  
*Eusphaeropeltis kedahensis* Paulian, 1942. Indonesia (Sumatra).  
*Eusphaeropeltis krikkeni* Paulian, 1978. Indonesia (Sumatra).  
*Eusphaeropeltis modiglianii* Gestro, 1899. Indonesia (Sumatra).  
*Eusphaeropeltis pulcher* (Lansberge, 1885) (*Synarmostes*). Indonesia (Sumatra).  
*Eusphaeropeltis punctatissimus* (Lansberge, 1887) (*Synarmostes*). Brunei, Malaysia.  
*Eusphaeropeltis raapi* Gestro, 1899. Indonesia (Nias).  
*Eusphaeropeltis sabah* Paulian, 1989. Malaysia (Sabah).  
*Eusphaeropeltis scheuerni* Paulian, 1982. Indonesia (Sumatra).
- Germarostes** Paulian, 1982 (69).  
 Subgenus **Germarostes** Paulian, 1982.  
*Germarostes (Germarostes) allorgei* (Paulian, 1947) (*Cloeotus*). Dominica, Guadeloupe.  
*Germarostes (Germarostes) anchicayae* Paulian, 1982. Colombia.  
*Germarostes (Germarostes) antiquus* (Erichson in Germar, 1843) (*Acanthocerus*). Peru, Surinam, Venezuela.  
 \**Germarostes (Germarostes) aphodioides aphodioides* (Illiger, 1800) (*Melolontha*). Canada to Argentina.  
*Acanthocerus laevistriatus* Laporte, 1840 (synonym).  
*Scarabaeus latipes* Germar, 1824 (synonym).  
*Trox splendidus* Say, 1835 (synonym).  
*Germarostes (Germarostes) aphodioides prionomus* (Bates, 1887) (*Cloeotus*). Guatemala.

- Germarostes (Germarostes) argentinus* (Ohaus, 1911) (*Cloeotus*). Argentina.
- Germarostes (Germarostes) bidens* (Bates, 1887) (*Cloeotus*). Brazil, Panama.
- Germarostes (Germarostes) carinatus* Paulian, 1982. Ecuador.
- Germarostes (Germarostes) carltoni* Howden & Gill, 2005. Peru.
- Germarostes (Germarostes) costulatus* Paulian, 1982. Colombia.
- Germarostes (Germarostes) crassicolis* (Arrow, 1903) (*Cloeotus*). St. Vincent.
- Germarostes (Germarostes) degallieri* Paulian, 1982. Colombia, Ecuador, French Guiana.
- Germarostes (Germarostes) ecuadoricus* Paulian, 1982. Ecuador.
- Germarostes (Germarostes) excisus* (Bates, 1887) (*Cloeotus*). Guatemala, Mexico.
- Germarostes (Germarostes) farri* (Howden, 1970) (*Cloeotus*). Jamaica.
- Germarostes (Germarostes) gaujoni* Paulian, 1982. Ecuador.
- Germarostes (Germarostes) globosus* (Say, 1835) (*Trox*). Mexico, USA.
- Germarostes (Germarostes) heterodynamus* Paulian, 1982. Brazil.
- Germarostes (Germarostes) howdenicus* Paulian, 1982. Ecuador.
- Germarostes (Germarostes) infantulus* (Bates, 1887) (*Cloeotus*). Guatemala.
- Germarostes (Germarostes) instriatus* Paulian, 1982. Ecuador.
- Germarostes (Germarostes) jamaicensis* (Howden, 1978) (*Cloeotus*). Jamaica.
- Germarostes (Germarostes) leticiae* Paulian, 1982. Brazil, Colombia.
- Germarostes (Germarostes) macleayi* (Perty, 1830) (*Acanthocerus*). Guatemala, Panama, Colombia, French Guiana, Peru, Brazil, Bolivia, Argentina, Paraguay.
- Germarostes (Germarostes) oberthueri* Paulian, 1982. Brazil.
- Germarostes (Germarostes) pauliani* (Chalumeau and Cambefort, 1976) (*Cloeotus*). Guadeloupe
- Germarostes (Germarostes) pecki* (Howden, 1970) (*Cloeotus*). Jamaica.
- Germarostes (Germarostes) plicatus* (Erichson in Germar, 1843) (*Acanthocerus*). Mexico to Argentina except Chile.
- Germarostes (Germarostes) posticus* (Germar, 1843) (*Acanthocerus*). Argentina (?), Chile.
- Acanthocerus muricatus* Curtis, 1845. (synonym).
- Cloeotus posticus mochae* Gutiérrez, 1946 (synonym?).
- Germarostes (Germarostes) pullus* Paulian, 1982. Ecuador
- Germarostes (Germarostes) puncticollis* (Erichson in Germar, 1843) (*Acanthocerus*). Brazil, Ecuador, Paraguay.
- Germarostes (Germarostes) punctulatus* (Ohaus, 1911) (*Cloeotus*). Argentina, Bolivia, Brazil, Colombia, French Guiana, Paraguay.
- Germarostes (Germarostes) pusillus* (Laporte, 1840) (*Acanthocerus*). Colombia.
- Germarostes (Germarostes) pustulosus* (Lansberge, 1887) (*Cloeotus*). Colombia.
- Germarostes (Germarostes) reticularis* (Bates, 1887) (*Cloeotus*). Mexico.
- Germarostes (Germarostes) rotundatus* Paulian, 1982. Venezuela.
- Germarostes (Germarostes) rufopiceus* (Arrow, 1903) (*Cloeotus*). St. Lucia, St. Vincent.
- Germarostes (Germarostes) rugatus* (Germar, 1843) (*Acanthocerus*). Colombia.
- Acanthocerus rugosus* Germar, 1843 (synonym).
- Germarostes (Germarostes) salesiacus* Paulian, 1982. Brazil.
- Germarostes (Germarostes) semituberculatus* (Germar 1843) (*Acanthocerus*). Bolivia, Brazil, Paraguay, Peru, Venezuela.
- Cloeotus acuarius* Petrovitz, 1973 (synonym).
- Germarostes (Germarostes) sinuatus sejunctus* (Bates, 1887) (*Cloeotus*). Guatemala.
- Germarostes (Germarostes) sinuatus sinuatus* (Bates, 1887) (*Cloeotus*). Belize, Guatemala, Mexico.
- Germarostes (Germarostes) sticticus* (Erichson in Germar, 1843) (*Acanthocerus*). Brazil, French Guiana, Nicaragua, Suriname.
- Germarostes (Germarostes) strigilateris* (Bates, 1887) (*Cloeotus*). Mexico.
- Germarostes (Germarostes) sulcipennis* (Harold, 1875) (*Cloeotus*). Peru.
- Germarostes (Germarostes) viridis* (Lansberge, 1887) (*Cloeotus*). Mexico.

**Subgenus *Haroldostes*** Paulian, 1982.

- Germarostes (Haroldostes) abruptus* (Petrovitz, 1973) (*Cloeotus*). Brazil.
- Germarostes (Haroldostes) batesi* (Harold, 1874) (*Cloeotus*). Brazil, Bolivia.
- Germarostes (Haroldostes) brunnipes* (Germar, 1843) (*Acanthocerus*). Bolivia, Ecuador, Paraguay.
- Germarostes (Haroldostes) bugabensis* (Arrow, 1903) (*Cloeotus*). Panama.
- Germarostes (Haroldostes) columbianus* Paulian, 1982. Colombia.
- Germarostes (Haroldostes) diffundus* (Petrovitz, 1976) (*Cloeotus*). Brazil, Ecuador, Paraguay.
- Germarostes (Haroldostes) ecuadoriensis* (Petrovitz, 1976) (*Cloeotus*). Ecuador, Venezuela.
- Germarostes (Haroldostes) geayi* Paulian, 1982. Peru.
- Germarostes (Haroldostes) guyanensis* Paulian, 1982. French Guiana, Panama (?).
- Germarostes (Haroldostes) hamiger* (Ohaus, 1911) (*Cloeotus*). Argentina, Bolivia.
- Germarostes (Haroldostes) haroldi* (Arrow, 1911) (*Cloeotus*). Colombia, Venezuela.
- Cloeotus puncticollis* Harold, 1874 (synonym) (homonym of *Germarostes (Germarostes) puncticollis* Erichson in Germar, 1843).
- Germarostes (Haroldostes) indigaceus* (Germar, 1843) (*Acanthocerus*). Brazil, Colombia, Ecuador, Venezuela.
- Germarostes (Haroldostes) leprieuri* (Germar, 1843) (*Acanthocerus*). Brazil, Ecuador, French Guiana.
- Germarostes (Haroldostes) madeiranus* Paulian, 1982. Brazil.
- Germarostes (Haroldostes) malkini* Paulian, 1982. Brazil.
- Germarostes (Haroldostes) metallicus* (Harold, 1874) (*Cloeotus*). Brazil, Colombia, Ecuador, French Guiana.
- Germarostes (Haroldostes) nasutus* (Bates, 1887) (*Cloeotus*). Mexico.
- Germarostes (Haroldostes) nigerrimus* (Blanchard, 1841) (*Sphaerelytrus*). Bolivia, Colombia, Ecuador.
- Cloeotus grandis* Petrovitz, 1973 (synonym).
- Germarostes (Haroldostes) nitens* (Guérin-Méneville, 1839) (*Acanthocerus*). Costa Rica, Brazil, Honduras, Mexico, Panama.
- Cloeotus acutipes* Arrow, 1903 (synonym).

\**Germarostes (Haroldostes) rugiceps* (Germar, 1843) (*Acanthocerus*). Brazil, Panama (?), Paraguay.

*Germarostes (Haroldostes) senegalensis* (Laporte, 1840) (*Acanthocerus*). Brazil, French Guiana.

*Acanthocerus striatus* Germar, 1843 (synonym).

*Germarostes (Haroldostes) tibialis* (Petrovitz, 1973) (*Cloeotus*). Brazil.

*Germarostes (Haroldostes) tubercauda* (Bates, 1891) (*Cloeotus*). Colombia, Ecuador.

*Germarostes (Haroldostes) viridipennis* (Bates, 1887) (*Cloeotus*). Costa Rica, Panama.

*Germarostes (Haroldostes) viridulus* (Bates, 1887) (*Cloeotus*). Mexico.

***Glyptogermarostes* nom. nov.** (1).

*Glyptopterus* Paulian, 1982 (synonym, homonym of *Glyptopterus* de Chaudoir, 1838, Carabidae).

\**Glyptogermarostes oberthueri* (Paulian, 1982) (*Glyptopterus*). Brazil.

***Goudotostes*** Paulian, 1979 (1).

\**Goudotostes scabrosus* (Laporte, 1840) (*Acanthocerus*). Madagascar.

***Macrophilharmostes*** Paulian, 1978 (1).

\**Macrophilharmostes major* (Paulian, 1975) (*Cyphopishtes*). Papua New Guinea.

***Madrasostes*** Paulian, 1975 (28).

*Madrasostes agostii* Paulian, 1993. Indonesia (Sumatra).

*Madrasostes boucomonti* Paulian, 1978. Indonesia, Malaysia.

*Madrasostes burckhardti* Paulian, 1989. Malaysia.

*Madrasostes clypeale* Paulian, 1993. Indonesia (Sumatra).

*Madrasostes depressum* Paulian, 1992. Indonesia (Sumatra).

*Madrasostes feae* Gestro, 1899. India, Kampuchea, Myanmar, Nepal, Thailand.

*Madrasostes franzi* Paulian, 1978. Thailand.

*Madrasostes granulatum* (Paulian, 1975) (*Cloeotus*). Papua New Guinea.

*Madrasostes inaequale* Paulian, 1992. Indonesia (Sumatra).

*Madrasostes kazumai hisamatsui* Ochi, 1990. Japan.

- Madrasostes kazumai kazumai* Ochi, Johki, and Nakata, 1990. Japan.
- Madrasostes loebli* Paulian, 1981. Papua New Guinea (Bismarck Isl.).
- Madrasostes malayanum* Paulian, 1979. Malaysia.
- Madrasostes masumotoi* Paulian, 1987. Thailand.
- \**Madrasostes nigrum* Paulian, 1975. India.
- Madrasostes orousseti* Paulian, 1981. Philippines.
- Madrasostes parcepunctatum* Paulian, 1989. Malaysia.
- Madrasostes punctatum* Paulian, 1989. Malaysia.
- Madrasostes rafflesi* Paulian, 1979. Malaysia.
- Madrasostes reticulatum* (Lansberge, 1887) (*Synarmostes*). Indonesia (Sulawesi), Philippines.
- Madrasostes sabah* Paulian, 1989. Malaysia (Sabah).
- Madrasostes sculpturatum* Paulian, 1989. Indonesia, Malaysia.
- Madrasostes simplex* Paulian, 1989. Malaysia.
- Madrasostes sumatranum* Paulian, 1992. Indonesia (Sumatra).
- Madrasostes tamil* (Paulian, 1975b) (*Philharmostes*). India.
- Madrasostes thai* Paulian, 1987. Thailand.
- Madrasostes thoracicum* Paulian, 1989. Malaysia.
- Madrasostes tonkinense* (Paulian, 1945) (*Cloeotus*). Vietnam.
- Madrasostes variolosum* (Harold, 1874) (*Cloeotus*). Indonesia, Malaysia.
- Martinezostes** Paulian, 1982 (3).
- \**Martinezostes asper* (F. Philippi, 1859) (*Acanthocerus*). Chile.
- Martinezostes fortecostatus* (Gutiérrez, 1949). (*Cloeotus*). Chile.
- Martinezostes ruizi* (Gutiérrez, 1946) (*Cloeotus*). Chile.
- Melanophilharmostes** Paulian, 1968 (17).
- Philharmostes* (*Melanophilharmostes*) Paulian, 1968.
- Melanophilharmostes ashantii* (Paulian, 1974) (*Philharmostes*). Ghana.
- Melanophilharmostes bicarinatus* (Paulian, 1974) (*Philharmostes*). Ghana.
- Melanophilharmostes burgeoni* (Paulian, 1946) (*Pterorthochaetes*). Cameroon, Zaire, Angola (?).
- Melanophilharmostes carinatus* (Paulian, 1974) (*Philharmostes*). Ghana.
- Melanophilharmostes carvalhoi* (Martínez, 1970) (*Astaenomoechus*). Angola.
- Melanophilharmostes demirei* Paulian, 1977. Cameroon.
- Melanophilharmostes donisi* (Basilewsky, 1955) (*Pterorthochaetes*). Zaire.
- Melanophilharmostes endroedyi* (Paulian, 1968) (*Philharmostes*) (*Melanophilharmostes*) Zaire.
- Melanophilharmostes ghanae* (Paulian, 1974) (*Philharmostes*). Ghana, Togo.
- Melanophilharmostes ocellatus* (Paulian, 1968) (*Philharmostes*) (*Melanophilharmostes*). Congo.
- Melanophilharmostes palustris* (Petrovitz, 1968) (*Philharmostes*). Zaire.
- Melanophilharmostes puncticeps* (Paulian, 1946) (*Pterorthochaetes*). Zaire, Liberia.
- Melanophilharmostes posthi* (Paulian, 1937) (*Pterorthochaetes*). Ivory Coast, Liberia, Togo.
- Melanophilharmostes pseudoposthi* (Paulian, 1977). Zaire.
- Melanophilharmostes pygmaeus* (Petrovitz, 1968) (*Philharmostes*). Zaire.
- Melanophilharmostes vincenti* (Paulian, 1968) (*Philharmostes*) (*Melanophilharmostes*). Congo.
- \**Melanophilharmostes zicsii* (Paulian, 1968) (*Philharmostes*) (*Melanophilharmostes*). Cameroon, Congo, Gabon.
- Nesopalla** Paulian and Howden, 1982 (2).
- Nesopalla borinquensis* Paulian and Howden, 1982. Puerto Rico.
- \**Nesopalla iviei* Paulian and Howden, 1982. Puerto Rico, Virgin Islands.
- Paulianostes** Ballerio, 2000 (3).
- Paulianostes acromialis* (Pascoe, 1860) (*Sphaeromorphus*). Malaysia.
- Philharmostes arrowi* Paulian, 1942 (synonym).
- \**Paulianostes georyssoides* (Gestro, 1899) (*Cyphopisthes*). Indonesia, Malaysia.
- Paulianostes panggoling* Ballerio, 2000. Brunei, Malaysia (Sabah).
- Perignamptus** Harold, 1877 (4).

*Perignamptus carinipennis* Gestro, 1899.  
Papua New Guinea.

*Perignamptus loriae* Gestro, 1899. Papua  
New Guinea.

*Perignamptus rossi* Paulian, 1978. Indo-  
nesia (Irian Jaya).

\**Perignamptus sharpi* Harold, 1877.  
Papua New Guinea.

***Petrovitzostes*** Paulian, 1977 (1).

\**Petrovitzostes guineensis* (Petrovitz,  
1968) (*Pterorthochaetes*). Cameroon,  
Equatorial Guinea.

***Philharmostes*** Kolbe, 1895 (31).

Subgenus ***Philharmostes*** Kolbe, 1895.

*Philharmostes (Philharmostes) adami*  
Paulian, 1968. (*Philharmostes*) (*Ca-  
rinophilharmostes*). Congo, Guinea,  
Ivory Coast.

\**Philharmostes (Philharmostes) aeneo-  
viridis* Kolbe, 1895. Madagascar.

*Philharmostes (Philharmostes) basicollis*  
(Fairmaire, 1897). Madagascar.

*Philharmostes obscurus* Fairmaire,  
1900 (synonym).

*Philharmostes (Philharmostes) basi-  
levskiyi* Paulian, 1977. Tanzania.

*Philharmostes (Philharmostes) bicolor*  
Boucomont, 1937. Madagascar.

*Philharmostes (Philharmostes) bouco-  
monti* Petrovitz, 1968. Madagascar.

*Philharmostes (Philharmostes) caffer*  
(Martínez, 1970) (*Astaenomoechus*).  
Angola.

*Philharmostes (Philharmostes) corruscus*  
Fairmaire, 1903. Madagascar.

*Philharmostes pilula* Fairmaire, 1903  
(synonym).

*Philharmostes convexifrons* Fair-  
maire, 1903 (synonym).

*Philharmostes (Philharmostes) criberri-  
mus* Paulian, 1979. Madagascar.

*Philharmostes (Philharmostes) cribrarius*  
Fairmaire, 1903. Madagascar.

*Philharmostes (Philharmostes) cupreolus*  
Fairmaire, 1900. Madagascar.

*Philharmostes (Philharmostes) descarp-  
entriasi* Paulian, 1979. Madagascar.

*Philharmostes (Philharmostes) disparilis*  
Hesse, 1948. South Africa.

*Philharmostes (Philharmostes) garciabesi*  
(Martínez, 1970) (*Astaenomoechus*).  
Congo (= former Zaire).

*Philharmostes (Philharmostes) girardi*  
Paulian, 1993. Guinea.

*Philharmostes (Philharmostes) greben-  
nikovii* Ballerio, 2004. Tanzania.

*Philharmostes (Philharmostes) integer*  
Kolbe, 1895. Tanzania.

*Philharmostes (Philharmostes) interrup-  
tus* Hesse, 1948. South Africa.

*Philharmostes (Philharmostes) latericos-  
tatus* (Fairmaire, 1885) (*Synarmos-  
tes*). Madagascar.

*Synarmostes obscuraoeneus* Fair-  
maire, 1897 (synonym).

*Synarmostes perroti* Wasmann, 1897  
(synonym).

*Philharmostes (Philharmostes) olsoufieffi*  
Boucomont, 1937. Madagascar.

*Philharmostes (Philharmostes) ornatus*  
Ballerio, 2004. Tanzania.

*Philharmostes (Philharmostes) perrieri*  
(Fairmaire, 1898) (*Synarmostes*). Ma-  
dagascar.

*Philharmostes (Philharmostes) pseudoba-  
sicollis* Paulian, 1979. Madagascar.

*Philharmostes (Philharmostes) pseudum-  
bratilis* Ballerio, 2004. Tanzania.

*Philharmostes (Philharmostes) spelaeus*  
Paulian, 1979. Zaire.

*Philharmostes (Philharmostes) umbilica-  
tus* Petrovitz, 1968. Zaire, Guinea.

*Philharmostes (Philharmostes) umbrati-  
lis* Petrovitz, 1968. Tanzania.

*Philharmostes (Philharmostes) vadonia-  
nus* Paulian, 1979. Madagascar.

*Philharmostes (Philharmostes) wernerii*  
Ballerio, 2001. Tanzania.

*Philharmostes (Philharmostes) zuluensis*  
Hesse, 1948. South Africa.

Subgenus ***Holophilharmostes*** Paulian,  
1968.

\**Philharmostes (Holophilharmostes)*  
*badius* (Petrovitz, 1967) (*Pterortho-  
chaetes*). Cameroon, Congo, Zaire,  
Guinea.

*Philharmostes (Holophilharmostes)*  
*cohici* Paulian, 1968 (synonym).

***Pseudopterorthochaetes*** Paulian, 1977  
(7).

*Pseudopterorthochaetes cambeforti* Pau-  
lian, 1981. Ivory Coast.

*Pseudopterorthochaetes criberrimus* Pau-  
lian, 1977. Zaire, Gabon.

\**Pseudopterorthochaetes elytratus* (Pau-  
lian, 1946) (*Pterorthochaetes*). Came-  
roon, Zaire.

*Pseudopterorthochaetes endroedyi* (Paulian, 1974) (*Pterorthochaetes*). Ghana, Ivory Coast.

*Pseudopterorthochaetes hystrix* Paulian, 1991. Madagascar.

*Pseudopterorthochaetes kumasii* (Paulian, 1974) (*Pterorthochaetes*). Gabon, Ghana.

*Pseudopterorthochaetes machadoi* (Martínez, 1970) (*Astaenomoechus*). Angola.

***Pterorthochaetes*** Gestro, 1899 (21).

*Pterorthochaetes andamanus* Paulian, 1937. India (Andaman Islands).

*Pterorthochaetes armatus* Paulian, 1945. Vietnam.

*Pterorthochaetes brevis* (Sharp, 1875) (*Synarmostes*). Indonesia (Irian Jaya), Papua New Guinea.

*Acanthocerus* (*Sphaeromorphus*) *byrrhoides* Westwood, 1883 (synonym).

*Pterorthochaetes brevisetosus* Gestro, 1899. Singapore.

*Pterorthochaetes coomani* Paulian, 1945. Vietnam.

*Pterorthochaetes cribricollis* Gestro, 1899. Australia. Papua New Guinea.

\**Pterorthochaetes gestroi gestroi* (Harold, 1874) (*Synarmostes*). Indonesia, Malaysia.

*Pterorthochaetes gestroi longisetosus* Gestro, 1899. Singapore.

*Pterorthochaetes haroldi* (Sharp, 1875) (*Synarmostes*). Indonesia, Malaysia, Singapore.

*Pterorthochaetes hirtus* Gestro, 1899. Indonesia (Sumatra).

*Pterorthochaetes incertus* Gestro, 1899. Malaysia.

*Pterorthochaetes insularis* Gestro, 1899. Indonesia, Malaysia, Nepal, Thailand.

*Pterorthochaetes latus* (Sharp, 1875) (*Synarmostes*). Indonesia (Sumatra), Singapore.

*Pterorthochaetes lavongai* Paulian, 1968. Papua New Guinea (Bismarck Isl.).

*Pterorthochaetes laxepunctatus* Paulian, 1973. Papua New Guinea.

*Pterorthochaetes mallicoloi* Paulian, 1968b. Vanuatu Island.

*Pterorthochaetes montanus* Ballerio, 1999. Malaysia.

*Pterorthochaetes picinus* (Sharp, 1875) (*Synarmostes*). Micronesia, Philippines.

*Pterorthochaetes puncticollis* (Sharp, 1875) (*Synarmostes*). Indonesia (Java).

*Pterorthochaetes septemtrionalis* Ballerio, 1999. Nepal.

*Pterorthochaetes simplex* Gestro, 1899. Australia, Papua New Guinea.

*Pterorthochaetes sulawesii* Paulian 1987. Indonesia (Sulawesi).

***Synarmostes*** Germar, 1843 (4).

*Synarmostes antsingyi* Paulian, 1979. Madagascar.

*Synarmostes humilis* Fairmaire, 1893. Comores islands.

*Synarmostes niger* Paulian, 1979. Madagascar.

\**Synarmostes tibialis* (Klug, 1832) (*Acanthocerus*). Madagascar.

**Tribe Ivieolini Howden and Gill, 2000.**

***Ivieolus*** Howden and Gill, 1988 (3).

*Ivieolus brooksi* Howden and Gill, 2000. French Guiana.

*Ivieolus inflaticollis* Howden and Gill, 2001. Ecuador.

\**Ivieolus pseudoscutellatus* Howden and Gill, 1988. Guyana, Venezuela.

**Tribe Scarabatermitini Nikolajev, 1999.**

***Scarabaeinus*** Silvestri, 1940 (1).

\**Scarabaeinus termitophilus* Silvestri, 1940. Brazil.

***Scarabatermes*** Howden, 1973 (1).

\**Scarabatermes amazonensis* Howden, 1973. Colombia.

***Trachycrusus*** Howden and Gill, 1995 (2).

\**Trachycrusus lescheni* Howden and Gill, 1995. Peru.

*Trachycrusus striatulus* Howden and Gill, 1995. Peru.

***Xenocanthus*** Howden and Gill, 1988 (1).

\**Xenocanthus singularis* Howden and Gill, 1988. Venezuela.



**Hybosorinae Erichson, 1847.****Type genus *Hybosorus*** MacLeay, 1819.***Apalonychus*** Westwood, 1845 (4).*Hapalonychus* (incorrect subsequent spelling by Lacordaire 1856).*Haplonychus* (incorrect subsequent spelling by Petrovitz (1973)).*Trichops* Val, 1853 (synonym) (type species *Trichops testaceus* Val, 1853).*Apalonychus nattereri* Petrovitz, 1973. Brazil.*Apalonychus pusillus* Arrow, 1911. Paraguay.*Apalonychus rufulus* (Laporte, 1840) (*Hybosorus*). Dominican Republic.\**Apalonychus waterhousei* Westwood, 1846. Cuba, Dominican Republic.*Trichops testaceus* Val, 1853 (synonym)*Apalonychus rufulus* de Borre, 1886 (synonym).***Araeotanypus*** Waterhouse, 1875 (6).*Araeotanopus* (Incorrect subsequent spelling by Arrow [1912]).*Araeotanypus bicolor* Petrovitz, 1967. South Africa.\**Araeotanypus boops* Waterhouse, 1875. Botswana, South Africa.*Araeotanypus consors* Péringuey, 1908. South Africa.*Araeotanypus petheri* Petrovitz, 1967. South Africa.*Araeotanypus striatus* Schmidt, 1912. Tanzania.*Araeotanypus zumpti* Petrovitz, 1967. South Africa.***Celaenochrous*** Kuijten, 1984 (1).\**Celaenochrous sinensis* Kuijten, 1984. China.***Coilodes*** Westwood, 1845 (9).*Coelodes* (incorrect subsequent spelling by Lacordaire (1856)).*Coilodes castaneus* Westwood, 1846. Colombia, Costa Rica, Nicaragua.*Coilodes chilensis* Westwood, 1846. Chile (?). (doubtful distribution).*Coilodes fumipennis* Arrow, 1909. Brazil.\**Coilodes gibbus* (Perty, 1830) (*Hybosorus*). Brazil.*Coilodes testaceus* Pic, 1928 (synonym).*Hybosorus brasiliensis* (Laporte, 1840) (synonym).*Coilodes humeralis* (Mannerheim, 1829) (*Hybosorus*). Brazil.*Hybosorus niger* (Mannerheim, 1829) (synonym).*Hybosorus auget* Westwood, 1846 (synonym).*Coilodes nigripennis* Arrow, 1903. St. Vincent.*Coilodes ovalis* Robinson, 1948. Venezuela.*Coilodes parvulus* Westwood, 1846. Brazil.*Coilodes punctipennis* Arrow, 1909. Ecuador, Peru.***Coprologus*** Heer, 1847 (1).\* † *Coprologus gracilis* Heer, 1847. Germany.***Cretohybosorus*** Nikolajev, 1999 (2).\* † *Cretohybosorus buryaticus* Nikolajev, 1999. Russia (Siberia).† *Cretohybosorus striatulus* Nikolajev, 1999. Russia (Siberia).***Dicraeodon*** Erichson, 1847 (3).*Aporolaus* Bates, 1887 (synonym).\**Dicraeodon basalis* (Westwood, 1846) (*Chaetodus*? West.). French Guiana.*Dicraeodon fimbriatus* (Bates, 1887) (*Aporolaus*). Panama.*Dicraeodon punctatus* Arrow, 1911. Guatemala, Colombia.***Hapalonychoides*** Martínez, 1994 (1).\**Hapalonychoides similis* Martínez, 1994. Argentina, Paraguay.***Hybosoroides*** Benderitter, 1914 (1).\**Hybosoroides alluaudi* Benderitter, 1914. Kenya.***Hybosorus*** MacLeay, 1819 (5).*Hybosorus crassus* Klug, 1855. Congo, Zimbabwe, Mozambique.\**Hybosorus illigeri* Reiche, 1853. Africa, U.S.A., Mexico, Cuba, Haiti, Bahamas, Nicaragua, Venezuela, Israel, Saudi Arabia, Iran, Central Asia, Afghanistan, Pakistan, India, China, Vietnam, Portugal, Spain, France, Italy, Hungary, Greece, Bulgaria, Cyprus.*Scarabaeus arator* (Illiger, 1803) homonym of *Scarabaeus arator* (Fabricius 1792)*Hybosorus pinguis* Westwood, 1845 (synonym).

- Hybosorus roei* Westwood, 1845 (synonym).
- Hybosorus carolinus* LeConte, 1847 (synonym).
- Hybosorus nitidus* Lansberge, 1882 (synonym).
- Hybosorus illigeri nossibianus* Fairmaire, 1895 (synonym).
- Hybosorus illigeri palearcticus* Endrödi, 1957 (synonym).
- Hybosorus laportei* Westwood, 1845. Egypt, Ethiopia, Mauritania, Mali, Nigeria, Senegal, Togo.
- Hybosorus thoracicus* Westwood, 1845 (synonym).
- Hybosorus orientalis* Westwood, 1845. Afghanistan, Myanmar, India, Indonesia (Java), Pakistan, Sri Lanka, Indonesia.
- Hybosorus ruficornis* Boheman, 1857. Botswana, Kenya, Mozambique, Namibia, Somalia, South Africa, Zambia, Zimbabwe.
- Hypseloderus*** Fairmaire, 1893 (1).
- \**Hypseloderus denticollis* Fairmaire, 1893. Vietnam.
- Kuijtenous*** Paulian, 1981 (2).
- \**Kuijtenous laeviceps* (Fairmaire, 1893) (*Hybosorus*). Comores Islands, Madagascar.
- Hybosorus baliensis* Brancsik, 1893 (synonym).
- Phaeochroops insularis* Linell, 1897 (synonym).
- Kuijtenous tenuipunctatus* (Fairmaire, 1895) (*Hybosorus*). Madagascar.
- Hybosorus sparsepunctatus* Pic, 1930 (synonym).
- Metachaetodus*** de Borre, 1886 (2).
- Metachaetodus brunneicollis* de Borre, 1886, Argentina.
- \**Metachaetodus discus* de Borre, 1886, Uruguay.
- Microphaeochroops*** Pic, 1930 (5).
- Microphaeochroops* Pic 1930. (inadvertent error)
- \**Microphaeochroops hirsutus* Pic, 1930. Vietnam.
- Microphaeochroops laetus* Arrow, 1942. Malaysia.
- Microphaeochroops nigrosetosus* Kuijten, 1985. Malaysia.
- Microphaeochroops peninsularis* Arrow, 1942. Malaysia.
- Microphaeochroops varius* Kuijten, 1985. Malaysia.
- Microphaeolodes*** Kuijten, 1985 (1).
- \**Microphaeolodes mulumontis* Kuijten, 1985. Malaysia.
- Mimocoelodes*** Pic, 1930 (1).
- \**Mimocoelodes minutus* Pic, 1930. Vietnam.
- Pantolasius*** Lansberge, 1887 (2).
- Pantolasius bandaharae* Kuijten, 1985. Indonesia.
- \**Pantolasius vethi* Lansberge, 1887. Indonesia.
- Phaeochridius*** Lansberge, 1887 (2).
- \**Phaeochridius derasus* (Harold, 1880). (*Liparochnrus*). Indonesia.
- Phaeochridius haroldi* Fairmaire, 1896 (synonym).
- Phaeochridius uniformis* Arrow, 1925. Malaysia (Sabah).
- Phaeochridius benderitteri* Pic, 1928 (synonym).
- Phaeochridius cinereicollis* Arrow, 1942 (synonym).
- Phaeochroops*** Cand ze, 1876 (26).
- Phaeochroops* (incorrect subsequent spelling by Nomura (1973).
- Phaeochroops* (incorrect subsequent spelling by Pic (1928).
- Phaeochroops acuticollis* (Arrow, 1907) (*Phaeochridius*). Malaysia (Sabah).
- Phaeochroops angulatus* Benderitter, 1923. Philippines.
- Phaeochroops colopacilis* Kuijten, 1981. Vietnam.
- Phaeochroops curtulus* Schmidt, 1912. India.
- Phaeochroops freenae* Kuijten, 1981. Malaysia.
- Phaeochroops gigas* Arrow, 1907. Malaysia.
- Phaeochroops gilleti* Benderitter, 1923. Malaysia, Sabah, Philippines.
- Phaeochroops punctulatus* Arrow, 1942 (synonym).
- Phaeochroops hisaeae* Nishikawa, 1989. Malaysia, Sabah, Indonesia.
- Phaeochroops indicus* Arrow, 1907. India.
- Phaeochroops lakhonicus* Kuijten, 1981. Thailand.

- \**Phaeochroops lansbergei* Candèze, 1876. Indonesia.
- Phaeochroops laotianus* Paulian, 1945. Laos.
- Phaeochroops longisetosus* Kuijten, 1981. India.
- Phaeochroops maruyamai* Nishikawa, 1989. Malaysia, Sabah, Indonesia.
- Phaeochroops masumotoi* Nishikawa, 1996. Thailand.
- Phaeochroops meghalayicus* Keith, 2001. India.
- Phaeochroops myanmarensis* Keith, 2000. Myanmar.
- Phaeochroops ninbin* Kuijten, 1981. Vietnam.
- Phaeochroops opacicollis* Arrow, 1909. Myanmar, Thailand.
- Phaeochroops peninsularis* Arrow, 1909. Malaysia.
- Phaeochroops rattus* Arrow, 1909. Indonesia, Malaysia.
- Phaeochroops batuensis* Arrow, 1909 (synonym).
- Phaeochroops mentaweiensis* Arrow, 1909 (synonym).
- Phaeochroops niasianus* Arrow, 1909 (synonym).
- Phaeochroops seres* Kuijten, 1981. Vietnam.
- Phaeochroops silphoides* Fairmaire, 1898. Indonesia, Malaysia, Sabah, Philippines.
- Phaeochroops recticollis* Pic, 1928 (synonym).
- Phaeochroops taiwanus* Nomura, 1973. China (Taiwan).
- Phaeochroops vulpecula* Arrow, 1909. Indonesia, Malaysia.
- Phaeochroops vulturius* Kuijten, 1981. Indonesia.
- Phaeochrous*** Laporte, 1840 (51).
- Silphodes* Westwood, 1845 (synonym).
- Phaeochrous amplus* Arrow, 1909. Cameroon.
- Phaeochrous colmanti* Schouteden, 1918 (synonym).
- Phaeochrous bayeri* Schouteden, 1918 (synonym).
- Phaeochrous confusus* Schouteden, 1918 (synonym).
- Phaeochrous westwoodi* Schouteden, 1918 (synonym).
- Phaeochrous australicus* Kuijten, 1978. Australia.
- Phaeochrous beccarii* Harold, 1871. Ethiopia, Sudan, Tanzania, Yemen.
- Phaeochrous arabicus* Arrow, 1909 (synonym).
- Phaeochrous elgonensis* Schouteden, 1918 (synonym).
- Phaeochrous gonsalvesi* Petrovitz, 1975 (synonym).
- Phaeochrous niloticus* Burgeon, 1928 (synonym).
- Phaeochrous stercorarius* Kolbe, 1895 (synonym).
- Phaeochrous tangensis* Schouteden, 1918 (synonym).
- Phaeochrous beccarii*, Schmidt, 1913 (synonym).
- Phaeochrous bicarinatus* Kuijten, 1986. Uganda, Rwanda, Burundi.
- Phaeochrous borealis* Kuijten, 1984. China.
- Phaeochrous burgoblitus* Kuijten, 1986. Zaire, Uganda, Rwanda.
- Phaeochrous kivuensis* Burgeon. (*nomen nudum*).
- Phaeochrous camerunensis* Arrow, 1909. Cameroon, Gabon, Nigeria, Congo, Zaire, Sudan, Ethiopia, Tanzania, Zambia, Rwanda, Burundi, Uganda, Mozambique, South Africa.
- Phaeochrous boranus* Müller, 1939 (synonym).
- Phaeochrous mashunus* Arrow 1909 (synonym).
- Phaeochrous zombensis* Schouteden, 1918 (synonym).
- Phaeochrous vicinus* Schouteden, 1918 (synonym).
- Phaeochrous compactus* Kuijten, 1978. Sri Lanka.
- Phaeochrous davaonis* Kuijten, 1981. Philippines.
- Phaeochrous dispar* Quedenfeldt, 1884. Angola, Zaire.
- Phaeochrous thomensis* Arrow, 1909 (synonym).
- Phaeochrous kuiuensis* Schouteden, 1918 (synonym).
- Phaeochrous dissimilis dissimilis* Arrow, 1909. Myanmar, China, Laos, Thailand, Vietnam.
- Phaeochrous dissimilis vietnamicola* Kuijten, 1978. China, Vietnam.
- Phaeochrous diversipes* Pic, 1928. India.
- Phaeochrous dubius* (Westwood, 1846) (*Silphodes*). Indonesia.
- Phaeochrous elevatus* Kuijten, 1978. Sri Lanka.

- Phaeochrous emarginatus benderitteri* Pic, 1928. Indonesia (Waigeu Island).  
*Phaeochrous rugosicollis* Benderitter, 1913 (synonym).  
*Phaeochrous celebensis* var. *ruficeps* Pic, 1928 (synonym).  
*Phaeochrous emarginatus buruensis* Kuijten, 1978. Indonesia (Buru Island)  
*Phaeochrous emarginatus davidis* Fairmaire, 1886. China.  
 \**Phaeochrous emarginatus emarginatus* Laporte, 1840. Japan, Melanesia, China, India, Thailand, Buthan, Laos, Vietnam, Malaysia, Indonse-sia, Philipines, Papua New Guinea, Australia.  
*Phaeochrous sumatrensis* (Westwood, 1846) (*Silphodes*) (synonym).  
*Phaeochrous hirtipes* (MacLeay, 1864) (*Silphodes*) (synonym).  
*Phaeochrous alternatus* Fairmaire, 1879 (synonym).  
*Phaeochrous asiaticus* Lewis, 1896 (synonym).  
*Phaeochrous pallidus* Arrow, 1909 (synonym).  
*Phaeochrous celebensis* Pic, 1928 (synonym).  
*Phaeochrous perroudi* Pic, 1943 (synonym).  
*Phaeochrous gracilis* Petrovitz, 1975 (synonym).  
*Phaeochrous emarginatus thilliezi* Keith, 1999. Pakistan.  
*Phaeochrous emarginatus suturalis* Lansberge, 1885. (Myanmar).  
*Phaeochrous enigmaticus* Kuijten, 1978. Bangladesh, China, Indonesia.  
*Phaeochrous gambiensis* (Westwood, 1846) (*Silphodes*). Gambia, Senegal, Burkina, Chad.  
*Phaeochrous gigas* Schouteden, 1918. Africa.  
*Phaeochrous latus* Pic, 1944 (synonym).  
*Phaeochrous hainanensis* Zhang-Youwei, 1990. China.  
*Phaeochrous indicus* (Westwood, 1846) (*Silphodes*). India.  
*Phaeochrous intermedius intermedius* Pic, 1928. Bhutan, China, India, Laos, Thailand, Vietnam.  
*Phaeochrous intermedius occidentalis* Kuijten, 1978. Bhutan.  
*Phaeochrous lobatus* Kuijten, 1978. Philipines.  
*Phaeochrous madagascariensis* (Westwood, 1846) (*Silphodes*). Madagascar.  
*Phaeochrous madrassicus* Kuijten, 1978. India.  
*Phaeochrous nicolasi* Keith, 2002. Australia.  
*Phaeochrous nitidus* Arrow, 1909. Tanzania.  
*Phaeochrous arrowi* Schouteden 1918 (synonym).  
*Phaeochrous philippinensis* (Westwood, 1846) (*Silphodes*). Philippines.  
*Phaeochrous pletus* Kuijten, 1978. East Timor.  
*Phaeochrous portuum* Kuijten, 1978. New Guinea.  
*Phaeochrous pseudintermedius* Kuijten, 1978. Vietnam.  
*Phaeochrous rhodesianus* Schouteden, 1918. Zimbabwe.  
*Phaeochrous kapiriensis* Schouteden, 1918 (synonym).  
*Phaeochrous rudis* Kuijten, 1984. Indonesia.  
*Phaeochrous ruficollis* Fairmaire, 1893. Vietnam.  
*Phaeochrous rufus* Pic, 1928. China.  
*Phaeochrous schoutedeni* Burgeon, 1928. Central Africa.  
*Phaeochrous separabilis* Zhang-Youwei, 1990. China.  
*Phaeochrous stupendus* Kuijten, 1986. Equatorial Africa.  
*Phaeochrous sulawesi* Kuijten, 1978. Indonesia.  
*Phaeochrous tanzanicus* Tagliaferri, 2002. Tanzania.  
*Phaeochrous tonkineus* Pic, 1943. Vietnam.  
*Phaeochrous tumbanus* Burgeon, 1928. Angola, Ivory Coast, Congo, Zambia, Central African Republic, Gabon, Ethiopia, Gabon, Kenya, Rwanda, Burundi, Tanzania, Uganda.  
*Phaeochrous tokaraensis* Nomura, 1961. Japan.  
*Phaeochrous turcanicola* Kuijten, 1986. Kenya.  
*Phaeochrous uelensis* Burgeon, 1928. Gabon, Cameroon, Zaire, Uganda, Mozambique, Madagascar.  
*Phaeochrous usambarae* Burgeon, 1928. Tanzania.

**Phaeocroides** Péringuey, 1908 (5).

*Phaeocroides* (incorrect subsequent spelling by Schmidt (1913).

\**Phaeocroides damarinus* Péringuey, 1908. Namibia.

*Phaeocroides effetus* (Kolbe, 1907) (*Phaeocrhous*?). Namibia, Botswana.

*Phaeocroides juvenilis* Kolbe, 1912. (synonym).

*Phaeocroides nanus* (Arrow, 1942) (*Phaeocrhous*). India, Pakistan.

*Phaeocroides mapellii* Petrovitz, 1972. Bangladesh.

*Phaeocroides orientalis* (Petrovitz, 1963) (*Araeotanopus*). India.

**Procoilodes** Ocampo, 2002 (1).

\* † *Procoilodes adrastus* Ocampo, 2002. Dominican Republic.

**Seleucosorus** Kuijten, 1983 (1).

\* *Seleucosorus punctatissimus* (Reiche, 1861) (*Hybosorus*). Syria, Turkey.

**Tyrannasorus** Ratcliffe and Ocampo, 2001 (1).

\* † *Tyrannasorus rex* Ratcliffe and Ocampo, 2001. Dominican Republic.

### **Liparochrinae Ocampo, 2006**

**Type species** *Liparochrus* Erichson, 1848.**Antiochrus** Sharp, 1873 (7).

*Antiochrus aberrans* (Fairmaire, 1877). (*Liparaochrus*). Australia.

\* *Antiochrus brunneus* Sharp, 1873. Australia.

*Antiochrus oblongus* Harold, 1873 (synonym).

*Antiochrus freyi* Petrovitz, 1963. Australia.

*Antiochrus politulus* (MacLeay, 1888) (*Liparaochrus*). Australia.

*Antiochrus septentrionalis* Petrovitz, 1968. Australia.

*Antiochrus setosus* Petrovitz, 1963. Australia.

*Antiochrus similis* Petrovitz, 1971. Australia.

**Liparochrus** Erichson, 1848 (41).

*Ranidia* Paulian, 1980 (synonym).

Subgenus uncertain.

*Liparochrus asperulus* Fairmaire, 1877. Australia.

**Subgenus Liparochrus** Erichson 1848.

*Liparochrus (Liparochrus) bimaculatus* Macleay, 1864. Australia.

*Liparochrus (Liparochrus) crassicollis* Arrow, 1925. Papua New Guinea.

*Liparochrus (Liparochrus) dilatatifrons* Blackburn, 1905. Australia.

*Liparochrus dilatatifrons* Arrow, 1912 (misspelling)(synonym).

*Liparochrus timidus* Arrow, 1909 (synonym).

*Liparochrus (Liparochrus) dolium* Heller, 1912. Papua New Guinea.

*Liparochrus (Liparochrus) dux* Arrow, 1909. Papua New Guinea.

*Liparochrus (Liparochrus) eungellae* Paulian, 1980. Australia.

*Liparochrus (Liparochrus) fossulatus* Westwood, 1852. Australia.

\* *Liparochrus (Liparochrus) geminatus* Westwood, 1852. Australia.

*Liparochrus (Liparochrus) hackeri* Blackburn, 1912. Australia.

*Liparochrus freyi* Petrovitz, 1963 (synonym).

*Liparochrus (Liparochrus) insularis* Petrovitz, 1980. Lord Howe Island.

*Liparochrus (Liparochrus) krikkeni* Paulian, 1980. Papua New Guinea.

*Liparochrus (Liparochrus) laevipennis* Petrovitz, 1963. Australia.

*Liparochrus (Liparochrus) laevis* Paulian, 1980. Australia.

*Liparochrus (Liparochrus) laevissimus* Paulian, 1980. Australia.

*Liparochrus (Liparochrus) matthewsi* Paulian, 1980. New Caledonia.

*Liparochrus (Liparochrus) nanus* Paulian, 1980. Australia.

*Liparochrus (Liparochrus) nitidicollis* Blackburn, 1905. Australia.

*Liparochrus (Liparochrus) occidentalis* Paulian, 1980. Australia.

*Liparochrus (Liparochrus) papuus* Lansberge, 1885. Papua New Guinea.

*Liparochrus alternatus* Macleay, 1886 (synonym).

*Liparochrus (Liparochrus) quadrimaculatus* Harold, 1877. Australia.

*Liparochrus (Liparochrus) rufus* Blackburn, 1892. Australia.

*Liparochrus (Liparochrus) sculptilis* Westwood, 1852. Australia.

- Liparochnrus ciliboides* Harold, 1875 (synonym).  
*Liparochnrus (Liparochnrus) septentrionalis* Paulian, 1980. Australia.  
*Liparochnrus (Liparochnrus) silphoides* Harold, 1874. Australia.  
*Liparochnrus raucus* Fairmaire, 1877 (synonym).  
*Liparochnrus (Liparochnrus) sulcatus* (Montrouzier, 1860). (*Sphaeridium*). New Caledonia.  
*Sphaeridium sulcatus* Montrouzier, 1860 (synonym).
- Subgenus **Parolichrus** Allsopp, 1982.  
 \**Liparochnrus (Parolichrus) ingens* Felsch, 1909. Papua New Guinea.  
*Liparochnrus ingenti*, Heller 1912 (synonym).  
*Liparochnrus (Parolichrus) lugubris* Arrow, 1925. Indonesia, Papua New Guinea.
- Subgenus **Ranidichrus** Allsopp, 1982.  
*Liparochnrus (Ranidichrus) cahilli* Paulian, 1980. Australia.  
*Liparochnrus (Ranidichrus) carnei* Paulian, 1980. Australia.  
*Liparochnrus (Ranidichrus) crenatulus* Fairmaire, 1877. Australia.  
*Liparochnrus crenulatus*, Lansberge, 1885 (synonym).  
*Liparochnrus weyersi* Petrovitz, 1971 (synonym).  
*Liparochnrus (Ranidichrus) darlingtoni* Paulian, 1980. Australia.  
*Liparochnrus (Ranidichrus) demarzi* Petrovitz, 1963. Australia.  
*Liparochnrus (Ranidichrus) globuliformis* Macleay, 1888. Australia.  
*Liparochnrus (Ranidichrus) infantus* Petrovitz, 1963. Australia.  
*Liparochnrus (Ranidichrus) irianae* Paulian, 1980. Indonesia, Papua New Guinea.  
*Liparochnrus (Ranidichrus) modestus* Paulian, 1980. Papua New Guinea.  
 \**Liparochnrus (Ranidichrus) multistriatus* Harold, 1874. Australia.  
*Liparochnrus pimelioides* Lansberge, 1885 (synonym).  
*Liparochnrus pimeloides*, Schimdt, 1913 (misspelling).  
*Liparochnrus (Ranidichrus) septemdecimlineatus* Petrovitz, 1968. Australia.
- Liparochnrus (Ranidichrus) tropicus* Petrovitz, 1963. Australia.
- Subgenus **Ropalichrus** Allsopp, 1982.  
*Liparochnrus (Ropalichrus) monteithi* Paulian, 1980. Australia.  
 \**Liparochnrus (Ropalichrus) storeyi* Paulian, 1980. Australia.
- Pachyplectrinae Ocampo, 2006**
- Type species *Pachyplectrus* LeConte, 1874.
- Pachyplectrus** LeConte, 1874 (1).  
 \**Pachyplectrus laevis* LeConte, 1874. U.S.A.
- Brenskea** Reitter, 1891 (2).  
*Spermohybosorus* Pic 1922. (synonym).  
*Brenskea chudeaui* Reitter, 1909. Algeria.  
 \**Brenskea coronata* Reitter, 1891. Central Asia, Iran, Israel, Morocco, Algeria, Tunisia, Libya, Egypt, Azerbaijan, Russia.  
*Brenskea varentzovi* Semenov, 1896 (synonym).  
*Spermohybosorus testaceous* Pic, 1922 (synonym).
- Incertae sedis**
- Borrochnrus** Allsopp, 1979 (2).  
*Trichops* de Borre, 1886. (preoccupied homonym). (type species *Trichops ciliatus* de Borre, nec Val, 1853).  
 \**Borrochnrus ciliatus* (de Borre, 1886). (*Trichops*). Brazil, Paraguay, Argentina.  
*Borrochnrus mutilus* (Petrovitz, 1968). (*Trichops*). Paraguay.
- Daimothoracodes** Petrovitz, 1970 (4).  
*Daimothoracodes confossus* Ocampo and Vaz-de-Mello, 2002. Brazil.  
*Daimothoracodes magnificus* Martínez, 1994. Bolivia, Argentina.  
 \**Daimothoracodes mirabilis* Petrovitz, 1970. Brazil.  
*Daimothoracodes rugomarginatus* Ocampo, 2005. Brazil.

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### ABOUT THE AUTHOR



Federico Ocampo collecting in Patagonia, Argentina, January 2006.

Dr. Federico Ocampo received his Ph.D. from the University of Nebraska-Lincoln in 2004 and is now the Entomology Collections Manager at the University of Nebraska State Museum. His research interests include the evolution, systematics, biogeography, and conservations of scarab beetles. His current research is on the phylogenetics, biogeography, and evolution of Neotropical scarabs.

Ocampo is originally from Argentina and spent most of his childhood and younger years in Patagonia, Argentina, where he discovered his passion for entomology. Ocampo started his career in evolutionary biology in La Plata University, Argentina, where he received his Licenciatura en Zoología. At La Plata University he worked as a teaching and research assistant at the Laboratorio de Biología Evolutiva under

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In 1999, Drs. Brett Ratcliffe and Mary Liz Jameson offered Ocampo a Ph.D. assistantship position at the University of Nebraska-Lincoln to conduct scarab systematics research. While a graduate student, he received several awards for excellence in teaching and research. At UNL, Ocampo's research resulted in several publications, including monographic revisions, phylogenetic analysis, dung beetle evolution and behavior, conservation, and biogeography. He also conducted research trips to many countries in Latin America.

Ocampo is one of the few experts who study the scarab family Hybosoridae. This monograph on the hybosorids is the main product of Ocampo's research endeavors as a Ph.D. student.