STUDIES ON WEST INDIAN TENEBRIONIDAE (COLEOPTERA)

by

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ABSTRACT

The West Indian *Cyrtosoma* are revised. Three species are described: *Cyrtosoma dominicae* Spiessberger and Ivie, **new species** from Dominica, *Cyrtosoma luciae* Spiessberger and Ivie, **new species** from Saint Lucia and *Cyrtosoma vincenti* Spiessberger and Ivie, **new species** from Saint Vincent. A key to the West Indian species is provided. Authorship of *Cyrtosoma lherminierii* (Guérin-Méneville) is clarified. *Platydema picea* Laporte and Brullé, 1831, is placed in *Hesiodus* Champion as *Hesiodus piceus* (Laporte and Brullé) **new combination**, a senior synonym of *Hesiodus caraibus* Fleutiaux and Sallé **new synonymy**.

A new genus of Anopidiina and thirteen new species are described from the West Indies. *Prototyrtaeus* Spiessberger and Ivie, **new genus** (type species *Prototyrtaeus darlingtoni* Spiessberger and Ivie, **new species**) is described from the Greater Antilles islands of Cuba, Jamaica, Hispaniola, and Puerto Rico, with 13 new species: *Prototyrtaeus duartei* Spiessberger and Ivie, **new species**; *Prototyrtaeus neiba* Spiessberger and Ivie, **new species**; *Prototyrtaeus obrieni* Spiessberger and Ivie, **new species**; *Prototyrtaeus pecki* Spiessberger and Ivie, **new species**; *Prototyrtaeus gracilicornis* Spiessberger and Ivie, **new species**; *Prototyrtaeus howdeni* Spiessberger and Ivie, **new species**; *Prototyrtaeus sandersoni* Spiessberger and Ivie, **new species**; *Prototyrtaeus beckeri* Spiessberger and Ivie, **new species**; *Prototyrtaeus darlingtoni* **new species**; *Prototyrtaeus maestrensis* Spiessberger and Ivie, **new species**; *Prototyrtaeus felis* Spiessberger and Ivie, **new species**; *Prototyrtaeus turquinensis* Spiessberger and Ivie, **new species**; *Prototyrtaeus aureocornis* Spiessberger and Ivie, **new species**. Wolcott's enigmatic single record of Byrrhidae for the West Indies hitherto is resolved as a misidentification of *P. obrieni*.

CHAPTER ONE

INTRODUCTION

Islands, as subjects of biology, have provided excellent sites for evolution and biogeography studies since Darwin (1859), with his studies on the Galapagos archipelago. The West Indies are no different, as they have been subject of such studies for centuries, representative examples of which include Darlington 1943, 1957; Williams 1972, 1973; Liebherr 1988; Hedges 1989, 2006.

Some of these studies provided novel insights on species diversity on islands, and have led to important ecological and biogeographical studies, such as the book "The Theory of Island Biogeography" (MacArthur and Wilson 1967). Therefore, understanding the taxonomy of the groups, and describing new taxa from this kind of environment is crucial for understanding the evolutionary processes that occurred in the region, as well as enabling the continuation of such studies.

Tenebrionidae are a very diverse group of Coleoptera, consisting of more than 20,000 species worldwide (Matthews *et al*. 2010). According to the recently published Catalogue of Tenebrionidae of North America (Bousquet *et al*. 2018) (which includes the West Indies and Central America), there are currently 655 described species in the West Indies.

Taxonomic treatment of tenebrionid groups from the West Indies have been done since Linnaeus, and have rapidly increased in frequency since the 1960's. Description of

new species and nomenclatural acts have predominated (Marcuzzi 1998, 1999; Ivie 2005; Hopp and Ivie 2008; Hart and Ivie 2017), but more comprehensive faunal projects (Soldati and Touroult 2014) and revisions have become increasingly more common in the last few decades (Campbell 1966, 1971, Watrous and Triplehorn 1982, Triplehorn and Merkl 1997, Hopp and Ivie 2009, Smith and Sanchez 2015, Hart and Ivie 2016), and have sometimes also dealt with phylogenetic relationships of the groups (Hopp and Ivie 2009). Still, a majority of the fauna remains unrevised.

This thesis is separated into two main parts, one dealing with the revision of *Cyrtosoma* Perty, 1830 (Stenochiinae: Cnodalonini), and the other with the description of a new genus and thirteen new species (Diaperinae: Anopidiina). *Cyrtosoma* is a diverse Neotropical genus of the Cnodalonini that contains 84 recognized species. However, the focus here is only on the West Indian species group, with four available species names, one of which is moved to another genus. We also describe three new species, resulting in a total of six species. The second part is the description of a new genus comprising thirteen new species, all endemic to the West Indies, of the subtribe Anopidiina, an understudied group. At the same time old records regarding the family Byrrhidae (Wolcott 1936, 1951; Blackwelder 1944) are also dealt with because of the misidentification of a species that is described herein.

This is a small, but yet necessary addition to West Indian Tenebrionidae faunal studies. In the West Indian Beetle Fauna Project collection, and others, there remain many Tenebrionidae to be described.

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CHAPTER TWO

REVISION OF THE WEST INDIAN *CYRTOSOMA* PERTY (COLEOPTERA: TENEBRIONIDAE: CNODALONINI), WITH DESCRIPTIONS OF THREE NEW SPECIES

Contribution of Author and Co-Author

Manuscripts in Chapters 2 and 3

Author: Erich L. Spiessberger

Contributions: Identified specimens, reviewed literature, wrote the key to species, wrote species descriptions, photographed specimens, prepared figures and wrote the first draft of the manuscript.

Co-Author: Michael A. Ivie

Contributions: Helped conceive the project, collected specimens, assembled loaned material, assisted in species definition and character development, provided feedback on early drafts of the manuscript.

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ABSTRACT

The West Indian *Cyrtosoma* are revised. Three species are described: *Cyrtosoma dominicae* Spiessberger and Ivie, **new species** from Dominica, *Cyrtosoma luciae* Spiessberger and Ivie, **new species** from Saint Lucia and *Cyrtosoma vincenti* Spiessberger and Ivie, **new species** from Saint Vincent. A key to the West Indian species is provided. Authorship of *Cyrtosoma lherminierii* (Guérin-Méneville) is clarified. *Platydema picea* Laporte and Brullé, 1831, is placed in *Hesiodus* Champion as *Hesiodus piceus* (Laporte and Brullé) **new combination**, a senior synonym of *Hesiodus caraibus* Fleutiaux and Sallé **new synonymy**.

Key Words: Stenochiinae, taxonomy, darkling beetles, biogeography, *Hesiodus*

INTRODUCTION

The current publication is a continuation of a goal attempting to make the West Indian Tenebrionidae fauna taxonomically tractable. It follows a series of revisions and reviews of genera aimed at clarifying the highly confused state of nomenclature that currently exists (Hopp and Ivie 2009; Hart and Ivie 2016; Ivie and Hart 2016; etc.). Like those previous studies, understanding of the genus *Cyrtosoma* Perty, 1830 has been hindered due to problems with identification, distribution, and species definitions, as well as the presence of undescribed species. The present aims to correct those problems.

Cyrtosoma was originally described for the single species *Cyrtosoma unicolor* Perty, 1830, from Brazil. Perty (1830) diagnosed it as having dilated apical antennomeres, a small penultimate tarsomere and a gibbous body. Today, *Cyrtosoma* is now known to be a large Neotropical genus, with 84 recognized species (Marcuzzi 1991, 1994, 1999, 2002, 2006; Hopp and Ivie 2009) placed in the Cnodalonini Oken, 1843 (Doyen 1989; Bouchard *et al*. 2011).

There are currently four described species in the West Indian fauna, one of which is herein removed. Three more newly-described are added, leading to a total of six species now known in the West Indies. The oldest West Indian name in *Cyrtosoma* is *Platydema picea* Laporte and Brullé, 1831, described from Guadeloupe. Gebien (1911) transferred it to *Cyrtosoma.* However, others treated it as two different species, and included it in parallel classifications in both genera (e.g. Peck *et al*. 2014; Soldati and Touroult 2014; Peck 2016). This mysterious species is treated more fully below, where it is removed from *Cyrtosoma*.

Guérin-Méneville (1833) illustrated a new species identified by Chevrolat as *Cnodalon atrum* Guérin-Méneville, 1833, unaware that Lepeletier and Audinet-Serville (1825) had already used that name. Guérin-Méneville (1844) gave the replacement name *Cnodalon lherminierii* Guérin-Méneville, 1844, the authorship of which has been credited to Chevrolat. The issue of authorship is clarified below. This species was moved to *Cyrtosoma* for the first time by Fleutiaux and Sallé (1889).

Marcuzzi (1976) established *Nesocyrtosoma* Marcuzzi, 1976, as a subgenus of *Cyrtosoma* for three species from the Greater Antilles. This was shortly followed by Marcuzzi's (1977) description of *Cyrtosoma jamaicensis* Marcuzzi, 1977, in *Cyrtosoma sensu stricto* from Jamaica. Doyen's (1989) work on the Cnodalonini raised Marcuzzi's subgenus *Nesocyrtosoma* to a full genus, separating the two by the character of exposed (*Cyrtosoma*) vs. hidden (*Nesocyrtosoma*) clypeal membrane, a definition followed by Doyen and Poinar (1994). In 1996, Garrido and Gutiérrez described a Cuban species in *Cyrtosoma*, but placing it in the subgenus *Nesocyrtosoma*, apparently missing Doyen's (1989) elevation of *Nesocyrtosoma* to a full genus. They also extensively rearranged the species of *Nesocyrtosoma*, but did not further impact *Cyrtosoma sensu stricto*. Marcuzzi (1998), without noting Doyen (1989), Doyen and Poinar (1994), nor Garrido and Gutiérrez (1996), again rearranged the species names of *Nesocyrtosoma*, but did not use that name, and placed everything in *Cyrtosoma sensu stricto*. Marcuzzi (1999) again did not note Doyen (1989), Doyen and Poinar (1994), nor Garrido and Gutiérrez (1996), this time recognized *Nesocyrtosoma* as a subgenus and added the subgenus, *Pachycyrtosoma* Marcuzzi, 1999 to *Cyrtosoma*. In that paper, he also described three new *Cyrtosoma*

sensu stricto in the current sense, including two from the West Indies — *Cyrtosoma martiniquensis* [*sic*], Marcuzzi, 1999, from Martinique and *Cyrtosoma grenadensis* [*sic*] Marcuzzi, 1999, from Grenada, incorrectly forming the species names with masculine endings for a neuter genus.

Ivie (2005) moved the only Greater Antillean *Cyrtosoma sensu stricto*, *Cyrtosoma jamaicensis*, to synonymy with the alleculine *Obesacula aptera* Campbell, 1971. Hopp and Ivie (2009, see also Hopp *et al*. 2014, ICZN 2017) returned *Nesocyrtosoma* (and its synonym *Pachycyrtosoma*), with all the Greater Antillean "*Cyrtosoma*" to full generic status, leaving only Lesser Antillean records in the West Indian fauna.

Cyrtosoma lherminierii, originally known only from Guadeloupe, was later used for records from the islands of Montserrat, Dominica, Saint Vincent, and Grenada. Champion (1896) added the Saint Vincent and Grenada records based on specimens in the NMNH. They constitute material of what is called herein *Cyrtosoma grenadense* and the type series of *Cyrtosoma vincenti* **new species**. Leng and Mutchler (1917) added a record for Montserrat, apparently based on the NMNH specimens from that island discussed below. Blackwelder (1945) added a record for Dominica, apparently based on the specimens here designated as paratypes of *Cyrtosoma dominicae* **new species**. Marcuzzi (1999) added new species from Martinique and Grenada, without comparing the Grenada species to *C. lherminierii*, leaving the Grenada record for that species in place. Ivie *et al*. (2008) attributed the Montserrat record to an undescribed species, and Ivie (2009) mentioned an undescribed species on Saint Lucia. The mistaken inclusion of the South American *Cyrtosoma arimense* Marcuzzi, 1999, in the Lesser Antillean fauna

of North America by Bousquet *et al*. 2018 rounds out the error-riddled history of this genus in the West Indies. Thus, as of the beginning of our study, four named and two unnamed species of West Indian *Cyrtosoma* were recognized, all from the Lesser Antilles, all in *Cyrtosoma sensu stricto*: *Cyrtosoma piceum* (Guadeloupe), *Cyrtosoma lherminierii* (Guadeloupe, Dominica, Saint Vincent, and Grenada), *Cyrtosoma martiniquense* (Martinique), and *Cyrtosoma grenadense* (Grenada), plus purportedly new species from Montserrat and Saint Lucia.

In the present study, we reexamined all available material from the region, revised the species concepts and provided descriptions of three new species, *C. dominicae, Cyrtosoma luciae* **new species**, *C. vincenti*, a redescription of *C. lherminierii*, as well as additions to the descriptions of *C. martiniquense* and *C. grenadense*. A key and illustrations for all species are also provided. Lastly, we clarify the authorship of *C. lherminierii* and place *C. piceum* in *Hesiodus* Champion, 1885.

MATERIAL AND METHODS

Specimens from the following collections were studied:

AMNH – American Museum of Natural History, New York, NY (Lee H. Herman).

BMNH – The Natural History Museum, London, UK (Maxwell V. L. Barclay).

CDFA – California State Collection of Arthropods, Sacramento, CA, USA (Andrew R. Cline).

CMNC – Canadian Museum of Nature, Ottawa, ON, Canada (François Génier and Robert S. Anderson).

FSCA – Florida State Collection of Arthropods, Gainesville, FL (Paul Skelley).

HNHM – Hungarian Natural History Museum, Budapest, Hungary (Ottó Merkl).

MNHN – Muséum national d'Histoire naturelle, Paris (Antoine Mantilleri).

NMNH – National Museum of Natural History, Washington, DC (Warren E. Steiner, Jr.).

WIBF – West Indian Beetle Fauna Project Collection, Montana State University, Bozeman, MT (Michael A. Ivie).

Label data are recorded following the convention of Ivie (1985), with lines separated by a semicolon (;) and labels by a slash (/). Specimens were studied on a Leica® Wild M3C stereoscope equipped with an LED ring light. Photographs were taken with a JVC® KY-F75U digital camera attached to a Leica® MS5 stereomicroscope, processed with Synchroscopy Automontage ®, and modified in Adobe Photoshop® CC 2018. In order to ensure clarity of structures, selected morphological characters were traced in Adobe Illustrator® CC 2018.

The morphological terminology follows Matthews *et al.* 2010 and Lawrence *et al*. 2011. A groove in front of the eye, below the frontal ridge, that may continue mesad across the gena, is called the genal groove. It is described as short if it does not extend behind the base of the maxilla (Figs. 2.8, 2.9); it is called long when it extends mesad behind the mouthparts but is not complete (Figs. 2.7, 2.10, 2.12); or complete when the groove is continuous from eye to eye (Fig. 2.11).

Diagnosis of West Indian *Cyrtosoma*

As this is a very diverse and poorly documented group on the mainland, we are limiting this diagnosis to the West Indian members. It can be differentiated from other West Indian Cnodalonini by the following combination of characters: body black to light brown; form gibbous; eye reniform, weakly emarginate by canthus of frons; clypeal membrane broadly exposed; labrum transverse, half the width of the epistoma, mandibles broadly exposed and flat on each side of labrum; last five antennomeres forming a weak club which bear stellate sensoria (sometimes difficult to see on VII); prosternal process prominent, sharply acute and received in mesoventral cavity; scutellary striole present, sometimes greatly reduced; with greatly reduced metathoracic wings that render them flightless; metaventrite shorter than mesocoxal diameter; metakatepisternal suture weakly sigmoid and deep, very close to metacoxa; meso- and metafemora on ventral surface with medial patch of short golden setae (on males, lacking in females); penultimate tarsomere small on all legs; abdomen with intercoxal process broadly rounded. In the search for morphological characters to distinguish between species, we dissected specimens to examine the male genitalia. No notable differences were found.

All descriptions below apply to both sexes, which all differ externally in the presence (males) or absence (females) of setose patches on the meso- and metafemora. Other variation such as the variation in the shape of the pronotum, were found to be unreliable in distinguishing the sexes.

Biology. Adults are nocturnal, usually found on dead, dry, decaying wood, and are flightless. Larvae of West Indian species are unknown.

Biogeography and Distribution. We limit this study to the biogeographic West Indies *sensu* Bond (1960), which does not include the islands of the continental shelf or former British West Indian colonies, such as Trinidad and Tobago or Belize. The West Indian *Cyrtosoma* appear to be a northward extension of the South American fauna, up the chain of Lesser Antillean Volcans. Most of the species are on the South American mainland and the islands of the South American continental shelf, such as Trinidad and Tobago (Marcuzzi 1999). In the absence of a phylogenetic analysis of the group, we are limited to descriptive information only, but there are some observations of interest. Based on available collection records, the group seems to be limited to the high, wet islands of volcanic origin, and amongthe limestone Caribees has been found only on Grande-Terre of Guadeloupe. The northern-most of the Volcans seem to lack *Cyrtosoma*, as Saba, Saint Kitts, and Nevis have all been extensively sampled, and no members of this genus have been located (MAI, unpublished). Saint Eustatius and Redonda have been less intensively inventoried, but also lack records. However, failure to find *C. lherminierii* during five years of extensive work on Montserrat belie the fact that 19th century records exist (Ivie *et al*. 2008), so it is possible that undiscovered populations also exist to the north of what is known today.

From Montserrat to Grenada, every high island now has a known *Cyrtosoma* species, with only one case of a species being known from more than a single island (i.e., *C. lherminierii* known from Montserrat, Basse-Terre, and Grande-Terre). The small, lower volcanic islands of Les Saintes and the Grenadines lack records, which may relate to the lack of appropriate habitat, but they are also far less sampled. If *Cyrtosoma* does

occur in the Grenadines, it is likely to be *C. grenadense*, as the Grenadine Bank, which was connected to Grenada by land as recently as 8,000–18,000 ybp (Fairbanks 1989; Lambeck and Chappell 2001; Hart and Ivie 2016).

The missing population on Montserrat is of conservation interest and may be a case of extirpation because of the volcanic activity of the last two decades (Ivie *et al*. 2008). An unexplored area of intact forest in the far south that cannot be accessed under current exclusion zone regulations may yet be found to harbor this species. We encourage anyone making such a discovery to make it known.

One last point — there are three distinct pairs of similar species that mimic the island order. Staring from North to South, the species from Guadeloupe and Dominica are similar, then the Martinique and Saint Lucia species are also similar, and lastly there is a Saint Vincent and Grenada pair. This similarity is most obvious in the microsculpture and degree of convexity of the elytral striae and intervals. This similarity may or may not be indicative of phylogenetic pattern, but is worthy of further study. This pattern is seen in other groups, such as *Dynastes* MacLeay (Huang 2017), again, crying out for further biogeographic study.

Key to West Indian species of *Cyrtosoma*

1. Pronotum and elytra glabrous; dorsal surface of tibiae lacking erect, long setae; metaventrite and first ventrite without post-coxal pit-like crenulations; genal groove variable.....2

1′. Pronotum and elytral intervals with sparse, fine setae; dorsal surface of tibiae with erect, long, fine, sparse setae; metaventrite and first ventrite with post-coxal pit-like crenulations; genal groove long (Fig. 2.7, 2.10) 5

2. Gena strongly punctate near eye (Figs 2.9, 2.12); elytral striae deep, with punctures, interstriae convex and punctate, shiny (Figs. 2.3, 2.6) 3

2′. Gena impunctate near eye (Figs. 2.8, 2.11); elytral striae shallow, without punctures, interstriae flat and nearly impunctate, matte (Figs. 2.2, 2.5) 4

3. Body elongate (Fig. 2.6); genal groove long (Fig. 2.12); St. Vincent .... ***C. vincenti*** **Spiessberger and Ivie, new species**

3′ Body short, laterally rounded (Fig. 2.3); genal groove short (Fig. 2.9); Grenada ....***C. grenadense*** **Marcuzzi**

4. Frons and clypeus distinctly punctate, punctures separated by less than a diameter; prosternal process bearing sparse long, fine, erect golden setae; genal groove short (Fig. 2.8); Martinique.....***C. martiniquense*** **Marcuzzi**

4′ Frons and clypeus very finely punctate, punctures separated by more than a diameter; prosternal process glabrous; genal groove complete (Fig. 2.11); St. Lucia..... .....***C. luciae*** **Spiessberger and Ivie, new species**

5. Gena coarsely, deeply punctate (Fig. 2.7); Guadeloupe .... ***C. lherminierii*** **(Guérin-Méneville)**

5′ Gena ventrally smooth near eye, impunctate (Fig. 2.10); Dominica .... ***C. dominicae*** **Spiessberger and Ivie, new species**

Cyrtosoma lherminierii (Guérin-Méneville, 1844)

(Figs. 2.1, 2.7)

Cnodalon atrum Guérin-Méneville, 1833: pl. 31 [not *Cnodalon atrum* Lepeletier and Audinet-Serville, 1825: 97]. Often attributed to Chevrolat, see Cowan (1971).

Cnodalon l'herminierii Guérin-Méneville, 1844: 123.

Cyrtosoma lherminieri; Fleutiaux and Sallé 1889: 428(78); Gebien 1911: 489, 1942: 314 (712); Leng and Mutchler 1914: 463 (in part, Guadeloupe record only), 1917: 214 (in part, Montserrat record only); Blackwelder 1945: 538 (in part, Guadeloupe and Montserrat records only); Marcuzzi and D'Aguilar 1971: 93; Marcuzzi 1984: 102 (in part, Guadeloupe and Montserrat records only), 1991: 249; Woodruff *et al*. 1998: 44 (Guadeloupe and Montserrat records only); Touroult 2005: 88; Peck 2006: 190 (in part, Guadeloupe record only), 2010: 48 (in part, Guadeloupe record only), 2016: 164 (in part, Guadeloupe record only); Peck *et al*. 2014: 86 (in part, Guadeloupe record only).

Cyrtosoma herminieri; Champion 1896: 28 (*lapsus calami*, in part, Guadeloupe records only).

Cyrtosoma n.sp.; Ivie *et al*. 2008: 61 (misidentification).

Cyrtosoma lherminierii; Soldati and Touroult 2014:104 (in part, Guadeloupe record only); Bousquet *et al*. 2018: 299.

As mentioned above, the authorship of this name has been the subject of some confusion. It was originally made available on a plate in *Iconographie du règne animal de G. Cuvier*. The plates were published before the text, with Guérin-Méneville (1833) listed as the author for plate 31. Figures 10, 10.a and 10.b were drawings of a new species, *Cnodalon atrum*, attributed to Chevrolat, unaware that Lepeletier and Audinet-Serville (1825) had already used that name. Chevrolat never really described this species, and in the text of *Iconographie*, published in 1844, Guérin-Méneville redescribed and replaced the preoccupied name with *Cnodalon lherminierii* Guérin-Méneville. According to Article 60.3 of the ICZN (1999), Guérin-Méneville should be given the authorship of this species name. Very recently the authorship of this species was noted by Bousquet *et al*. (2018). All the dates used here are based on Cowan's (1971) study of Guérin-Méneville's work in *Iconographie*.

Ivie *et al*. (2008) misstated that the Montserrat records represented a new species different from *C. lherminierii*, but after further study of the vouchers, we conclude they are indeed *C. lherminierii*. More on that will be discussed below.

Type Material. The types are presumed to be in the Chevrolat collection, now included in the Fairmaire collection at the MNHN. They were not examined, as the original illustration and locality were sufficient for identification of the species.

Other Material Examined. 1 ♀: GUADELOUPE: Basse T.; Deshaies, hauteins; 10 AUG 2003, 450m; J. Touroult colr.; ex rotten branch (WIBF). 1 ♀: GUADELOUPE; Domaine Duclos; under bark; 11-xi-66 A.B Gurney/ Cyrtosoma; picea Lap + Br.; det. T.J. Spilman '67/ Cyrtosoma n. sp./ det. M.A. Ivie 2006 (NMNH). 1 ♀: Montserrat; 23.3

WI/ HGHubbard; Collector/ Clearings; 2000 ft./ 116 (NMNH). 1 ♀: Mntserrat [*sic*]; 23.3 WI./ U. S. N. M.; Acc. 31016 (NMNH). 1 ♀: Guadeloup; e Cnodalon; atrum; Chevr./ 71.6 (BMNH). 1 ♂: Nevison Coll.; 1918–14 (BMNH). 1 ♂: Guadeloupe/ Cyrtosoma; Lherminieri; Chev:; com[pared] with type [in F. Bates' hand]e/ F. Bates.; 81–19 (BMNH). 1 ♂: Guadeloupe/ See C. Lherminieri; Chev. Ic. R. p. 123/ Pascoe; Coll.; 93–60 (BMNH). 1 ♂: WInd: GUADELOUPE, BT; Pigeon, Trace Poirier; N16°08.83, W61°45.22; Humid forest FIT, 350m; 14-31.V.2012, S. Peck 12-22 (CMNC). 1 ♂: GUADELOUPE: BT: Trace des Pitons; ou Sauts de Bouillante; 16.v.2012, 16.11735; -61.74291, 700m; peak, montane forest litter; R. Anderson, 2012-114 (CMNC).

Redescription. Length 9.7–11.0 mm, width 5.1–5.6 mm. Dark brown to black, dorsal surface with very sparse erect golden setae, most obvious on elytral intervals, weakly shining, weakly matte. Head transverse, moderately punctate, more densely so on clypeus; gena strongly punctate, genal groove long (Fig. 2.7); antenna reddish brown bearing golden setae on all antennomeres, more densely on VII–XI; pronotum transverse, somewhat convex, margins beaded, lateral margins rounded, widest at middle, anterior margin straight, bead fading medially, anterior angles rounded, basal margin beaded fading medially, basal angles obtuse, surface moderately weakly punctured, each puncture with a fine golden seta, surface between punctures shagreened at higher magnification; hypomeron glabrous, impunctate, and shagreened; prosternum medially longitudinally raised, bearing pits with golden setae, margined between coxae and behind, prosternal process with a raised smooth lateral margin separated from medial disc by deep groove, disc between these grooves not depressed, bearing fine golden setae

(Fig.2.7). Elytron with deep, fine striae with small punctures; first and second striae converging anteriorly, usually not joined; interstriae convex and sparsely punctate, each puncture with an erect golden seta, surface shagreened. Mesoventrite with higher concentration of shallow setose punctures in mesoventral cavity. Metaventrite nearly impunctate, punctures shallow and dispersed with post-coxal pit-like crenulations. Legs, tibiae with sparse, erect golden setae on dorsal surface, more densely so on apical half of ventral surface, becoming dense golden brush at apex. Abdomen with post-coxal pit-like crenulations, surface shining, shallowly punctate, and microsetose.

Distribution. Montserrat, Basse-Terre, and Grande-Terre (Guadeloupe).

Remarks. At one time, almost all the Lesser Antilles records for *Cyrtosoma* were attributed to *Cyrtosoma lherminierii* (the exception being "*Cyrtosoma*" *piceum*, see below). Described from Guadeloupe, Champion (1896) added Saint Vincent and Grenada, Leng and Mutchler (1917) added Montserrat, and Blackwelder (1945) added Dominica. Marcuzzi (1999) named *Cyrtosoma grenadense* without reference to the Grenada record of this species, thereby leaving the appearance of two species occurring there. Ivie *et al*. (2008) mistakenly removed the Montserrat record. This resulted in the most recent catalog with detailed distributions (Soldati and Touroult 2014) to report *C. lherminierii* from Guadeloupe, Dominica, Saint Vincent, and Grenada. Our study has shown this situation to be mostly mistakes, with *C. lherminierii* being present only on Basse-Terre and Grande-Terre, Guadeloupe, the Montserrat records must be returned to this species, while the Dominica, Saint Vincent and Grenada records are removed to

other species. Most of this confusion was the result of dealing with island populations in isolation, and with highly generalized descriptions.

The Montserrat specimens and record require some comment. The specimens were collected by Henry Guernsey Hubbard (1850–1899), who spent parts of February, March, and April of 1894 on Montserrat (see Ivie *et al*. 2008). The details on the labels support the veracity of the record. The fact that this species has not been recollected in the extensive recent survey work on Montserrat is troubling, and was discussed by Ivie *et al*. (2008) in light of the volcanic eruptions that have devastated the island in the last few decades. It is possible that it has been extirpated from Montserrat.

Cyrtosoma martiniquense **Marcuzzi, 1999**

(Figs. 2.2, 2.8)

Cyrtosoma martiniquensis Marcuzzi, 1999: 83; Peck 2011: 31, 2016: 164; Touroult and Poirier 2012: 49; Soldati and Touroult 2014: 104; Touroult *et al*. 2017: 41.

Cyrtosoma martiniquense; Bousquet *et al*. 2018: 299.

Type Material. HOLOTYPE: 1 ♂: MARTINIQUE,2; km.Est.Espri; May 17,1985; C.W.& L.B.O'Brien/ (handwritten by Marcuzzi) *Cyrtosoma*; *martiniquensis*; Marcuzzi/ (red label) HOLOTYPUS/ (yellow label) HOLOTYPUS; *Cyrtosoma* (s. str.); *martiniquensis*; MARCUZZI, 1999 (HNHM).

Other Material Examined. 1 ♂: Antilles; Martinique; Morne Rouge; June 13, 1960; C. & P. Vaurie (AMNH). 2 ♂♂: (handwritten) GUADELOUPE; WI.72.1043; at San Juan; #2275 (NMNH, mislabeled, see discussion below). 1 ♀: FWI: Martinique,

Case-; Pilote, Côte bois d'Inde; 14.69°N, 61.1198°W; 06 NOV2016, 780m; N. Moulin colr, 16-Z47 (WIBF). 1 ♂, 1♀: FWI: Martinique; Rivière-Pilote: Morne Camp; 14.5146°N, 60.8970°W; 30OCT2016; N. Moulin colr, ZN48-HC (WIBF). 1 ♂: FWI: Martinique; Le Marin, Rocher Zombis; 14.4854°N, 60.8846°W; 01NOV2016, 125m; N. Moulin, 16-ZN23-UV (WIBF). 1 ♂: MARTINIQUE: Marin; Morne Aca, 250m; 14.4612°N 60.9003°W; 22NOV2017; N.MOULIN & T. RAMAGE/ WIBF 059331. 6 ♀♀, 4 ♂♂: LES. ANT.: MARTINIQUE; 5 km SE LeMarin, Forêt Creve; Coeur, N14°27.16, W60°51.11; 55m, 20.VII.2012, dryforest; Night colln, S.Peck 12-65 (CMNC).

Description. A description of the adult (Fig. 2.2) is available in Marcuzzi, 1999. We add the following characters for a better definition of the species.

Gena impunctate, genal groove short (Fig. 2.8); prosternal process with a raised smooth lateral margin between coxae to posterior apex, median disc depressed and separated by shallow fine groove, bearing fine golden setae (Fig. 2.8). Metaventrite and first abdominal ventrite without post-coxal pit-like crenulations.

Distribution. Martinique.

Remarks. The two male specimens from the NMNH labeled "Guadeloupe" represent specimens intercepted by USDA port inspectors at San Juan, Puerto Rico. These specimens were misidentified by T. J. Spilman as *C. lherminierii*, in contrast to a female of the true *C. lherminierii* from Guadeloupe that he determined as *C. picea*. Unfortunately, the records for the port identification numbers are lost (S. Lingafelter and P. A. Touhey, *in lit*.). The locality on such labels indicates the last port visited by the

vessel inspected. These specimens are clearly *C. martiniquense*, and must have been picked up in Martinique on the way to San Juan via Guadeloupe. No Guadeloupe record is justified by these specimens.

***Cyrtosoma grenadense* Marcuzzi, 1999**

(Figs. 2.3, 2.9)

Cyrtosoma herminieri; Champion 1896: 28 (in part, Grenada record only).

Cyrtosoma lherminieri; Leng and Mutchler 1914: 463 (in part, Grenada record only); Blackwelder 1945: 538 (in part, Grenada record only); Marcuzzi 1984: 102 (in part, Grenada record only); Woodruff *et al*. 1998: 44 (Grenada record only); Peck 2006: 190 (in part, Grenada record only), 2010: 48 (in part, Grenada record only), 2016: 164 (in part, Grenada record only); Peck *et al*. 2014: 86 (in part, Grenada record only).

Cyrtosoma grenadensis Marcuzzi, 1999: 85; Peck 2016: 164.

Cyrtosoma lherminierii; Soldati and Touroult 2014:104 (in part, Grenada record only).

Cyrtosoma grenadense; Bousquet *et al*. 2018: 298.

Type Material. HOLOTYPE: 1 ♀: GRENADA, Grand Etang; N.P.,Beausejour View; Tr.,±1970, IX-4-1991; C.W.&L.B.O'Brien/ (handwritten by Marcuzzi) *Cyrtosoma*; *grenadensis*; Marcuzzi/ (red label) HOLOTYPUS/ (yellow label) HOLOTYPUS; *Cyrtosoma* (s. str.); *grenadensis*; MARCUZZI, 1999 (HNMH).

Other Material Examined. 1 ♂: Balthazar; (Windward side); Grenada, W.I.; H.H. Smith.; 107/ W. Indies.; 96-98 (BMNH). 1 ♀: La Force Est.; (Windward side);

Grenada, W.I; H.H. Smith.; 96/ W. Indies.; 96-98 (BMNH). 6 ♂♂, 4 ♀♀: GRENADA: Par. St. John; Closier; 27-X-1990; RE Woodruff, at night (5 ♂♂, 3 ♀♀FSCA, 1 ♂, 1 ♀ WIBF). 1 ♂: GRENADA: Par. St. Andrew; Grand Etang Lake; 21-II-1990, at night; R.E.Woodruff, A. Thomas; J. Telesford (FSCA). 1 ♀: WEST INDIES: GRENADA; Par. St. Andrew; Grand Etang For. Pres.; 9-VI-1990; coll. M. C. Thomas (FSCA).

Description. A description of the adult (Fig. 2.3) is available in Marcuzzi, 1999. We add the following characters for a better definition of the species.

Gena strongly punctate, genal groove short (Fig. 2.9); prosternal process with a raised smooth lateral margin between coxae to posterior apex, median disc not depressed and separated by shallow fine groove, bearing fine golden setae (Fig. 2.9). Metaventrite and first ventrite without post-coxal pit-like crenulations.

Distribution. Grenada

Cyrtosoma dominicae Spiessberger and Ivie, new species

(Figs. 2.4, 2.10)

Cyrtosoma lherminieri; Leng and Mutchler 1917: 214 (in part, Dominica record only); Blackwelder 1945: 538 (in part, Dominica record only); Marcuzzi 1984: 102 (in part, Dominica record only); Peck 2006: 190 (in part, Dominica record only), 2010: 48 (in part, Dominica record only), 2016: 164 (in part, Dominica record only); Peck *et al*. 2014: 86 (in part, Dominica record only).

Cyrtosoma lherminierii; Soldati and Touroult 2014:104 (in part, Dominica record only)

Type Material. HOLOTYPE: 1 ♂: WEST INDIES: DOMINICA; Springfield Estate, 31.V-16.VI.04,; N15°20.841' W61°22.000', 500m; ridgetop forest above Mt Joy, FIT; S. & J. Peck, 04-90 (CMNC). PARATYPES (4 specimens): 1 ♀: same locality data as holotype (WIBF). 1♂1♀: Dominica; June-July; H.W. Foote; Yale Exp 1913/ *Cyrtosoma; lherminieri* Chevr (NMNH). 1 ♀: DOMINICA BWI; West Cabrits; 28.III.1956; J.F.G. Clarke (NMNH).

Etymology. The name is a latinized noun in the genitive case based on the modern name of the island, treated as a noun in apposition.

Description. Length 10.2–11.5 mm, width 5.3–5.6 mm. Dark reddish brown, dorsal surface with very sparse erect golden setae, more densely so on pronotum, weakly shining, weakly matte. Head transverse, softly punctate, slightly more densely so on clypeus; gena without punctures, genal groove long (Fig. 2.10); antenna reddish brown bearing golden setae on all antennomeres, more densely on VII–XI; pronotum transverse, somewhat convex, margins beaded, lateral margins rounded, widest at middle, anterior margin slightly elevated and weakly sinuate medially, bead fading medially, anterior angles obtuse to rounded, basal marginal bead fading medially, basal angles obtuse, surface moderately weakly punctured, each puncture with a fine golden seta, surface between punctures shagreened at higher magnification; hypomeron glabrous, impunctate, and shagreened; prosternum medially longitudinally raised, bearing pits with golden seta, margined between coxae and behind, prosternal process with a raised smooth lateral margin separated from medial disc by deep groove, disc between these grooves not depressed, bearing fine golden setae (Fig. 2.10). Elytron with deep fine striae with small

punctures; first and second striae converging anteriorly, usually not joined, interstriae convex and sparsely punctate, each puncture with an erect golden seta, surface shagreened. Mesoventrite with higher concentration of shallow setose punctures in mesoventral cavity. Metaventrite nearly impunctate, punctures shallow and dispersed, with post-coxal pit-like crenulations. Legs, tibiae with sparse erect golden setae on dorsal surface, more densely so on apical half of ventral surface, becoming dense golden brush at apex. Abdomen with post-coxal pit-like crenulations, surface shining, shallowly punctate, and microsetose.

Distribution. Dominica.

Remarks. Considering the extensive inventory work that has been conducted on Dominica (see Peck 2011), it is surprising more specimens of the species have not been found. It must be relatively rare or unusually cryptic.

Cyrtosoma luciae Spiessberger and Ivie, new species

(Figs. 2.5, 2.11)

Cyrtosoma n.sp.; Ivie 2009: 98; Peck 2016: 164.

Type Material. HOLOTYPE: 1 ♂: ST. LUCIA: N. of Pass, 340m; Barre d'Isle Res.; 13.93682°N, 60.95936°W; 29 APR 2009; I.A.Foley and R.C.Winton (WIBF to be deposited in NMNH). PARATYPES (19 specimens): 2 ♂♂: ST. LUCIA: N. of Pass, 340m; Barre d'Isle Res.; 13.93682°N, 60.95936°W; 02 MAY 2009; I. A. Foley colr (WIBF). 1 ♂: ST. LUCIA: Barre de L'Isle; 13.9341°N, 60.9586°W, 320m; 11JUNE2009, ex. Treefern; C.A. Maier (WIBF). 1 ♂: ST. LUCIA: Barre de L'Isle; 13.9247°N,

60.9589°W,289m; 18MAY2009; R.C. Winton & A.R. Cline (WIBF). 1 ♂: ST. LUCIA: Barre de L'Isle; 13.9326°N, 60.9582°W,285m; 18-30MAY2009; canopy malaise; R.C. Winton, L.L. Ivie,; A.R. Cline & S.D. Gaimari (CDFA). 1 ♀: WEST INDIES: ST. LUCIA; Barre D'Isle, south side, 289 m; 13.92471°''N, 60.95891°W; A.R. Cline, S.D. Gaimari, R. Winton; 18-22-MAY-2009, ex: malaise trap (CDFA). 4 ♂♂,4 ♀♀: ST. LUCIA: Mont LaCombe; 13.9209°N, 60.9592°W, 271m; 05JUNE2009, in old dry log; R.C. Winton (1♂1♀ BMNH, 1 ♂ FSCA, 1♀ NMNH, 2♂♂ 2 ♀♀ WIBF). 1 ♀: ST. LUCIA: Piton Troumasse; trap site, 793m; 13.8535°N, 61.0098°W; 17JUNE2009; R. Winton & M. Smith (WIBF). 2 ♀♀: ST. LUCIA; Mamiku Bot. Garden, 70m; 13.88112°N,60.90800°W; 09 MAY 2009; R.C. Winton. (WIBF). 1 ♂ (disarticulated, on card): ST. LUCIA: Gros Piton; 13.13.805˚N, 61.0597˚; 18 MAY 2009, 784m; R.C.Winton (WIBF). 1 ♀: LESSER ATILLES: St. Lucia; Mon Repos, 6.5 km W FoxGroveInn; 10-28.VII.07, submontane forest malaises; S & J. Peck, 07-53A/ Cyrtosoma n. sp.; DET: S. Peck, 2012. (CMNC).

Etymology. The name is a latinized noun in the genitive case based on the modern name of the island, treated as a noun in apposition.

Description. Length 7.8–11.9 mm, width 4.2–6.2 mm. Black, dorsal surface glabrous, matte. Head transverse, nearly impunctate; gena impunctate, genal groove complete (Fig. 2.11); antenna brown, antennomeres I–V nearly glabrous, VI with few golden setae in the apex, VII–XI bearing golden setae; pronotum transverse, convex, margins beaded, lateral margins rounded, widest at middle, anterior margin slightly elevated and slightly curved inward, bead fading medially, anterior angles rounded, basal

marginal bead fading medially, basal angles obtuse, surface impunctate, shagreened at higher magnification; hypomeron glabrous, impunctate, and shagreened; prosternum medially longitudinally raised, lacking pits, and glabrous, margined between coxae and behind, prosternal process with a raised smooth lateral margin between coxae to posterior apex, median disc depressed and separated by shallow fine groove, glabrous. Elytron with shallow, fine striae impunctate; first and second striae converging anteriorly, always joined, interstriae flat, impunctate, and glabrous, surface shagreened. Mesoventrite nearly impunctate, sparsely setose; Metaventrite nearly impunctate, bearing microsetae, without post-coxal pit-like crenulations. Legs, tibiae glabrous on dorsal surface, apical third of ventral surface with erect golden setae, becoming dense golden brush at apex. Abdomen without post-coxal pit-like crenulations, surface shining, nearly impunctate, and microsetose.

Distribution. Saint Lucia.

Remarks. More biological information is available on this species than any other. During a three-month inventory of Saint Lucia, this species was recorded from 70 m to nearly 800 m, on dead wood. The most informative record is taking the flightless species in a canopy Malaise trap, indicating they may live in dead wood in the canopy.

Cyrtosoma vincenti **Spiessberger and Ivie, new species**

(Figs. 2.6, 2.12)

Cyrtosoma herminieri; Champion 1896: 28 (in part, Saint Vincent record only); Leng and Mutchler 1914: 463 (in part, Saint Vincent record only).

Cyrtosoma lherminieri; Blackwelder 1945: 538 (in part, Saint Vincent record only); Marcuzzi 1984: 102 (in part, Saint Vincent record only); Woodruff *et al*. 1998: 44 (Saint Vincent record only); Peck 2006: 190 (in part, Saint Vincent record only), 2010: 48 (in part, Saint Vincent record only), 2016: 164 (in part, Saint Vincent record only); Peck *et al*. 2014: 86 (in part, Saint Vincent record only).

Cyrtosoma lherminierii; Soldati and Touroult 2014:104 (in part, Saint Vincent record only).

Type Material. HOLOTYPE: ♂: St. Vincent,; W.I.; H. H. Smith.; 17./ W. Indies. 96-98 (BMNH). PARATYPES (5 specimens): 1 ♀: St. Vincent,; W.I.; H. H. Smith.; 17/ W. Indies. 96-98/ *Cyrtosoma lherminierii* Chevr. [in unknown hand] (BMNH), 1 ♀: St. Vincent,; W.I.; H. H. Smith.; 17/ W. Indies. 96-98; 29 (BMNH). 1 ♀: Leeward side; St. Vincent, W.I.; H. H. Smith; 200/ W. Indies. 96-98/ *Cyrtosoma lherminierii* Chevr. [in unknown hand] (BMNH). 1 ♀: Leeward side; St. Vincent, W.I.; H. H. Smith; 203; 203 (WIBF). 1 ♀: ST. VINCENT, St.; Patrick P, Cum-; berland, 9-3-1991; C.W.& L.O'Brien (BMNH).

Etymology. The name is a latinized noun in the genitive case based on the modern name of the island, treated as a noun in apposition.

Description. Length 7.8–9.2 mm, width 3.8–4.2 mm. Dark brown to black, dorsal surface glabrous, shining. Head transverse, coarsely punctate, more densely so on clypeus; gena strongly punctate, genal groove long (Fig. 2.12); antenna reddish brown. Pronotum somewhat convex, margins beaded, lateral margins weakly bisinuate, widest at middle, anterior margin slightly elevated and weakly sinuate medially, bead fading

medially, anterior angles rounded, basal marginal bead fading medially, basal angles obtuse, surface moderately punctured, shagreened between punctures at higher magnification; hypomeron glabrous, impunctate, and shagreened; prosternum medially longitudinally raised, bearing pits with golden seta, margined between coxae and behind, prosternal process with a raised smooth lateral margin between coxae to posterior apex, median disc not depressed and without groove, bearing fine golden setae (Fig. 2.12). Elytron with deep fine striae with small punctures; first and second striae converging anteriorly always joined, interstriae convex and sparsely finely punctate, glabrous, surface shagreened. Mesoventrite with higher concentration of shallow setose punctures in mesoventral cavity. Metaventrite nearly impunctate, punctures shallow and disperse without post-coxal pit-like crenulations. Legs, tibiae with sparse microsetae on dorsal surface, apical third of ventral surface with erect golden setae, becoming dense golden brush at apex. Abdomen without post-coxal pit-like crenulations, surface shining, shallowly punctate, and microsetose.

Distribution. Saint Vincent.

Hesiodus piceus **(Laporte and Brullé, 1831), new combination**

(Figs. 2.13–2.14)

Platydema picea Laporte and Brullé, 1831: 362; Soldati and Touroult, 2014: 96.

Platydema piceum; Fleutiaux and Sallé 1889: 424(74); Marcuzzi and D'Aguilar 1971: 84; Marcuzzi 1984: 89; Peck *et al*. 2014: 83; Peck 2016: 158.

Cyrtosoma piceum; Gebien 1911: 489; Gebien 1942: 314 (712); Marcuzzi and D'Aguilar 1971: 93; Marcuzzi 1984: 102; Marcuzzi 1991: 250; Peck *et al*. 2014: 86; Soldati and Touroult 2014: 104; Peck 2016: 164; Bousquet *et al*. 2018: 299.

Cyrtosoma ?piceum; Leng and Mutchler 1914: 463.

Cyrtosoma picea; Blackwelder 1945: 538.

Hesiodus caraibus Fleutiaux and Sallé, 1889: 424; Blackwelder 1945: 534; Gebien 1911: 437, 1941: 337 (632); Leng and Mutchler 1914: 463; Marcuzzi and d'Aguilar 1971: 91; Chalumeau 1982: 191; Hopp and Ivie 2009: 3; Soldati and Touroult 2014: 104; Peck *et al.* 2014: 86; Peck 2016: 162; Bousquet *et al.* 2018: 302. **New synonymy.**

Type Material. Syntype ♀: Guadeloupe/ 60/ *Cyrtosoma*; *picea* [corrected to *piceum*] Cast.[elnau] Br[ullé] mm [messieurs]; p. 362 *Platydema*; Guadulpia [Latin name of Guadeloupe] F. l'Herminier; Pointe à Pitre/ Muséum Paris;1906/ coll. L. Fairmaire/ SYNTYPE/ SYNTYPE; *Platydema*; *picea* Laporte de Castelnau; & Brullé, 1831/ MNHN; EC9 175 (MNHN). Material in square brackets inserted for clarity.

Remarks. This species has a confused taxonomic history with a surprising ending. Originally described from Guadeloupe in *Platydema* Laporte and Brullé, 1831, the type was said to be in the Louis Alexandre Auguste Chevrolat (1799–1884) collection, the tenebrionid portion of which is housed today in the collection of Léon Marc Herminie Fairmaire (1820–1906) in the Muséum national d'Histoire naturelle, Paris (Horn and Kahle 1935). This specimen has not been reported on since the original description, in spite of the fact that the tenebrionids of Guadeloupe have been treated four

times (Fleutiaux and Sallé 1889; Marcuzzi and d'Aguilar 1971; Chalumeau 1982; Soldati and Touroult 2014).

Fleutiaux and Sallé (1889) treated it as a *Platydema*, but only cited its description, adding nothing to indicate they knew the species. The species appeared without explanation in *Cyrtosoma* in Gebien's (1911) catalog. If it was moved earlier than that, we have been unable to find the reference. Zoological Record has no mention of this action, and Soldati and Touroult (2014) were also unable to find the origin of this transfer. After Gebien's (1911) catalog, it was listed under *Cyrtosoma* with varying levels of doubt several times (*e.g*. Leng and Mutchler 1914). It even appeared a few times as two species, being included under both genera (*e.g*. Marcuzzi and d'Aguilar 1971; Peck *et al*. 2014; Soldati and Touroult 2014).

Marcuzzi (1991) included it in his key to *Cyrtosoma*, and he acknowledges the BMNH as the source of "all the present material." A search of that collection did not unearth any specimen with that name (Maxwell Barclay, *in lit*.), and from the characters in the key, it would appear its inclusion is based on the original description, not a specimen. As such, apparently no specimen attributed to this name has been seen by anyone publishing on this species since its original description.

In any case, judging from the description, Laporte and Brullé's species is simply not a Guadeloupe *Cyrtosoma*. Antoine Mantilleri located the type of *P. picea* at our request, and provided photos (Figs. 2.13–2.14), in fact revealing that it is conspecific with *Hesiodus caraibus* Fleutiaux and Sallé, 1889. It is unfortunate, but unavoidable that the

older and poorly known name must replace the well-established one, but its recent use as a valid name requires us to retain the junior synonym under Art. 23.9.1.1. (ICZN 1999).

The specimen from the MNHN identified as the Syntype of this species was found by curator Antoine Mantilleri. Figures 2.13 and 2.14 represent the specimen and labels on this specimen. It appears the first label is in the hand of Ferdinand Joseph L'Herminier (1802–1866). The third label appears to be in the hand of Chevrolat. Thus, the specimen matches the information in Laporte and Brullé's (1831) description. The use of the name *Cyrtosoma* by Chevrolat apparently predates the description as a manuscript name and this third label could be the source of Gebien's placement, even though Chevrolat's concept associated with that manuscript name differed from what was eventually published.

The question of its status as the Holotype or a Syntype is unclear. Clearly, the syntype label was added long after the original description. ICZN (1999) Recommendation 73F suggests that an assumption of Holotype status be avoided in the absence of a clear statement of a singleton in a description before 2000. Other than the fact there is only a single measurement in the description of this species, there is nothing to definitively say there was only a single type specimen. We feel the curators in Paris have acted correctly in considering this specimen a Syntype. Because we are not revising *Hesiodus*, we will not designate this specimen as a Lectotype, leaving that for a future reviser. In a similar case, Laporte and Brullé (1831) also named *Nesocyrtosoma virens* (Laporte and Brullé, 1831) in *Platydema* (Hopp and Ivie 2009), and *Nesocyrtosoma* Marcuzzi, 1976 is a close relative of *Hesiodus*.

Distribution: Guadeloupe, for details see Soldati and Touroult (2014).

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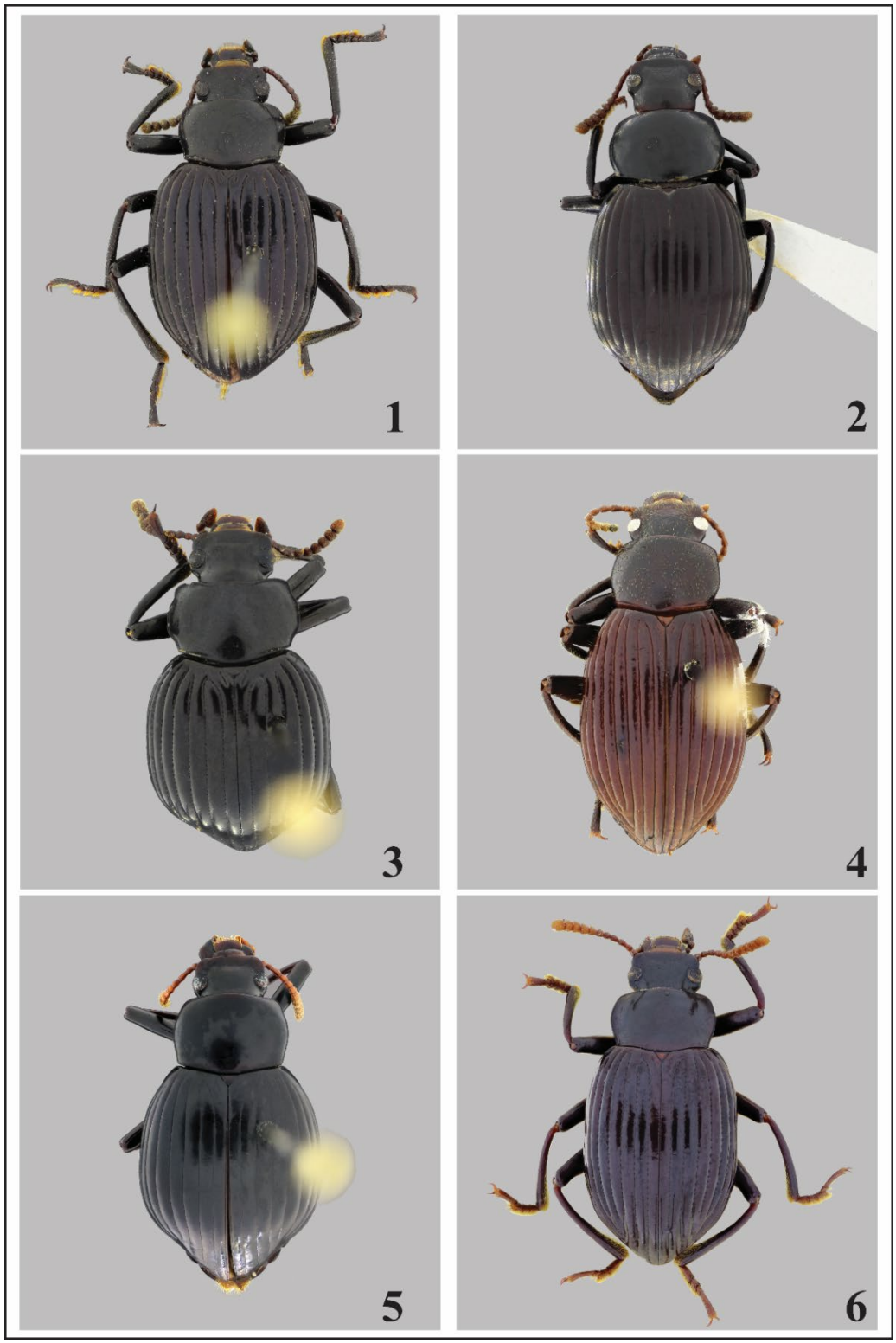
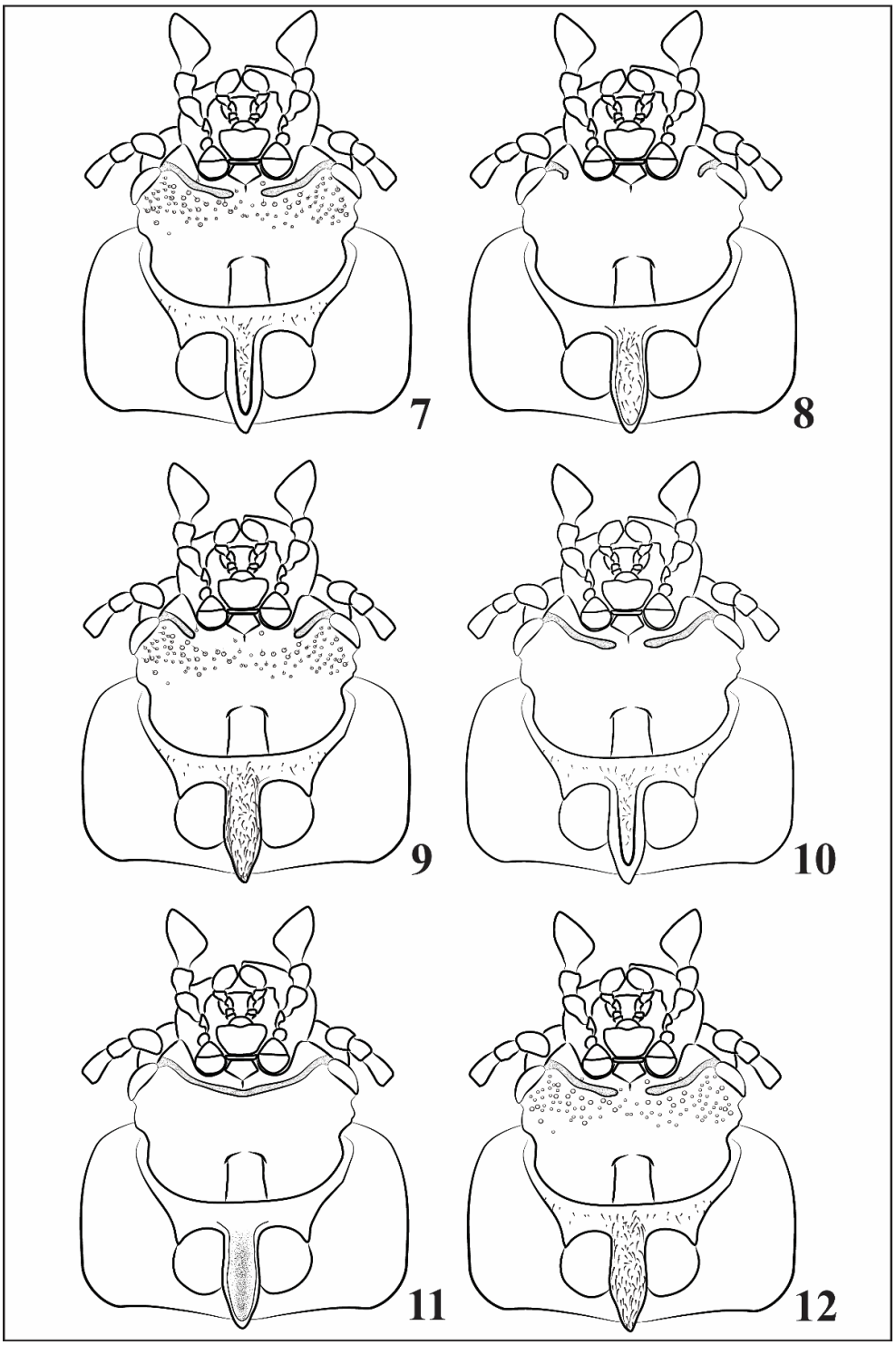


Figs. 2.1–2.6. Dorsal view of species of *Cyrtosoma.* **2.1)** *C. lherminierii*; **2.2)** *C. martiniquense*; **2.3)** *C. grenadense*; **2.4)** *C. dominicae*; **2.5)** *C. luciae*; **2.6)** *C. vincenti*.



Figs. 2.7–2.12. Ventral view of *Cyrtosoma* head and prosternum. **2.7)** *C. lherminierii*; **2.8)** *C. martiniquense*; **2.9)** *C. grenadense*; **2.10)** *C. dominicae*; **2.11)** *C. luciae*; **2.12)** *C. vincenti*.

Figs. 2.13–2.14. *Hesiodus piceus* (Laporte and Brullé, 1831), Syntype. **2.13)** Habitus. **2.14)** Labels. © MNHN/A. Mantilleri.

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CHAPTER THREE

A NEW GENUS AND THIRTEEN NEW SPECIES OF ANOPIDIINA (TENEBRIONIDAE: DIAPERINAE: GNATHIDIINI) FROM THE WEST INDIES

Contribution of Author and Co-Author

Manuscripts in Chapters 2 and 3

Author: Erich L. Spiessberger

Contributions: Collected specimens, assembled loaned material, identified specimens, reviewed literature, wrote the key to species, wrote species descriptions, photographed specimens, prepared figures and wrote the first draft of the manuscript.

Co-Author: Michael A. Ivie

Contributions: Helped conceive the project, collected specimens, assembled loaned material, assisted with species concepts and character development, provided feedback on early drafts of the manuscript.

Manuscript Information

Erich L. Spiessberger and Michael A. Ivie

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ABSTRACT

A new Anopidiina genus and thirteen new species are described from the West Indies. *Prototyrtaeus* Spiessberger and Ivie, **new genus** (type species *Prototyrtaeus darlingtoni* Spiessberger and Ivie, **new species**) is described from the Greater Antilles islands of Cuba, Jamaica, Hispaniola, and Puerto Rico, with 13 new species: *Prototyrtaeus duartei* Spiessberger and Ivie, **new species**; *Prototyrtaeus neiba* Spiessberger and Ivie, **new species**; *Prototyrtaeus obrieni* Spiessberger and Ivie, **new species**; *Prototyrtaeus pecki* Spiessberger and Ivie, **new species**; *Prototyrtaeus gracilicornis* Spiessberger and Ivie, **new species**; *Prototyrtaeus howdeni* Spiessberger and Ivie, **new species**; *Prototyrtaeus sandersoni* Spiessberger and Ivie, **new species**; *Prototyrtaeus beckeri* Spiessberger and Ivie, **new species**; *Prototyrtaeus darlingtoni* **new species**; *Prototyrtaeus maestrensis* Spiessberger and Ivie, **new species**; *Prototyrtaeus felis* Spiessberger and Ivie, **new species**; *Prototyrtaeus turquinensis* Spiessberger and Ivie, **new species**; *Prototyrtaeus aureocornis* Spiessberger and Ivie, **new species**. Wolcott's enigmatic single record of Byrrhidae for the West Indies hitherto is resolved as a misidentification of *P. obrieni*.

Key Words: Darkling beetles, taxonomy, Byrrhidae

INTRODUCTION

Despite recent revisions of several genera of Tenebrionidiae Latreille, 1802, (Hopp and Ivie 2009; Smith and Sanchez 2015; Hart and Ivie 2016; Spiessberger and Ivie 2018), there are still a great number of undescribed tenebrionid taxa awaiting study and description from this region. While assembling material for a review of the Anopidiina Jeannel and Paulian, 1945, we could not place a group of thirteen species from the Greater Antilles in any of the currently described genera.

The Anopidiina and Gnathidiina Gebien, 1921, are the two subtribes of the diaperine tribe Gnathidiini (Doyen and Lawrence 1979, Bouchard *et al*. 2005, 2011). Gnathidiina are not known from the New World, but several descriptions of new taxa have appeared recently (Ando and Chûjô 2005; Medvedev 2007; Schawaller 2009, 2016a, 2016b; Akita and Masumoto 2013; Ando 2018; Schawaller and Ando 2018).

Recent descriptions of new taxa of Anopidiina have been confined to the Old World (Matthews and Lawrence 2005; Schawaller and Purchart 2012, Akita and Masumoto 2013), and the last New World Anopidiina were described more than 30 years ago (Dajoz 1986). Since then, only a few distribution and nomenclatural papers have treated New World Anopidiina (Hopp and Ivie 2008; Ivie and Spiessberger 2017; Aloquio and Lopes-Andrade 2019).

The New World Anopidiina currently consist of seven valid genera (Doyen and Lawrence 1979) that can be divided into two groups: those without reductions in antennomeres and tarsomeres (eleven segmented antennae and tarsal formula 5-5-4): *Cryptozoon* Schaufuss, 1882, *Menimopsis* Champion, 1896, *Caecomenimopsis* Kaszab,

1970, *Caecophloeus* Dajoz, 1972 and *Sphaerognathium* Dajoz, 1975; and the ones with reductions (less than 11 antennomerers and tarsal formula 4-4-4): *Tyrtaeus* Champion, 1913 and *Neanopidium* Dajoz, 1975.

The group of 13 species described here belong to that second group, but not to either genus. Even though some of the species described herein are present in very large numbers in collections containing Greater Antillean material, the obscurity of the Neotropical Anopidiina makes them almost unidentifiable. The Puerto Rican species, for instance, is easily found on moss on palm trees at the El Verde Field Station and is well represented in the small collection there and in larger museum collections. When identified, they are usually misidentified as *Loxostethus* Triplehorn, 1962 (Diaperini). However, their small size and reduction of morphological characters (antennae and tarsi) makes their membership in the Tenebrionidae less than obvious. A thorough morphological examination of the specimens confirmed them to be closely related to *Tyrtaeus* and *Neanopidium*.

We describe this new genus andthirteen new species, with a key and illustrations for the species. Interestingly, for a group represented by hundreds of specimens in a wide array of collections, there is only a single published reference that can be tied to the group. The long-standing mystery of the only record of Byrrhidae Latreille, 1804, for the West Indies (Wolcott 1936, 1951; Blackwelder 1944) is resolved and shown to be a misidentification of one of the species described below.

MATERIAL AND METHODS

Specimens from the following collections were studied:

AMNH – American Museum of Natural History, New York, NY (Lee H. Herman).

CDFA – California State Collection of Arthropods, Sacramento, CA (Andrew R. Cline).

CMNC – Canadian Museum of Nature, Ottawa, ON, Canada (François Génier)

CMNH – Carnegie Museum of Natural History, Pittsburgh, Pennsylvania (Robert L. Davidson).

CNCI – Canadian National Collection of Insects, Ottawa, ON, Canada (Patrice Bouchard).

FMNH – Field Museum of Natural History, Chicago, IL (Alfred F. Newton)

FSCA – Florida State Collection of Arthropods, Gainesville, FL (Paul Skelley).

INHS – Illinois Natural History Survey, Champaing, IL (Chris Dietrich).

MCZC – Museum of Comparative Zoology, Harvard University, Cambridge, MA (Philip Perkins).

MHNG – Muséum d'Histoire Naturelle, Geneva, Switzerland.

NMNH – National Museum of Natural History, Washington, DC (Warren E. Steiner, Jr.).

WIBF – West Indian Beetle Fauna Project Collection, Montana State University, Bozeman, MT (Michael A. Ivie).

Paratypes will also be deposited in the following collections:

BMNH – Natural History Museum, London, UK (Maxwell V. L. Barclay)

MNHNSD – Museo Nacional de Historia Natural Profesor Eugenio de Jesús Marcano, Santo Domingo, Dominican Republic (Carlos Suriel).

IIBZ – Dominican Republic, Santo Domingo, Universidad Autónoma de Santo Domingo, Instituto de Investigaciones Botánicas y Zoológicas (Ruth Bastardo).

MNHN – Muséum National d'Histoire Naturelle, Paris (Oliver xxx)

RLAC – Rolf Aalbu private collection, El Dorado Hills, CA.

SMNS – Staatliches Museum für Naturkunde, Stuttgart, Germany (Wolfgang Schawaller).

Label data are recorded following the conventions of Ivie (1985), with lines separated by a semicolon (;) and labels by a slash (/), in this paper we added inverted slash (\) to separate GUIs (globally unique identifiers) from different specimens to avoid extensive repetition of label data. Specimens were studied on a Leica® Wild M3C stereoscope equipped with an LED ring light. Photographs were taken using a JVC (DC Ky-F75U) digital camera mounted on a Leica® MS5 stereoscope and a Visionary Digital Passport II imaging system, equipped with a Canon 6D DSLR and a Canon T3i DSLR with a MP-E 65 mm lens and stacked using the software Zerene Stacker version 1.04. Drawings were prepared based on photographs using Adobe Illustrator® CC. Enhancements to digital images were made in Adobe PhotoShop® CC. Drawings were prepared based on photographs using Adobe Illustrator CC 2018. Distribution maps were generated using Google Earth and Quantum GIS 2.18.9, using maps available on the website http://www.naturalearthdata.com, a free public database of maps. Adobe Illustrator® CC was used to create vectorized images of the original maps.

The morphological terminology follows Matthews *et al.* 2010 and Lawrence *et al*. 2011.

TAXONOMY

Prototyrtaeus Spiessberger and Ivie, new genus

Type Species. *Prototyrtaeus darlingtoni* Spiessberger and Ivie **new species**.

Etymology. This is an old Ivie manuscript name that has been around for years, but is used here in a more restrictive manner than was first understood. "*Proto*" means "first" in Greek, and *Tyrtaeus* is a related genus in the Anopidiina.

Diagnosis. This genus can be differentiated from other members of the Anopidiina by having the body convex, sometimes metallic (the only genus of Gnathidiini with metallic species); antennae seven-segmented (i.e. with three fused antennomeres) (Figs. 3.14f–h), or nine-segmented (distinctly divided antennomeres) (Figs. 3.14a–e, i–m); eyes entire, coarsely facetted; pronotal lateral margins never crenulate, beads not completely connected at angles; elytron lateral margin of elytron never crenulate; flight wings absent; metaventrite short (distance between meso and metacoxae half of mesocoxal diameter); and tarsal formula 4-4-4. *Prototyrtaeus* shares similarities with *Tyrtaeus* and *Neanopidium*, two other Anopidiina genera that occur in the Neotropical region. All three genera have a reduced number of antennomeres (six to nine), with the club consisting of either three or four fused antennomeres, or three distinctly separated antennomeres. They also share the tarsal formula of 4-4-4. *Prototyrtaeus* can be differentiated from *Tyrtaeus* by having a convex body, eyes coarsely facetted, flight wings absent, metaventrite short with distance between meso and metacoxae half the diameter of the mesocoxa, anterior margin of the prothorax sometimes lacking a bead, lateral pronotal margins never crenulate, and the lateral margin

of the elytron never crenulate. It can be differentiated from *Neanopidium* by having eyes and the body always convex, the lateral margins of the pronotum and elytron never crenulate. Some, but not all *Prototyraeus* can be further distinguished from *Neanopidium* by the nine-segmented antennae (except for Jamaican species), the anterior pronotal margin sometimes lacking a bead. Those *Protyrtaeus* that have a metallic color are immediately distinguished from all other Anopidiina.

Description. Body strongly convex, metallic or not, shiny or matte; eye entire, rounded or slightly reniform, coarsely facetted and protuberant; head width subequal to anterior edge of pronotum, or not as wide, frons glabrous or setose, sparsely punctate, becoming sparser posteriorly, or evenly punctate; gena ventrally punctate; antenna clubbed, seven (club consisting of one antennomere formed from the fusion of last three) (Figs. 3.14f–h), or nine segmented (club consisting of three distinctly separated apical antennomeres) (Figs. 3.14a–e, i–m), setose, with higher concentration of setae towards apex, antennomere III subequal to II, or distinctly longer; maxillary palp four segmented, with apical palpomere acuminate; pronotum strongly or weakly transverse, convex, widest at base or middle, anterior angles rounded, protruding or not, posterior angles obtuse, anterior margin beaded or not, lateral margin rounded or nearly straight, strongly beaded, lateral bead width uniform or gradually increasing posteriorly, with short setae sticking out laterally, posterior margin beaded, sometimes bead nearly effaced medially, beads not completely connected at angles; prosternal process triangular, narrow between coxae and wide at apex, margins elevated; hypomeron glabrous and impunctate. Elytron punctato-striate or lacking striae; epipleuron wide, gradually narrowing to anterior border

of sternite V, then terminating. Mesoventrite finely and sparsely punctate. Metaventrite short, lateral area smooth, weakly or strongly punctate, distance between meso and metacoxae half of mesocoxal diameter; metepisternum smooth, weakly or strongly punctate. Pro and mesocoxae rounded, metacoxa transverse, narrowing outwards; femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical or with glabrous area on venter on apical ½ and somewhat flattened; tarsi 4-4-4, tarsomere I slightly or distinctly enlarged, with thick golden setae on dorsal surface, more densely and longer so on ventral surface, forming ventral patches on I-III. Intercoxal process of ventrite I acute or rounded, sparsely punctate, punctures bearing very fine golden setae. Defensive glands absent. Ovipositor with paraproct baculus elongate (subequal to length of coxites II+III), oriented longitudinally, coxite divided into four segments, coxite I baculus short (half of length of paraproct baculus) transversally oriented, coxite IV bearing gonostyles at apex. Aedeagus basale and apicale subequal in length or not, strongly or slightly curved on lateral view, median lobe sticking out of apicale or not.

Distribution. Cuba, Jamaica, Hispaniola, Puerto Rico (Figs. 3.17, 3.18, 3.19).

Biology. Unlike other Anopidiina, *Prototyrtaeus* is more likely to be surface active. Although occasionally found under stones, they are rarely found in litter, and never in soil. At least some species of this genus are commonly found on tree trunks with moss, lichens and/or fungi. The known larvae are from trunks of trees or under rocks, associated with adults.

KEY TO THE SPECIES OF *PROTOTYRTAEUS*

1. Antenna seven-segmented (Figs. 3.14f–h), club composed of three fused antennomeres; Jamaica 2

1′. Antenna nine-segmented (Figs. 3.14a–e, i–m), club composed of three distinctly divided antennomeres; Cuba, Hispaniola and Puerto Rico.....4

2. Elytron with a weak longitudinal elevation along the elytral suture, only one long seta above lateral groove of elytra on basal ¼ (if missing, distinct puncture present) (Fig. 3.15c); lateral margin of pronotum above lateral bead sinuate on posterior ⅓. .....***P. beckeri***

2′. Elytron lacking elevation along elytral suture, more than one long seta above lateral groove of elytra; lateral margins of pronotum above lateral bead in posterior 1/3 nearly straight.....3

3. Body size small, length 1.3–2.0mm, strongly convex rounded behind, more declivous in lateral view (Fig. 3.15b); frons sparsely punctate, clypeus with few setae, mostly apico-laterally.....***P. sandersoni***

3′. Body size large, length 2.4–3.3mm, convex more attenuate behind, less declivous in lateral view (Fig. 3.15a); frons moderately punctate, clypeus with complete row of setae across apex.....***P. howdeni***

4. Dorsal surface usually metallic green, blue to purple; elytron usually punctato-striate; pronotum widest at middle, anterior margin without bead; Cuba 5

4′. Dorsal surface not or occasionally weakly metallic; elytron impunctate or with punctures confusedly distributed; pronotum widest at base, anterior margin beaded or not; Hispaniola and Puerto Rico.....9

5. Large species, 3.5–4.0 mm long; protibia sometimes ventrally glabrous between raised weak carinae on apical ½; tarsomere I of mesotibia weakly to distinctly larger than II (Fig. 3.15d) .....***P. darlingtoni***

5′. Smaller species, 2.3–2.8 mm long; protibia cylindrical, venter setose on apical ½; tarsomere I or mesotibia only slightly larger than II (Fig. 3.15e).....6

6. Antennae unicolored; antennomere IV wider than 7

6′. Antennae weakly bicolored, antennomeres I-VIII dark, apex of IX light colored; antennomere IV subquadrate or longer than wide 8

7. Impunctate metepisternum; head finely punctate, frons with punctures becoming sparser posteriorly..... ***P. felis***

7′. Metepisternum with line of strong punctures; head coarsely punctate, frons with punctures evenly distributed ..... ***P. aureocornis***

8. Antennomeres I-VIII black, IX with yellow apex; antennomere IV longer than wide (Fig. 3.14j); frons glabrous, punctures evenly distributed, punctures subequal to eye facet; pronotum coarsely punctate.....***P. maestrensis***

8′. Antennomeres I-VIII dark yellow or brown, IX yellowish at apex; antennomere IV subquadrate (Fig. 3.14l); frons bearing long setae, punctures becoming sparser posteriorly; pronotum finely to moderately punctate..... ***P. turquinensis***

9. Antenna bicolored from V; intercoxal process of ventrite I broadly rounded between metacoxae (Fig. 3.15f); pronotum moderately transverse ..... ***P. duartei***

9′. Antenna unicolored, if weakly bicolored, from VII; intercoxal process of ventrite I between metacoxae acute (Fig. 3.15h,i), narrowly (Fig. 3.15g) or moderately rounded (Fig. 3.15j); pronotum strongly transverse 10

10. Anterior angles of pronotum weakly projecting somewhat acute; frons with confluent punctures, forming striguli (more evident under LED white light); intercoxal process of ventrite I moderately rounded (Fig. 3.15j); third antennomere distinctly longer than 2 (Fig. 3.14e); integument always shiny; aedeagus with basale twice as long as apicale (Fig. 3.16e); Puerto Rico..... ***P. gracilicornis***

10′. Anterior angles of pronotum rounded; frons without confluent puncutures; intercoxal process of ventrite I acute (Fig. 3.15h,i) or narrowly rounded (Fig. 3.15g); third antennomere subequal to 2 (Fig. 3.14b,c,d); integument shiny or matte; aedeagus with basale subequal to apicale; Hispaniola and Puerto Rico.....11

11. Anterior pronotal margin lacking bead or incomplete medially; antenna dark brown; head width usually subequal to anterior margin of pronotum; aedeagus with median lobe projected ventrally, sticking out of apicale (Fig. 3.16b); Hispaniola.... .....***P. neiba***

11′. Anterior pronotal margin completely beaded; antenna red, yellow or light brown; head narrower than anterior margin of pronotum; aedeagus with median lobe concealed inside apicale; Puerto Rico.....12

12. Lateral area of metaventrite smooth or weakly punctate; aedeagus elongate and thin, apicale converging at apical ⅓ and narrowed at apex (Fig. 3.16c); integument matte or shiny, microsculpture present on dorsal part (more nitid on matte forms); antennae red or yellow; Puerto Rico ..... ***P. obrieni***

12′. Lateral area of metaventrite strongly punctate; aedeagus short and wide, apicale and basale subequal in length, apex rounded, converging at apical ¼ (Fig. 3.16d); integument shiny, weakly microsculptured dorsally; antennae yellow; Puerto Rico ..... ***P. pecki***

Prototyrtaeus duartei **Spiessberger and Ivie, new species**

(Figs. 3.1, 3.14a, 3.15f, 3.16a)

Type Material. HOLOTYPE: DOMIN. REP: Prov. Santiago; Par. Nac. ArmandoBermudez; Valle deBao. 1785m.9JULY; 1992. pine bark at night; 19°04'N.71°02'W. M. Ivie (WIBF to be deposited in NMNH). PARATYPES (402): 42: Same locality data as holotype (WIBF). 65: DOMIN. REP: Prov. Santiago; Par. Nac. ArmandoBermudez; N. slope LaPelona. 2865m; 19°02'N.71°00'W. 09JULY; 1992. M.A. & R.O. Ivie (WIBF). 28: DOMIN. REP: Prov. Santiago; Par. Nac. ArmandoBermudez; N. slope LaPelona. 2575m; 09JULY1992. under rocks; M.A. & R.O. Ivie colrs (WIBF). 12: DOM. REP: Prov. San Juan; Par. Nac. ArmandoBermudez; Pico Duarte Weather Sta; 19°02'N. 71°00'W. 2885m; 06APR1992. M.A. Ivie colr (WIBF). 15: Loma Rucilla &; mts. N., Dom. Rep.; June'38, 5-8,000 ft.; Darlington (MCZC). 9: cloudforest; vic. Valle Nuevo; Aug'38, Dom.Rep.; c. 6,000 ft, Darl.

(MCZC). 11: Loma Rucilla; June'38, Dom. Rep.; 8-10,000 ft.; Darlington (MCZC). 1: Valle Nuevo; SE Constanza; Aug.'38, Dom. Rep.; c. 7,000 ft., Darl. (MCZC). 3: DOM. REP., LaVega,; 53km. SE. Constanza; August 9, 1979; C.W.O'Brien (WIBF). 4: DOM. REP., LaVega,; 53km. SE. Constanza; August 9,1979; L.B.O'Brien (WIBF). 1: DOM. REP., La Vega,; 47km. SE. Constanza; August 9,1979; C.W.O'Brien (WIBF). 1: DOM. REP., La Vega,; 53km. SE. Constanza; August 9,1979; G.B. Marshall (WIBF). 4: DOMINICAN REPUBLIC:; Piquito del Yaque; 11 AUGUST 1964 (NMNH). 4: DOM. REP.: Par. Nac. Almando; Bermudez, Cordillera Cent.; slopes of Pico del Yaque; 04 SEP 1988, 1930-2415m; beating in pine forest/ M.A. Ivie, T.K. Philips; & K.A. Johnson colrs. (WIBF). 1: DOM. REP.: Par. Nac. Almando; Bermudez, Cordillera Cent.; summit Pico Duarte; 05AUG1988, M.A. Ivie,; K. Philips & K.A. Johnson/ Pico Duarte official; elev. 3175m, our; altimeter read 2970m/ under rocks (WIBF).4: DOM. REP.: Par. Nac. Almando; Bermudez, Cordillera Cent.; slopes of Pico del Yaque; 06 SEP 1988, 2570m; fern, pine & stump litter/ M.A. Ivie, T.K. Philips; & K.A. Johnson colrs. (WIBF). 1: DOM. REP.: Par. Nac. Almando; Bermudez, Cordillera Cent.; Aguita Fria, 2560m; 04SEP1988, M.A. Ivie,; K. Philips & K.A. Johnson (WIBF).2: DOMINICAN; REP. 6000'; 8/5-63/ MOSS PLANTS; 63-; 20062 (NMNH). 4: DOMIN. REP: Par.Nac. Almando; Bermudez, Cordillera Cent.; AguitaFria (2560m) – saddle; W. Pico del Yaque (2690m); 05 SEP 1988, beating veg./ M.A. Ivie, T.K. Philips; & K.A. Johnson colrs. (WIBF). 1: DOMINIC. REP.: Prov. La Vega; 40km S. Constanza, 2165m; M. A. Ivie, T. K. Philips; & K. A. Johnson colrs.; litter under moss & log (WIBF). 2: DOM.REP: Prov. Santiago; N. slope Pico del Yaque; 2515m, flight int. trap; 08APR-07JUL1992, pine;

forest. M.A. & R.O. Ivie (WIBF). 1 DOMINICAN REPUBLIC:; Pico Duarte Trail – 8700 ft.; Aguita Fria – sweeping; 19°01.979'N, 70°56.194'W; 30 June 2004 S.W. Lingafelter (WIBF). 2: DOM. REP: Prov. Santiago; Par. Nac. ArmandoBermudez; LomalaRucilla, 05APR1992; white fungus on roots; M. Ivie, D. Sikes, W. Lanier (WIBF). 2: DOMIN. REP: Prov. San Juan; Par. Nac. ArmandoBermudez; Pico Duarte weather sta.; 2855M, 08JULY1992; M.A. & R.O. Ivie colrs/ 19°02N, 71°00W; under rocks (WIBF). 1: DOM. REP: Prov. La Vega; nr. Buena Vista, Hotel; La Montana, 03APR1992; flight intercept trap; M.A. Ivie, D.S. Sikes (WIBF).1: DOMINICAN REPUBLIC: La; Vega. Cordillera Central,; Reserva Valle Nuevo, La; Nevera, 15.1 km SE Valle; Nuevo, 18-41-47N, 70-35-30W; 2252 m, 25 May 2003/ R. Davidson, C. Young,; C. Nunez, J. Rawlins, P.; Acevedo, montane meadow; in cloud forest, pine,; hand collected,; Sample 24142/ Carnegie Museum; Specimen Number; CMNH- 377,316 (CMNH).16: DOMINICAN REPUBLIC:; La Vega. Reserva; Cientifica Valle Nuevo,; Sector La Nevera, 3km; WNW La Nuez, 2200 m./ 18-42N, 70-36W.; 7 October 1991; C. Young, S. Thompson,; R. Davidson, J. Rawlins; Mesic pine woodland/ Carnegie Museum; Specimen Number; CMNH- 376,189\ CMNH- 384,808\ CMNH- 388,391\ CMNH- 376,717\ CMNH- 380,136\ CMNH- 380,628\ CMNH- 380,929\ CMNH- 386,187\ CMNH- 378,905\ CMNH- 387,031\ CMNH- 377,999\ CMNH- 388,066\ CMNH- 381,124\ CMNH- 379,916\ CMNH- 376,841\ CMNH- 381,104 (CMNH). 4: DOMINICAN REPUBLIC:; Peravia. 3km SW; La Nuez, uper; Rio Las Cuevas./ 18-40N, 70-36W. 1850m; 5-6 August 1990; J. Rawlins, S. Thompson/ Carnegie Museum; Specimen Number; CMNH- 402,535\ CMNH- 397,685\ CMNH- 398,449\ CMNH-

396,873 (CMNH). 19: DOM.REP: Prov. Santiago; ParNac. ArmandoBermudez; N.side La Pelona, 2850m; 07APRIL1992, under rock; M.A. Ivie, & D.S. Sikes (WIBF). 1: DOM.REP: Prov. Santiago; P.Nac. ArmandoBermudez; Aguita Fria, f.i.t.; 19°02'N, 70°56'W, 2545m; 07JULY1992- 24JULY1993/ M.A. Ivie &; D.S. Sikes (WIBF). 1: DOMIN.REP: Prov. SanJuan; P.N.A. Bermudez, 2380-; 2575m, 08APR1992, Aguita; Fria to LaCompartacion; 70°57'N,70°57'W, M. Ivie (WIBF). 1: DOMIN.REP: Prov. Santiago; Par. Nac. ArmandoBermudez; summit of La Pelona; 09JULY1992, under rocks; 3087m M.A. & R.O. Ivie (WIBF). 12: DOM.REP: Prov. SanJuan; Pico Duarte weather; sta., 2885m, 06APR1992; under & around rocks; M.A. Ivie & D.S. Sikes (WIBF). 4: DOMIN.REP: Prov. SanJuan; 19°02'N, 70°56'W, 2545m; Aguita Fria, P.N.A. Berm; 08APR-07JUL1992, M.A.; Ivie, flight inter. trap (WIBF). 3: DOM.REP: Prov. Santigo; N.side Pico del Yaque; 19°03'N, 70°56'W, 2515m; JULY1992-JULY1993; flight intercept trap (WIBF). 1: DOM.REP: Prov. Santiago; P.Nac. ArmandoBermudez; N.side Pico del Yaque; 19°03'N, 70°56'W, 2515m; 25-29JULY1993, f.i.t./ D.S. Sikes &; R.P. Rosenfeld (WIBF). 2: DOM.REP: Prov. Santiago; Par. Nac. ArmandoBermudez; Pico del Yaque, 2425m; 05APR1992. rotten pine; M. Ivie, D. Sikes, W. Lanier (WIBF). 2: DOM.REP: Prov. La Vega; Par. Nac. ArmandoBermudez; LosTablones, 1245m, 19°03'; N. 70°53'W, 07 JULY 1992; M.A. & R.O. Ivie colrs/ 19°02N, 71°00W; under rocks (WIBF). 1: DOMINICAN REPUBLIC:; La Vega. Reserva; Cientifica Valle Nuevo,; Sector La Nevera, 3km; WNW La Nuez, 2200 m./ 18-42N, 70-36W.; 7 October 1991; C. Young, S. Thompson,; R. Davidson, J. Rawlins; Mesic pine woodland/ Carnegie Museum; Specimen Number; CMNH- 385,702

(CNMH). 89: DOMINICAN REPUBLIC:; Peravia. 3 km SW La; Nuez, upper Rio Las; Cuevas, 1880m.; 18-39N, 70-36W/ 5-6 October 1991; J. Rawlins, R. Davidson; C. Young, S. Thompson; Cloud forest on river/ Carnegie Museum; Specimen Number; CMNH- 388,634\ 388,868\ 378,100\ 377,746\ 378,272\ 378,159\ 381,675\ 386,020\ 387,968\ 379,971\ 388,909\ 378,025\ 376,794\ 380,207\ 380,849\ 386,033\ 384,024\ 384,599\ 380,987\ 382,714\ 382,693\ 384,836\ 382,636\ 386,956\ 378,977\ 386,394\ 380,875\ 382,480\ 376,851\ 379,700\ 380,032\ 388,376\ 378,603\ 385,703\ 387,584\ 386,806\ 383,430\ 385,892\ 384,711\ 378,972\ 382,991\ 386,148\ 387,906\ 378,447\ 377,392\ 379,291\ 380,968\ 384,109\ 387,967\ 379,458\ 388,459\ 380,505\ 382,508\ 379,573\ 377,338\ 380,054\ 388,622\ 380,168\ 377,672\ 379,272\ 379,928\ 377,333\ 387,476\ 388,950\ 380,639\ 377,439\ 387,170\ 377,547\ 382,071\ 384,920\ 382,763\ 378,576\ 385,457\ 384,989\ 376,298\ 383,038\ 388,533\ 376,395\ 388,893\ 381,079\ 378,648\ 381,759\ 380,931\ 384,138\ 384,153\ 384,638\ 383,201\ 382,982\ 383,995 (CMNH). 25: DOMINICAN REP.: La Vega; 2km before La Nevera; 2.VIII.1980 A. Norrbom; 2200m (CMNH).

Diagnosis. This species is distinguished by having a non-metallic integument; bicolored antenna; moderately transverse pronotum with a beaded anterior margin and is widest at base; and the intercoxal process of ventrite I broadly rounded (Fig. 15f). Only three species of *Prototyrtaeus* have bicolored antennae, the main difference being that *P. maestrensis* and *P. turquinensis* have a dark antenna, with the apex of the apical segment brighter, while *P. duartei* have the first four segments black, and the remaining six light yellow.

Etymology. Named in honor of founding father Juan Pablo Duarte (1813-1876), revolutionary hero, writer and poet of the Dominican Republic, whose name is given to the mountain that lies in the center of the range of this species. Pico Duarte (officially 3,087 meters high) is not only the highest peak in the Dominican Republic, it holds that position for the West Indies as a whole. It was earlier named Pico Trujillo from its identification as the highest peak on Hispaniola in 1944 until the 1961 assassination of brutal dictator Rafael Leónidas Trujillo Molina (1891 – 1961).

Description. 2.5–4.0 mm long, 1.5–2.0 mm wide. Dorsal surface piceous with very sparse erect, fine, golden setae, and few longer setae along lateral elytral margin, shiny; antennae bicolored, black and yellow. Head width not as wide as anterior edge of pronotum, moderately, coarsely punctate, punctures subequal to eye facet, scarcely setose; epistomal suture weakly marked; clypeus more densely setose and bearing longer setae, longer so on labrum; antenna nine segmented (Fig. 3.14a), bicolored, antennomere II subequal in length and slightly wider than III, antennomeres I-IV dark, V-VI vary from brown to dark yellow, VII-IX yellow and forming club, club gradually decreasing in width, being VII the widest, last antennomere rounded at apex; pronotum moderately transverse, widest at base, sparsely and finely punctate, punctures smaller than eye facet; all margins beaded, anterior margin slightly bisinuate, lateral margin nearly straight converging towards apex, sometimes slightly rounded, bead width gradually increasing posteriorly, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially, anterior angles rounded, protruding, posterior angles obtuse. Elytron without striae, with faint, shallow and small punctures, pair of long setae

above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area smooth or weakly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum smooth or weakly punctate. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I broadly rounded (Fig. 3.15f), sparsely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16a) with basale slightly longer than apicale, apicale becoming slightly acuminate at apex; lateral view, basale slightly curved on basal ⅓, apicale slightly curved on apical ⅓.

Distribution. Hispaniola, Dominican Republic (Fig. 3.17).

Biology. The species is found at high elevations in the Cordillera Central. It is quite common within its range, being obvious on the surface of lichens on the trunks of *Pinus* along the trails in the high Cordillera Central (MAI pers. obs.). It has also been taken repeatedly under rocks, some of which were also associated with lichens and in one case on white fungi growing on *Pinus occidentalis* roots. This later association could involve ectomycorrhizal fungi.

Two larvae of this species were taken with adults, one with the holotype and several paratypes on the bark of *Pinus occidentalis* and the other under rocks. Adults have been taken on lichens, in mosses, in a rotten pine log, and beating pines and general vegetation. Berlese samples from fern, pine and stump litter, litter under moss and a log

have also yielded specimens. Specimens labeled from flight intercept traps were from traps which allowed flightless individuals to crawl into the pan as if it was a pitfall trap (MAI, unpublished data).

Remarks. This is the most commonly taken of the Hispaniolan species.

Prototyrtaeus neiba **Spiessberger and Ivie, new species**

(Figs. 3.2, 3.14b, 3.15g, 3.16b)

Type Material. HOLOTYPE: DOMINICAN REPUBLIC: San; Juan. Sierra de Neiba,; Saban del Silencio,; 10.0km SSW El Cercado; 18-39-07N, 71-33-21W,; 2009m, 20 June 2003/ J. Rawlins, C. Nunez, R.; Davidson, C. Young, P.; Acevedo, M. de la Cruz; cloud forest along Dan-; thonia savannah, hand; collected, Sample 33242/ Carnegie Museum; Specimen Number; CMNH-388,750 (CMNH). PARATYPES (39 specimens): 12 same locality data as holotype (with different voucher numbers): CMNH-386,648\ CMNH-380,698\ CMNH-386,055\ CMNH-386,770\ CMNH-382,683\ CMNH-385,872\ CMNH-388,231\ CMNH-381,387\ CMNH-377,378\ CMNH-382,649\ CMNH-385,590\ CMNH-386,857 (CMNH). 6 (with different voucher numbers): DOMINICAN REPUBLIC: San; Juan. Sierra de Neiba,; 9.4km SSW El Cercado,; 8-39-18N, 71-32-51W,; 1973m, 22 June 2003/ R. Davidson, C. Nunez,; C. Young, J. Rawlins, P.; Acevedo, M. de la Cruz,; meadow near mature pine; forest, hand collected,; Sample 32242/ Carnegie Museum; Specimen Number; CMNH-388,494\ CMNH-380,401\ CMNH-384,530\ CMNH-388,109\ CMNH-386,777\ CMNH-379,477 (CMNH). 3 (with different voucher numbers): DOMINICAN REPUBLIC: San; Juan. Sierra de Neiba,; 9.4km SSW El

Cercado,; 8-39-18N, 71-32-51W,; 1973m, 18-19 Nov 2004/ C.W. Youg, J.E. Rawlins,; C. Nunez, V. Verdecia, W.; Zanol. meadow near mature; pine forest. hand; collected. Sample 32245/ Carnegie Museum; Specimen Number; CMNH-381,849\ CMNH-379,230\ CMNH-380,345 (CMNH). 1: DOMINICAN REPUBLIC:; Independencia. Sierra; de Neiba just south; of crest, 5km NNW; Angel Feliz, 1780m/ 18-41N, 71-47W; 13-15 October 1991; J. Rawlins, R. Davidson; C. Young, S. Thompson; Cloud forest/ Carnegie Museum; Specimen Number; CMNH-382,297 (CMNH).17: DOM: REP.: Independencia; 32 kmNW La Descubierta; SabanaReal, 1800m, cloud; forest moss & litter, 26.; XI.91, S&JPeck, 91-334 (CMNC).

Diagnosis. This species can be distinguished by having a non-metallic integument; unicolored antenna; transverse pronotum, widest at base, anterior margin lacking bead or the bead incomplete medially; intercoxal process of ventrite I acute or narrowly rounded (Fig. 15g).

Prototyrtaeus neiba is similar to *P. obrieni* and *P. pecki*, the easiest way to tell them apart is by their geographic distribution. But morphologically, the head width of *P. neiba* is usually subequal to the anterior margin of the pronotum, the anterior margin of the pronotum is not beaded, and the aedeagus has the median lobe projecting ventrally, outside of apicale (Fig. 16b).

Etymology. The name is a latinized noun in the genitive case based on the name of the Sierra de Neiba mountain range where the species is found. The name comes from the Taíno word “neyba” meaning “white earth” according to the 18th century French writer Médéric Louis Elise Moreau de Saint-Méry (1750 – 1819).

Description. 2.0–3.8 mm long, 1.4–1.7 wide. Dorsal surface dark brown without distinct setation, only few microsetae and few longer setae along lateral elytral, shiny; antenna light or dark brown. Head width subequal to anterior edge of pronotum, frons moderately, coarsely punctate, punctures subequal to eye facet, setose; epistomal suture weakly marked; clypeus setose with a higher concentration of setae at apex; labrum with longer and more densely distributed setae; antenna nine segmented (Fig. 3.14b), light or dark brown, antennomere II subequal in length and slightly wider than III, antennomeres VII-IX forming club, gradually decreasing in width being VII the widest, last antennomere rounded or oval at apex; pronotum strongly transverse, widest at base, sparsely and finely punctate, punctures smaller than eye facet; anterior margin lacking bead or incomplete medially, slightly bisinuate, lateral margin nearly straight or slightly rounded, strongly beaded, gradually increasing width posteriorly, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially, anterior angles rounded, slightly protruding, posterior angles obtuse. Elytron without striae, punctured, sometimes faintly and shallowly, with few fine pale setae sparsely distributed, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area smooth or weakly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum smooth or weakly punctate. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose,

becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I acute or narrowly rounded (Fig. 3.15g), sparsely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16b) with basale and apicale subequal in length, median lobe sticking out of apicale and apex exceeding apicale apex in length; lateral view, slightly curved in basal ⅔ of basale, median lobe clearly projected ventrally forming an acute angle.

Distribution. Hispaniola, Dominican Republic (Fig. 3.18).

Biology. This species has been taken in cloud forest and pine forests with one mention of forest moss and litter, which is consistent with more detailed observations for other species.

Remarks. This species has only been taken in the Sierra Neiba, and seems to be an allopatric relative to *P. duartei* from the Cordillera Central.

Prototyrtaeus obrieni **Spiessberger and Ivie, new species**

(Figs. 3.3, 3.14c, 3.15h, 3.16c)

? *Lioon* sp.; Wolcott 1936: 218 [Byrrhidae misidentification].

Lioon; Blackwelder 1944: 270; Wolcott 1951: 269

Type Material. HOLOTYPE: PUERTO RICO:; Luquillo Nat. For.; El Verde Field Sta.; 18.32361°N 065.81831°W;18 JUN 2017; E. L. Spiessberger; & V. S. Ferreira colr. Paratypes (234). 9: PUERTO RICO; Guilarte For. Res.; Hwy. 131&158, July; 23,1979 LB. O'Brien (WIBF). 6: PUERTO RICO; Guilarte For. Res.; Hwy. 131&158, July; 23,1979 CW. O'Brien (WIBF). 1: PUERTO RICO, Hwy.; 131K5H1, Guilarte; For.

Res., July23,; 1979 L.B. O'Brien (WIBF). 8: PUERTO RICO, Hwy.; 131&518, Guilarte; For. Res., July24; 1979G.B. Marshall (WIBF). 3: PUERTO RICO; Guilarte For. Res.; Hwy. 131&158, July; 23,1979 GB Marshall (WIBF). 8: PUERTO RICO, Gui-; larteSt.For., Hdqts.; Tr. VIII-5-1999, C.W.; O'Brien, P.W. Kovarik (FSCA). 1: PUERTO RICO,; Guilarte St. For.; VIII-2-199, C.W.; O'Brien, P. Kovarik (FSCA). 1: P. RICO: Adjuntas; Guillarte For. Res.; 3.VIII.1999, P.W.; Kovarik, collector; beating nr. Rt.-131 (WIBF). 3: PUERTO RICO, Carib.; N.F., El Toro Negro D.,; Hwy. 143,K 19H4, 7-; 22-1979 GB. Marshall (WIBF). 1: PUERTO RICO, Carib.; N.F., El Toro Negro D.,; Hwy. 143,K18H6, 7-; 22-1979; LB. O'Brien (WIBF). 1: PUERTO RICO, Carib.; N.F., El Toro Negro D.,; Hwy. 143,K18H6, 7-; 22-1979; CW. O'Brien (WIBF). 2: PUERTO RICO, Carib.; N.F., El Toro Negro D.,; K19H9, Hwy.143, July; 22,1979 LB. O'Brien (WIBF). 2: PUERTO RICO, Carib.; N.F., El Toro Negro D.,; Hwy. 143,K19H4, 7-; 22-1979; CW. O'Brien (WIBF). 3: Cerro Dona Juana; Toro Negro Forest; Puerto Rico/ 28.XII.1966-; 4.I.1967; S. Peck carrion trap; 900 m. elev. (FMNH). 1: PUERTO RICO, Carib.; N.F., El Toro Negro D.,; Hwy. 143,K 18H4, 7-; 21-1979 GB. Marshall (WIBF). 6: 18°18'10''N, 065°54'73''W; PUERO RICO: Rio; Grande, El Yunque Nat.; For., Mt. Britton Tr., 4-; 12.VIII.1999, P. Kovarik (WIBF). 4: PUERTO RICO, El; Yunque, Mt. Britton; Tr. viii-4-1999, C.W.; O'Brien, P. Kovarik (FSCA). 1: same data, except date, viii-6-1999. (FSCA). 2: PUERTO RICO, El; Yunque, Mt. Britton; Tr. Viii-11-1999, tree; ferns, C.W.O'Brien (FSCA). 2: PUERTO RICO:; Caribbean Nat. Forest; Mt. Britton summit; 06 AUG 1999, 941m; P. Kovarik, leaf litter (WIBF). 11: WEST INDIES: Puerto; Rico, Carib. Nat. For.; base Mt. Britton Tr.; 17 March 1983; R.S. Miller colr. (WIBF). 1:

PUERTO RICO, Carib.; N.F.., Mt. BrittonTr.,; dwarf forest, 7-29-; 1979 L.B.O'Brien (WIBF). 1: PUERTO RICO, Carib.; N.F., Mt. Britton; Trail, July19,1979; C.W.O'Brien (WIBF). 1: same data, except collector, G.B. Marshall (WIBF). 3: PUERTO RICO:; Luquillo Nat. For.; El Verde Res. Sta.; 27-31 DEC 2001; M. A. Ivie colr. (WIBF). 3: PUERTO RICO:; Luquillo Nat. For; El Yunque Trail; 30 DC 2001; M. Huben (WIBF). 2: PUERTO RICO:; El Verde Research Sta; ridge tops in forest; 02-30 SEP 1996; E. Nazario, pitfall (WIBF). 2: El Yunque; c. 3,000 ft, P.R.; May 1938; Darlington (MCZC). 4: PuertoRico; El Yunque; 22-XII-36/ Sta 351; Chapin and; Blackwelder (NMNH). 4: PuertoRico; El Yunque; 18-XII-36/ Sta 347; Chapin and; Blackwelder (NMNH). 2: PUERTO RICO, Carib.; N.G., El Yunque Hwy.; (191) K12H7, July19,; 1979 L.B. O'Brien (WIBF). 1: PUERTO RICO: Sa.; Luquillo, El Yunque; 17AUG1954 (INHS). 1: Puerto Rico:; El. Yunque; elev. 2,100-2,200'; Ex Bromeliad/ 15-24 Feb. 1969; T. & B. Hlavac (MCZC.). 1: EL YUNQUE; P.R. DECAYING;WOOD/ INTERCEPT; JAN. 30,1967/ 67-;7124 (NMNH). 7: Maricao Forest; 2-3,000 ft, P.R.; May 30-June 2,'38; Darlington (MCZC). 4: PUERTO RICO: Maricao; St. For., 01JUL1958; M.W. Sanderson; beating & sweeping (2 INHS, 2 WIBF). 1: PUERTO RICO, Hwy.; 120, K10H2, Maricao; For. Res., July 26,; 1979 C.W. O'Brien (WIBF). 3: Maricao PR; fish hatchery; VIII-8-61/ collected by; Flint Spangler, (NMNH). 1: PUERTO RICO, Hwy.; 120, km. 15-16, Maricao; St. For. Viii-10-1999,C.; W.O'Brien, P.Kovarik (FSCA). 2: PUERTO RICO, Mari-; cao For. Res., Hwy.; 120, K13H8, July26,; 1979 L.B. O'Brien (WIBF). 2: PUERTO RICO: San German; Reserva For. Maricao; km. 162 on Rt. 120; 08AUG1999, P.W. Kovarik; leaf litter Berlese (WIBF). 5: Ponce P.R.; Dec. 5, 1933;

RGOakley (NMNH). 4: Ponce PR; Dec 5.33; RG Oakley; S1 4789-3 (NMNH). 2: Araca Catechu; Principal Finca; Adjuntas, P.R.; Coll. 23 Oct.33; R.G. Oakley (NMNH). 1: Araca catechu; Adjuntas P.R.; X-23-1933; R.G. Oakley; San Juan 4789 (NMNH). 1: Adjuntas. P.R.; Feb. 13, 1954/ J. Maldonado; S. Medina Colls. (NMNH). 1: Picachos, Mts, P.R; III-30-1929./ Coll: A.S. Muller./ Stuart T. Danforth; Collection (MCZC). 10: PUERTO RICO: Guavate-; Carite St. For., Cerro la; Santa, 17JULY1958, summit; trail, beating and sweep; M.W. Sanderson PR58-16 (5 INHS, 5 WIBF). 2: PUERTO RICO: Carite; Native Forest; APRIL 1999; M.A. Garcia, CNF6 (WIBF). 1: PUERTO RICO, Hwy.; 184, K21H9, Carite; For. Res. July20,; 1979 C.W.O'Brien (WIBF). 29: PUERTO RICO:; El Yunque; 16-17 JULY 1958; M.W. Sanderson (WIBF). 9: PUERTO RICO:; Caribbean Nat. Forest; El Yunque Trail; 610-1050m, 23SEP1987; M.A. Ivie, beating (WIBF). 1: PUERTO RICO, Carib.; N.F., El Yunque Hwy.; (191) K12H7, July29,; 1979 G.B. Marshall (WIBF.). 1: same data as previous, except, K11H2, July19 (WIBF). 1: same data as previous, except, C.W. O'Brien (WIBF). 2: PUERTO RICO, Carib.; N.F., El Yunque Hwy.,; (191) K11H4, July 29; 1979 L.B. O'Brien (WIBF). 2: same data as previous, except, C.W. O'Brien (WIBF). 3: WEST INDIES: Puerto; Rico, Carib. Nat. For.; km. 12 on Hwy. 191; 18 March 1983; R.S. Miller colr. (WIBF). 1: PUERTO RICO: Carib.; Nat. For., S. of Palmer; 500-700ft, 25 SEP 1987; M.A. Ivie, under bark (WIBF). 5: El Yunque St.,; Luquillo Forest,; P.R. VII 2-5,1969; H.&A. Howden (CNCI). 1: same data as previous, except, VII 6-9,1969 (CNCI). 1: same data as previous, except, VII 10-16, 1969 (CNCI). 5: PUERTO RICO, Carib.; N.F., El Yunque Hwy.; (191) K12H7, July 29,; 1979 C.W.O'Brien (WIBF). 3: same data as previous, except, L.B.O'Brien (WIBF).

1: PUERTO RICO:; Caribbean Nat. For.; East Peak Rd. 670m; 22SEP1987, M.A.Ivie; ex fungus on log (WIBF). 1: PUERTO RICO; Monte de Estado; Area Recreativa; k.13,Rte.120/ 750m. (Rain; Forest); 20.VI.1969; W.C. Gagne (MCZC). 1: PUERTO RICO:; P.R. Univ. Biol Sta.; Muni. Rio Grande; 11-17-1969/ 670 m. elev.; Banana leaf; Coll. L. Herman (MCZC). 10: PUERTO RICO: Maricao,; Maricao at 18°8.890'N; 66°58.932'W 902m. Arboreal; moss sifting. 6.ix.2014; A.S. Konstantinov. WP-486 (WIBF). 6: PUERTO RICO: El Yunque Natl.; For., El Toro Tr. At 18°16.564'N; 65°50.288'W. 933m. Arboreal; & rock moss sifiting. 8.ix.2014; A.S. Konstantinov. WP-489 (WIBF). 4: PUERTO RICO: Jayuya,; Toro Negro at 18°10.335'N; 66°35.504'W. 1,350m. WP-479; Arboreal moss sifting. 3 Sept; 2014. A.S. Konstantinov (WIBF).

Diagnosis. This species is very similar to *P. pecki*, in fact, externally they can morphologically overlap, sometimes being only distinguished by their aedeagi. This species has several forms, the most distinct one with matte integument, and red antennae, but may also have shiny integument and yellow antennae. The latter form is only distinguishable from *P. pecki* by the aedeagus. *Prototyrtaeus obrieni* has a thinner adeagus (Fig. 16c) with an acute apicale tip, while *P. pecki* has a wider adeagus (Fig. 16d), with a broad and rounded apicale tip.

Etymology. This species is named in honor of Charles W. O'Brien, who along with his constant companion, Lois O'Brian, collected not only part of this type series, but has contributed massively to our knowledge of West Indian beetles through his indefatigable collecting efforts throughout the region.

Description. 1.7–2.5 mm long, 1.3–1.5 wide. Dorsal surface greenish bronze, bronze or light brown without distinct setation, only few microsetae and few longer setae along lateral elytral margin, matte, or shiny; antennae red, or pale yellow to brownish. Head width not as wide as anterior edge of pronotum, frons moderately, coarsely punctate, punctures subequal to eye facet, scarcely setose; epistomal suture moderately marked; clypeus setose with a higher concentration of setae at apex; labrum with longer and more densely distributed setae; antenna nine segmented (Fig. 3.14c), red or pale yellow, antennomere II subequal in length and slightly wider than III, antennomeres VII-IX forming club, gradually decreasing in width being VII the widest, club subequal or slightly longer than antennomeres I-VI, last antennomere rounded at apex; pronotum strongly transverse, widest at base, sparsely and finely punctate, punctures smaller than eye facet; all margins beaded, anterior margin bisinuate, lateral margin nearly straight or slightly rounded, strongly beaded, bead gradually increasing width posteriorly, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially, anterior angles rounded, protruding, posterior angles obtuse. Elytron without striae, with faint, shallow and small punctures, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area smooth or weakly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum with line of weak punctures. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal

surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I acute (Fig. 3.15h), sparsely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16c) elongate and narrow, basale and apicale subequal in length, apicale converge at apical ⅓ narrowing at apex; in lateral view, aedeagus slightly curved medially.

Distribution. Puerto Rico (Fig. 3.19).

Biology. This species was collected by the author (ELS) at the El Verde Field Station on palm trees covered on moss. However, on fungi at the same location we also found *Loxosthetus*, a very similar beetle when seen with unaided eyes.

Remarks. A specimen recorded by Wolcott (1936, 1951) as "doubtfully determined by Mr. H. S. Barber" as a *Lioon* Casey, 1912 (Byrrhidae), is actually a misidentified specimen of *P. obrieni*, included here as a paratype. Wolcott (1936) mentioned the specimen had a sample number of 4789 and in his next work (Wolcott 1951) that it was taken by R. G. Oakley at Adjuntas. The details are recorded on the label of the specimen, found in NMNH material that was on loan for decades and only recently been available. Wolcott's record was the only unresolved West Indian Byrrhidae, and the family can now be removed from the West Indian faunal lists. Bizarrely, this is the sole mention in the scientific literature that we can link to any member of this new genus.

***Protyrtaeus pecki* Spiessberger and Ivie, new species**

(Figs. 3.4, 3.14d, 3.15i, 3.16d)

Type Material. HOLOTYPE: PUERTO RICO, B265; Aguas Buenas, forest; at Aguas Buenas Cave; 7-17.V.73, 250m.; S. Peck et al (WIBF). PARATYPES (36): 31: Same locality data as holotype (WIBF). 5: PTO.RICO, Aguas; Buenas, 7-17.V.; 1973, S.Peck; Berlese 265 (CNCI).

Diagnosis. Similar to *P. obrieni*, it can be easily confused when *P. obrieni* has the "shiny form" which includes a yellow antenna. Examination of the adeagi is the only way to certainly differentiate *P. pecki* from the *P. obrieni* shiny form. The adeagus of *P. pecki* is wide, with the apicale broad and rounded apically (Fig. 3.16d), while in *P. obrieni* the adeagus is narrow, with the apicale acute at the apex (Fig. 3.16c).

Etymology. Named in honor of Stewart B. Peck, who collected the type series and has contributed both collections and publications increasing our knowledge and understanding of the West Indian beetle fauna.

Description. 1.8–2.3 mm long, 1.2–1.3 mm wide. Dorsal surface bronze, or light brown without distinct setation, only few microsetae and few longer setae along lateral elytral margin, shiny; antennae yellowish brown or light brown. Head width not as wide as anterior edge of pronotum, frons moderately, coarsely punctate, punctures subequal to eye facet, glabrous; epistomal suture moderately marked; clypeus setose with a higher concentration of setae at apex; labrum with longer and more densely distributed setae; antenna nine segmented (Fig. 3.14d), yellow to brown, antennomere II subequal in length and slightly wider than III, antennomeres VII-IX forming club, gradually decreasing in

width being VII the widest, club subequal or slightly longer than antennomeres I-VI, last antennomere rounded or oval at apex; pronotum strongly transverse, widest at base, sparsely and finely punctate, punctures smaller than eye facet; all margins beaded, anterior margin bisinuate, lateral margin nearly straight or slightly rounded, strongly beaded, bead gradually increasing width posteriorly, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially, anterior angles rounded, protruding, posterior angles obtuse. Elytron without striae, with faint, shallow and small punctures, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area strongly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum with line of strong punctures. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I acute (Fig. 3.15i), sparsely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16d) short and wide, basale and apicale subequal in length, apicale broadly rounded at apex, converging at apical ¼; in lateral view, aedeagus curved medially.

Distribution. Puerto Rico (Fig. 3.19).

Biology. This species was extracted from sifted litter with Berlese funnels. The litter was from a sink area known as Los Sumideros near Aguas Buenas Cave (Peck 1974).

Remarks. The type series was collected at 250m, outside a central Puerto Rican limestone cave (Fig. 3.19). The habitat is briefly discussed by Peck (1974). All of the known specimens were taken by Berlese from 171 liters of sifted litter, sifted from 493 kilos of litter, for an average of 1 specimen per 10 kilos of forest litter. This species, as well as *P. gracilicornis*, differs from others in being collected from litter rather than specifically with moss, lichen or fungi.

Prototyrtaeus gracilicornis **Spiessberger and Ivie, new species**

(Figs. 3.5, 3.14e, 3.15j, 3.16e)

Type Material. HOLOTYPE: PUERTO RICO:; Caribbean Nat. For.; Pico El Yunque, 1005m; 23SEP1987, M.A. Ivie; litter und. Treefern (WIBF). PARATYPES (19 specimens): 5: Same locality data as holotype (WIBF). 6: El Yunque; c. 3,000 ft, P.R.; May 1938; Darlington (MCZC). 2: PUERTO RICO; El Yunque Peak; III-28-1970 litter; R. Lavigne (WIBF). 1: West Peak; Puerto Rico (MCZC). 1: Luquillo Forest; East Peak, P.R.; July. 15, 1969; H. & A. Howden (CNCI). 1: PUERTO RICO:; El Verde Research Sta; ridge tops in forest; 02-30 SEP 1996; E. Nazario, pitfall (WIBF). 3: PUERTO RICO: Liquillo [sic]; Forest, Big Tree trail; 05 DEC 1959, G.F. Haas; ex forest debris (2 INHS, 1 WIBF).

Diagnosis. This species can be distinguished by having a non-metallic integument; a unicolored antenna with antennomere III distinctly longer than II (Fig. 3.14e); the head with confluent punctures forming striguli (more evident under LED white light). It is the only species with acute anterior angles on the pronotum; the anterior margin of the pronotum beaded, the pronotum widest at base and the intercoxal process of ventrite I rounded (Fig. 3.15j).

Etymology. The species name refers to the thin and slightly elongate antennae of this species.

Description. 2.0–2.5 mm long, 1.2–1.5 mm wide. Dorsal surface brown without distinct setation, only few microsetae and few longer setae along lateral elytral margin, shiny when less esclerotized; antennae brown. Head width not as wide as anterior edge of pronotum, frons moderately, coarsely punctate, punctures confluent forming striguli (more evident under LED white light), glabrous; epistomal suture moderately marked; clypeus setose with a higher concentration of setae at apex; labrum with longer and more densely distributed setae; antenna nine segmented (Fig. 3.14e), brown, antennomere III distinctly longer than II, antennomere VI distinctly thinner and shorter than VII, antennomeres VII-IX forming club, gradually decreasing in width being VII the widest, club shorther than antennomeres I-VI, last antennomere rounded at apex; pronotum strongly transverse, widest at base, sparsely and finely punctate, punctures smaller than eye facet; all margins beaded, anterior margin bisinuate, lateral margin nearly straight, strongly beaded, bead gradually increasing width posteriorly, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially,

anterior angles acute, with bead of lateral margin weakly protruding forward, posterior angles obtuse. Elytron without striae, with faint, shallow and small punctures, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area smooth, distance between meso and metacoxa half of mesocoxa diameter; metepisternum smooth. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I rounded (Fig. 3.15j), sparsely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16e) with basale twice longer than apicale; in lateral view, basal ⅔ of basale curved, apical ¼ of apicale curved.

Distribution. Puerto Rico (Fig. 3.19).

Biology. The label data on this series indicates this species lives in litter on the ground. The only further information in that one of the series was taken under a tree fern.

Remarks. This species has been found only in the Luquillo Mountains of eastern Puerto Rico. Like another Puerto Rican species of apparently limited distribution, *P. pecki*, this species seems to live in litter on the ground.

***Prototyrtaeus howdeni* Spiessberger and Ivie, new species**

(Figs. 3.6, 3.14f, 3.15k, 3.16f)

Type Material. HOLOYPE: JAMAICA, 7400'; Blue Mt. Peak; VII.27-28.1966; Howden & Becker (CNCI). PARATYPES (36 specimens): 22: same locality data as holotype (CNCI). 8: Main Range; Blue Mts.; 5-7388 ft.; Aug. 17-19/ Jamaica; 1934; Darlington (MCZC). 2: Cinchona, Jamaic[a]; 5000 ft. Jan.1912; C. T. Brues/ Gift of; C.T.Brues (MCZC). 3: JAM., St Thomas P.; Portland Gap, 5500'; 17.XII.72-1.I.1973; S&J Peck, cloud; for., dung&carrion tr. (WIBF). 1: JAM., St Thomas P.; Blue Mts. Peak, 7400'; 1.I.1973, S&J; Peck. Ber.252. (WIBF).

Diagnosis. This species can be distinguished by having a non-metallic integument; a unicolored seven-segmented antenna (Fig. 3.14f); the pronotum widest at the base, weakly transverse and with a beaded anterior margin as well as the intercoxal process of ventrite I broadly rounded (Fig. 3.15k). *Prototyrtaeus howdeni* can be confused with *P. sandersoni* and *P. beckeri*. It can be differentiated from *P. sandersoni* by not having a strongly convex body, having the frons moderately punctate and being larger, ranging from 2.4–3.3mm. It can be differentiated from *P. beckeri* by not having a longitudinal elevation along elytral suture, and having four long elytral setae (Fig. 15a), one long seta behind the basal margin, a pair of long setae above the lateral groove on the basal ¼ of the elytron, and one long seta above the lateral groove on the apical ⅓ of the elytron.

Etymology. This species is named for Henry Fuller Howden (1925-2014), longtime mentor, inspiration and friend of MAI and dozens of other coleopterists lucky

enough to have known him. He and his friend Edward Becker collected the majority of the type series.

Description. 2.4–3.3 mm long, 1.4–1.6 mm wide. Dorsal surface piceous, convex, more attenuate behind, less declivous in lateral view, without distinct setation, only few microsetae and few longer setae along lateral elytral margin, shiny; antennae yellow or light brown. Head width not as wide as anterior edge of pronotum, frons moderately, finely punctate, punctures smaller than eye facet, glabrous; epistomal suture weakly marked; clypeus bearing one row of golden long setae at the apex; labrum densely setose; antenna seven segmented (Fig. 3.14f), yellow or brown, antennomere II slightly wider than III, antennomeres after III gradually widening, VII forming club of three fused antennomeres, oval, club length subequal to antennomeres II-VI; pronotum weakly transverse, widest at base, moderately and finely punctate, punctures smaller than eye facet; all margins beaded, anterior margin slightly bisinuate, lateral margin above lateral bead nearly straight, strongly beaded, bead gradually increasing width posteriorly, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead sometimes nearly effaced medially, anterior angles rounded, protruding, posterior angles obtuse. Elytron without striae, finely punctate, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area weakly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum weakly punctate. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden

setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly englarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I broadly rounded (Fig. 3.15k), sparsely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16f) apicale curved medially, half-length of basale, basale curved medially and on posterior ⅓, median lobe slightly exceeding apicale.

Distribution. Jamaica (Fig. 3.17).

Biology. Unknown.

Remarks. Little is recorded about this species in the label data available. The fact that a few were taken in a baited pitfall and by Berlese funnel indicates a terrestrial habitat. Howden and Becker are known to have collected by beating on this trip, and futer examination of their field notes may give some insight.

Prototyrtaeus sandersoni Spiessberger and Ivie, new species

(Figs. 3.7, 3.14g, 3.15k, 3.16g)

Type Material. HOLOTYPE: Jamaica, Brit.; West Indies/ Hardwar Gap,; Portland Par.; 4000' 03AUG1956; B&B Valentine/ Hardwood cloud; forest, beating (WIBF to be deposited in NMNH). PARATYPES (29 specimens): 5: same locality data as holotype (WIBF). 1: JAMAICA, 4000'; Hardwar Gap; VII.4.1966; A.T. Howden (CNCI). 3: same locality data as previous, except, Howden & Becker (CNIC). 1: same locality data as previous, except VII.5.1966 (CNCI). 1: JAMAICA, 4000'; Hardwar Gap; VII.10.1966; A. T. Howden (CNCI). 1: same locality data as previous, except, Howden &

Becker (CNCI). 1: same locality data as previous, except, VII.12.1966 (CNCI). 1: same locality data as previous, except, VII.13.1966 (CNCI). 3: same locality data as previous, except, VII.16.1966 (CNCI). 1: same locality data as previous, except, VII.17.1966 (CNCI). 2: JAM., St Andrew P.; Hardwar Gap; 16.XII.1973; S&J Peck (WIBF). 1: JAMAICA: St. Andrew; Par., Hardwar Gap; 4380 ft., 8AUG1985; M. A. Ivie colr. (WIBF). 1: JAMAICA, Portland; P., Hardwar Gap; Dec,5,1975 C.W.&L.; O'Brien & Marshall (FSCA). 1: JAMAICA: Portland; Par., Hardwar Gap; 09MAY1950; Acc. No. 49613 5-4 (INHS). 2: Main Range; Blue Mts.; 5-7388 ft.; Aug. 17-19/ Jamaica; 1934; Darlington (MCZC). 1: JAMAICA, 7400'; Blue Mt. Peak; VII.27-28.1966; Howden & Becker (CNCI). 1: JAMAICA:; 6MI. N.MAVIS BANK; JUNE 1 1966/ B. K. DOZIER; COLL. (FSCA). 1: Mt. Diablo, Jamaica; St. Ann Par.; IV-3-68/ J.F. Lawrence; Lot. 2553/ Peck & Fiske; Collectors (MCZC). 1: Whitfield Hall; Blue Mts.; nr 4500 ft.; Aug. 13-20/ Jamaica; 1934; Darlington (MCZC).

Diagnosis. This species can be distinguished by having a non-metallic integument; the body strongly convex; the antenna unicolorous and seven-segmented (Fig. 14g); the pronotum transverse, with the anterior margin beaded, and widest at base; while the intercoxal process of ventrite I is broadly rounded (Fig. 15k). *Prototyrtaeus sandersoni* can be confused with *P. howdeni* and *P. beckeri*. It can be differentiated from *P. howdeni* by having a strongly convex body, the frons sparsely punctate and a small body size, ranging from 1.3–2.0mm. It can be differentiated from *P. beckeri* by lacking a longitudinal elevation along the elytral suture, and having at least three long elytral setae (Fig. 15a,b).

Etymology. This species is named for Milton Sanderson (1910-2012), in honor of his contributions to West Indian entomology through his extensive collections in Cuba, Jamaica, Puerto Rico and Hispaniola.

Description. 1.3–2.0 mm long, 0.9–1.3 mm wide. Dorsal surface piceous, strongly convex, rounded behind, more declivous in lateral view without distinct setation, only few microsetae and few longer setae along lateral elytral margin, shiny; antennae yellow or light brown. Head width not as wide as anterior edge of pronotum, frons sparsely, finely punctate, punctures smaller than eye facet, glabrous; epistomal suture weakly marked; clypeus bearing golden long setae at the apex, at corners, not medially; labrum densely setose; antenna seven segmented (Fig. 3.14g), yellow or brown, antennomere II slightly wider than III, antennomeres after III gradually widening, VII forming club of three fused antennomeres, rounded to oval, club length subequal to antennomeres II-VI; pronotum transverse, widest at base, moderately and finely punctate, punctures smaller than eye facet; all margins beaded, anterior margin slightly bisinuate, lateral margin above lateral bead nearly straight, strongly beaded, bead gradually increasing width posteriorly, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead sometimes nearly effaced medially, anterior angles rounded, protruding, posterior angles obtuse. Elytron without striae, finely punctate, one long seta behind basal margin or absent, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a,b). Metaventrite short, lateral area weakly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum weakly punctate. Legs, pro and

mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly englarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I broadly rounded (Fig. 3.15k), sparsely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16g) evenly curved medially, basale and apicale subequal in length, median lobe not exceeding apicale.

Distribution. Jamaica (Fig. 3.18).

Biology. Nothing is recorded on the biology of this species.

Remarks. The majority of specimens of this species have been taken by beating in the hardwood cloud forests around Hardware Gap and Blue Mountain Peak.

Prototyrtaeus beckeri Spiessberger and Ivie, new species

(Figs. 3.8, 3.14h, 3.15l, 3.16h)

Type Material. HOLOTYPE: JAMAICA, 7400'; Blue Mt. Peak; VII.27-28.1966; Howden & Becker (CNCI). PARATYPES (16 specimens):15: same locality data as holotype (CNCI). 1: JAMAICA, 4000'; Hardware Gap; VII.4.1966; Howden & Becker (CNCI).

Diagnosis. This species can be distinguished by having a non-metallic integument; a unicolored seven-segmented antenna (Fig. 3.14h); the pronotum weakly transverse, with the anterior margin beaded and widest at the base or middle. It is the only species with a longitudinal elevation along the elytral margin and the intercoxal process

of ventrite I broadly rounded (Fig. 3.15l). The only other species with seven antennomeres are *P. howdeni* and *P. sandersoni*, but they lack the elevation along the elytral margin, and *P. beckeri* have just one long seta above lateral groove on basal ¼ of elytron (Fig. 3.15c), while the other species have more.

Etymology. This species is named in honor of Edward C. Becker (1923-2008), co-collector with his friend Henry Howden of all known specimens of this species. He was a friend to all, and highly respected Coleopterist.

Description. 1.8–2.2 mm long, 1.2–1.3 mm wide. Dorsal surface piceous, not strongly convex, without distinct setation, only few microsetae, shiny; antennae yellow or light brown. Head width not as wide as anterior edge of pronotum, frons moderately, finely punctate, punctures smaller than eye facet, glabrous; epistomal suture weakly marked; clypeus bearing one row of golden long setae at the apex; labrum densely setose; antenna seven segmented (Fig. 3.14h), yellow or brown, antennomere II slightly wider than III, antennomeres after III gradually widening, VII forming club of three fused antennomeres, oval, club length subequal to antennomeres II-VI; pronotum weakly transverse, widest at base or middle, sparsely and finely punctate, punctures very shallow and smaller than eye facet; all margins beaded, beads not connected at angles, anterior margin slightly bisinuate, lateral margin above lateral bead sinuate on basal ⅓, bead gradually increasing width posteriorly, visible setae from dorsal view sticking out laterally, posterior margin slightly arcuate, anterior angles rounded, posterior angles obtuse. Elytron without striae, finely punctate, one long seta above lateral groove (if missing, distinct puncture present) on basal ¼ (Fig. 3.15c); weak longitudinal elevation

along the elytral suture. Metaventrite short, lateral area weakly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum weakly punctate. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I broadly rounded (Fig. 3.15l), sparsely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16h) apicale curved medially, half-length of basale, basale curved medially and on posterior ⅓.

Distribution. Jamaica (Fig. 3.17).

Biology. Nothing is known about the biology of this species.

Remarks. Also known from the Blue Mountains and Hardwar Gap, a few of the paratypes of his species actually bear the same labels, *i.e*. was taken in the same events as some specimens of *P. sandersoni*.

Prototyrtaeus darlingtoni **Spiessberger and Ivie, new species**

(Figs. 3.9, 3.14i, 3.15m, 3.16i)

Type Material. HOLOTYPE: CUBA: Granma, P.N. Pico; Turquino, Aguada de Joachim,; 20.01447 -76.84065, 1359m,; 27.ix.2014, R. Anderson, F. Cala; Riquelme, A. Deler Hernandez,; 2014-018X, beating mont. Forest (CMNC). PARATYPES (23 specimens): 6: Pico Turquino; S. side; June 1936; 3000-5000 ft./ Cuba 1936; Darlington; Collector (MCZC). 1: Pico Turquino; June 16-21, 1936; 6000 ft. (summit)/ Cuba 1936;

Darlington; Collector (MCZC). 1: CUBA: Granma, P. N. Pico; Turquino, Pico de Joachim; 20.013°N, 76.834°W; 1660m, 27SEP2014, RAnderson; montane forest litter (WIBF). 5: CUBA: Granma; Parque Nacional Pico Turquino; 1660m, 20.01309 - 76.83400,; IV.2012, CarBio Team, montane; forest litter, CU-06 (CMNC). 1: CUBA: GRANMA, Parque; Nacional Pico Turquino; Aguada de Joaquin, 1368m,; 20.01463 - 76.63971, 24.V.2012; F. Cala Riquelme & Deler; Hernandez, montane forest litter (CMNC). 1: CUBA: Granma, P.N. Pico; Turquino, slope Pico Turquino,; 19.99258 - 76.83377, 1800m,; 28.ix2014, R. Anderson, F. Cala; Riquelme, A. Deler Hernandez; 2014-019, montane forest litter (CMNC). 3: same data as previous specimen, except for: 19.99323 -76.83408, 1804m; 2014-021 (CMNC). 3: CUBA: Granma, P.N. Pico; Turquino, Pico de Joachim,; 20.013 -76.834, 1660m,; 27.ix.2014, R. Anderson, F. Cala; Riquelme, A. Deler Hernandez; 2014-018, montane forest litter (CMNC). 1: CUBA: Granma, P.N. Pico; Turquino, Pico Turquino,; 19.99008 -76.83562, 1955m; 28.ix.2014, R. Anderson, F. Cala; Riquelme, A. Deler Hernandez; 2014-020, elfin forest litter (CMNC). 1: CUBA: Granma, P.N. Pico; Turquino, Aguada de Joachim,; 20.01447 - 76.84065, 1359m,; 27.ix.2014, R. Anderson, F. Cala; Riquelme, A. Deler Hernandez,; 2014-018[a], mont. For. Litter (CMNC).

Diagnosis. This species can be distinguished by having a metallic integument; a unicolored antenna with antennomere III distinctly longer than II (Fig. 3.14i); the transverse pronotum is widest at the middle and lacks an anterior marginal bead. The intercoxal process of ventrite I is broadly rounded (Fig. 3.15m) and the mesotarsus has

the first tarsomere distinctly enlarged (Fig. 3.15d). This the only species to have a somewhat flattened protibia with a glabrous area on the venter in the apical ½.

Etymology. This species is named after the prominent collector and Carabidae specialist Philip J. Darlington, the collector of some specimens of the type specimens of this species and others.

Description. 3.5–4.0 mm long, 2.0–2.5 mm wide. Dorsal surface metallic green, glabrous, except for few long setae along lateral elytral margin, shiny; antennae light brown. Head width subequal to anterior edge of pronotum, coarsely punctate, frons glabrous, punctures evenly distributed, punctures subequal to eye facet; epistomal suture weakly marked; clypeus short, setose with a higher concentration of setae at apex; labrum with longer and more densely distributed setae; antenna nine segmented (Fig. 3.14i), light brown, antennomere III distinctly longer (about two times) than antennomere II, antennomeres VII-IX forming club, gradually increasing in width, being IX the widest or VIII and IX equally wide, last antennomere rounded at apex; pronotum moderately transverse, widest at middle, densely and coarsely punctate, punctures subequal to eye facet; anterior margin without bead, lateral margin rounded, strongly beaded, width not varying, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially, anterior angles rounded, not protruding, posterior angles obtuse. Elytron punctato-striate shallowly punctate, with few punctures on interstriae, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area smooth or weakly punctate, distance

between meso and metacoxa half of mesocoxa diameter; metepisternum smooth or weakly punctate. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, sometimes with glabrous area on venter on apical ½ and somewhat flattened, tarsomere I distinctly (Fig. 3.15d) or weakly enlarged, longer and sometimes wider than II+III. Abdomen, intercoxal process of ventrite I broadly rounded (Fig. 3.15m), sparsely finely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16i) basale and apicale subequal in length, basale straight on first ¼, curved on other ¾, apicale slightly narrowed on apical ¼, terminating slightly truncate, slightly narrowed on basal ¼, median lobe slightly exceeding apicale.

Distribution. Cuba (Fig. 3.18).

Biology. Specimens were collected at high altitude (915 – 1830m) in montane forest litter.

Remarks. This species is only know from on and around Pico Turquino, the highest peak on Cuba. As so often happens, it is not known if this is a real case of local endemism or the result of collecting bias, and it is the destination of virtually every collector in eastern Cuba.

Prototyrtaeus maestrensis **Spiessberger and Ivie, new species**

(Figs. 3.10, 3.14j, 3.15n, 3.16j)

Type Material. HOLOTYPE: CUBA: GRANMA; Alto de Meriño, nr. Biological; Station, 958 m, 5-10.III.2013; 19°59’9’’N 77°0’57’’W; pluviselva litter, F.

Cala-Riquelme; & A. Deler-Hernández (CMNC). PARATYPES (16 specimens): 16: same locality data as holotype (CMNC).

Diagnosis. This species can be distinguished by having a metallic integument; a bicolored antenna with antennomere III distinctly longer than II (Fig. 14j); the pronotum transverse and widest at middle, and lacking a bead on the anterior margin. The intercoxal process of ventrite I is moderately rounded (Fig. 15n). Only three species have bicolored antennae, the main difference being that *P. maestrensis* and *P. turquinensis* have a dark antenna with the apex of the apical segment lighter, while *P. duartei* has the first four segments black, and the remaining six light yellow. *Prototyrtaeus maestrensis* can be distinguished from *P. turquinensis* by having the first eight antennal segments black and the apex of antennomere IX yellow, antennomere IV longer than wide, the frons with punctures evenly distributed and the pronotum coarsely punctate.

Etymology. The name is a latinized noun in the genitive case based on the name of the Cuba mountain range the Sierra Maestra.

Description. 2.4–2.8 mm long, 1.4–1.6 mm wide. Dorsal surface metallic green or bronze, glabrous, except for few long setae along lateral elytral margin, shiny, antennae black, and yellow on last antennomere. Head width subequal to anterior margin of pronotum, coarsely punctate, frons glabrous, punctures evenly distributed, punctures subequal to eye facet; epistomal suture weakly marked; clypeus short, setose with a higher concentration of setae at apex; labrum with longer and more densely distributed setae; antenna nine segmented (Fig. 3.14j), black, and yellow at apex of antennomere IX, antennomere III distinctly longer than antennomere II, antennomere IV longer than wide,

antennomeres VII-IX forming club gradually increasing in width, being IX the widest or VIII and IX equally wide, last antennomere rounded at apex; pronotum strongly transverse, widest at middle, moderately and coarsely punctate, punctures subequal to eye facet; anterior margin without bead, lateral margin rounded, strongly beaded, width not varying, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially, anterior angles rounded, not protruding, posterior angles obtuse. Elytron punctato-striate, with a few punctures on interstriae, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area smooth or weakly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum smooth or weakly punctate. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I moderately rounded (Fig. 3.15n), sparsely finely punctate, punctures bearing very fine golden setae. Aedeagus (Fig. 3.16j) basale almost twice longer than apicale, basale slightly narrowed on apical ¼, apicale converging on apical ½, terminating acute, slightly narrowed on basal ¼, median lobe slightly exceeding apicale; lateral view, basale curved on basal ⅔, straight apicale.

Distribution. Cuba (Fig. 3.18).

Biology. All the type specimens were collected in a single event at 958 m of altitude on Alto de Meriño from rain forest litter.

Remarks. This seemingly restricted species may occur more widely in the mostly unsampled mountains to the north of the type locality.

Prototyrtaeus felis **Spiessberger and Ivie, new species**

(Figs. 3.11, 3.14k, 3.15n)

Type Material. HOLOTYPE: Loma del Gato; Cobre Range, O; July 3-7, 1936; about 3000ft./ Cuba 1936; Darlington; Collector (MCZC). PARATYPES (5 specimens): 4: same locality data as holotype (MCZC). 1: CUBA: Oriente, Loma; (Pico) del Gato, Sierra; Maestra, 26-28 MAR 1959; M. W. Sanderson (INHS).

Diagnosis. This species can be distinguished by having a metallic integument; antenna yellow, antennomere III slightly longer than II (Fig. 3.14j); pronotum transverse, anterior margin without bead, widest at middle; intercoxal process of ventrite I moderately rounded (Fig. 3.15n). This species is similar to *P. aureocornis* and *P. turquinensis*, but can be distinguished from *P. aureocornis* by the yellow antennae, and frons with punctures distribution becoming sparser posteriorly, and from *P. turquinensis* by the antennae unicolored, frons glabrous and finely punctate.

Etymology. The name is based on the name of the mountain where the type specimens were found, Loma del Gato, where "*felis*" is the generic name of the species of the domesticated house cat, *Felis catus* Linnaeus, 1758, the only cat on Cuba.

Description. 2.3–2.6 mm long, 1.4–1.5 mm wide. Dorsal surface metallic greenish bronze, glabrous, except for few long setae along lateral elytral margin, shiny; antennae yellow. Head width subequal to anterior edge of pronotum, finely punctate, frons glabrous, punctures distribution becoming sparser posteriorly, punctures smaller than eye facet; epistomal suture weakly marked; clypeus short, setose with a higher concentration of setae at apex; labrum with longer and more densely distributed setae; antenna nine segmented (Fig. 3.14k), yellow, antennomere III slightly longer than antennomere II, antennomere IV wider than long, antennomeres VII-IX forming club gradually increasing in width, being IX the widest or VIII and IX equally wide, last antennomere rounded; pronotum strongly transverse, widest at middle, moderately and finely punctate, punctures subequal to eye facet; anterior margin without bead, lateral margin rounded, strongly beaded, width not varying, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially, anterior angles rounded, not protruding, posterior angles obtuse. Elytron punctato-striate, with a few punctures on interstriae, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area smooth or weakly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum smooth. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged

(Fig. 3.15e). Abdomen, intercoxal process of ventrite I moderately rounded (Fig. 3.15n), sparsely finely punctate, punctures bearing very fine golden setae. Aedeagus not studied

Distribution. Cuba (Fig. 3.18).

Biology. Nothing is known of the biology of this species.

Remarks. All the specimens of this species known were collected either before the Cuban Revolution, or in the months shortly following the rise of the new regime. The area is currently a National Park, and some collecting has occurred since then, but no further specimens are known to us.

Prototyrtaeus turquinensis **Spiessberger and Ivie, new species**

(Figs. 3.12, 3.14l, 3.15n)

Type Material. HOLOTYPE: CUBA: Granma; P.N. Pico Turquino, La Platica; 20.01065 -76.88950, 928m; 26.ix.2014, R. Anderson, F. Cala; Riquelme, A. Deler Hernandez; 2014-017 montane forest litter (CMNC). PARATYPE (2 specimens): 2: Pico Turquino; S. side, 1500 ft.; June 25, 1936/ Cuba 1936; Darlington; Collector (MCZC).

Diagnosis. This species can be distinguished by having a metallic integument; a bicolored antenna with antennomere III slightly longer than II (Fig. 14l); the pronotum transverse, widest at middle and lacking a bead on the anterior margin. The intercoxal process of ventrite I is moderately rounded (Fig. 15n). Only three species have bicolored antennae, and the distinguishing characteristics are discussed above under *P. maestrensis*. *Prototyrtaeus turquinensis* can be distinguished from *P. maestrensis* by having the first eight segments brown and the apex of antennomere IX yellowish, antennomere IV

subquadrate, frons punctures distribution becoming sparser posteriorly and pronotum slightly or moderately punctate.

Etymology. The name is a latinized noun in the genitive case based on the name of the Cuban mountain Pico Turquino, the highest mountain in Cuba and the only known locality for this species.

Description. 2.4–2.6 mm long, 1.4 mm wide. Dorsal surface metallic bronze with greenish reflections, glabrous, except for head, and few long setae along lateral elytral margin, shiny; antennae brown with yellowish apex. Head width subequal to anterior edge of pronotum, coarsely punctate, frons bearing long setae, punctures distribution becoming sparser posteriorly, punctures subequal to eye facet; epistomal suture weakly marked; clypeus short, setose with a higher concentration of setae at apex; labrum with longer and more densely distributed setae; antenna nine segmented (Fig. 3.14l), brown, and yellowish at apex of antennomere IX, antennomere III slightly longer than antennomere II, antennomere IV subquadrate, antennomeres VII-IX forming club gradually increasing in width, being IX the widest or VIII and IX equally wide, last antennomere rounded at apex; pronotum strongly transverse, widest at middle, moderately and finely punctate, punctures smaller than eye facet; anterior margin without bead, lateral margin rounded, strongly beaded, width not varying, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially, anterior angles rounded, not protruding, posterior angles obtuse. Elytron punctato-striate, with a few punctures on interstriae, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on

apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area smooth or weakly punctate, distance between meso and metacoxa half of mesocoxa diameter; metepisternum smooth or weakly punctate. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I moderately rounded (Fig. 3.15n), sparsely finely punctate, punctures bearing very fine golden setae. Aedeagus not studied

Distribution. Cuba (Fig. 3.17).

Biology. Specimens were collected in forest litter at 460 m.

Remarks. This species is only known from on and around Pico Turquino, one of the seemingly sympatric group of species from the area.

Prototyrtaeus aureocornis **Spiessberger and Ivie, new species**

(Figs. 3.13, 3.14m, 3.15n)

Type Material. HOLOTYPE: Pico Turquino; S. Side, 1500 ft.; June 25, 1936/ Cuba 1936; Darlington; Collector (MCZC).

Diagnosis. This species can be distinguished by having a metallic integument; bicolored antenna with antennomere III slightly longer than II (Fig. 14m); a transverse pronotum that is widest at the middle and the anterior margin lacking a bead. The intercoxal process of ventrite I is moderately rounded (Fig. 15n). This species is similar

to *P. felis* and *P. turquinensis*, but can be distinguished from *P. felis* by the orange antennae, and the coarse puncatation of the frons evenly distributed. From *P. turquinensis* it can be distinguished by the glabrous frons and unicolored antennae.

Etymology. This species name refers to the orange antenna that is unique in this genus.

Description. 2.5 mm long, 1.5 mm wide. Dorsal surface metallic green, glabrous, except for few long setae along lateral elytral margin, shiny; antennae orange. Head width subequal to anterior margin of pronotum, coarsely punctate, frons glabrous, punctures evenly distributed, punctures subequal to eye facet; epistomal suture weakly marked; clypeus short, setose with a higher concentration of setae at apex; labrum with longer and more densely distributed setae; antenna nine segmented (Fig. 3.14m), orange, antennomere III slightly longer than antennomere II, antennomere IV wider than long, antennomeres VII-IX forming club gradually increasing in width, being IX the widest or VIII and IX equally wide, last antennomere rounded at apex; pronotum strongly transverse, widest at middle, moderately and coarsely punctate, punctures subequal eye facet; anterior margin without bead, lateral margin rounded, strongly beaded, width not varying, visible setae from dorsal view sticking out laterally, posterior margin arcuate with bead nearly effaced medially, anterior angles rounded, not protruding, posterior angles obtuse. Elytron punctato-striate, with a few punctures on interstriae, one long seta behind basal margin, pair of long setae above lateral groove on basal ¼, one long seta above lateral groove on apical ⅓ (if missing, distinct puncture present) (Fig. 3.15a). Metaventrite short, lateral area strongly punctate, distance between meso and metacoxa

half of mesocoxa diameter; metepisternum with line of strong punctatures. Legs, pro and mesocoxa rounded (external view), metacoxa transverse, narrowing outwards, femora with short, sparsely distributed golden setae, protibia with sparse straight golden setae on dorsal surface, venter completely setose, becoming dense golden brush on apical ½ and cylindrical, tarsomere I slightly enlarged (Fig. 3.15e). Abdomen, intercoxal process of ventrite I moderately rounded (Fig. 3.15n), sparsely finely punctate, punctures bearing very fine golden setae. Aedeagus not studied.

Distribution. Cuba (Fig. 3.17).

Biology. The single known specimen of this species was collected at 460 m.

Remarks. This is yet another species known only from the environs of Pico Turquino.

DISCUSSION

One of the facts that makes this a remarkable discovery is that, even though this is a genus that sometimes is very abundant in entomological collections, there is virtually no taxonomic history for any of the 13 species (the single known exception is Wolcott's 1936 record of *P. obrieni* as a Byrrhidae).

The status of this genus as a Greater Antillean endemic seems solid. It is important to emphasize that these species were pulled out of a large accumulation (ca. 3,000 specimens) of generally Neotropical Anopidiina assembled by MAI over the last 35 years. Others were loaned specifically for this project. Nothing like this group occurs

on the mainland as far as we have found. We have also examined large collections of Lesser Antillean Coleoptera, and nothing like this genus is present there either.

A pattern that we found to be useful for further works on this group is its restrictions to high elevation wet areas. In Cuba, the records are mainly in the various ranges of the Sierra Maestra, (four of the five species occur there) predominantly near, and even to the top of the range's highest point, Pico Turquino (1950 m). Besides that, there are two other locations, *P. aureocornis* occurring both in Pico Turquino and a little far north close to the city of Buey Arriba, which is close to the Río Buey, being the lowest elevation record for Cuba, at around 125 m, while the next lowest is the south part of Pico Turquino at about 460 m. And *P. felis* only occurring farther east, about 20 km from Pico Turquino. Some of this may be collecting bias, as the Sierra Maestra seems to receive an inordinate portion of the collecting effort in Cuba.

The Jamaican records are mainly in the Blue Mountains on the eastern part of the island with the highest elevation reaching 2256 m at Blue Mountain Peak. There are few other records close to the mid-east region of the island, the lowest record being from around 250 m.

The species known from Hispaniola inhabit different mountain ranges in the Dominican Republic. *Prototyrtaeus duartei* is located along the Cordillera Central, reaching as high as 3098 m on the summits of Pico Duarte and 3084 m and La Pelona (Pico del Yaque) and as low as 1400 m. *Prototyrtaeus neiba* is located in the Sierra Neiba, with the highest record being 2010 m and the lowest, close to the border with Haiti, 1270 m.

The most widespread records are found in Puerto Rico. *Prototyrtaeus* is found from far-west Maricao, to far-east in the Luquillo National Forest. *Prototyrtaeus obrieni* is the most widespread species and holds both the highest (at 1050 m) and lowest Puerto Rican (at 230 m) records for this genus. *Prototyrtaeus gracilicornis* is restricted to the Luquillo National Forest, and *P. pecki* to the Aguas Buenas area.

Looking at our data, we recognize that there are neglected regions on each island that have potential to shelter *Prototyrtaeus*. The whole central and western part of Cuba remain unrepresented. Records are also lacking on the western parts of Jamaica and Hispaniola, although Haiti forests are largely devasted in comparison to Dominican Republic. Puerto Rico is the most sampled island, but still with some gaps on the central/central-east region, and the whole northern part, which mostly suffers from anthropic influence. Thus, recapturing the pattern of distribution on high elevation areas and wet forests predominance, there is a lot of potential for additional populations of *Prototyrtaeus* to be discovered on these islands.

Other future needs for studies beyond the search for new species and distribution records is to confirm their food source. All the records reported *Prototyrtaeus* to be found (label data or personal observation of the authors) associated with moss, lichen or fungi. *Prototyrtaeus* are also found in Berlese/Winkler extractions from leaf litter and moss-leaf-litter samples, indicating that they probably feed on fungi, moss, or some decaying organic matter that can be found on leaf litter, as well as on lichen and moss on rocks. The two known larvae were taken with adults in these situations. Establishing the food habits and describing the larvae are important goals for future research.

There has been no phylogenetic study on the Anopidiina so far. Its sister-group relationship with the Gnathidiina dates to Doyen and Lawrence (1979), and has not been further tested. Work by Kergoat *et al*. (2014), Gunter *et al*. (2014) and Kojun Kanda (*in lit*.) provide a framework for such study, but to date the data have either not included members of the two subtribes (Kergoat *et al*. 2014 and Kanda *in lit*.), or have not pursued the question to that taxonomic level (Gunter *et al*. 2014). The investigation of the tribal and subtribal monophyly using DNA is an important next step in the study of this still-poorly-known group.

If a future phylogeny is done to attempt to understand the relationships between the species of *Prototyrtaeus*, we expect to see at least two well-supported groups: 1) the Cuban group, characterized by metallic integument, pronotum widest at middle and lacking bead on the anterior margin, and elytra with punctate striae; and 2) the Jamaican group with seven free antennomeres and potential for loss of long setae on the elytra. The two Hispaniola species do not seem to be as closely related, as *P. neiba* lacks the anterior bead of the pronotum margin, while *P. duartei* retains it. *Prototyrtaeus obrieni* and *P. pecki* are extremely similar to each other and are expected to be close phylogenetically, while *P. gracilicornis* has several differences, including the projected pronotum angles, the genitalia with a bent apicale and difference on the length proportion between apicale and basale.

Expecting a possible monophyly hypothesis over the groups mentioned above to be supported, it seems obvious that, if there are more species to be found in Cuba, they will have the characteristics mentioned above, as well as the Jamaican ones. It is harder

to predict what is to be found in Hispaniola and Puerto Rico as they seem to not be as consistent as Cuban and Jamaican groups.

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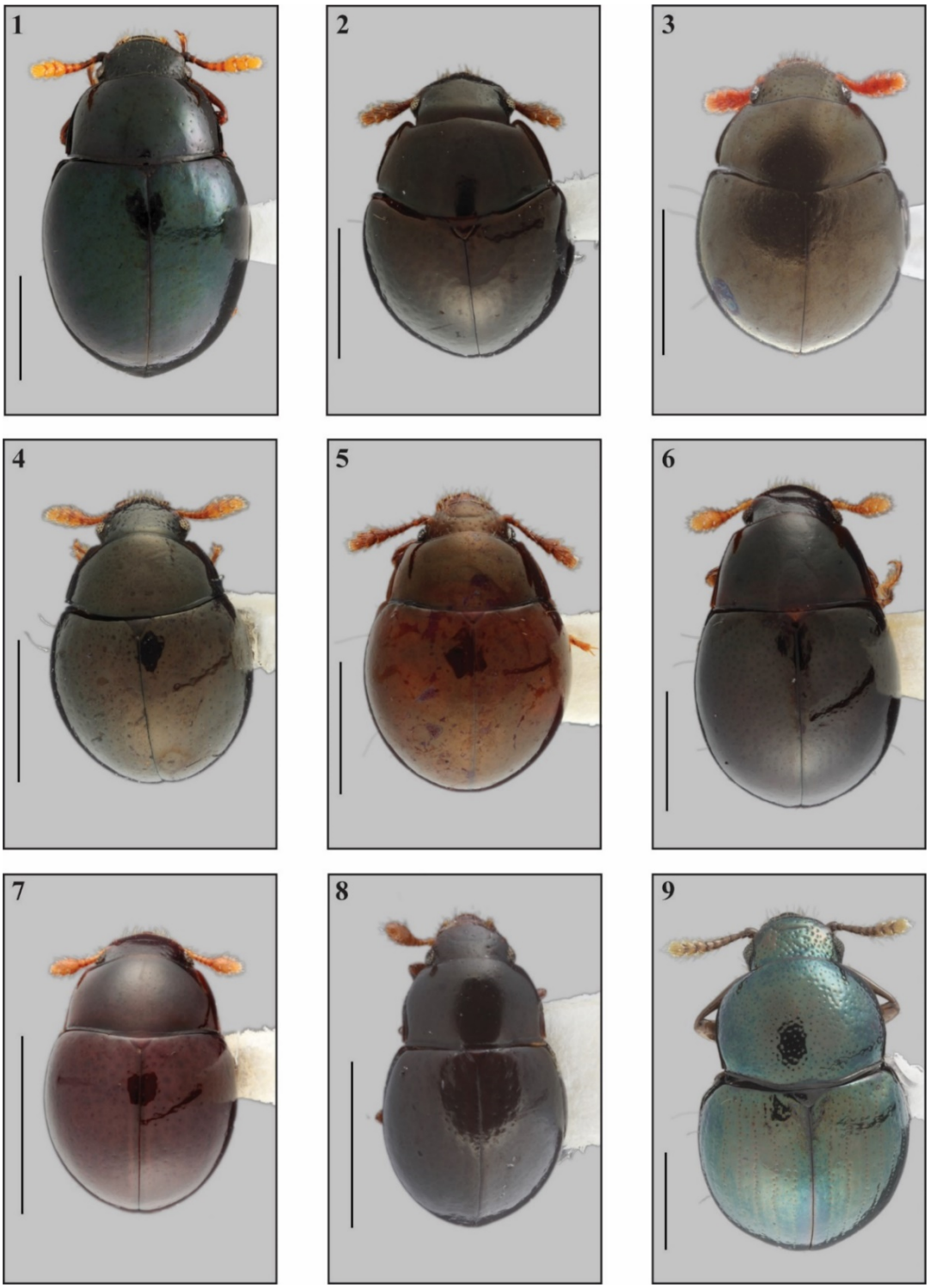
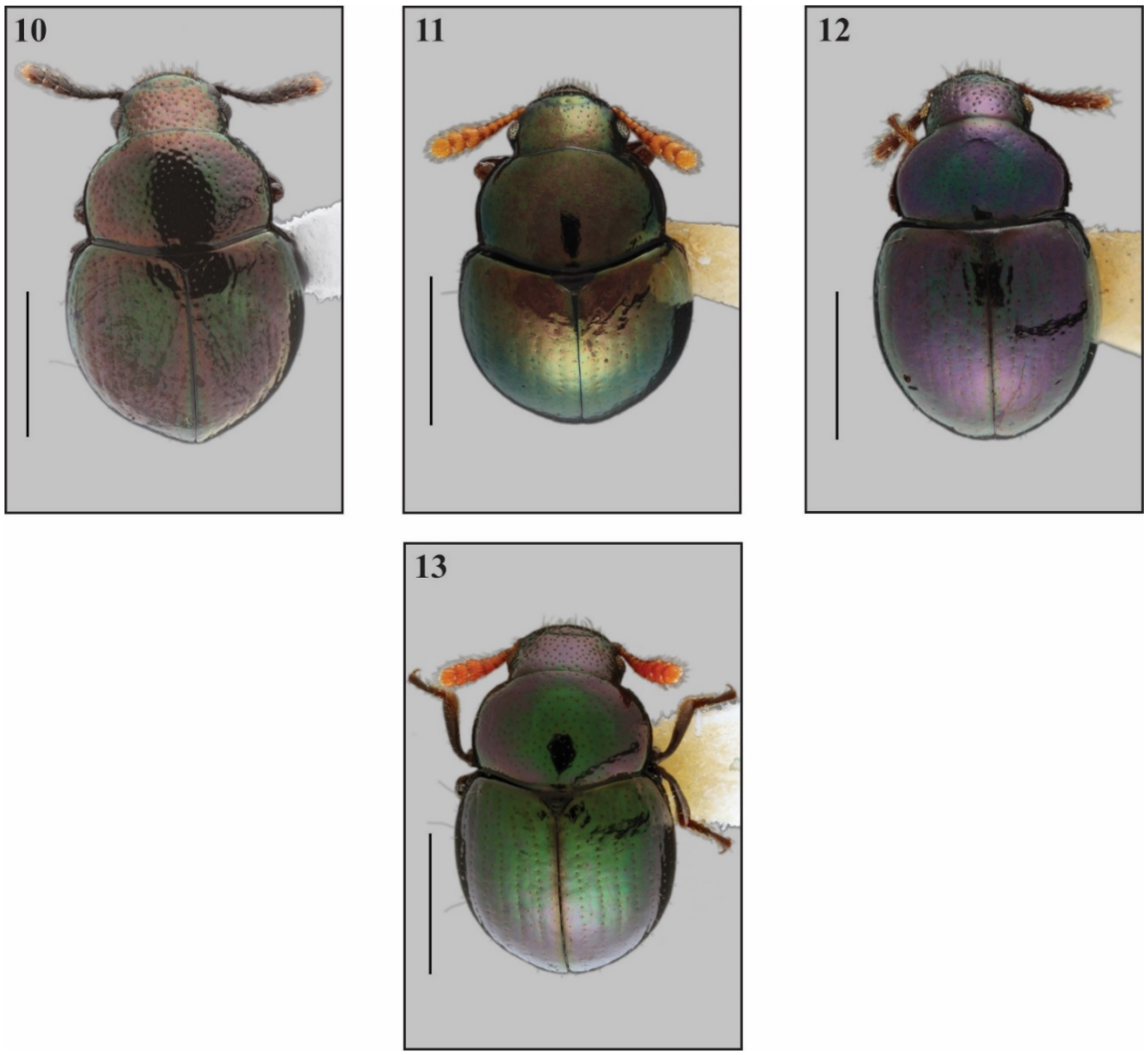


Figs. 3.1–3.9. *Prototyrtaeus* species, dorsal habitus. **3.1)** *P. duartei;* **3.2)** *P. neiba;* **3.3)** *P. obrieni*; **3.4)** *P. pecki*; **3.5)** *P. gracilicornis*; **3.6)** *P. howdeni*; **3.7)** *P. sandersoni*; **3.8)** *P. beckeri*; **3.9)** *P. darlingtoni*. Scale bars = 1mm.



Figs. 3.10–3.13. *Prototyrtaeus species*, dorsal habitus. **3.10)** *P. maestrensis*; **3.11)** *P. felis*; **3.12)** *P. turquinensis*; **3.13)** *P. aureocornis*. Scale bars = 1mm.

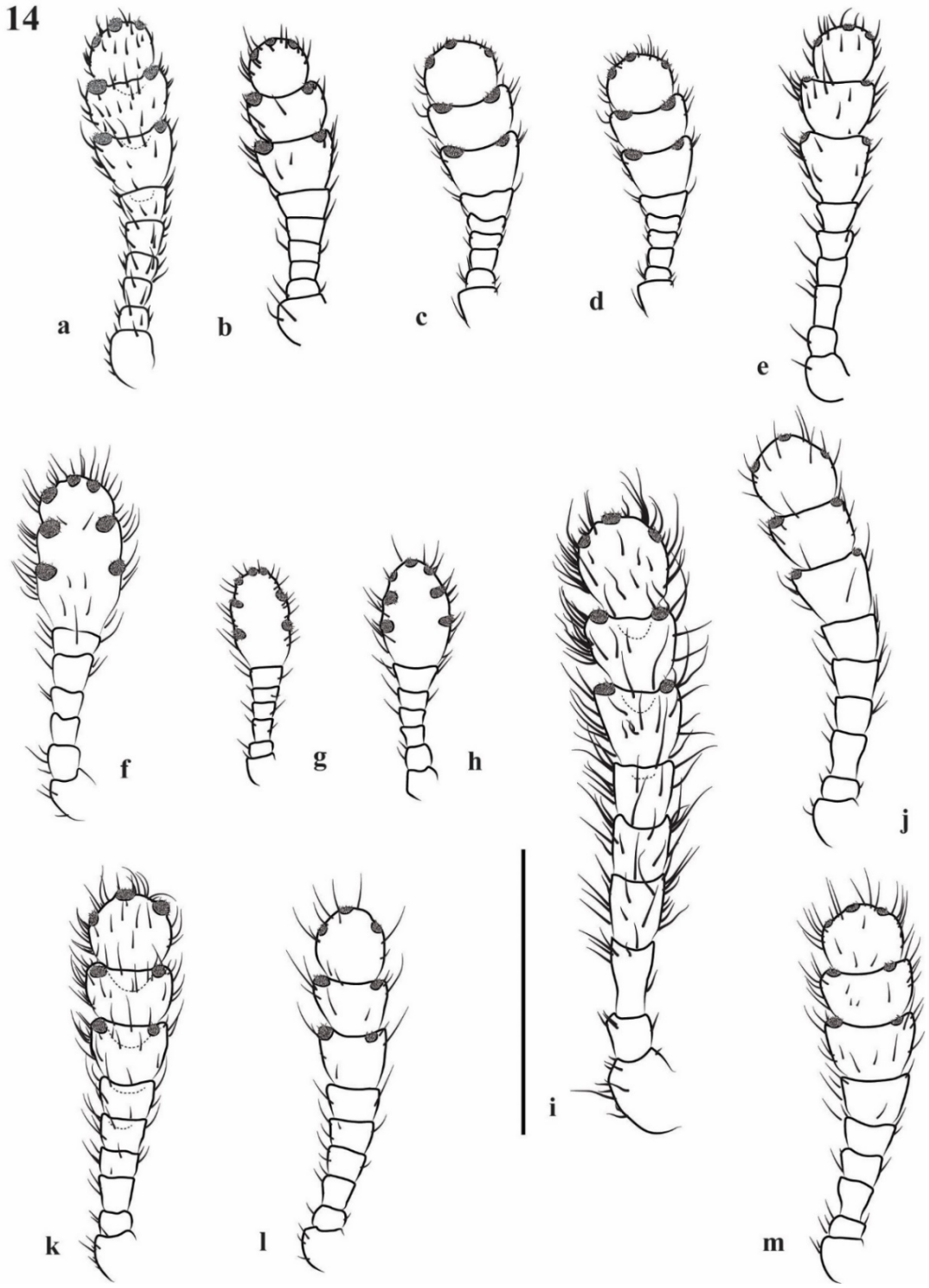


Fig. 3.14. Antennae. a) *P. duartei*, b) *P. neiba*, c) *P. obrieni*, d) *P. pecki*, e) *P. gracilicornis*, f) *P. howdeni*, g) *P. sandersoni*, h) *P. beckeri*, i) *P. darlingtoni*, j) *P. maestrensis*, k) *P. felis*, l) *P. turquinensis*, m) *P. aureocornis*. Scale bar = 0.5mm.

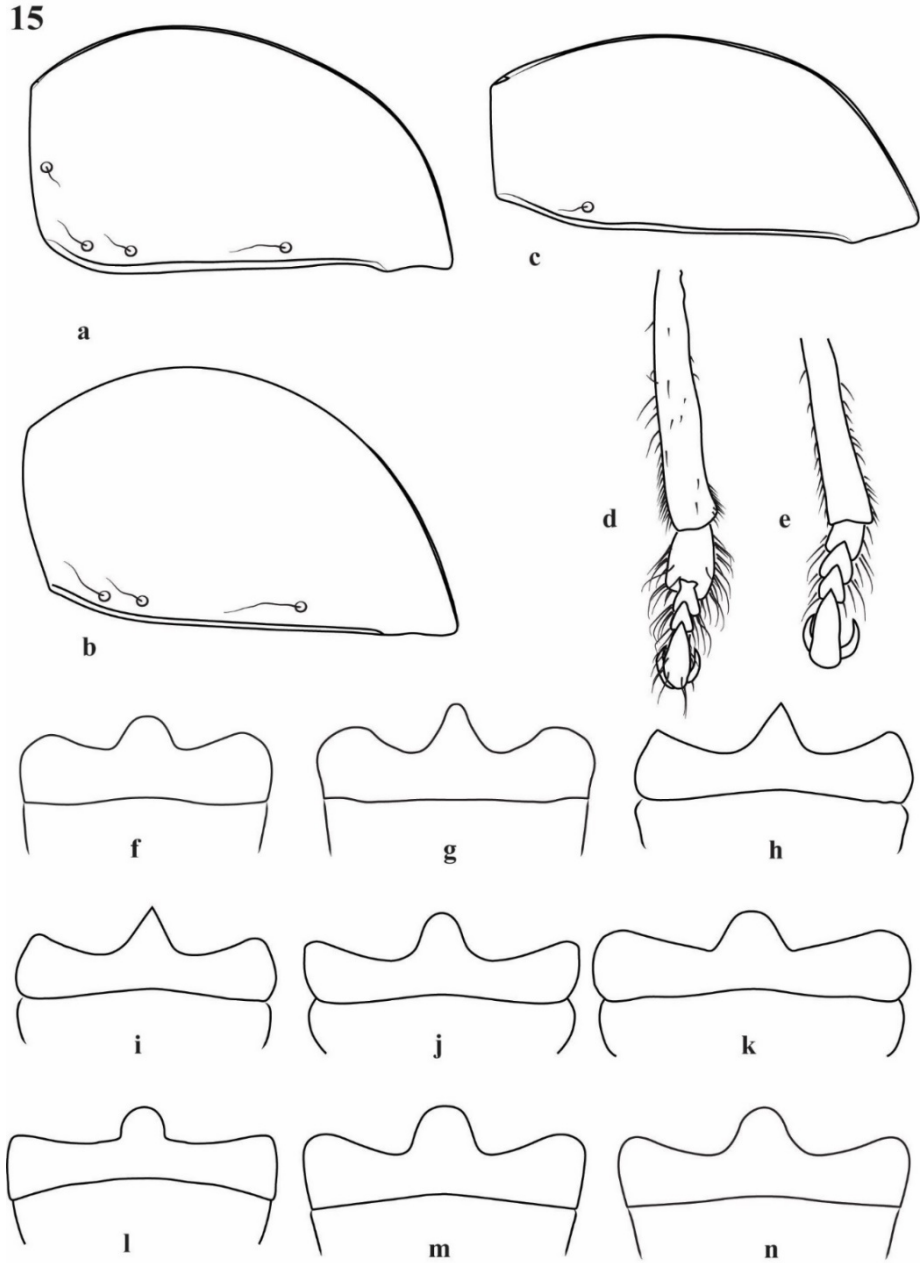


Fig. 3.15. Lateral views of *Prototyrtaeus* elytron, a–c. a) Lateral view of an elytron with four long setae, b) Lateral view of an elytron with three long setae, c) Lateral view of an elytron with one long seta. Mesoleg d–e. d) First tarsomere distinctly enlarged, e) First tarsomere slightly enlarged. Abdomen, intercoxal process, f–n. f) *P. duartei*, g) *P. neiba*, h) *P. obrieni*, i) *P. pecki*, j) *P. gracilicornis*, k) *P. howdeni*, l) *P. beckeri*, m) *P. darlingtoni*, n) *P. maestrensis*, *P. felis, P. turquinensis*, and *P. aureocornis*.

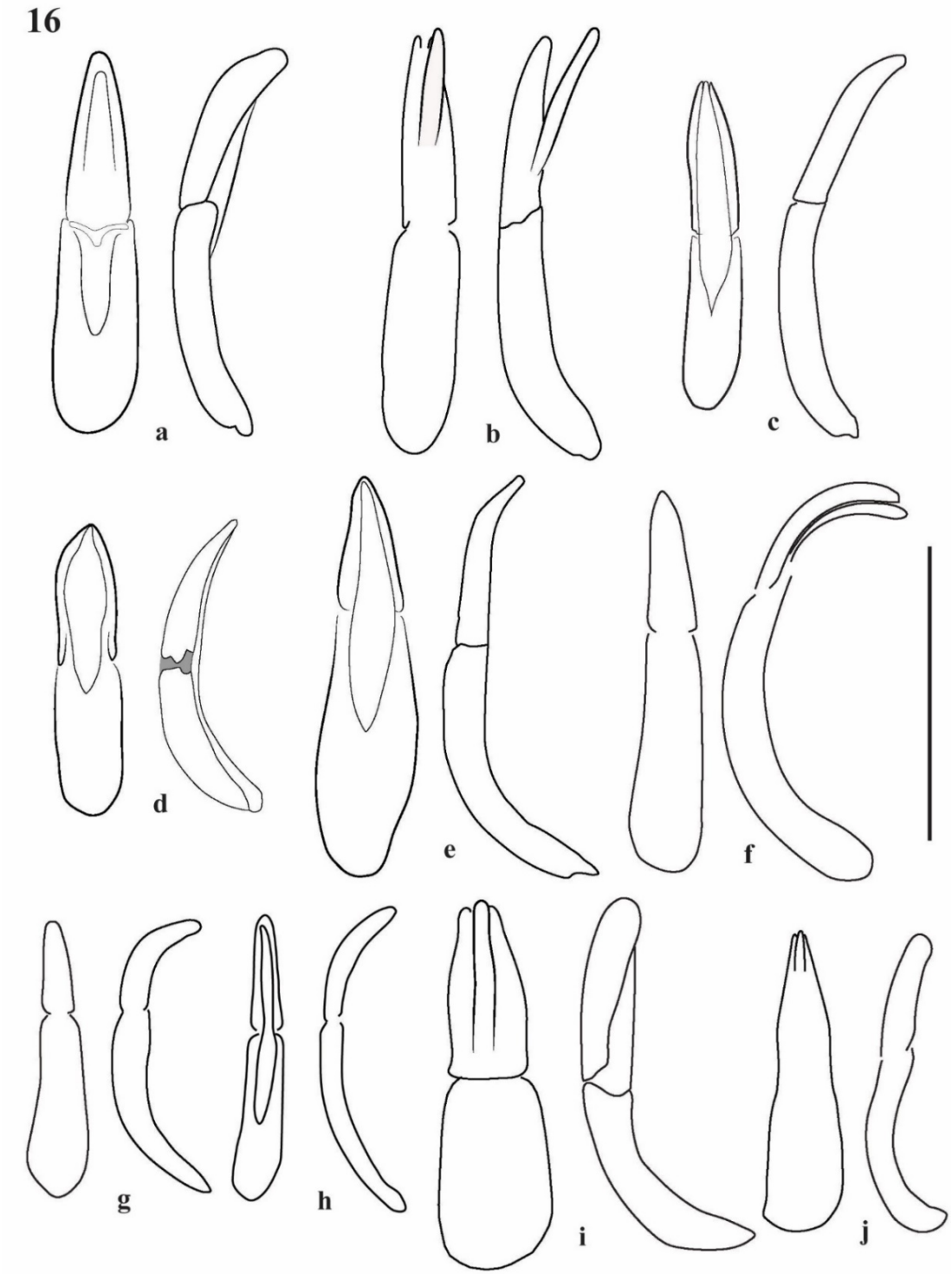


Fig. 3.16. Aedeagi, ventral and lateral view. a) *P. duartei*, b) *P. neiba*, c) *P. obrieni*, d) *P. pecki*, e) *P. gracilicornis*, f) *P. howdeni*, g) *P. sandersoni*, h) *P. beckeri*, i) *P. darlingtoni*, j) *P. maestrensis*

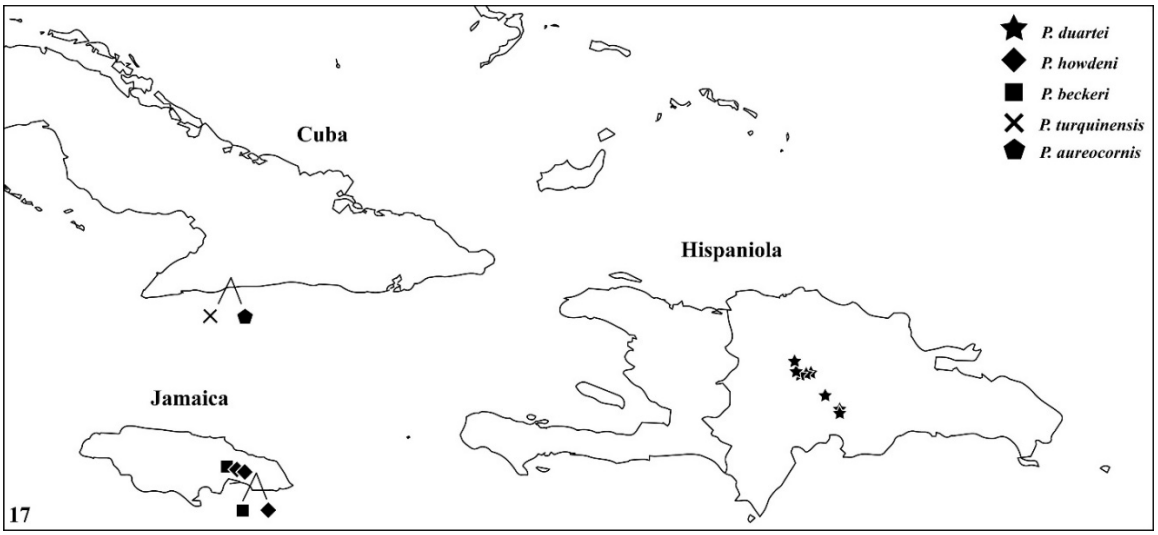


Fig. 3.17. Distribution map of *P. duartei*, *P. howdeni*, *P. beckeri*, *P. turquinensis*, and *P. aureocornis*.

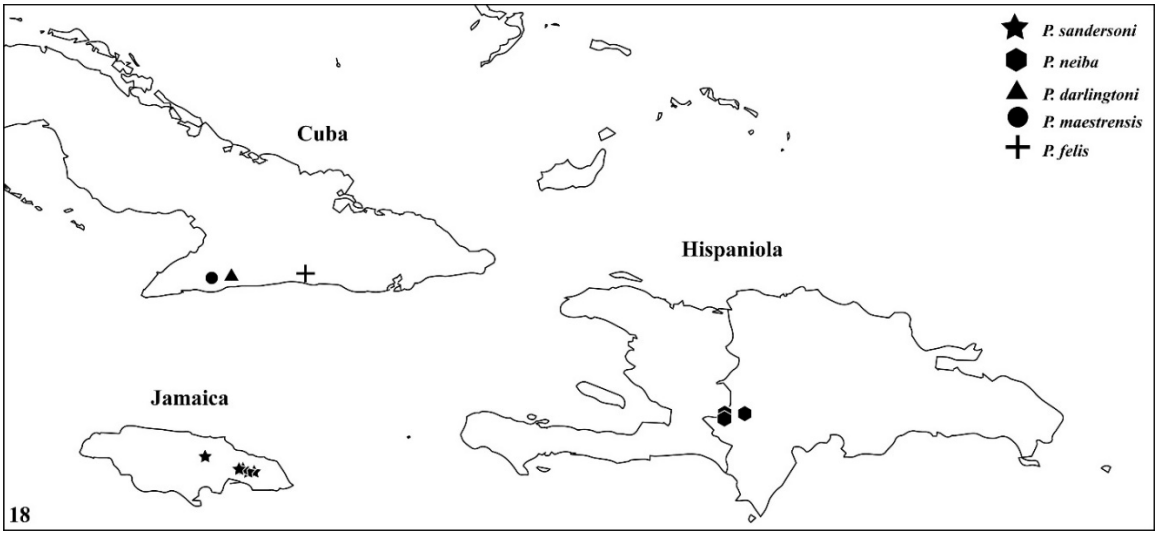


Fig. 3.18. Distribution map of *P. sandersoni*, *P. neiba*, *P. darlingtoni*, *P. maestrensis*, *P. felis*.

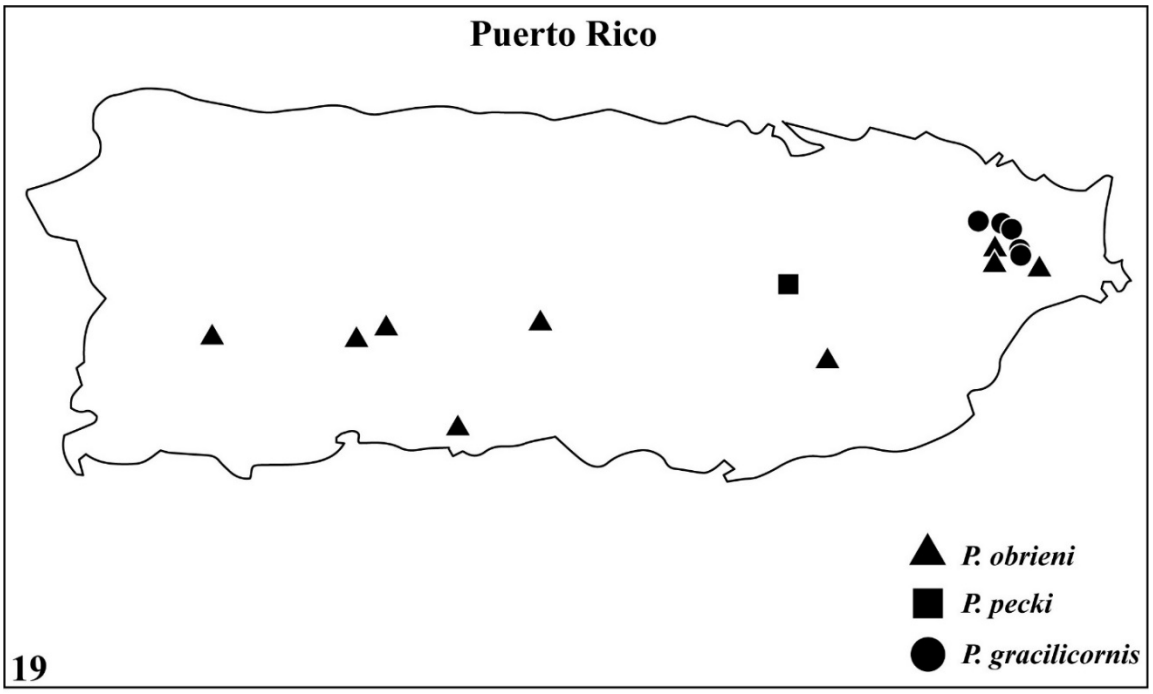


Fig. 3.19. Distribution map of *P. obrieni*, *P. pecki*, and *P. gracilicornis*.

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CHAPTER FOUR

CONCLUSION

This study helps on the understanding of the species of the genus *Cyrtosoma* that occurs in the West Indies and describing a new genus and thirteen new species of Anopidiina.

Regarding the revision of the West Indian *Cyrtosoma*, previous mistakes and confusions made mainly by Marcuzzi, are clarified. It is in part a continuation of Hopp and Ivie's (2009), review of of *Nesocyrtosoma*, which also dealt with a lot of Marcuzzi's literature. The most significant cases dealt on this chapter are the description of three new species, some specimens of which were previously studied by Champion (1896) and left unnoticed as an undescribed species. And the enigmatic species *Cyrtosoma picea*, that was proved to be a species belonging to the genus *Hesiodus*, and the senior synonym of *H. caraibus*, through the study of the type specimen.

The creation of an identification key exclusively for the West Indian *Cyrtosoma*, facilitates the study of the group on this area, avoiding the need to use Marcuzzi's (1991) key for *Cyrtosoma,* which has several issues. The diagnosis of the genus is also valuable for a better definition of it, and to correlate with closely related groups, for future studies. High quality illustrations are also important for more accurate identification, as well as for future studies. Before each detailed species description, synonymical lists are provided, making it easier to find bibliographic references for each species.

The other chapter, dealing with *Prototyrtaeus*, is a different scenario. It does not deal with a lot of literature review, as this is a completely new genus and species, meaning no nomenclatural issues, or previous citations. The last major Neotropical Anopidiina papers were done around 45 years ago by Dajoz (1975), and a few others after some years (Dajoz 1981, 1986). While gathering material for this study, we received specimens from ten different collections, showing that even though some species are not uncommon in collections, some have been unnoticed for decades. The relationship between abundance in collection and no studies ever done, shows how neglected this group has been, elucidating the importance of taxonomic studies like this.

As well as the second chapter, the third chapter also provides an identification key for the thirteen newly described species, with good quality picture and structure illustrations with the addition of distributional maps. A clear diagnosis for the genus is provided, comparing it the closely related genera *Tyrtaeus* and *Neanopidium*, giving light to these understudied groups and therefore stablishing a better starting point for future studies.

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