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THE DARKLING BEETLES (COLEOPTERA: TENEBRIONIDAE) OF SAN SALVADOR, BAHAMAS, WITH NOTES ON BIOGEOGRAPHY

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ABSTRACT

As part of the ongoing survey and descriptions of the darkling beetles of the Bahama Archipelago, the known tenebrionid fauna of San Salvador is reviewed and illustrated, and a checklist and key to the species are provided. In addition to specimens collected in June 2003, February 2004, and June 2005, material in the collection of the Gerace Research Center and other institutions was included in this study. Beetles were selectively sampled using manual techniques; many were found under leaf litter in coastal scrub habitats and beach drift on sand, in dry fungi on dead wood, and at night at artificial lights. Twenty-nine species are identified here. Only three species have been previously recorded from the island. Ten species new to science are represented, most of which are presumed to be endemic to San Salvador. Four species are identified as introduced exotics; others represent widespread Antillean forms but some are first-time records for the Bahamas.

For its small size, San Salvador was found to be surprisingly rich in species. The geologic history of San Salvador, isolated on its own bank, has probably led to the evolution of distinct species, best illustrated in the genera with flightless members. Conservation of the localized habitats of these beetles is recommended.

INTRODUCTION

With only 14 days of focused fieldwork on 3 visits to San Salvador, Bahamas, supplemented by examination of unidentified specimens in the collection at the Gerace Research Center (GRC), the following 29 species of Tenebrionidae have been documented, including 9 species newly described (Steiner, 2006) and one awaiting the collection of male specimens before it can be named. It is remarkable that the "Age of Discovery" has not ended for this small island in spite of its history as the site of the first landfall made by Columbus and crew on 12 October 1492. Until my studies (Steiner, 2005a, 2005b), the Tenebrionidae had not received much attention as a focal taxon in the Bahamas.

San Salvador Island, centrally located in the Bahamian archipelago and only 161 km² in area, has never been part of a larger land mass, but its offshore cays were likely part of a larger island during lower sea level periods of the Pleistocene. Habitats for tenebrionids on the island include drift on sand beaches, leaf litter cover in sandy maritime scrub, loose bark of dead trees, and polypore fungi on rotting wood (Steiner 2006). Additional notes on habitats and collection will be given for each species record.

METHODS

The collecting techniques and specimen preservation and preparation used have been described previously (Steiner, 2005a, 2005b). The Gerace Research Center and other sites were visited in June 2003, February 2004, and June 2005; these included two offshore cays and many points around the island as given in specimen records. Specimens in the collection of the Gerace Research Center, San Salvador, were also studied and identified, along with a few specimens from institutions in Florida (see Steiner, 2006). Specimens from my fieldwork are deposited in the U.S. National Museum of Natural History, Smithsonian Institution, Washington, DC, USA, and the collection at the Gerace Research Center; others are to be incorporated into the Bahamian National Insect Collection, Nassau, Bahamas.

RESULTS

Hand-collecting techniques were by far the most productive, yielding series of specimens from under leaf litter on sandy soil, seaweed drift on beaches, in sand, under bark of dead trees, and in polypore fungi on dead wood. Caves were examined for beetles but with negative results. Operation of a black light hung against white sheets at the GRC was also successful in getting species and series not obtained by other methods. Yellow bowl pitfall traps took very few tenebrionids, and a Malaise trap (used in June 2003), although proving useful at other locations, captured few beetles.

The checklist of the 29 known species of Tenebrionidae on San Salvador (Table 1) includes 10 newly discovered species, plus seven others that are reported from the Bahamas for the first time. All but three (Alleculinae, *Hymenorus* spp.) are new island records for San Salvador. Four are known to be introduced from other regions and the occurrence of a few others may be anthropogenic. The key (Table 2) includes all 28 named species for the island (one *Adelina* remains unidentified) and figure numbers correspond to those in the checklist and text. Some details on the distributions, habitats, and related literature are given in annotations with each species, listed below, with specimen data (labels quoted verbatim) and numbers. For the nine recently named species, complete specimen data may be found following those descriptions (Steiner, 2006), so are not repeated here.

ANNOTATED LIST AND SPECIMEN DATA

Branchus geraceorum (Figure 1)

The largest tenebrionid on San Salvador, this flightless endemic beetle is easy to recognize, but not often found. They hide under leaf litter in dense coastal scrub and often are under the sand surface in small depressions in deep, loose sand on swales or flats behind the beach front. The species co-occurs with both *Trientoma* at the sites mentioned above, but has been found at many more localities around the island, usually along with *Diastolinus that* (see below). Adults tend to be most common during the winter months, while the long (to 40 mm) larvae were more abundant in June and often found at sites without associated adults. In June 2005, larvae were found in low areas of the interior forest behind the GRC in finer sand than at sites nearer the coast.

Figure 1. Branchus geraceorum, *length 14 mm.*

Hemasodes batesii (Figure 2)

This species, first noted among recent collections from Grand Turk (unpublished data), was thought to be undescribed, but comparisons with other known relatives proved it to be a South American (Brazil) species and so probably introduced to the Bahamas. This is the first report of it's occurrence outside of the previously known range (Freude, 1967). On San Salvador, most known specimens have been found at or near the grounds of the GRC; it has been common after dark (under artificial lights) on the stone and

concrete walls between open sandy turf and roadsides. Some specimens were found under wood and leaf litter during day.

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 19 June 2003 / W. E. Steiner & J. M. Swearingen collectors" (2); same data except "20 June 2003" (4), "21 June 2003" (2), "22 June 2003" (5), "14 February 2004" (9), "15 February 2004" (2), "19 February 2004" (1), "20 February 2004" (10), "23 June 2005" (10), "25 June 2005" (11), "26 June 2005" (6), "27 June 2005" (1); "BAHAMAS, San Salvador, 18 June 1999, M. & L. Deyrup / Coppice forest along Hard Bargain Trail" (1); "THE BAHAMAS, Salvador Island, 23 Nov. 1976 / CCFL Base, B. Tanner (1); same data except "Dec. 5, 1977 / CCFL Base, M. Pearson" (1), "Dec. 5, 1977" (1); same data except "22 Nov. 1978, W. Villers, Leg." (1); "SAN SALVADOR, BAHAMAS, 13 June 1993, M. Deyrup / Bahamian Field Sta., at lights" (2).

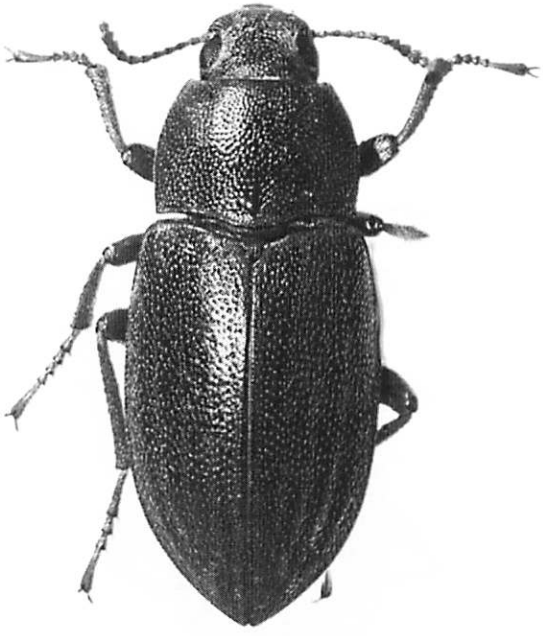


Figure 2. Hemasodes batesii, *length 7.5 mm.*

Trientoma jilae (Figure 3)

Known only from two localities on the southern end of San Salvador, this species is among several flightless forms endemic to the island (Steiner, 2006). It has been found in the undisturbed scrub zone behind beaches on dry, semi-loose sand covered by leaf litter and layered leaves of the silver thatch palm, most commonly but not abundant in a small forest at Sandy Point.

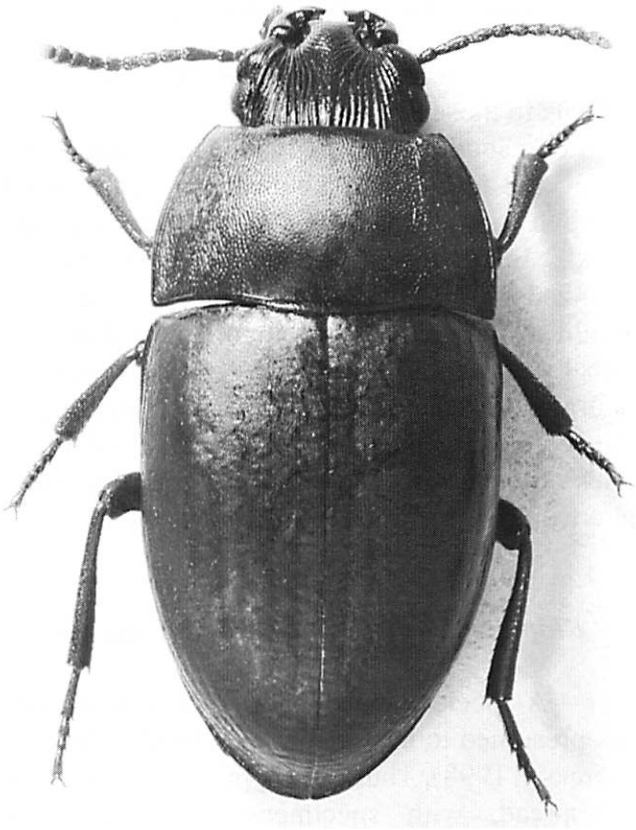


Figure 3. Trientoma jilae, *length 8.5 mm.*

Figure 4. Trientoma voegeliorum, *length 6.5 mm.*

Trientoma voegeliorum (Figure 4)

This smaller *Trientoma* lives in similar habitats to those of *T. jilae* and is also known only from two southern San Salvador localities; it was discovered to be fairly abundant at Sandy Hook, where a single specimen of *T. jilae* was also found. Because of the apparent rarity and localized distributions of this pair of species, both should be studied further in order to determine global conservation status. Preservation of naturally vegetated sites at the type-localities is highly recommended. Populations of all of the other co-occurring endemic elements discovered here would be afforded protection as well.

Rhipidandrus fulvomaculatus (Figure 5)

A species newly reported here, this beetle was presumed to be endemic to Florida (Peck and Thomas, 1998), but is apparently far more widespread, with specimens now seen from Andros and Hispaniola (unpublished data). On San Salvador, series of the beetles have been taken at black light and in an unidentified white polypore fungus on wood of a dead *Casuarina.*

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 22 June 2003 / W. E. Steiner, J. M. Swearingen et al. collectors / At black light, scrub forest edge at open catchment" (20); same data except "19 February 2004" / W. E. Steiner & J. M. Swearingen collectors" [no third label] (3), "25 June 2005" (3), "26 June 2005" (1).

Nautes guanhani (Figure 6)

This species is closely related to others known from other Bahamian islands and several remain undescribed. Hind wings appear to be slightly reduced. Specimens are not common, perhaps due to a seasonal period of emergence other than the periods so far sampled (February and June).

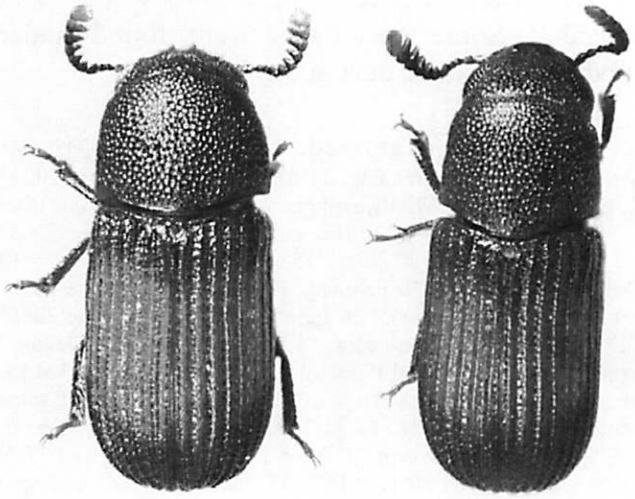


Figure 5. Rhipidandrus fulvomaculatus, *length 2.7-3.2 mm; left, male; right, female.*

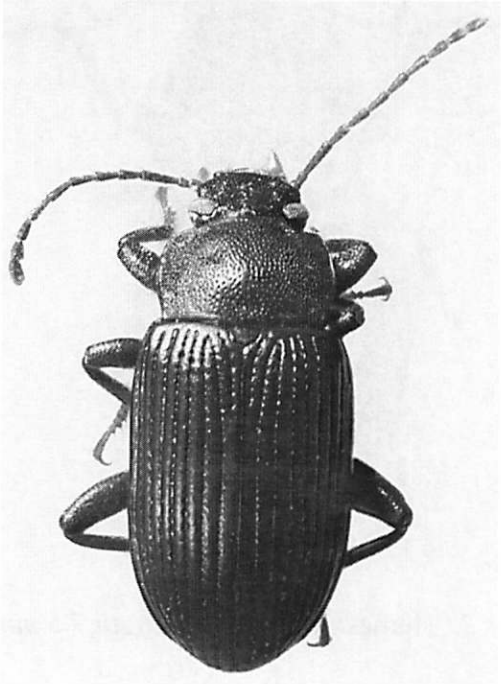


Figure 6. Nautes guanahani, *male, length 6.5 mm.*

Alaetrinus minimus (Figure 7)

Known mostly from specimens found around buildings at the GRC, this beetle is considered adventive on San Salvador. Individuals closely resemble specimens from southern Florida (Iwan, 1995) which would be a likely source of introduction. It is the only known occurrence of this mainland species in the

Bahamas, but *Alaetrinus pullus* (Sahlberg), widespread in the Antillean region and considered also to be adventive in many localities, is reported from Grand Bahama (Steiner, 2005a).

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 20 February 2004 / W. E. Steiner & J. M. Swearingen collectors (3); same data except "21 February 2004 " (1); "THE BAHAMAS, San Salvador Island, 24 Nov 1975 / Rick Hopkins" (1); same data except "P. Salbert" (1), "8 June 1978, P. Salbert / CCFL Base" (1), "25 Nov 1975 / Shelley Metz" (1), "CCFL, VI-9-1978 / A. G. Scarbrough" (1), "Dec. 9, 1978, J. Irwin, leg. / C.C.F.L. Base" (1), 1 Dec. 1978, T. Mak[? Illegible] leg. / Jake Jones Road" (1, poor condition).

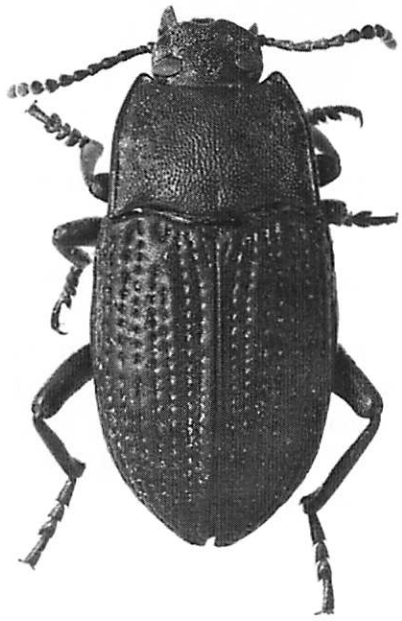


Figure 7. Alaetrinus minimus, *male, length 8.5 mm.*

Blapstinus punctatus (Figure 8)

This species is known from Cuba, Puerto Rico, and the Virgin Islands (Marcuzzi, 1984). It is possible that its occurrence on San Salvador represents an introduction; specimens are from open, disturbed habitats with known adventive species, and can be very abundant.

Material examined. "BAHAMA ISLANDS: San Salvador, East Beach., 24°06'N, 74°25'W, 18 February 2004 / W. E. Steiner & J. M. Swearingen collectors" (5); "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 20 June 2003 / W. E. Steiner & J. M. Swearingen collectors (13); same data except "21 June 2003" (4), "22 June 2003" (19), "14 February 2004" (11), "15 February 2004" (5), "16 February 2004" (2), "19 February 2004" (12), "20 February 2004" (5), "21 February 2004" (3), "23 June 2005" (7), "25 June 2005" (2), "26 June 2005" (5), "27 June 2005" (3); "BAHAMA ISLANDS: San Salvador, Long Bay (Columbus Landing), 24°02'N, 74°31'W, 16 February 2004 / W. E. Steiner, J. M. Swearingen, J. Winter, et al. collectors" (1); same data except "19 February 2004 / J. Winter et al. collectors; In loose fine sand in weedy gap, coastal forest" (1); "BAHAMA ISLANDS: San Salvador, airport terminal near Riding Rock Pt., 24°04'N, 74°31'W, 27 June 2005 / W. E. Steiner & J. M. Swearingen collectors (1);); "SAN SALVADOR, BAHAMAS, 19 June 1993, M. Deyrup / Around buildings of Bahamian Field Station" (3); same data except "11 June 1993 / Grass litter behind Bahamian Field Station" (2); same data except "14 June 1993 / Papaya by clothesline" (1).

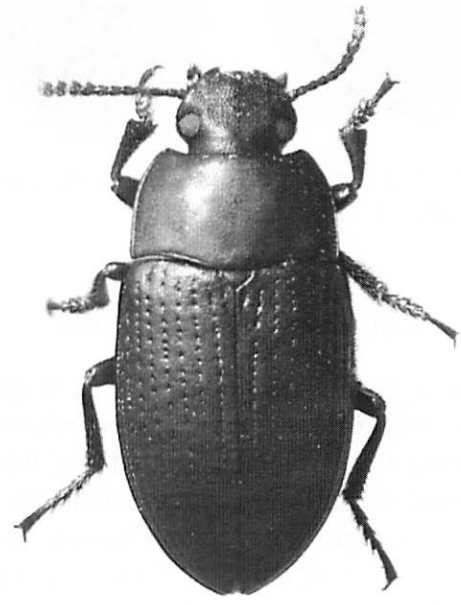


Figure 8. Blapstinus punctatus, *male, length 4.5 mm.*

Blapstinus humilis (Figure 9)

Members of this large genus are often difficult to identify and revisionary studies are badly needed. The few San Salvador specimens of this species visually match those from other Antillean islands and the type-locality in southern Florida, but there may be older names for this entity which will have priority (Steiner, 2006).

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 20 February 2004 / W. E. Steiner & J. M. Swearingen collectors (1); same data except "25 June 2005" (1), "26 June 2005" (2); "SAN SALVADOR, BAHAMAS, 18 JUNE 1993, M. DEYRUP / ON BEACH, 3 DOG SITE" (1).

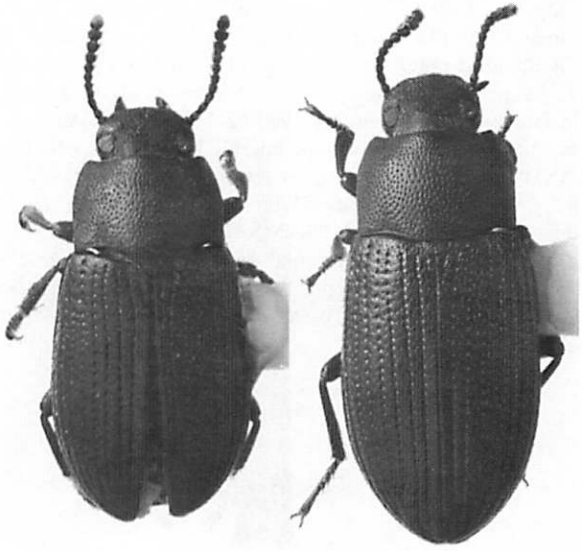


Figure 9. Blapstinus humilis, *left, male; right, female; lengths 3.7 and 4.2 mm.*

Figure 10. Blapstinus kalik, *male, length 4.5 mm.*

Blapstinus kalik (Figure 10)

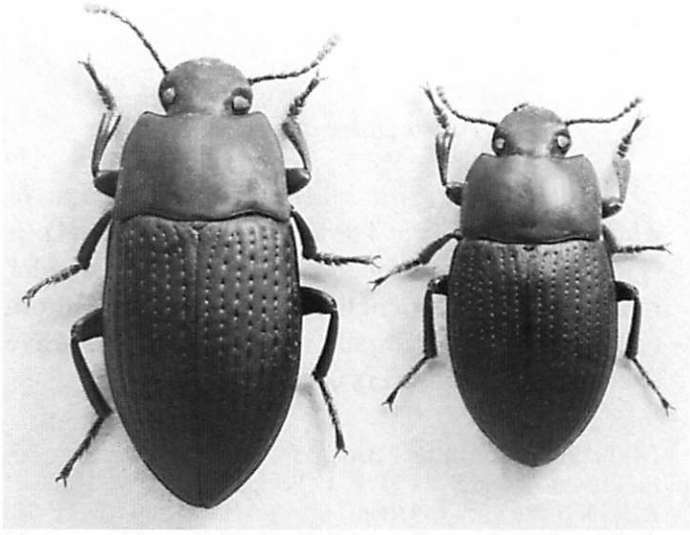
Most of the specimens flew to black light on warm, relatively calm evenings; others were found during the day under matted leaf litter and dead grass at scrub forest edges around the GRC. This newly recognized species (Steiner, 2006) is presumably endemic to San Salvador, but has several similar relatives on other islands.

Diastolinus that (Figure 11)

The discovery of two endemic *Diastolinus* on San Salvador is in keeping with the speciation pattern in this genus on separate island banks. This and the following species are very similar, yet distinct, from species known from other Bahamian island groups, where one or two species occur. The most abundant tenebrionid on San Salvador, *D. that* occurs around the island in the shrub zones behind beaches, and in any dry sandy soil areas inland. It is the only darkling beetle so far found on rocky cays without sand beaches (and easily detected on brief visits to Green Cay and White Cay). As long as pockets of sand with some sparse plant and litter cover are available, *D. that* can usually be found.

Diastolinus this (Figure 12)

Separated ecologically from its larger congener above, *D. this* has only been found on beach sand under the low, fringing vegetation of the upper beach edge. It sometimes co-occurs with *Phaleria punctipes*.



Figures 11 and 12. Left, Diastolinus that, *length 8 mm; right:* D. this, *length 6.6 mm.*

Lobopoda deyrupi (Figure 13)

Lobopoda is a very large Neotropical genus. This is the smallest known member of the subgenus *Flavipoda*, members of which are endemic to either Cuba or the Bahamas (Campbell, 1971). While fully winged, it is likely endemic to San Salvador.

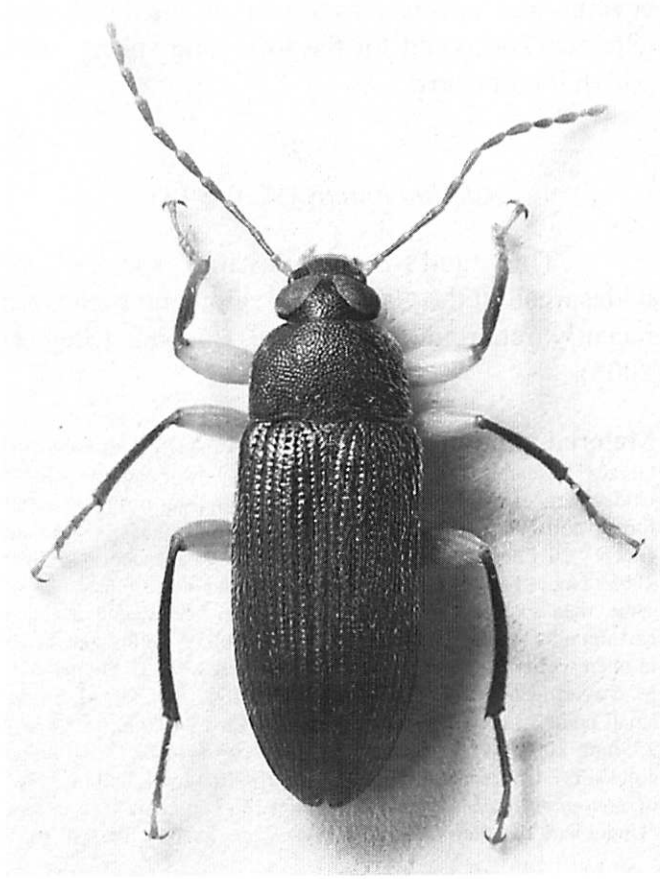


Figure 13. Lobopoda deyrupi, *male, length 6 mm.*

Hymenorus convexus (Figure 14)

This and the other *Hymenorus* reported here will likely be found on most of the larger Bahamian islands that have sandy coastal scrub habitats. All three also occur in Florida. *Hymenorus convexus* and *H. densus* have been recorded from San Salvador by Campbell (1971). Specimens have commonly been found at night at lights or (during day) under dry loose bark of dead wood.

Material examined. "BAHAMA ISLANDS: San Salvador, East Beach., 24°06'N, 74°25'W, 18 February 2004 / W. E. Steiner & J. M. Swearingen collectors" (20); "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 21 June 2003 / W. E. Steiner & J. M. Swearingen collectors (2); same data except "22 June 2003 / At black light, scrub forest edge at open catchment" (11), "22 June 2003 / In flower of *Yucca* (1), "14 February 2004" (1), "16 February 2004" (2), "17 February 2004" (3), "19 February 2004" (1), "14 February 2004" (1), "23 June 2005" (1) "26 June 2005" (5); "BAHAMA ISLANDS: San Salvador, near small pond 2 km W of Gerace Research Ctr.; 24°07'N, 74°28'W / 25 June 2005; W. E. Steiner, J. M. Swearingen & D. J. Lodge collectors / Under dry loose bark of fire-killed *Casuarina* in coastal forest" (4); "SAN SALVADOR, BAHAMAS, 19 June 1993, M. Deyrup / Thick coppice-forest, hill trail north of Osprey Pond" (1); "THE BAHAMAS, San Salvador Island, Field S. CCFL, 5-IV 1980, A. G. Scarbrough" (1).

Hymenorus densus (Figure 15)

These beetles are probably pollen-feeders, as they are often found in numbers on inflorescences of sea-oats and in flowers of *Yucca*. Most San Salvador specimens were taken at artificial lights.

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 19 June 2003 / W. E. Steiner & J. M. Swearingen collectors (3); same data except "21 June 2003" (5), "22 June 2003 / At black light, scrub forest edge at open catchment" (1), "23 June 2005 (1), "25 June 2005" (13), "26 June 2005" (5); "SAN SALVADOR, BAHAMAS, 13 June 1993, M. Deyrup / Bahamian Field Sta., at lights" (1); "THE BAHAMAS, San Salvador Island, Field S. CCFL, 5-IV 1980, A. G. Scarbrough" (1).

Hymenorus farri (Figure 16)

Since the diagnosis and first report of this "weed species" on San Salvador (Steiner, 2004), the following additional specimens have been identified.

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 15 February 2004 / W. E. Steiner & J. M. Swearingen collectors (1); same data except "20 February 2004" (1, "23 June 2005 (1); "BAHAMA ISLANDS: San Salvador, Long Bay (Columbus Landing), 24°02'N, 74°31'W, 16 February 2004 / W. E. Steiner, J. M. Swearingen, J. Winter, et al. collectors" (1).

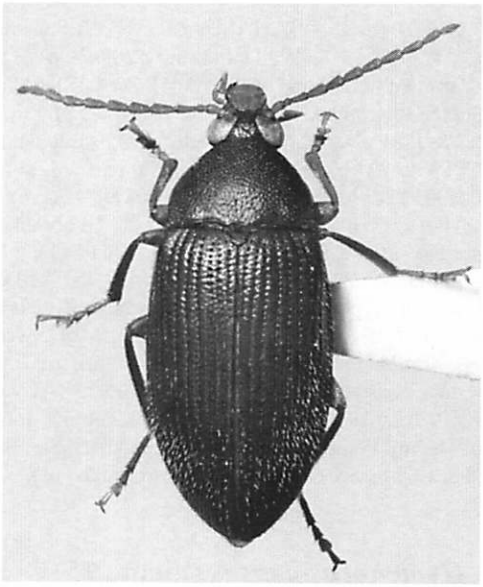


Figure 14. Hymenorus convexus, *length 7 mm.*

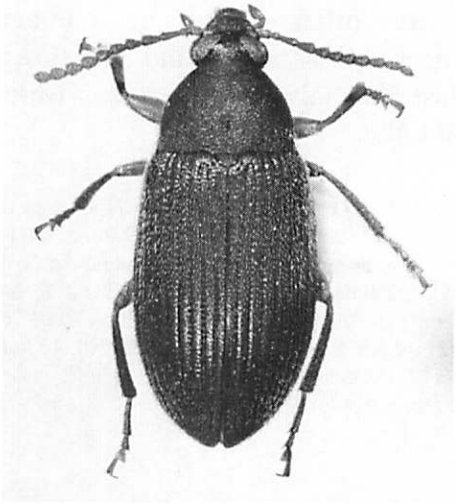


Figure 15. Hymenorus densus, *length 6 mm.*

Figure 16. Hymenorus farri, *length 5.2 mm.*

Adelina bacardi (Figure 17)

Member of this genus, all flat oblong beetles, occur under dry thin loose bark, mostly on branches of dead standing or fallen trees; several species may co-occur on the same tree. *Adelina bacardi* is the largest of four species known on San Salvador and so far considered an endemic element. It has been found under bark of several tree species, as given in the label data (Steiner, 2006) and for the following species with which it co-occurs.

Adelina bidens (Figure 18)

This and the following species are widespread in the Caribbean region and both were recently reported from Grand Bahama (Steiner, 2005).

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 18 February 2004 / Under bark of dead standing *Terminalia catappa* in mixed scrub forest; coll. W. E. Steiner & J. M. Swearingen" (5); same data except "20 February 2004" (2);); same data except "23 June 2005 / Under bark of fallen *Bursera simaruba* in scrub forest" (1); same data except "At black light, scrub forest edge at open catchment" (1) ame data except "26 June 2005 / Yellow bowl trap in open weedy trail, coastal scrub forest; collrs. W. E. Steiner & J. M. Swearingen" (1); "BAHAMA ISLANDS: San Salvador, near small pond 2 km W of Gerace Research Ctr.; 24°07'N, 74°28'W / 25 June 2005; W. E. Steiner, J. M. Swearingen & D. J. Lodge collectors / Under dry thin loose bark of fallen trunk and branches of *Metopium toxiferum* in coastal forest" (22); same data except "Under bark of fallen *Coccoloba diversifolia* in coastal forest" (5).

Adelina plana (Figure 19)

This species was discovered co-occurring among series of the other two *Adelina* above; the fallen poisonwood tree was undoubtedly a casualty of Hurricane Frances in September 2004.

Material examined. "BAHAMA ISLANDS: San Salvador, near small pond 2 km W of Gerace Research Ctr.; 24°07'N, 74°28'W / 25 June 2005; W. E. Steiner, J. M. Swearingen & D. J. Lodge collectors / Under dry thin loose bark of fallen trunk and branches of *Metopium toxiferum* in coastal forest" (4).

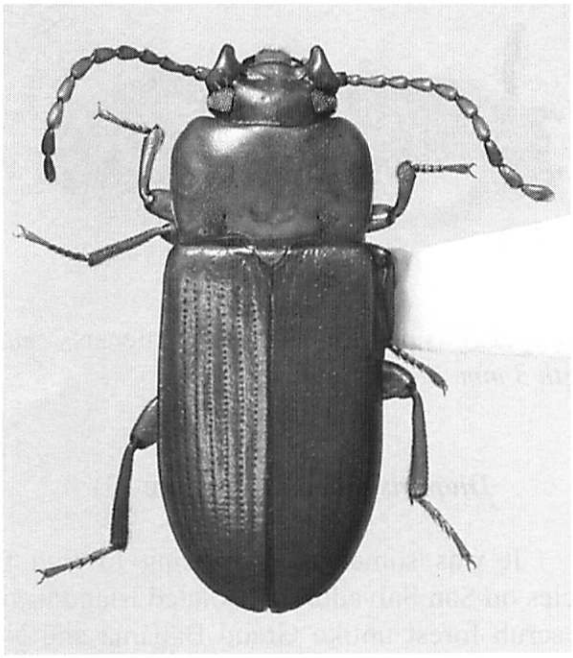


Figure 17. Adelina bacardi, *male, length 6 mm.*

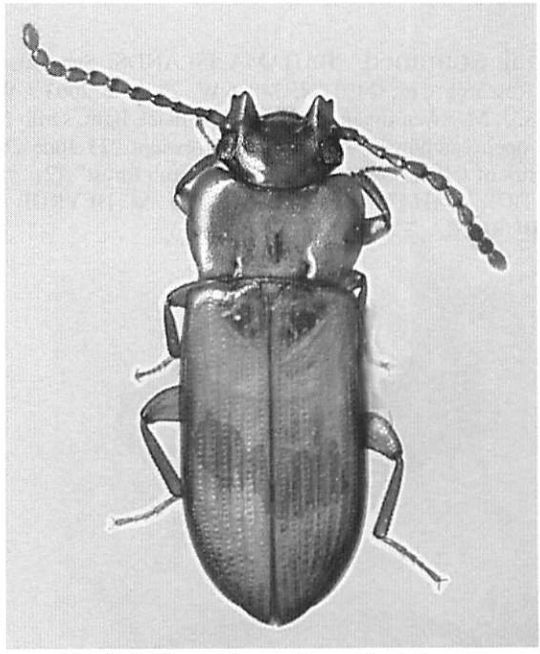


Figure 19. Adelina plana, *length 4.1 mm.*

Figure18. Adelina bidens, *male, length 4.5 mm.*

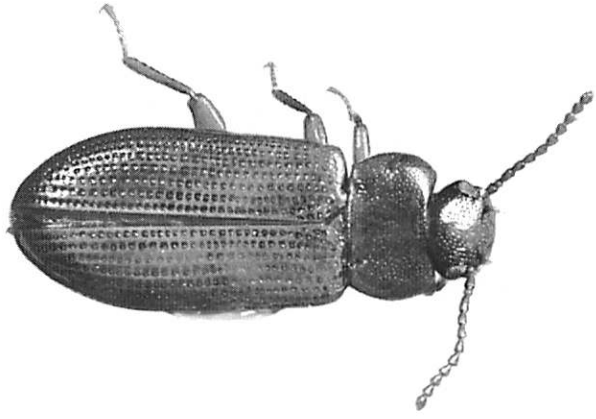


Figure 20. Adelina *sp., female, length 3.5 mm.*

Material examined. "BAHAMAS, SAN SALVADORE IS., 9 JUNE 1991, M. DEYRUP" (2); "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 22 June 2003 / W. E. Steiner & J. M. Swearingen collectors / At black light, scrub forest edge at open catchment" (1).

Adelina sp. (Figure 20; not in key)

This unidentified species is probably new to science, but only three females are known at present. Its description awaits the discovery of male specimens, which will probably have distinctive head armature and genitalic characters. The available specimens are distinct in having larger elytral punctures than other *Adelina* of similar size.

Gnatocerus curvicornis (Figure 21)

This is the first report of the genus in the Bahamas, but both this and the following species are known to be widespread in "Middle America" and I have seen specimens from other Bahamian islands, to be reported in future studies.

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 22 June 2003 / W. E. Steiner & J. M. Swearingen collectors / At black light, scrub forest edge at open catchment" (2); same data except "23 June 2005 / Under bark of fallen *Bursera simaruba* in scrub forest" (2); "SAN SALVADOR, BAHAMAS, 18 JUNE 1993, M. DEYRUP / ON DEAD BURSERA, 3 DOG SITE" (2).

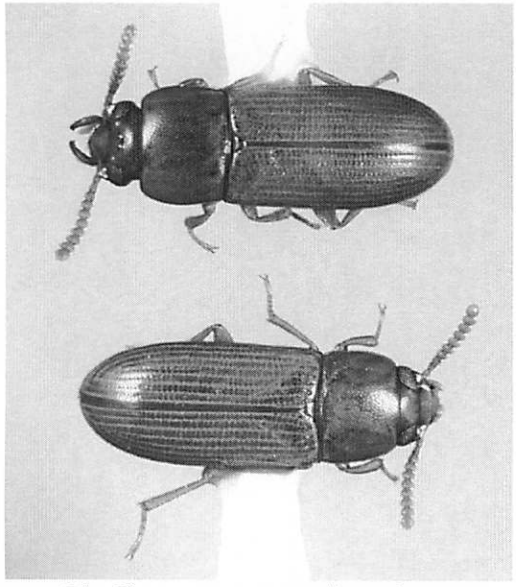


Figure 21. Gnatocerus curvicornis, *upper, male; lower, female; lengths 3.2 and 3.5 mm.*

Gnatocerus guatemalensis (Figure 21)

Populations of this and other bark beetles probably increased following Hurricane Frances, which provided many broken trees.

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 20 February 2004 / Under bark of dead standing *Terminaliacatappa* in mixed scrub forest; coll. W. E.Steiner & J. M. Swearingen" (1); same data except "23 June 2005 / Under bark of fallen *Bursera simaruba* in scrub forest" (1); "BAHAMA ISLANDS: San Salvador, near small pond 2 km W of Gerace Research Ctr.; 24°07'N, 74°28'W / 25 June 2005; W. E. Steiner, J. M. Swearingen & D. J. Lodge collectors / Under bark of dead *Coccoloba uvifera* in coastal forest" (2).

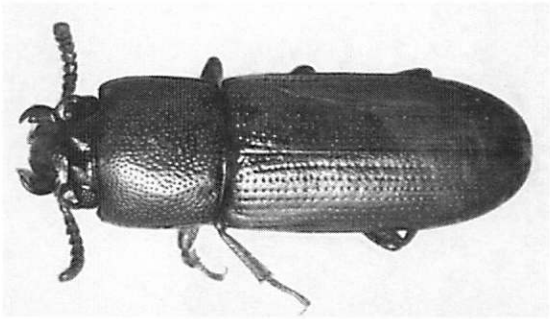


Figure 22. Gnatocerus guatemalensis, *male, length 3 mm.*

Diaperis maculata (Figure 23)

It was somewhat surprising to find this species on San Salvador, an isolated island having dry scrub forest unlike Grand Bahama and New Providence, where *D. maculata* is known to occur (Steiner, 2005a). However, potential polypore fungus host species have been seen in native forest areas on the island and beetles were found in an unidentified white, corky polypore on a large dead *Casuarina* trunk at the GRC (with *Rhipidandrus fulvomaculatus*).

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 22 June 2003 / W. E. Steiner & J. M. Swearingen collectors" [taken at light] (1); same data except [from the fungus mentioned above] "19 February 2004" (2), "23 June 2005" (8), "26 June 2005" (4).

Platydema excavatum (Figure 24)

A common and widespread tenebrionid already reported from Grand Bahama (Steiner, 2005a), beetles of the series found here were under bark of dead *Terminalia* trees with small fungus brackets of *Schizophyllum commune*, the known host for this species, growing on the bark and wood.

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 20 February 2004 / Under bark of dead standing *Terminalia catappa* in mixed scrub forest; coll. W. E. Steiner & J. M. Swearingen" (17).

Figure 23. Diaperis maculata, *length 6 mm.*

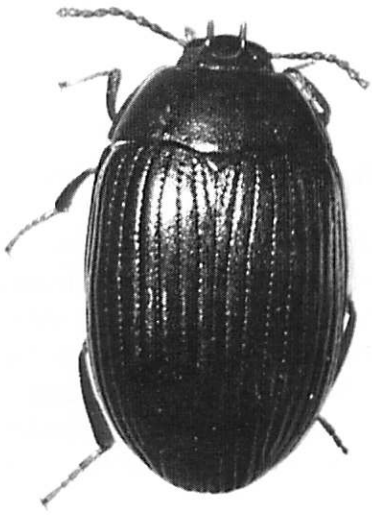


Figure 24. Platydema excavatum, *male, length 3 mm.*

Neomida bicornis (Figure 25)

Specimens were taken on several occasions in brackets of the cinnabar polypore, *Pycnoporus cinnabarinus,* growing on fallen *Casuarina* logs. This is another widespread and common fungus beetle and was reported from Grand Bahama (Steiner, 2005a).

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 18 February 2004 / W. E. Steiner & J. M. Swearingen collectors" (24); same data except "19 February 2005" (5), "20 February 2005" (4), "23 June 2005" (8).

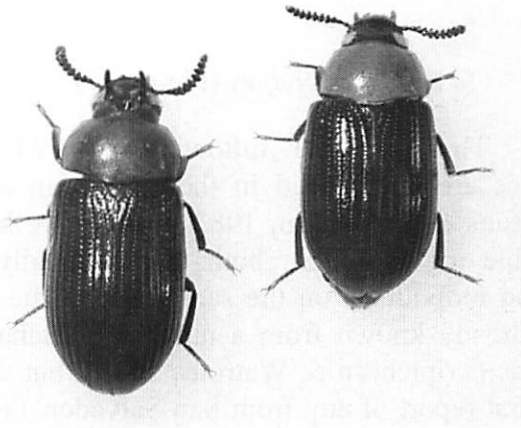


Figure 25. Neomida bicornis, *left, male; right, female; lengths 4.5 and 4.2 mm.*

Gondwanocrypticus platensis (Figure 26)

Often associated with fire ants (*Solenopsis* spp.) in open disturbed sandy areas, this beetle has spread as a "weed species" to the U.S. mainland and many Caribbean islands (unpublished records) and is reported from Grand Bahama (Steiner, 2005a). It is common in turf around buildings at the GRC.

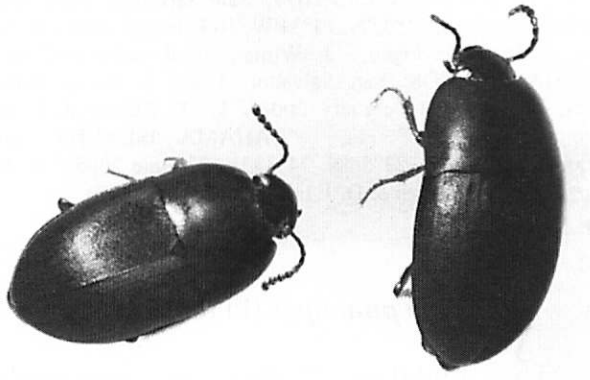


Figure 26. Gondwanocrypticus platensis, *length 3.9-4.6 mm.*

Material examined. "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 20 June 2003 / W. E. Steiner & J. M. Swearingen collectors (3); same data except "21 June 2003" (2), "22 June 2003" (9), "14 February 2005" (2), "20 February 2004" (5), "21 February 2004" (3), "23 June 2005" (2), "26 June 2005" (1), "27 June 2005" (1); same data except "22 June 2003 / At black light, scrub forest edge at open catchment" (1); "BAHAMA ISLANDS: San Salvador, airport terminal near Riding

Rock Pt., 24°04'N, 74°31'W, 27 June 2005 / W. E. Steiner & J. M. Swearingen collectors (2); "SAN SALVADOR, BAHAMAS, 19 June 1993, M. Deyrup / Around buildings of Bahamian Field Station" (1).

Phaleria picipes (Figure 27)

This and the following two *Phaleria* species are widespread in the Caribbean region (Watrous & Triplehorn, 1982) and all are highly variable in coloration, both geographically and among individuals on the same beach. The three are already known from a number of Bahamian islands (Triplehorn & Watrous, 1979), but this is the first report of any from San Salvador. Figures 27-29 each show 3 examples of color variants of each species. San Salvador specimens of *P. picipes* are generally unicolorous but may be pale yellow to very dark brown. Beetles occupy a middle zone on open beaches, usually on dry sand just above the recent high tide line of debris and under drier clumps of debris, e.g., algae.

Material examined. "BAHAMA ISLANDS: San Salvador, French Bay Beach., 23°57'N, 74°32'W, 21 June 2003 / W. E. Steiner & J. M. Swearingen collectors" (6); "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 20 June 2003 / W. E. Steiner & J. M. Swearingen collectors (1); same data except "23 June 2005" (14), "26 June 2005" (11); "BAHAMA ISLANDS: San Salvador, Long Bay (Columbus Landing), 24°02'N, 74°31'W, 16 February 2004 / W. E. Steiner, J. M. Swearingen, J. Winter, et al. collectors" (1); "BAHAMA ISLANDS: San Salvador, 1 km S Rocky Point, 24°07'N, 74°31'W, 17 February 2004 / W. E. Steiner & J. M. Swearingen, collectors" (1); "BAHAMA ISLANDS: San Salvador, Sandy Point, 23°58'N, 74°33'W, 25 June 2005 / W. E. Steiner, J. M. Swearingen & D. J. Lodge, collectors" (12).

Phaleria punctipes (Figure 28)

This flightless *Phaleria* is surprisingly widespread and has been found on almost every beach site examined on San Salvador. Beetles and larvae occur under the driest debris of the upper beach, often at the edge of the first live vegetation. Color varies from pale tan to dark brown, and some individuals have pale elytra with a dark sutural stripe and/or darker fore-body.

Material examined. "BAHAMA ISLANDS: San Salvador, Barkers Point, 24°07'N, 74°29'W, 24 June 2005 / W. E. Steiner, J. M. Swearingen et al. collectors" (6); "BAHAMA ISLANDS: San Salvador, Dim Bay (beach) near Fortune Hill, 24°02'N, 74°26'W, 18 February 2004 / W. E. Steiner & J. M. Swearingen collectors" (2); "BAHAMA ISLANDS: San Salvador, East Beach., 24°06'N, 74°25'W, 18 February 2004 / W. E. Steiner & J. M. Swearingen collectors" (2); "BAHAMA ISLANDS: San Salvador, French Bay Beach., 23°57'N, 74°32'W, 21 June 2003 / W. E. Steiner & J. M. Swearingen collectors" (2); "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 20 June 2003 / W. E. Steiner & J. M. Swearingen collectors (7); same data except "14 February 2004" (6), "16 February 2004" (3); "26 June 2005" (11); "BAHAMA ISLANDS: San Salvador, Long Bay (Columbus Landing), 24°02'N, 74°31'W, 16 February 2004 / W. E. Steiner, J. M. Swearingen, J. Winter, et al. collectors" (4); "BAHAMA ISLANDS: San Salvador, North Point, near Govt. Dock, 24°07'N, 74°26'W, 15 February 2004 / W. E. Steiner & J. M. Swearingen, collectors" (4); "BAHAMA ISLANDS: San Salvador, Rice Bay (beach), 24°07'N, 74°26'W, 16 February 2004 / W. E. Steiner & J. M. Swearingen, collectors" (3); "BAHAMA ISLANDS: San Salvador, Sandy Hook, 23°58'N, 74°28'W, 18 February 2004 / W. E. Steiner & J. M. Swearingen collectors" (1): "BAHAMA ISLANDS: San Salvador, Sandy Point, 23°58'N, 74°33'W, 19 February 2004 / W. E. Steiner & J. M. Swearingen collectors" (2); same data except "25 June 2005 / W. E. Steiner, J. M. Swearingen & D. J. Lodge, collectors" (5).

Phaleria testacea (Figure 29)

San Salvador specimens show a mix of color forms similar to that of series from Florida and Grand Bahama (Steiner, 2005a), with dark to yellowish-brown individuals and others bicolored, e.g., elytra dark brown with yellow basal maculae and/or lateral stripe. Beetles live under moist seaweed drift at recent high tide lines, on damp sand generally not utilized by the other two species above.

Material examined. "BAHAMA ISLANDS: San Salvador, East Beach., 24°06'N, 74°25'W, 22 June 2003 / W. E. Steiner & J. M. Swearingen collectors" (6); "BAHAMA ISLANDS: San Salvador, French Bay Beach., 23°57'N, 74°32'W, 21 June 2003 / W. E. Steiner & J. M. Swearingen collectors" (21); "BAHAMA ISLANDS: San Salvador, Gerace Research Ctr., 24°07'N, 74°26'W, 20 June 2003 / W. E. Steiner & J. M. Swearingen collectors (9); same data except "23 June 2005" (21), "26 June 2005" (9); "BAHAMA ISLANDS: San Salvador, Sandy Point, 23°58'N, 74°33'W, 25 June 2005 / W. E. Steiner, J. M. Swearingen & D. J. Lodge, collectors" (2).

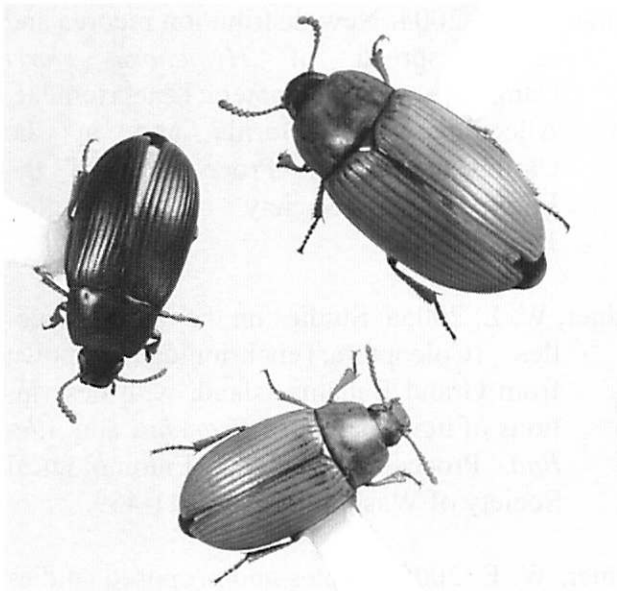


Figure 27. Phaleria picipes, *length 4.5-6.2 mm.*

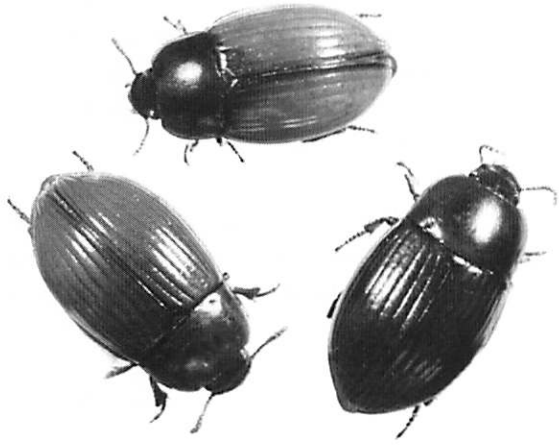


Figure 28. Phaleria punctipes, *length 6-7 mm.*

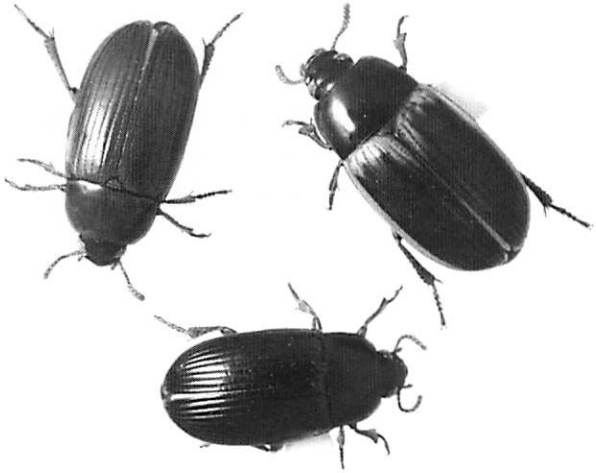


Figure 29. Phaleria testacea, *length 5-7 mm.*

BIOGEOGRAPHY

Of the darkling beetle species so far documented on San Salvador, one third are believed to be endemic to the island. The majority of the new species are flightless and belong to genera that have island endemic members known elsewhere. Only 12 of the species (all members of either Diaperinae or Alleculinae) are found also on Grand Bahama and these are all known to be widespread, with some being adventive. Besides being on separate platforms in the Bahamian archipelago, the dry scrub forest habitats of San Salvador, in contrast to those of the larger "pine island" of Grand Bahama, may also contribute to the low overlap of species. Naturally vegetated areas on San Salvador have been impacted by human activities but many are still relatively intact, and so far not as threatened by the spread of *Casuarina* as seen on many other islands.

Except perhaps for its offshore cays, San Salvador has never been connected to other islands during recent ice ages of the Pleistocene, when sea levels were much lower (Browne, 1992; Browne *et al.*, 1993). The historic isolation of San Salvador on its own "bank" appears to have led to speciation in genera with less vagile members (*Branchus, Trientoma, Nautes, Diastolinus,* some *Blapstinus*, and *Lobopoda*). It is exciting to speculate that, on Great and Little Inagua, Mayaguana, the Acklins, and other islands not yet sampled, other new species in these groups remain to be discovered.

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Table 1. Checklist of Tenebrionidae known from San Salvador Island, including nine newly described species (Steiner, 2006). Classification follows that of Bouchard et al. *(2005). Abbreviations: A, adventive; B, new island record but previously known from the Bahamas; N, new record for the Bahamas; E, apparently endemic to the Bahamas; P, previously reported from the island.*

Pimeliinae

Branchini
1. *Branchus geraceorum* Steiner – N, E

Epitragini
2. *Hemasodes batesii* Waterhouse – A, N

Edrotini
3. *Trientoma jilae* Steiner – N, E
4. *Trientoma voegeliorum* Steiner – N, E

Tenebrioninae

Bolitophagini
5. *Rhipidandrus fulvomaculatus* (Dury) – N

Helopini
6. *Nautes guanahani* Steiner – N, E

Pedinini
7. *Blapstinus humilis* Casey – N
8. *Blapstinus kalik* Steiner – N, E
9. *Blapstinus punctatus* (Fabricius) – N
10. *Diastolinus that* Steiner – N, E
11. *Diastolinus this* Steiner – N, E
12. *Alaetrinus minimus* (Beauvois) – N, A

Alleculinae

Alleculini
13. *Lobopoda deyrupi* Steiner – N, E
14. *Hymenorus convexus* Casey – P
15. *Hymenorus densus* LeConte – P
16. *Hymenorus farri* Campbell – P, A

Diaperinae

Diaperini
17. *Adelina bacardi* Steiner – N, E?
18. *Adelina bidens* (Schaeffer) – B
19. *Adelina plana* (Olivier) – B
20. *Adelina n. sp.*? (females only) – N, E?
21. *Gnatocerus curvicornis* (Champion) – N
22. *Gnatocerus guatemalensis* (Champion) – N
23. *Diaperis maculata* Olivier – B
24. *Platydema excavatum* (Say) – B
25. *Neomida bicornis* (Fabricius) – B

Crypticini
26. *Gondwanocrypticus platensis* (Fairmaire) – A, B

Phaleriini
27. *Phaleria picipes* Say – B
28. *Phaleria punctipes* LeConte – P
29. *Phaleria testacea* Say – B

Table 2. Key to the Tenebrionidae of San Salvador, Bahamas (Steiner).

1. Abdomen with polished membranes visible on hind margins of sternites 3 and 4.....5
-- Abdomen with membranes not visible (concealed) on hind margins of sternites 3 and 4 2

2. Color dark brown; body with golden hairs or scales on dorsal surfaces; clypeus broadly emarginate medially.....3
-- Color black; body surfaces smooth, not scaly or hairy; clypeus produced, truncate, toothed laterally (*Trientoma* spp.).....4

3. Body robust, broadly oval, hind wings absent and elytra fused; elytra with raised, polished costae; body length 11.5 to 14.5 mm. (Fig. 1).....***Branchus geraceorum***
-- Body elongate, spindle-shaped, winged; elytral surfaces generally smooth; body length 6.5 to 8.5 mm. (Fig. 2).....***Hemasodes batesii***

4. Size larger, body length 7.9 to 9.3 mm.; frons extensively rugose across vertex (Fig. 3)... .....***Trientoma jilae***
-- Size smaller, body length 5.3 to 6.7 mm.; frons rugose laterally, not so on vertex (Fig. 4) .....***Trientoma voegeliorum***

5. Tarsal claws simple.....6
-- Tarsal claws pectinate (Alleculinae).....12

6. Middle and hind tibiae with a longitudinal, finely crenulate carina on outer (dorsal) side (Diaperini)..... 15
-- Middle and hind tibiae without longitudinal, crenulate carina on outer (dorsal) side.....7

7. Antennae short, with a distinct pectinate club; body cylindrical with costate elytra, reddish across middle; body length 2.7 to 3.2 mm. (Fig. 5) ....***Rhipidandrus fulvomaculatus***
-- Antennae generally longer than width of head, moniliform; if clubbed, not pectinate; other characters variable 8

8. Eyes divided into dorsal and ventral halves by epistomal canthus (Opatrini).....22
-- Eyes entire.....9

9. Front tibiae modified for digging, expanded and flattened at apex; color variable; beetles 4.5 to 7 mm. long; found on sand beaches (*Phaleria* spp.).....26
-- Front tibiae not expanded or otherwise modified (but beetles often found on sandy soil).....10

10. Color dark brown with metallic luster; body somewhat parallel-sided at middle; antennae much longer than width of pronotum; body length 5.6 to 6.4 mm. (Fig. 6)... .....***Nautes guanahani***
-- Color black; body outline oval; antennae about as long as width of pronotum 11

11. Small (body length 3.9 to 4.6 mm.), broadly oval, smooth, with matted sheen (Fig. 26) ... ***Gondwanocrypticus platensis***
-- Larger (body length 8 to 9 mm.), heavily punctate (Fig. 7)..... ***Alaetrinus minimus***

12. Antennomeres mostly slender, two to three times longer than wide; femora yellow and tibiae dark; body length 5.5 to 6.5 mm (Fig. 13) ..... ***Lobopoda deyrupi***
-- Antennomeres about twice as long as wide or shorter; legs not bicolored; (*Hymenorus* spp.) 13

13. Color dark brown with legs paler, dull yellow; males with dense median patch of setae on basal abdominal sternites; body length 4.5 to 5.5 mm. (Fig. 16) ..... ***Hymenorus farri***
-- Color uniformly tan including legs; males with setae evenly, sparsely distributed on basal abdominal sternites; body length longer than above.....14

14. Antennomeres 4 to 10 obconical, about as long as wide and very wide apically, giving antennae a serrate appearance; pronotum appearing rough with very dense small punctures separated by less than their diameters; length 5.8 to 6.5 mm. (Fig. 15)..... ***Hymenorus densus***
-- Antennomeres 4 to 10 elongate, nearly two times as long as wide; pronotum wide, smooth, with distinct round punctures separated by a distance equaling their diameters; length 6.5 to 7.2 mm. (Fig. 14)..... ***Hymenorus convexus***

15. Color tan to yellowish or reddish brown; body elongate, parallel-sided, often flat.....18
-- Color variable but not brownish; body form more robust, broadly oval to cylindrical....16

16. Body robust, globular, length 5.6 to 6.4 mm.; elytra with orange and black maculae; males not horned (fig. 23)..... ***Diaperis maculata***
-- Body more elongate, smaller; elytra unicolorous; males with pair of frontal horns.....17

17. Body broadly oval, shining black, length 3.5 to 5 mm. (Fig. 24).... ***Platydema excavatum***
-- Body sub-cylindrical; pronotum orange, elytra metallic blue to greenish; length 3.9 to 4.2 mm. (Fig. 25)..... ***Neomida bicornis***

18. Body very flattened; males with head broad, bearing forward frontal projections lateral to mouth (*Adelina* spp.) 20
-- Body narrow but not flattened; males bearing teeth or tusks arising from mandibles (*Gnatocerus* spp.) 19

19. Prothorax slightly wider than long, anterior corners rounded; males with slender, curved, converging, mandibular tusks (Fig. 21)..... ***Gnatocerus curvicornis***
-- Prothorax as wide as long, more quadrate, anterior corners narrowly rounded; males with mandibular horns flattened, short, with an inner median tooth (Fig. 22) ..... ***Gnatocerus guatemalensis***

20. Pronotum convex across middle; edge of elytral lateral declivity not sharply defined; males with frontal projections ending in a single, deflexed apex (Fig.17)..... ***Adelina bacardi***

-- Pronotum flat to slightly concave medially; edge of elytral lateral declivity well defined by a distinct carina; males with frontal projections each with two lobes or corners.....21

21. Head (males) wider than long; frontal projections with outer tooth narrowly pointed, triangular, deflexed (Fig. 18).....***Adelina bidens***
-- Head (males) about as wide as long; frontal projections with outer tooth less distinct and closer to inner tooth, forming an obliquely truncate process (Fig. 19) .....***Adelina plana***

22. Larger (5.6 to 9.2 mm. long) beetles with fused elytra, hind wings vestigial (*Diastolinus* spp.) 23
-- Smaller (3.7 to 5.4 mm. long) beetles with elytra free, hind wings usually well-developed (*Blapstinus* spp.) 24

23. Length 5.6 to 6.6 mm., stout (Fig. 12); apical (11th) antennomere brown, paler in apical half, globular, widest, more so than antennomere 10; ventral surfaces punctate-rugose, shining..... ***Diastolinus this***
-- Length 6.7 to 9.2 mm., elongate-oval (Fig. 13); antennomeres antennomeres 9-11 light brown to yellowish; antennomeres 10 and 11 of equal width; ventral surface smooth with matt luster ....***Diastolinus that***

24. Color dark brown with a dull luster and conspicuous golden setae on dorsum and in dense patches at sides of abdominal sternites; body length 4.4 to 5.4 mm. (Fig. 10) ....***Blapstinus kalik***
-- Color black, surface setae small, inconspicuous 25

25. Length 4.2 to 5.4 mm., body broadly oval; elytra with widely spaced, shallow strial punctures (Fig. 8).....***Blapstinus punctatus***
-- Length 3.7 to 4.2 mm., body narrowly oval; elytra with small, deep, strial punctures and fine punctures on intervals (Fig. 9).....***Blapstinus humilis***

26. Prosternal process deflexed behind coxae and apex obtuse; prosternum with conspicuous setae scattered from anterior margin to base of prosternal process; body robust, very convex dorsally (Fig. 28); hind wings vestigial.....***Phaleria punctipes***
-- Prosternal process horizontal, lanceolate; prosternum not setose; body elongate-oval., moderately convex dorsally; hind wings fully developed 27

27. Pygidium with apex emarginate; eyes separated ventrally by about the ventral diameter of an eye; antennae about as long as head (Fig. 29).....***Phaleria testacea***
-- Pygidium with apex broadly rounded; eyes larger, separated ventrally by less than ventral diameter of an eye; antennae longer than head (Fig.27).....***Phaleria picipes***