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A new species of *Phyllophaga* Harris from the island of Navassa in the Caribbean (Coleoptera: Scarabaeidae: Melolonthinae)

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Abstract. The small Caribbean island of Navassa (U.S. possession) is unoccupied by humans, but recent surveys have detected a surprising number of endemic (precinctive) invertebrates. A **new species** of May beetle, *Phyllophaga navassa*, is here described and compared to the Hispaniolan *Phyllophaga* fauna.

Introduction

The large genus *Phyllophaga* Harris is estimated to contain over 500 species (Morón 1997:229); perhaps the largest genus of New World Scarabaeidae. In the recent revision of the species for the island of Hispaniola (Woodruff and Sanderson 2004), 48 species were treated, of which 22 were described as new. All 48 are endemic only to Hispaniola, and many have restrictive distributions within the island.

The Island of Navassa lies only 56 km west of the tip of Haiti, so it was somewhat surprising to learn that this endemic new species was abundant there. Discovery of these, and a narrative of the survey of the island, was documented by Steiner and Swearingen (1998, 2000), and Swearingen (1999). They reported collecting more than 600 terrestrial arthropod morphospecies, estimated to be 30% endemic. Additional information on habitat was provided by Nearns and Steiner (2006) in the description of a new species of *Plectromerus* Haldeman (Cerambycidae), and by Steiner (2008) in a report on Carabidae known from the island.

The island has been a U.S. possession since 1856, when it was claimed under the “Guano Act”, and it was mined for phosphates during the latter part of the 19th century. The U.S. Coast Guard operated a lighthouse there from 1929 to 1996. It was acquired by the U.S. Department of Interior, and in 1999 it was designated as the Navassa National Wildlife Refuge under the U.S. Fish and Wildlife Service. The herpetology of the island was treated by Powell (1999).

The island is only 5 kilometers square, with no beaches, and abrupt cliffs reaching heights of 20 meters. The central forest is about 70 meters elevation, where many specimens were collected. The geology was studied by Burne, Horsfield, and Robinson (1974), and the island was estimated to be 2-5 million years old, but never connected to another larger landmass. This isolation would explain much of the endemism found. It is composed of Eocene limestone with rugged karst surface and red oolitic soil (reminiscent of the bauxite areas near Cabo Rojo in the Dominican Republic). It has a significant forest cover, dominated by 4 species of tropical trees: *Sideroxylon foetidissimum* Jacquin, *Ficus populnea* Wildenow var. *brevifolia* (Nuttall) Warb., *Coccoloba diversifolia* Jacquin, and *Metopium brownei* (Jacquin). A brief botanical reconnaissance was made by Proctor (1959).

Phyllophaga navassa Woodruff and Steiner, new species

Holotype male. Navassa Island [U.S.], central forest area, 70M, 18°24.08'N, 75°00.694' W, 28 July 1998, collrs. W. E. Steiner, J. M. Swearingen, *et al.* / At blacklight in gap in mixed forest (*Ficus*, *Metopium*, *Coccoloba*, *Thrinax*) on limestone. [U.S. National Museum of Natural History, Smithsonian Institution].

General description (Fig. 4, habitus). Medium sized (L. 15mm, W. 8mm), shiny, uniformly dark mahogany brown, convex, nearly glabrous dorsally, unremarkable for genus; genitalia simple, but distinctive, cylindrical, parameres fused ventrally at tip, aedeagus recessed, partly sclerotized, tip upturned (Fig. 8-15).

Head (Fig. 4, 5). Clypeus barely emarginate, lateral angles smoothly rounded, medial indentation slight, margin carinate; clypeal punctures dense, with most coalescing, not setose. Head punctures similar to clypeus, with a few separated by a puncture diameter, and a typical impunctate band near base. Eyes large with setose canthus near center.

Antenna (Fig. 1,3). Nine segmented, 3 club segments nearly equal in length, antennomere 1 nearly equal to next 3 combined, 3rd and 4th more cylindrical and smaller than 2nd or 5th; 6th small and compressed.

Pronotum (Fig. 4,5). Convex, shiny, punctures sparse, shallow, non-setiferous; lateral margin slightly crenulate at origin of long, curved lateral golden setae; anterior margin complete, posterior margin barely indicated, fading medially, smooth with only few scattered punctures.

Scutellum. Triangular, slightly convex, punctate, posteriorly flattened.

Elytra (Fig. 4) Convex, flattened medially, somewhat rugulose horizontally, striae barely indicated, disc glabrous, lateral third and humerus with fine scattered setae; marginal golden setae longest below humerus, similar to pronotal setae. Sutural interval raised, broadest in posterior fifth; terminating in slight projection (not toothed).

Pygidium (Fig. 6). Broadly oval/triangular, evenly convex, shiny, glabrous, with few, shallow, non-setigerous punctures; posterior lateral margin carinate (inaccurately termed “bead” in older literature) with elongate, golden setae medially.

Legs (Fig. 2-5, 7). Relatively long, especially tarsi; all claws not cleft with sharp termination, middle tooth small, nearer base than tip (anterior right claw in Fig. 3).

Anterior tibia tridentate (Fig. 5), anterior tooth elongate, middle sharp, triangular, posterior tooth reduced; teeth spaced nearly equidistant; spur narrow, cylindrical, sharp, half length of 1st tarsal segment. Anterior tarsal segments cylindrical, nearly equal in diameter, segments 2-4 subequal in length.

Meso- and metatibia with longitudinal carina and incomplete transverse carina (Fig. 7), teeth prominent with long, golden setae. Metatibial spurs (Fig. 2) moveable, long (reaching near middle of tarsal segment 2), narrow, slightly curved, inner surface flattened, inner spur about 20% longer than outer spur; terminus not noticeably notched; fringe of spines 14-16. Metatarsal segments long, cylindrical, 2nd longer than 1st; claws as in other legs.

Male Genitalia (Fig. 8-15). Of a simplified form, and unremarkable aedeagus. Parameres symmetrical, lateral views (Fig. 8-9) nearly identical. Caudally (Fig. 10) with large broadly oval opening, parameres fused ventrally; dorsally (Fig. 14) opening v-shaped posteriorly. Each paramere with smoothly rounded lateral carina (Fig. 12-13) about half length; nearly truncate ventrally. Aedeagus cylindrical, partly sclerotized, longer than parameres when extended (Fig. 8, 9, 11). Cylinder twisted and open at tip, with distinctive upturned medial dorsal process, barely protruding in repose (Fig. 12, 13, 15).

Female. Unknown. Because all specimens are males and were collected at light and flight intercept traps, the unknown females may be flightless and subterranean (as are some Hispaniolan high altitude species, see Woodruff and Sanderson 2004). On a small windswept island such adaptation would obviously have survival value.

Relationships. Because 48 species of *Phyllophaga* are known from the nearest land mass (Hispaniola), it would be significant to establish the relationships of this isolated species. The simplicity of both body habitus and male genitalia imply that it may be a relictual, primitive species. Its colonization of Navassa Island suggests an old, durable, survivor from ancestral stock. DNA investigations may elucidate its relationships.

It does not appear closely related (morphologically) to any other Caribbean *Phyllophaga* known to us. It is most similar to *P. hogardi* Blanchard, one of the most abundant, widespread (and economic) species on Hispaniola. It does not possess the distinctive spine-like projections on the elytra sutural tip, and it lacks the “brain-like” mass at the aedeagal tip of that species.

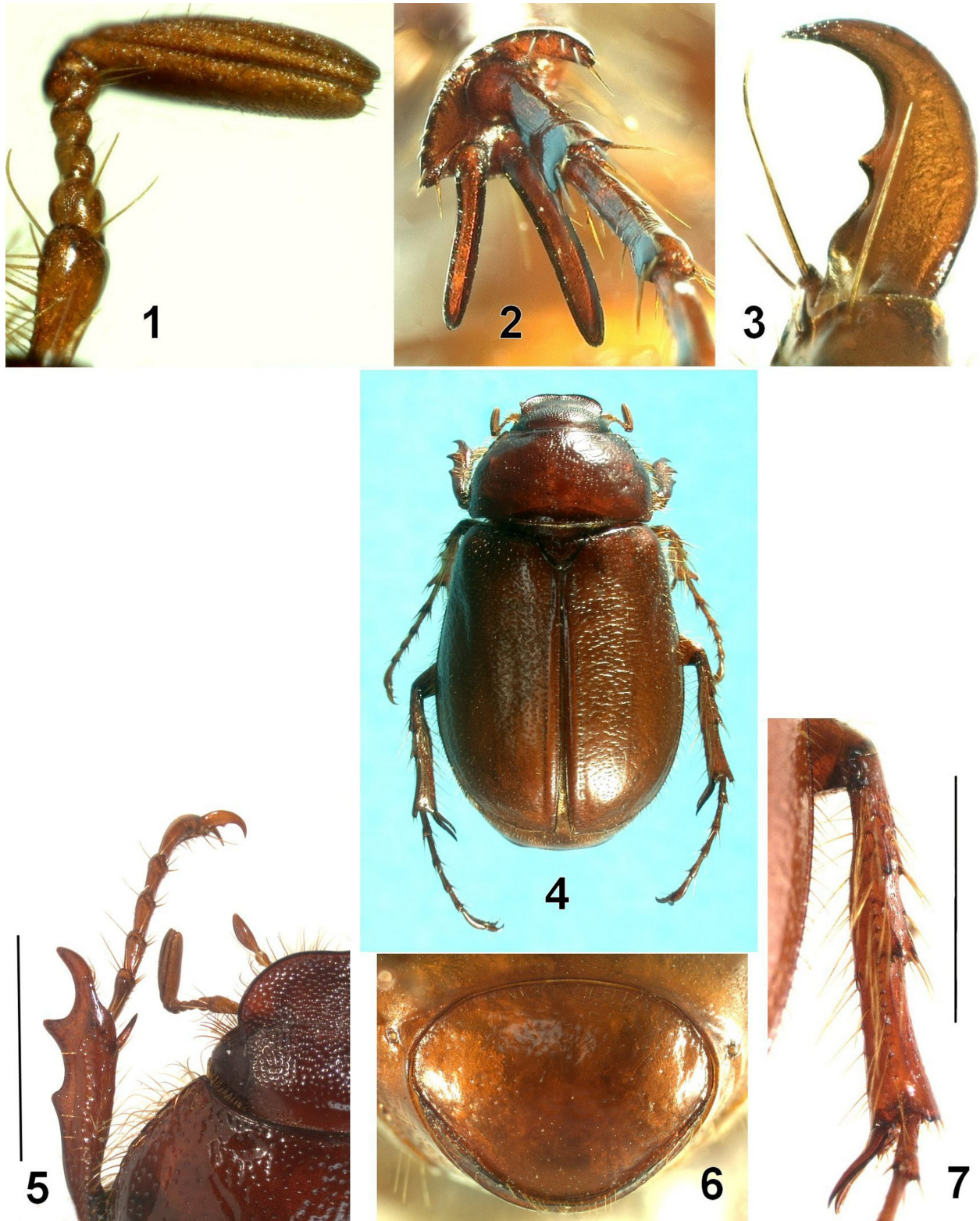


Figure 1-7. *Phyllophaga navassa*, n.sp. 1) Right antenna. 2) Right metatibial apex. 3) Right protibial claw. 4) Habitus, adult male. 5) Left protibia, tarsus, clypeus (line = 5mm). 6) Pygidium (caudal view). 7) Right metatibia (line = 5mm).

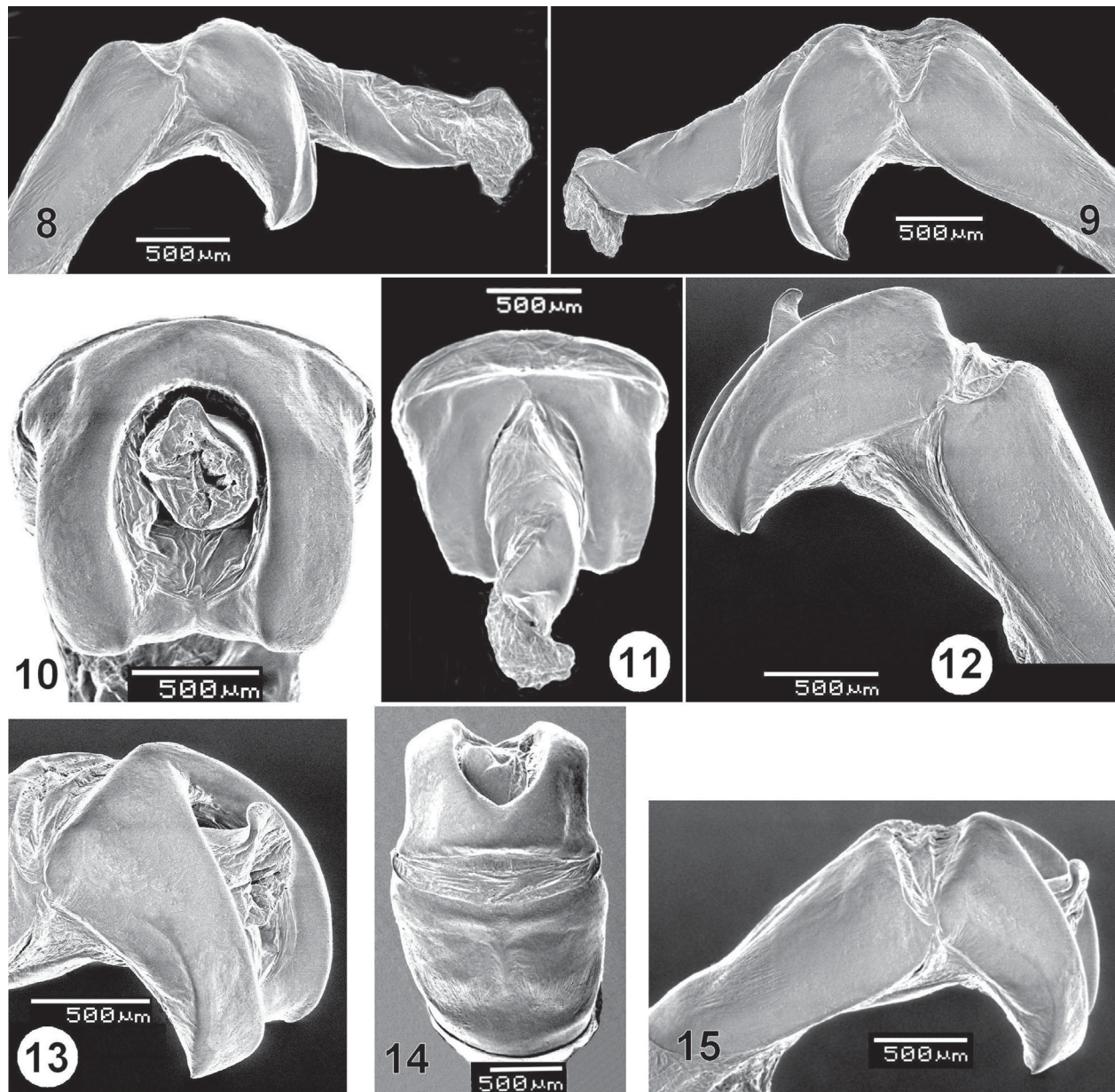


Figure 8-15. *Phyllophaga navassa*, n.sp., male genitalia. 8,9,11) Aedeagus extended. 10,12-15) Aedeagus in repose. 8) Left lateral. 9) Right lateral. 10) Caudal. 11) dorsal/caudal. 12) Right lateral. 13) Laterocaudal. 14) Dorsal. 15) Left lateral (note upturned aedeagal tip).

Specimens examined [57]. Holotype and 56 paratype males. All from Navassa Island, collected by W. E. Steiner, J. M. Swearingen, *et al.* (numbers of paratypes in brackets): Central forest area, 70m., 18°24.08'N, 75°00.69'W, 28 July 1998, at black light in gap of mixed forest (*Ficus*, *Metopium*, *Coccoloba*, *Thrinax*) on limestone [3]; bluff of southwest rim, 65m., 18°23.75'N, 75°00.94'W, 25-30 July 1998, flight-intercept/yellow pans in Malaise trap, open mixed forest (*Metopium*, *Coccoloba*, *Ficus*) at rim of upper terrace, limestone and red oolitic soil [1]; central forest area, 70m., 18°23.99'N, 75°00.67'W, 26 July-4 August 1998, flight-intercept/yellow pans in Malaise trap in gap of mixed forest (*Ficus*, *Metopium*, *Coccoloba*, *Sideroxylon*, *Thrinax*) on limestone [3]; same except Malaise trap in gap of mixed forest (*Ficus*, *Metopium*, *Coccoloba*, *Sideroxylon*, *Thrinax*) on limestone [1]; E. end of east savanna, 65m., 18°23.75'N, 75°00.52'W, 1 August 1998, at black light at edge of grass savanna and mixed forest (*Ficus*, *Metopium*, *Coccoloba*) on limestone and red oolitic soil [3]; near lighthouse, 80m., 18°23.82'N, 75°00.74'W,

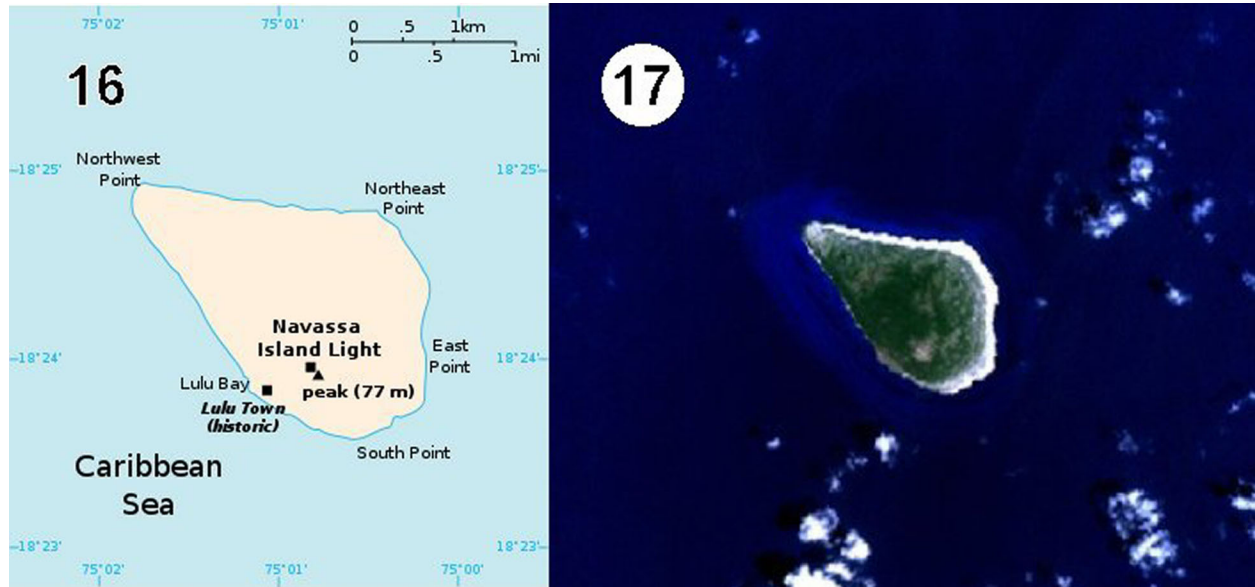


Figure 16-17. The Island of Navassa. **16)** Outline map with major features (courtesy of Wikipedia). **17)** Aerial view of the island from satellite imagery (courtesy of NASA).

24 July-4 Aug. 1998, taken in Malaise Trap, edge of open weedy scrub and mixed forest (*Ficus*, *Metopium*, *Thrinax*) on limestone [2]; same except 26 July 1998, at black light in open weedy scrub near mixed forest (*Ficus*, *Metopium*, *Thrinax*) on limestone and red oolitic soil [1]. Paratypes deposited in the U. S. National Museum of Natural History, Washington, D.C., the Florida State Collection of Arthropods, Gainesville, Florida, and the Illinois Natural History Survey, Urbana, Illinois.

Etymology. The specific name *navassa* is the same as this remote island, the only locality from which it is known. It is applied as a noun in apposition.

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