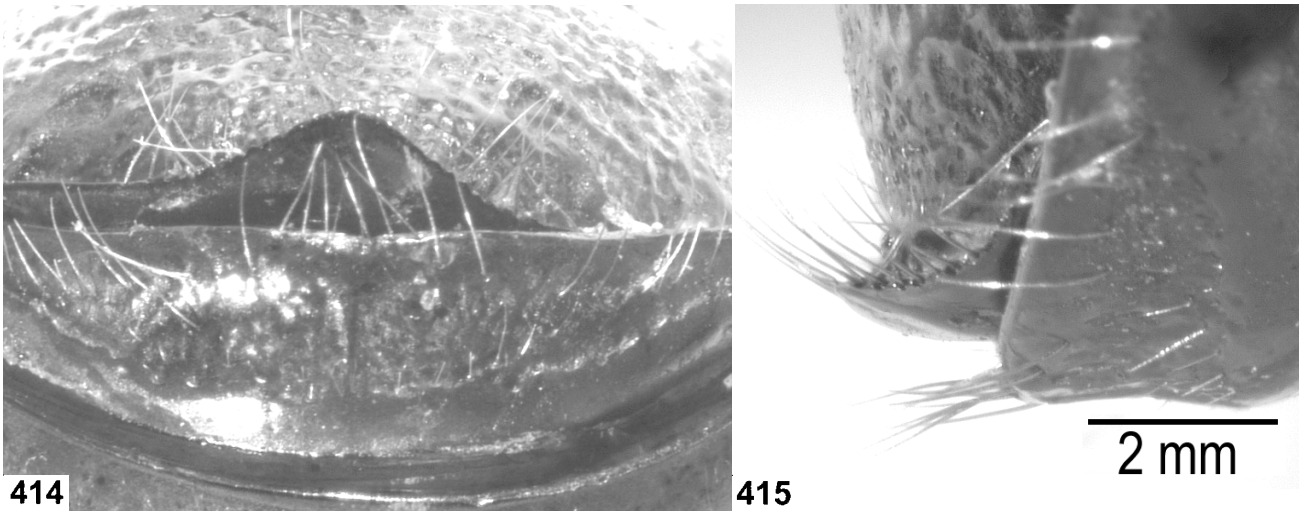

Fig. 414-415. ***Phyllophaga kenscoffi* Wolcott.** Tip of female pygidium, showing upturned lip: 414) ventral; 415) lateral.

Elytra. Light colored, yellowish-orange, very shiny, punctures shallow and finer than pronotum, costae barely visible except sutural costa slightly convex and punctate as remainder of elytra. Suture slightly carinate from just above apical declivity, not ending in a noticeable spine; elytral apices somewhat truncate, rounded inwardly at sutural apex. Lateral margin barely raised in anterior half.

Pygidium. Wider than long, convex, densely punctate, some punctures coalescing into wrinkles; several scattered, elongate setae, like those on apical fringe (female allotype is covered with such setae).

Legs. Protibia tridentate, basal tooth much nearer middle one and less developed on right leg than on left, middle tooth nearer proximal one; apical spur acuminate, reaching near middle of first tarsal segment. Protarsal segments 2 through 4 sub-equal, fifth 1.5X longer; claws sharp, middle tooth triangular, located near middle, as long as apical tooth and forming notch with base. Mesotibial transverse carina incomplete, marked by teeth and long spines; longitudinal carina noticeable only between 2 teeth on upper side; tibial apex expanded; spurs acuminate, outer one-fifth shorter; mesotarsal segments 1 through 4 progressively shorter, fifth 1.5X fourth; claws as on protarsi. Metatibial transverse carina incomplete as on mesotibia, longitudinal carina same; apical spurs flattened, concave on inner side, slightly wider in apical third, and slightly, gently curved; inner spur extending almost to middle of second tarsal segment; apical fringe about 15 spines.

Abdomen. Ventral surface lightly, uniformly punctate, nearly glabrous, cluster of longer setae laterally in penultimate sternite; ultimate sternite merely grooved, with a few long setae arising from punctures; penultimate sternite, densely, more coarsely punctate medially, with a few setae arising from punctures.

Genitalia, male (Fig. 416-420). Parameres curved downward at tip, pointed, little modified. Aedeagus heavily sclerotized and plug-like; consisting of tubular base with attached lateral lobes (somewhat asymmetrical), from which large hooks arise dorsally, and which are concave on their face, their sides without several large teeth as in *recorta* (Fig. 644-652); below these lies a saw-like process imbedded in softer tissue.

Allotype female. DOMINICAN REPUBLIC: Prov. Pedernales, La Abeja [Las Abejas], 38 km N. Cabo Rojo, 18-09N, 71-38W, 1250 m, 15-VII-1987, J.E. Rawlins, R. L. Davidson, CMNH 307,817 [CMNH]. Similar to male, except much lighter in color, pygidium extensively covered with elongate setae (Fig. 425), tergite above with similar row of golden setae, ultimate sternite more convex without a deep groove; abdomen more convex medially. Frons more densely punctate and depressed, making surface irregular; posterior band convex in its anterior margin. Genitalia (Fig. 421-424) similar to *recorta* (Fig. 655-658), but in *larimar* tips of superior plates with more setae (about 24 vs. 14 total) and the inferior plates have a strong groove paralleling open suture. Both species have exceptionally large triangular plate sealing sutural base (Fig. 422, 655).

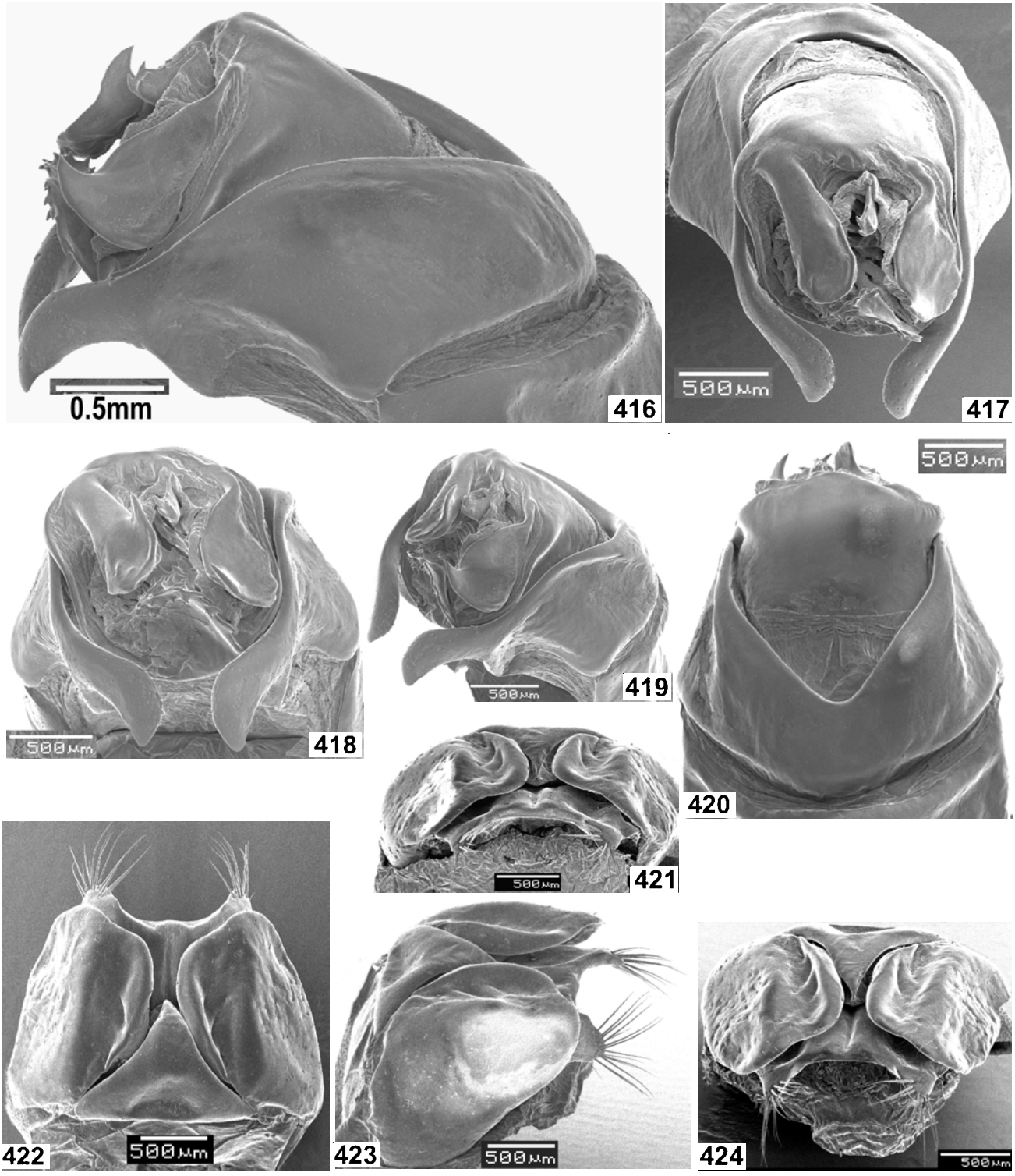

Fig. 416-424. ***Phyllophaga larimar* Woodruff**. 416-420 Male genitalia: 416) lateral; 417) dorso/caudal; 418) caudo/ventral; 419) caudo/ lateral; 420) dorsal; 421-424 female genitalia: 421) caudal; 422) ventral (note triangular plate separating inferior plates); 423) lateral; 424) caudo/ventral.

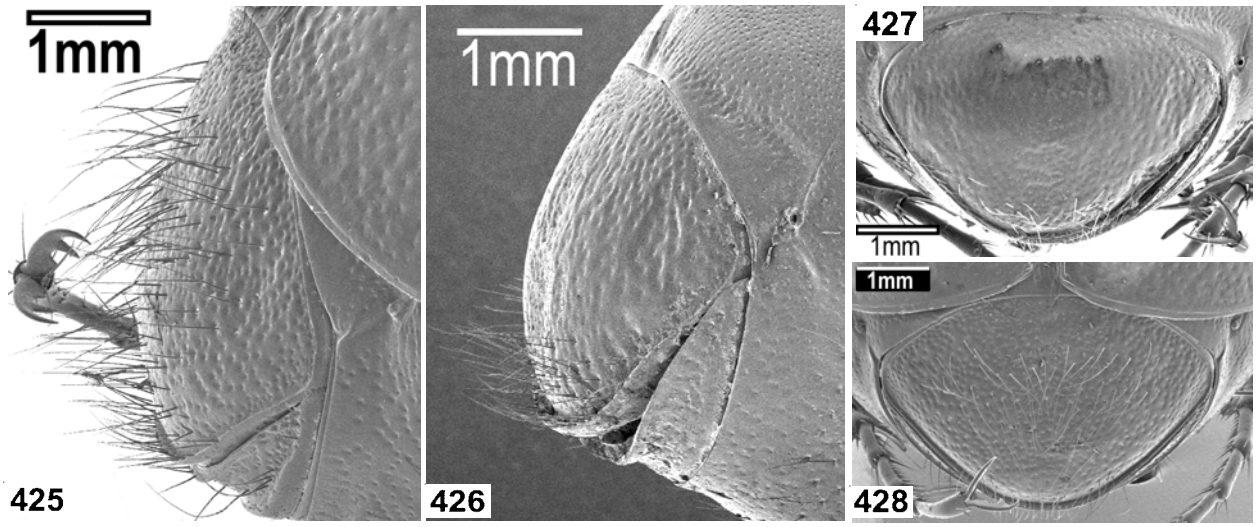

Fig. 425-428. ***Phyllophaga larimar*** **Woodruff**. Pygidium: 425 (lateral); 428 (caudal); long setae over nearly entire pygidium, and ***P. recorta*** **Sanderson**, 426 (lateral); 427 (caudal); long setae confined to terminal one-third or less, females.

Comparisons. Externally and in genitalic characters this is a "sister species" to *recorta*. It is slightly larger, the female has a completely hairy pygidium (Fig. 425), and the male genitalia have black asymmetrical plates on sides of parameres with hook like tips and non-tooted sides (compare Fig. 416-420 with 644-652). Female genitalia compared above. In *recorta* the female pygidium has only a few setae near apex (Fig. 426-427).

Specimens examined. Total 24, including holotype and allotype. Paratypes as follows: **DOMINICAN REPUBLIC:** (1) same as holotype, except 26-VI-7-VII-1992 [FSCA]. (9) same as allotype, except some 13-14-VII-1987 and some 1160 m [CMNH]. (2) Prov. Pedernales, 25 km N. Cabo Rojo, 12-VII-1996, M.C. Thomas, 700m, MV/ultraviolet light [FSCA]. (2) Prov. Pedernales, 26 km N. Cabo Rojo, 18-06N, 71-38W, 730m, 20-VII-1990, Young, Rawlins, Thompson [CMNH]. (4) same, except 26-27-IX-1991, Young, Rawlins, Thompson, Davidson, wet deciduous forest [CMNH]. **HAITI:** (4) Dept. de l'Ouest, 2 km S. Kenscoff, nr. top of highest mtn., 18-26N, 72-17W, 10-IX-1995, 1790 m, Rawlins, Onore, Davidson [CMNH].

Ecology. This is another of the "South Island" species, found in the southern peninsula of Haiti and the Baoruco mountains of the DR at altitudes from 700 to 1790 m. Most of these localities are cloud forest or "wet deciduous forest". At the Larimar Mine the site is a prominence above the mine, the light traps drawing from a cloud forest modified for shade grown coffee (presently abandoned). Of the several hundred *Phyllophaga* (including *mali, kenscoffi, ortizi, leptospica, baoruco, toni*, and *panicula*) collected during a 3 week period, at the same time, only 2 specimens of *larimar* were taken. It appears to be active from June through September, but is scarce.

Etymology. It is named for the type locality. The name "Larimar" was coined by Miguel Mendez for a unique gemstone, found only at a single deposit in the Baoruco Mountains, near Filipinas. It is composed of an abbreviation of his daughter's name (Larisa) and the Spanish for sea (mar), because of its beautiful blue color. It was my reason for first visiting this unusual locality, publishing the first article on this stone (Woodruff, 1986), in which photos of the area can be found.

This volcanic deposit is dated as Cretaceous in age and was a part of the "South Island", now being subducted beneath the plate of the "North Island" (De Leon, 1989; Donnelley, 1989). Fossil trees and molluscs (not yet studied), found in the deposit and partially replaced by Larimar, may be significant markers to elucidate the zoogeography of the Caribbean. Microtektites and shocked quartz (in situ) were found in a deposit a short distance away in Haiti at the K-T boundary; these are believed to be the result of the meteorite that created the Chicxulub Crater off Yucatan or a similar depression called the Colombian Basin Crater, which ended the Cretaceous (Hildebrand and Boynton, 1991).

Because of the antiquity of this unique area, and its former isolation as a separate island, it is extremely rich and diverse in endemic species, including many reptiles, butterflies, and other insects. The 8 species of *Phyllophaga* collected here, including 4 new

species (2 of them known from no other locality), is additional evidence of its importance. A concerted effort should be made by the Dominican government to address conservation efforts for the entire Baorucos. I initiated a cooperative project to build a biological station (Bio-Eco-Dom) at this site, through the Center for Systematic Entomology (Gainesville, Florida) and the Museo Nacional de Historia Natural (Santo Domingo). It has been delayed because of political problems, but it still has great potential for future studies there.

Phyllophaga latiungula Wolcott
(Fig. 90, 429-439)

Phyllophaga latiungula Wolcott (1928a: 28; Sanderson, 1951: 277; Fig. 49-50, 69, 71)

The original description of this species was based on a single female: HAITI: Hotel Mon Repos, Carrefour (near Port-au-Prince), 2-IV-1925 [Type USNM# 40662, examined]. The brief description was not accompanied by an illustration of the female genitalia, but it was easily distinguished from the few small species known then (*minutissima* and *audanti*) because of its pruinose coating ("plumbeus bloom" of Wolcott). Sanderson (1951) described 4 additional small species in this group (*cartaba, imprima, mella, panicula),* all of which are pruinose.

It is most similar to *cartaba* in external and genitalic characters. The male genitalia are distinctive; the parameres are elongate, projecting downward in *cartaba* (Fig. 241-245), whereas they are apically rounded, but projecting posteriorly in *latiungula* (Fig. 431). The aedeagus in *cartaba* is cylindrical, terminating in an evagination containing 3 or 4 spines imbedded deeply within (Fig. 242, 247); that of *latiungula* is lyre-shaped (Fig. 430, 432), with several spines (Sanderson says 12-13, presumably from cleared specimens) imbedded in soft tissue, 3 or 4 pointing forward and 8 pointing backward. In addition to distinctive genitalia, it is smaller (L. 8.5, W. 4-4.5 mm) than *mella* (L. 13.5-15, W. 6.5-7 mm), *imprima* (L. 10.5-12, W. 6 mm), and *panicula* (L. 11.5, W. 5 mm). It is now known only from the area around Port-au-Prince, Haiti.

The male antennal club is oval (Fig. 433, 435), the outer lamellae bun-shaped, with middle lamella flattened on both sides, and sandwiched between. The lamellae have large receptors on most of surfaces (Fig. 435), which presumably play a role in locating the females.

Specimens examined. Total 21, all from HAITI: In addition to the holotype female, I have seen the following: (7) Port-au-Prince, R.J. Crew [MCZC, INHS]; (13) Petionville, 29-III-1972, B.K. Dozier [FSCA].

Phyllophaga leptospica Sanderson
(Fig. 91, 440-449)

Phyllophaga leptospica Sanderson (1951: 262; Fig. 13,14, 64)

This large species (L. 19 mm) was briefly characterized by Sanderson (1951), from the male holotype and an "imperfect" female allotype. As he suspected, the female superior plates are provided with setae (not shown in his Fig. 64, but shown here in Fig. 446-449). These were merely labeled "Hayti" [MCZC]. No additional specimens have been reported for over 50 years. It now appears that it is another of the "South Island" species, found in both southern Haiti and the Dominican Republic.

Generally *leptospica* is slightly larger (L. 18-19 mm) than *romana* (L. 16-19 mm), and somewhat more convex (Fig. 91 vs. 108).The male genitalia (Fig. 440-445) are similar to its "sister species" *romana,* but that species has the ridge or carina (often a line of darker color) incomplete on the face of parameres (Fig. 691, 693), and the dorsum of the phallobase gently rounded, not parallel (in lateral view, Fig. 690) with the paramere apical margin as it is in *leptospica* (Fig. 444). The female genitalia (Fig. 446-449 vs. 697-699) are similar and variable, so males are needed for confirmation. Both species are pruinose, but related to *hogardi* because of the enlarged apical spine of the elytral suture. That species is non-pruinose, extremely shiny, and the male genitalia have the parameres fused ventrally.

Specimens examined. Total 170. **HAITI**: (3) Dept. du Sud, Ville Formon, 31km NW Les Cayes, S. slope of Morne Formon, Massif de la Hotte, 18-20N, 70-01W, 7-8-IX-1995, 1405 m, R. Davidson, G. Onore, J. Rawlins, disturbed forests and fields [CMNH]. **DOMINICAN REPUBLIC (new country records)**: (151) Prov. Barahona, nr. Filipinas, Larimar Mine, 26-VI-7-VII-1992, R.E. Woodruff, P.E. Skelley, 3300 ft, blacklight trap [FSCA, USNM, MHND, INHS, NHMB, MCZC]; (11) same, except 3-11-VII-1993, R.E. Woodruff [FSCA]; (5) same, except 26-VI-1999, mercury vapor light [FSCA].

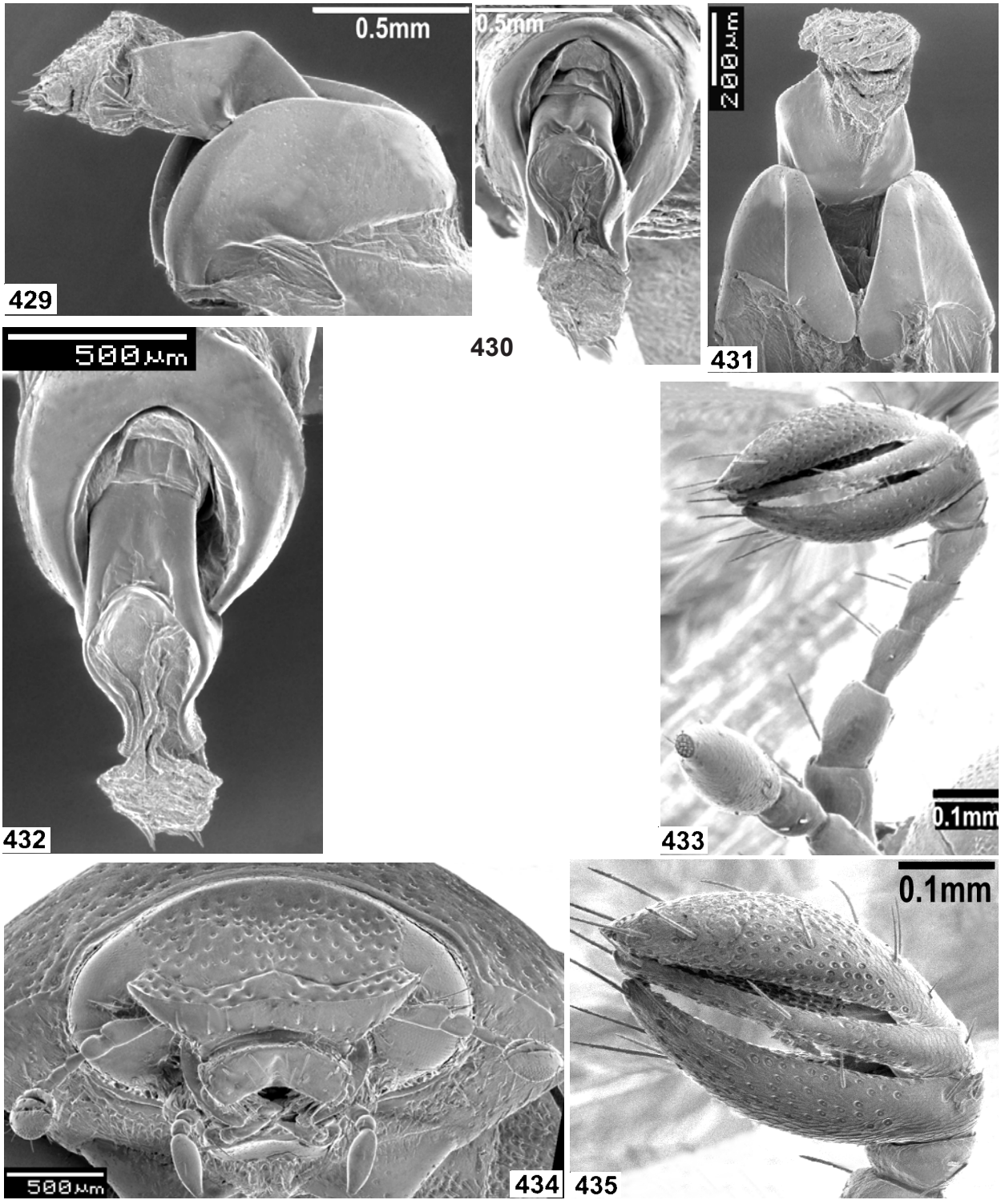

Fig. 429-435. ***Phyllophaga latiungula*** **Wolcott**. Male. 429-432 genitalia: 429) lateral; 430) caudal; 431) ventral; 432) dorso/caudal; 433) antenna; 434) head, frontal; 435) antennal club [note enlarged sensors, except on lamellar base].

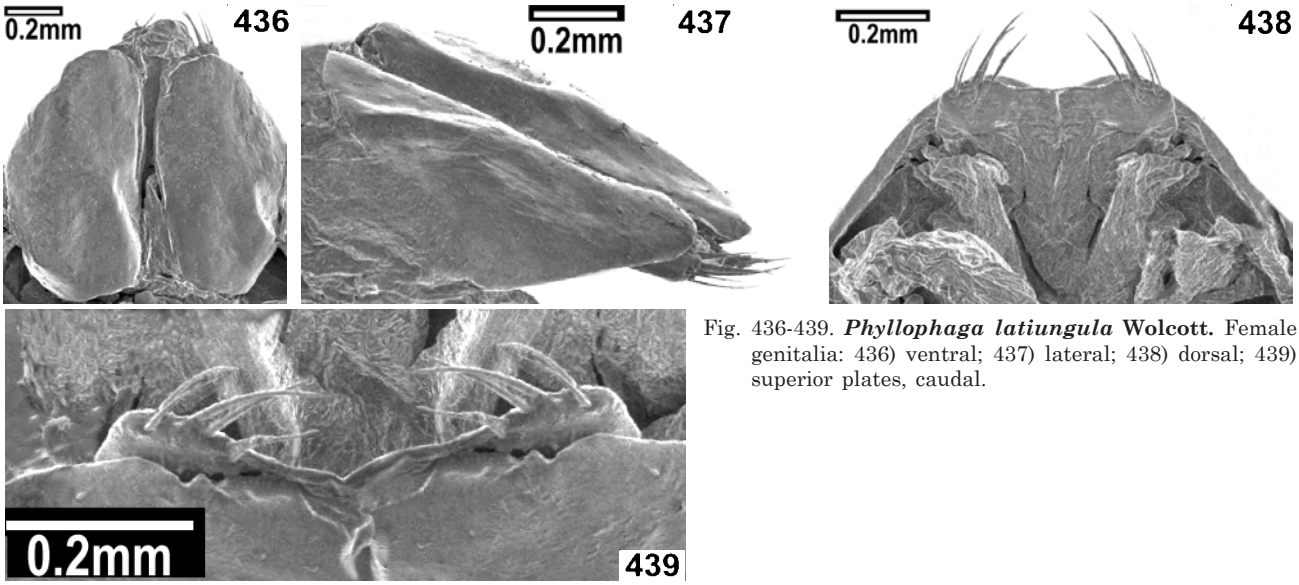

Fig. 436-439. ***Phyllophaga latiungula*** **Wolcott.** Female genitalia: 436) ventral; 437) lateral; 438) dorsal; 439) superior plates, caudal.

Phyllophaga mali Wolcott
(Fig. 92, 450-460)

Phyllophaga mali Wolcott (1928: 25; Fig. 2; Sanderson, 1951: 272-273; Fig. 4-42, 77)

This is probably the most common and widespread species, and it is also quite variable in the shape of the aedeagal processes. As Sanderson (1951) said "This is one of the most variable of all known Hispaniolan *Phyllophaga* if all the individuals studied actually constitute one species." However, this variation does not seem to be correlated with geographic or altitudinal distribution. The aedeagal median projection normally terminates in a distinctive "nail puller or crowbar head". This head is the most variable portion (Fig. 453-455), the tip only slightly expanded in the holotype.

The holotype was from Kenscoff, Haiti [USNM# 40659, examined], feeding on apple and rose [presumably foliage]. Although Wolcott gave no etymology for the name, it is an appropriate double entendre, the Spanish "mal" meaning bad (pest) and the generic name for apple being "*Malus*". Several species are similar externally and probably related to *mali*, and all have the reddish (ferrugineous), pruinose dorsum. The male genitalia are very complicated and nearly indescribable, so illustrations here for those in the group should be consulted: *neglecta* (Fig. 513-522) is smaller, but the most similar in male and female genitalia; *barrosa* (Fig. 199-209) is known from a unique female; *haitiensis* (Fig. 333-352) is slightly larger, more iridescent, complicated male genitalia, and unique female genitalia; *rustica* (Fig. 700-709) is known from 2 males only, is larger, and the lower median aedeagal projection is not present, only a dorsal and 2 lower acuminate projections.

Specimens examined. Data were recorded for the nearly 700 specimens seen (only 5 from Haiti, including the holotype), but space limitations prohibit listing them here. Dominican Republic Provinces represented: Baoruco, Barahona, Dajabon, Distrito Nacional, Elias Piña, El Seibo, Hato Mayor, La Altagracia, La Vega, Monseñor Nouel, Pedernales, Puerto Plata, San Cristobal, San Juan, Santiago.

Ecology. Because it is so abundant and widespread, it is probably one of the species which causes economic damage as larvae. Although most specimens have been collected at blacklight, it has been recorded from semiarid regions, deciduous forest to high elevation, and pine forest. Elevations range from 30 ft to 1973 m, and seasonally from April to November. Serious efforts should be made to rear larvae to adults, so that the most economically important stage can be identified to species. Currently no Hispaniolan white grubs can be identified.

Phyllophaga marcano Woodruff, **new species**
(Fig. 93, 112-113, 461-483)

Holotype male. DOMINICAN REPUBLIC: Prov. Elias Piña, Rio Limpio, 26-27-IV-2000, 2400 ft, R.E. Woodruff, T.J. Henry, blacklight trap [FSCA].

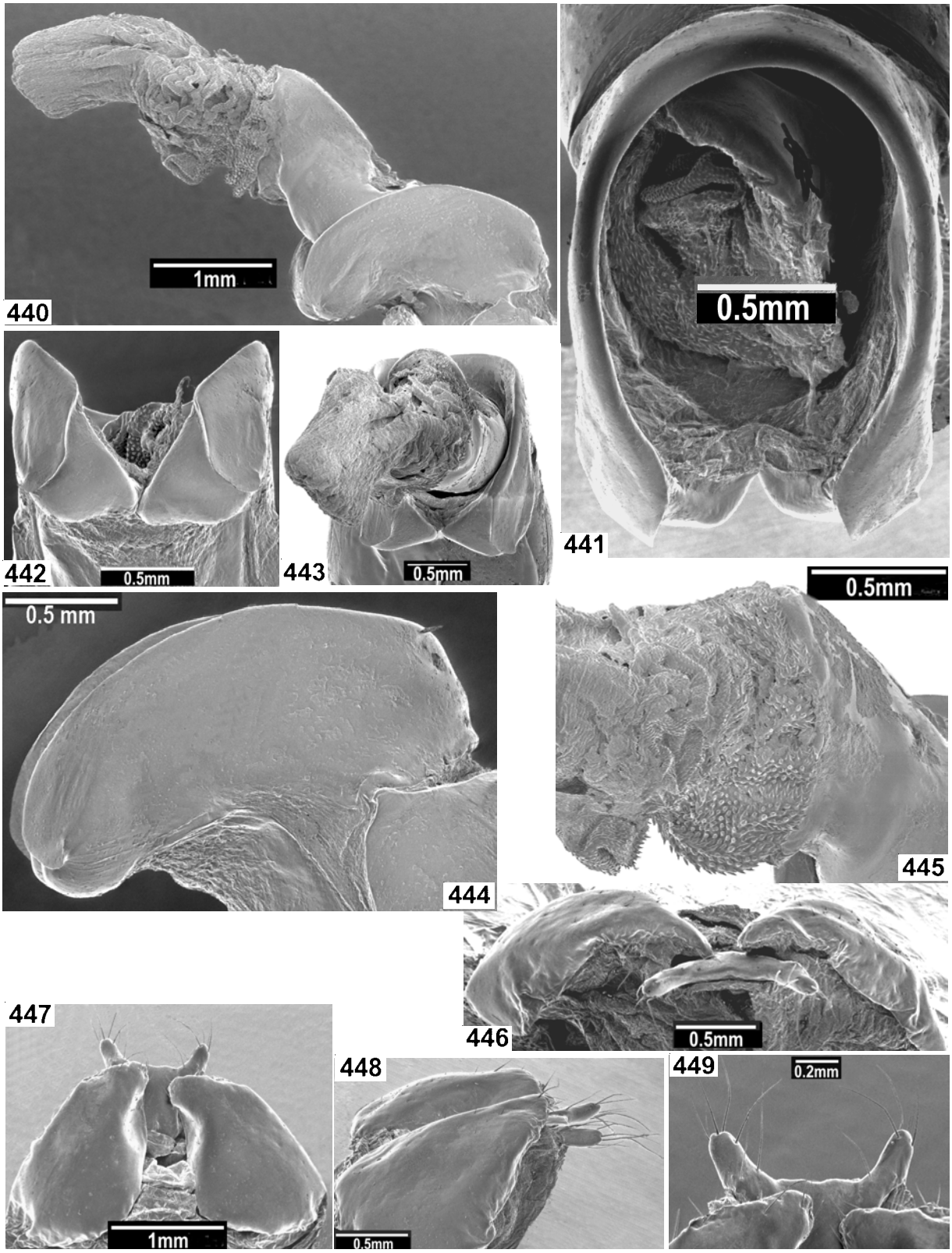

Fig. 440-449. ***Phyllophaga leptospica*** **Sanderson**. 440-445 Male genitalia: 440) lateral; 441) caudal (aedeagus removed); 442) ventral; 443) caudo/ventral; 444) parameres, lateral; 445) spiny area of aedeagus; 446-449 female genitalia: 446) caudal; 447) ventral; 448) lateral; 449) superior plates.

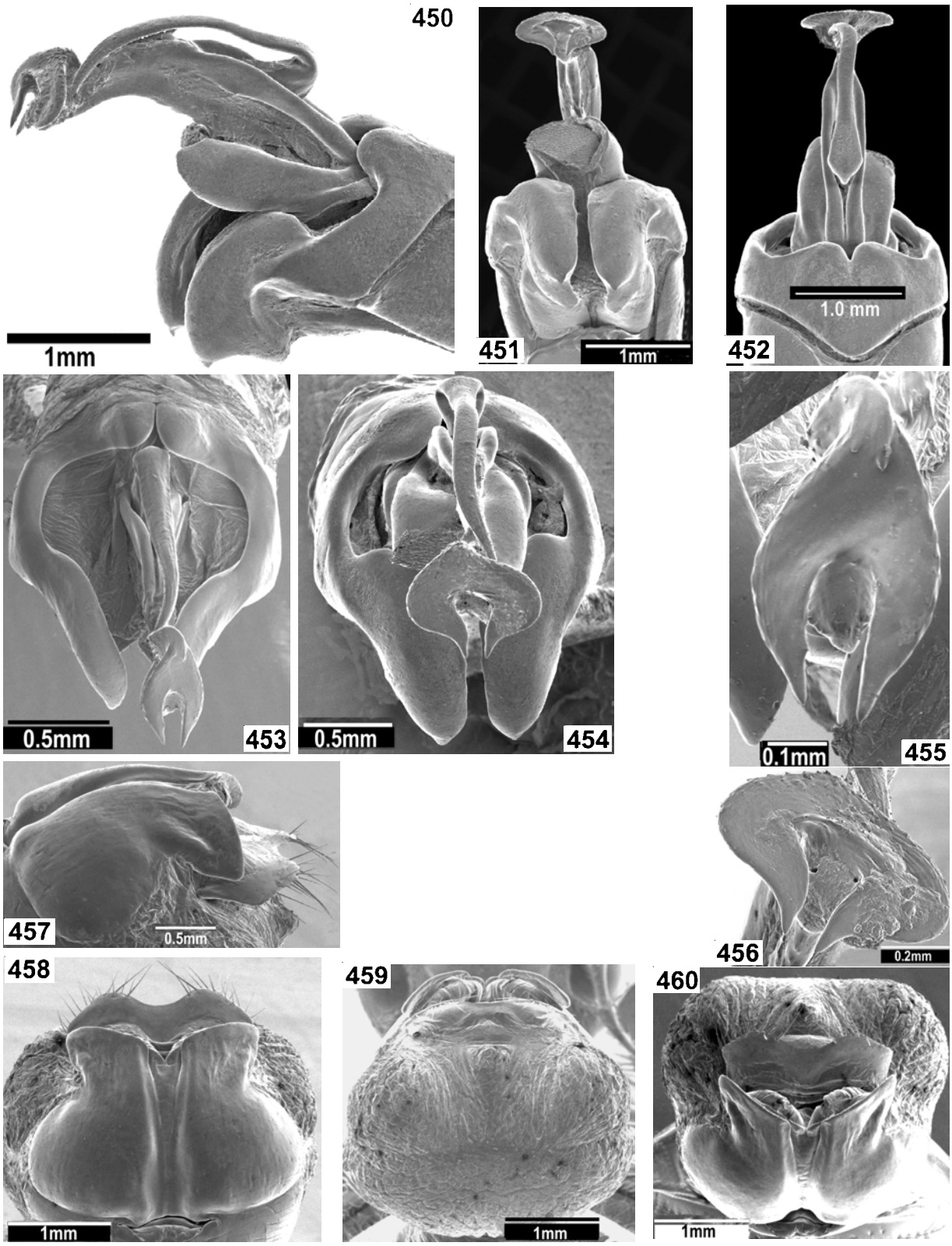

Fig. 450-460. ***Phyllophaga mali* Wolcott**. 450-456 Male genitalia: 450) lateral; 451) ventral; 452) dorsal; 453-454) caudal (2 different specimens); 455-456) same, aedeagal tip enlargement; 457-460 female genitalia: 457) lateral; 458) ventral; 459) dorsal; 460) caudal.

General description. (Habitus, Fig. 93). Exceptionally large (L. 30, W. 15 mm). Dark grey-brown above, light yellow below, heavy bodied, head and pronotum densely punctate, glabrous, scutellum densely punctate, elytra pruinose, silky; antennae exceptionally small for size of beetle.

Head. (Fig. 472). Clypeus emarginate, anterior angles obtuse, appearing lobed, gently curved to posterior angles which are abruptly curved to frontal suture. Surface densely, often contiguously punctured throughout. Margin reflexed, especially at posterior angles, frontal suture deeply impressed. Frons longer than clypeus, densely and coarsely punctate as clypeus, posterior band with a few punctures, broken longitudinally at side by band of punctures above eye (Fig. 482). Eye canthus carinate, with about 7 long, reddish setae and a few shorter ones. **Antenna** (Fig. 473) exceptionally small, compared to beetle size, club oval, receptors not noticeable, sub-equal to previous 4 antennomeres, antennomeres 3 shorter than 4, subequal to 5, which is longer than wide, slightly projecting anteriorly, 6 much reduced, wider than long.

Pronotum. Nearly twice as wide as long at widest point. Glabrous, shiny between dense punctures, medially with vestige of impunctate longitudinal line on posterior half; punctures often coalescing, especially on sides, rarely separated by more than 1 diameter and often much less. Anterior margin slightly raised, with a groove behind medially, more punctate groove toward anterior angles. Anterior angles projecting, pointed, acute (Fig. 93); lateral angles nearly median, not prominent, pronotum widest at posterior angles. Lateral margin with a few long setae, crenulate in anterior half, margin slightly reflexed to posterior angles, which are nearly 90 degrees; posterior margin marked by chevron shaped punctures, but marginal line obsolete medially.

Scutellum. (Fig. 474). Punctate as pronotum (compare impunctate scutellum of *eladio* , Fig. 77-78).

Elytra. Widest at posterior third, appearing swollen. Beautifully pruinose (the "plumbeus bloom" of Wolcott) except for top of humeral angles and lateral margin just below; surface matte, due to "fingerprint-like" sculpture (Fig. 469). Surface glabrous, fairly evenly punctate, punctures much shallower and sparser than head and pronotum. Elytral suture carinate only at apical declivity and beyond, ending in a very tiny straight spine (Fig. 470). Elytral apices smoothly rounded, slightly indented near apical spine, costae slightly convex, sutural one more so, sutural costae with punctures scattered and less dense. Lateral margin weakly carinate from humeral angles to suture, area below humerus depressed, surface more densely punctate, margain slightly dimpled, with a blue/grey sheen.

Pygidium. Glabrous except for terminal fringe, wider than long, punctures dense, many coalescing into wrinkles, but relatively shallow, pygidium barely convex. Tergite above extending beyond elytra, quite convex, swollen, with a crescent-shaped slight depression anteromedially (as a darker line).

Legs. Protibae reddish, basal tooth well-developed, middle tooth nearer proximal than basal, terminal spur acuminate, sharp, extending beyond base of first tarsal segment. Protarsal segments 2, 3, and 4 becoming progressively longer, fifth 1.5X fourth; claws sharp, middle tooth longer than apical, tip slightly projected posteriorly; forming notch with quadrate base. Mesotibial transverse carina incomplete, marked by teeth and spines; longitudinal carina noticeable for most of tibial length; apical spurs acuminate, sharp pointed, nearly straight; tibial apex appearing toothed, surrounding apical fringe of about 8 widely separated setae with large sockets. First mesotarsal segment expanded apically on both sides, segments 1-4 progressively shorter, fifth 1.5X fourth; tarsal claws as in protibia. Metatibial transverse carina with gap more prominent, but marked with teeth and spines as in mesotibia; longitudinal carina nearly complete; tibial apex not toothed as in mesotibia; apical fringe with 11 spines, widely spaced and short; apical spurs elongate, inner face concave, inner spur curved toward body and extending to middle of second tarsal segment, outer spur shorter and barely curved (Fig. 475). Metatarsal segments 1 and 2 both expanded at apex with large spines on inside and out; segments 2 and 3 subequal, 3 with enlarged spine only on inner face, 4 shorter, fifth 1.1X third.

Abdomen. Venter extremely convex, swollen, sternites fused medially, punctures scattered, shallow, nearly glabrous, with scattered elongate setae on penultimate sternite which is depressed apically and slightly more densely punctate; ultimate sternite with typical transverse, shallow groove, slightly punctate with a few scattered setae. Little sexual modification of sternum, male appearing effeminate.

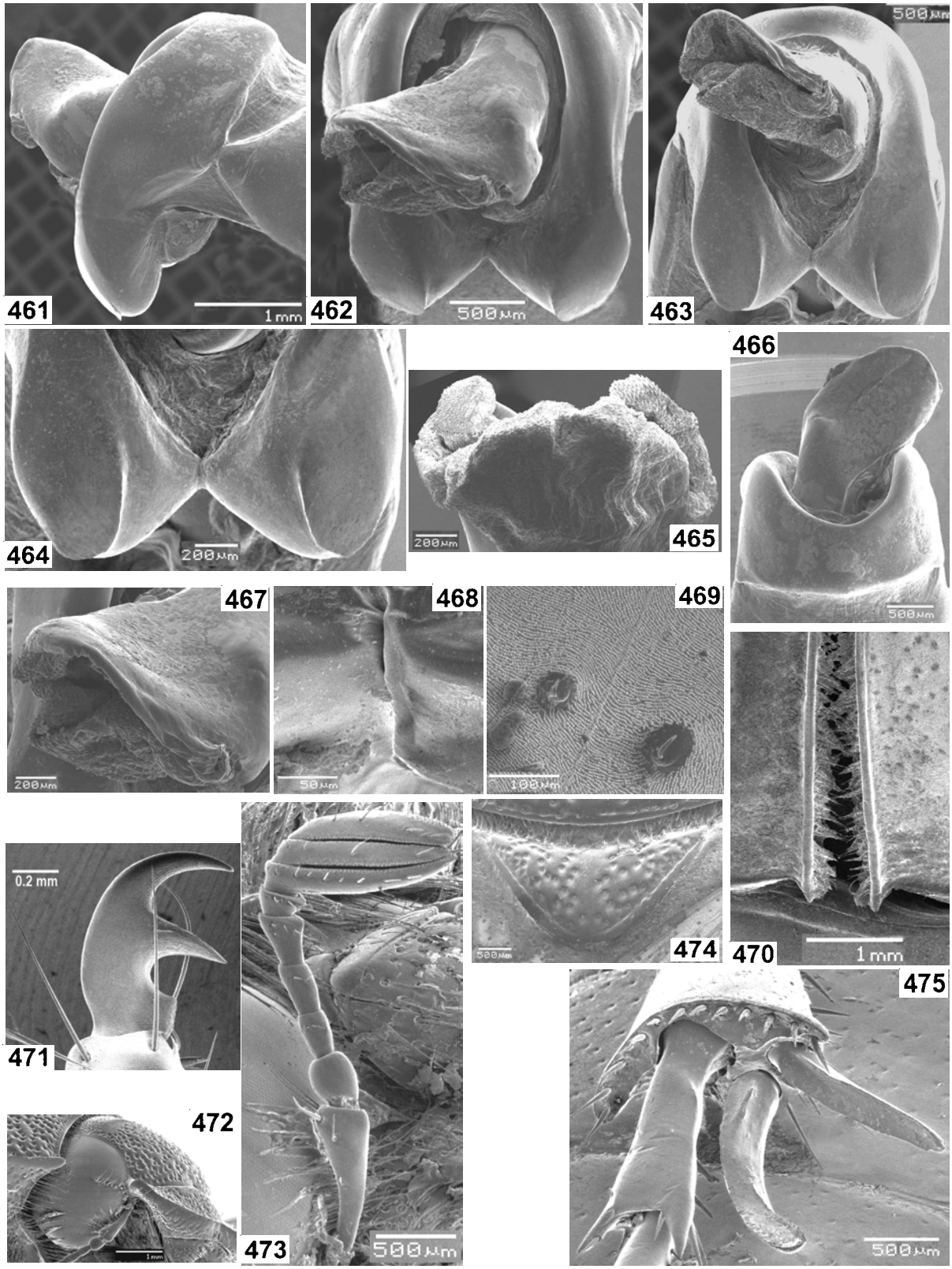

Fig. 461-475. ***Phyllophaga marcano* Woodruff.** 461-468 Male genitalia: 461) lateral; 462) caudal; 463) caudo/ventral; 464) paramere tips; 465) aedeagal tip; 466) dorsal; 467) spinose aedeagal tip; 468) paramere junction; 469) elytral sculpture; 470) elytral tips; 471) protarsal claw; 472) head, lateral; 473) antenna; 474) scutellum; 475) metatibial apex.

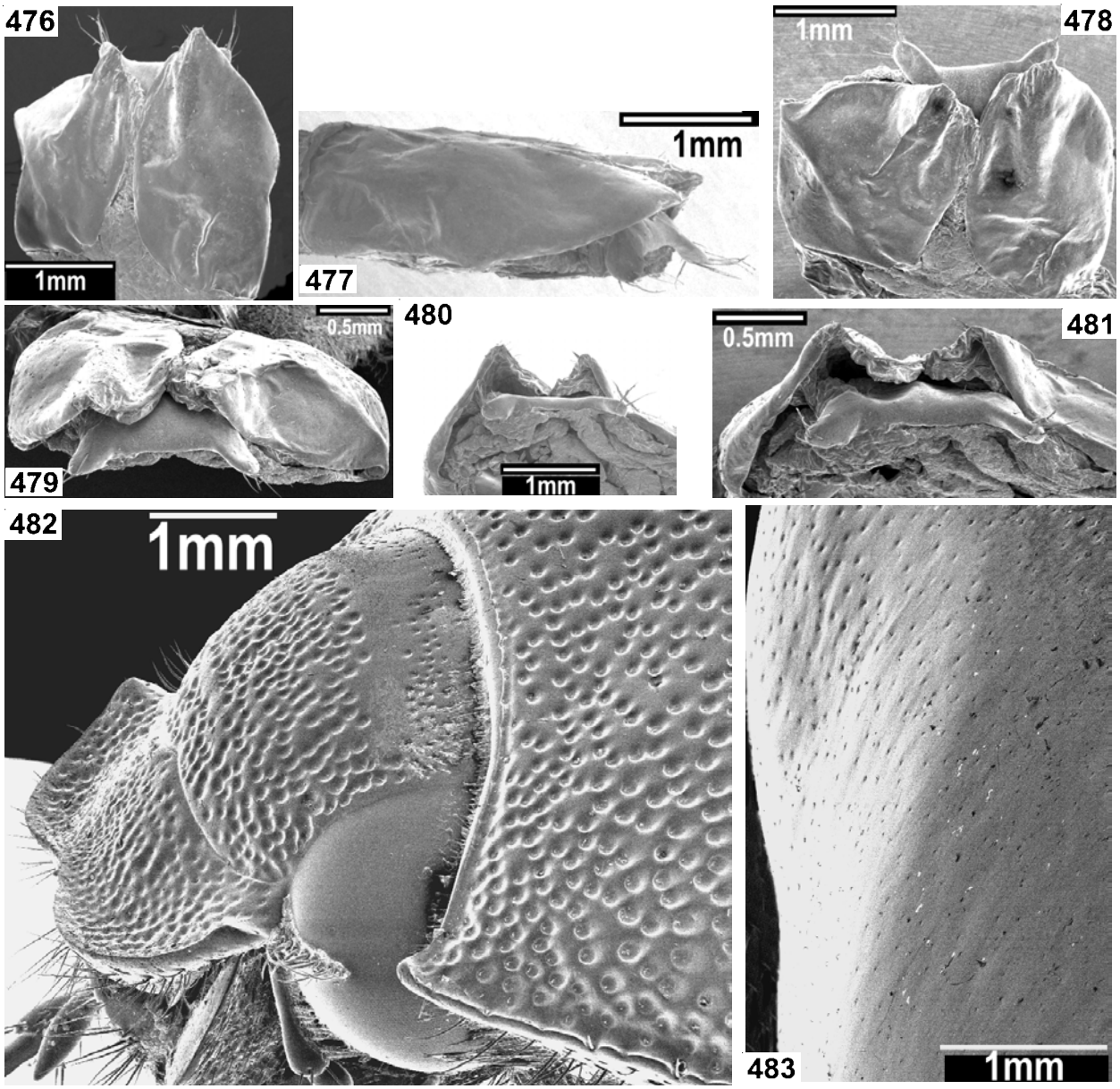

Fig. 476-483. ***Phyllophaga marcano* Woodruff.** Female. 476-481 Genitalia: 476) ventral; 477) lateral; 478) caudo/ventral; 479) caudal; 480) dorsal; 481) same, different angle; 482) head dorso/lateral; 483) smooth area above lateral margin of elytron.

Genitalia, male (Fig. 461-468). Relatively simple, of the *hogardi* type and most similar to *eladio*. Paramere gently rounded in lateral view, with barely indicated apical carina of face pointing down and back; tips fused internally (Fig. 464), as in *hogardi* and *eladio*; carina on labial face incomplete, similar to *romana*. Aedeagus dorsally heavily sclerotized, projecting as a foot (Fig. 462), tip rounded, its lower surface spongy and setose, evaginated (Fig. 465).

Allotype female (Fig. 476-481). Same data as holotype [FSCA]. Similar to male, antennae nearly equal in size. Elytral margin below humerus smooth for 2/3 length, shiny, and less pruinose compared to remainder of elytra (Fig. 112-113, 483); scutellum with a vestige of median pronotal line impunctate. Elytral tumosities less pruinose, somewhat shiny, pygidium more convex, slightly more elongate than male. Posterior tibial spurs broader, more spatulate-shaped, first tarsal segment much expanded inside and out as a spur, but second with spur only on inside. All legs reddish, metafemur bicolored yellow and red. Abdomen more convex, ultimate segment without noticeable transverse groove. **Female genitalia** similar to

that of *eladio*; superior plates fused, margin between lateral angles recessed, angles prolonged, teat-like (in *eladio* nearly in same line with median, not projecting). Only 2 females of *marcano* available, so little can be said about variation.

Comparisons. This huge species is similar only to *eladio,* and the 2 are obviously "sister species". Although the genitalia are distinct (Fig. 461-467 vs. 261-264) they are similar and their internally fused parameres tie them to the *hogardi* group. They may be separated externally by the impunctate scutellum of *eladio*, densely punctate in *marcano* (Fig. 474); male metatibial spur with an S-shaped twist in *eladio* (Fig. 265-266), whereas it is only curved in *marcano* (Fig. 475); and the pygidium is glabrous in *marcano*, but covered with short, stiff setae in *eladio*. It appears that, in some cases when external differences abound, genitalic differences are minimal; certainly true in these 2 "sister species".

Specimens examined. Total 12, including holotype and allotype (all **DOMINICAN REPUBLIC**). Paratypes are designated as follows: (2 males, 1 female) with same data as holotype [FSCA]. (5) Prov. La Estrelleta, 4 km SE Rio Limpio, 24-25-V-1973, D. and M. Davis, ca. 760 m [USNM]. Both collections were probably made very near the same location.

Note: Two additional specimens have been identified as this species but are not made paratypes, because the genitalia differ slightly. Only a single pair is known, so the extent of variation is not certain. They are larger, the male being 33 mm long and 17 mm wide, whereas the female is 30 mm long and 17 mm wide. They were collected on the "South Island": Prov. Pedernales, El Banano, Rio el Mulito, [21km N. Pedernales, 18°09.3'N, 71°45.6'W, 280 m], 14-V-1995, K. Guerrero, O. Flint [MHND]. This area has produced several new species of Trichoptera, recently described by Flint and Sykora (2004).

Ecology. All my specimens were collected at blacklight in a disturbed area, but near a small stream with dense trees. This area is a few kilometers from the town of Rio Limpio, at an altitude of 2400 ft, in the shadow of Nalga de Maco. This is the far western end of the Cordillera Central, the peak being 1960 m. The few specimens of *marcano* were taken in April and May. Near the type locality, another localized endemic scarab (*Mimeoma nigra* Endrödi, 1997), was collected. The type series of that species was collected by D. and M. Davis at 4 km SE Rio Limpio. No other species in the genus is known from the Caribbean.

When the female specimens were collected, the smoother lateral elytral border (Fig. 483) appeared as broad stripes and fluoresced under the standard BL (long wavelength) blacklight, very distinct from the males. These huge *Phyllophaga* fly well, but were apparently confined to the forested area along the stream. None was taken in a trap, set 100 ft away in the open.

Etymology. The name Marcano is perhaps the best known one in Hispaniola in the Natural Sciences. Rather than Latinizing it, I have chosen to use the species name as the original spelling of the surname (as a noun in apposition) partly for the sake of euphony in Spanish. For more than 30 years, and 46 trips, the late Professor Eugenio de Jesus Marcano was always available to me and my colleagues. While Director of the Museo Nacional de Historia Natural, he was instrumental in developing the insect collections, and his collecting has provided a great legacy for future taxonomists. As a professor at Universidad Autónoma de Santo Domingo he trained and stimulated untold young naturalists. He excelled as a botanist and published several major works, including "Plantas venenosas en la Republica Dominicana" and "Ruta ecológica de la Provincia Monseñor Nouel". He was recognized with 2 honorary doctoral degrees. His friendship and camaraderie in the field will never be forgotten.

Additionally the species is named to honor his entire family, especially his son, José Marcano, who is a well known naturalist and conservationist in his own right. He accompanied Dr. Thomas Henry (Smithsonian) and me to the type locality in 2000; without his knowledge and assistance, this species may not have been described. We also fondly recall, and still savor, the fabulous *san cocho*, with herbs collected by Eugenio, served by Mrs. Marcano to huge groups of visitors. We know that spouses rarely get proper recognition for their support, but we know that Eugenio and José were blessed with the best. We therefore wish to dedicate this species to the entire Marcano family.

Phyllophaga mella Sanderson
(Fig. 94, 484-500)

Phyllophaga mella Sanderson (1951: 278-9; Fig. 54-56, 74)

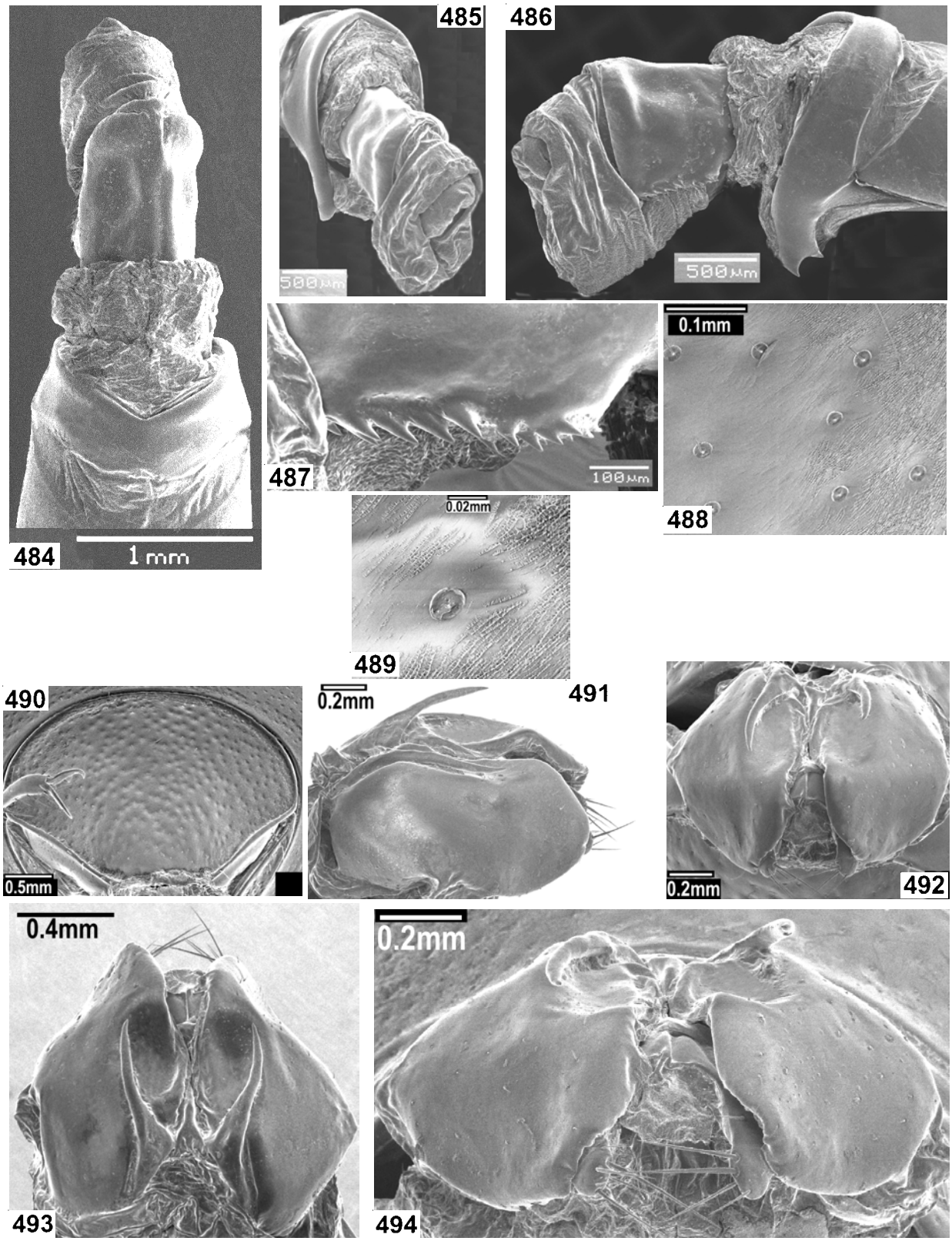

Fig. 484-494. ***Phyllophaga mella* Sanderson**. 484-487 Male genitalia: 484) dorsal; 485) caudo/lateral; 486) lateral; 487) aedeagus lateral margin; 488-490 female pygidium: 488) junction of smooth central area and pruinose sides; 489) enlarged single puncture in 488); 490) caudal, entire; 491-494 female genitalia: 491) lateral; 492) caudo/ventral; 493) ventral; 494) caudal.

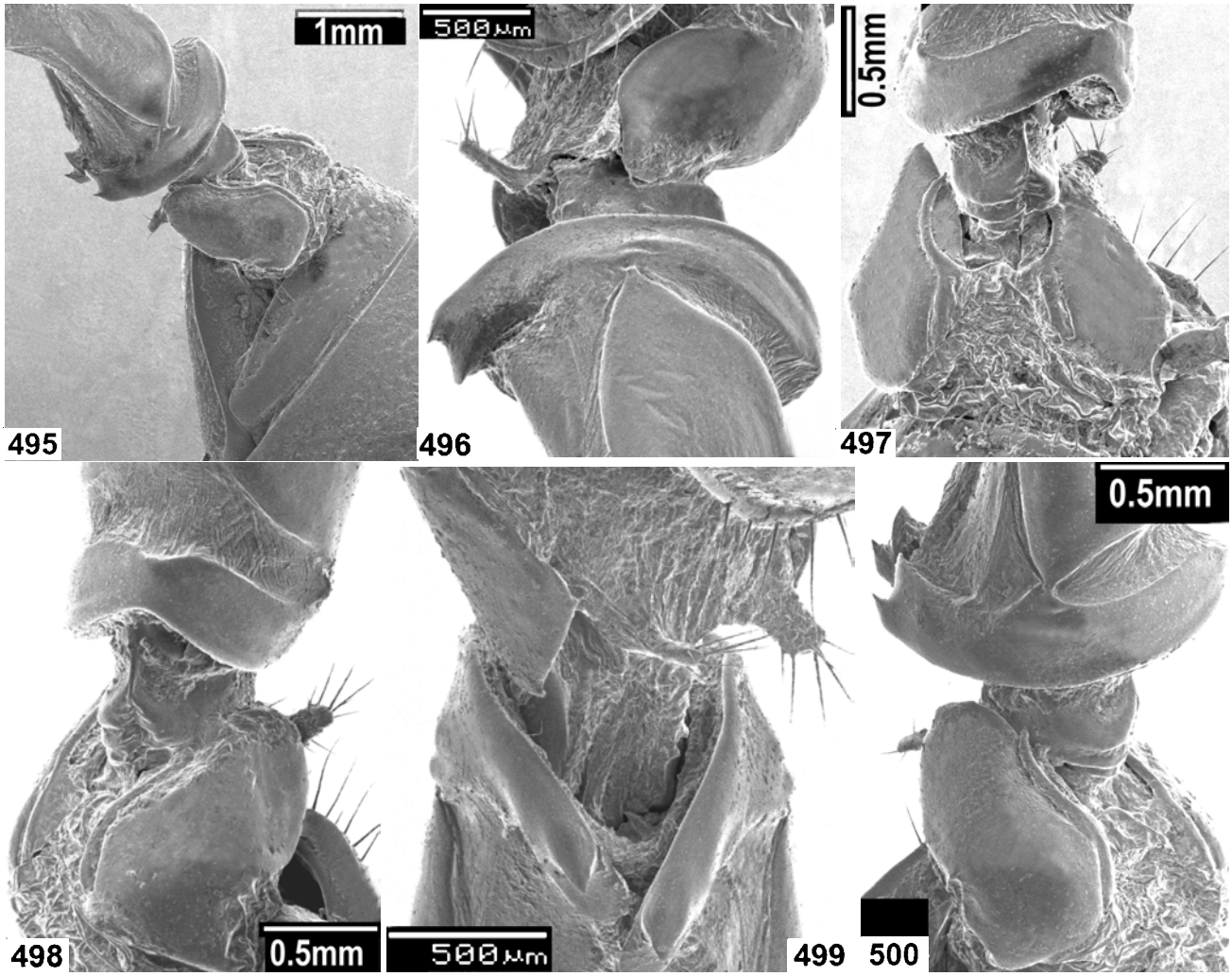

Fig. 495-500. ***Phyllophaga mella* Sanderson**. Mating pair. The female apparently applied the specialized hooks, holding the male genitalia, which was extracted and remained attached to the female when collected. No other female *Phyllophaga* are known with such hooks. 495) ventral female abdomen, in coitus; 496-500: various views of copulation. Note that the male parameres are external, and only the aedeagus actually penetrates the female between the inferior and superior plates. Although the parameres, because of their various modifications, must play an important part in mating behavior, in this case they are not involved in the "lock & key" mechanism previously surmised for these structures.

This medium sized, pruinose species (L. 13.5-16, W. 6.5-7 mm) is one of the easiest to identify from its habitus (Fig. 94). It was described from 7 specimens, all from DOMINICAN REPUBLIC and collected by [P.J.] Darlington, [Prov. Santiago ?], foothills Cordillera Central, south of Santiago, June 1938, [holotype and 2 paratypes MCZC, INHS, examined]; Mt. Diego de Ocampo, 3000-4000 ft, July, 1938, [allotype, MCZC]; [Prov. Santiago] San José de las Matas, 1000-2000 ft, June, 1938 [2 paratypes, MCZC, INHS]; Prov. La Vega, Constanza, 3000-4000 ft, August, 1938 [1 paratype, MCZC].

The male and female genitalia are also very distinctive (Fig. 484-494). The male has simple clasp-ers, but the aedeagus has the lower lateral edge serrate, the teeth sharp, pointing backward (Fig. 487). The female is unique in having inferior plates with 2 apically projecting, moveable large spines ("ice-tongs") arising from base (Fig. 491-494); plates themselves concave behind these; normally these spines are appressed in pinned specimens, but they can be moved easily in alcoholic or fresh specimens. No other known *Phyllophaga* has such structures.

Fortunately a single female was collected which had the male genital capsule (without the beetle) hanging from its abdomen. When these were later retrieved from alcohol, they were still in place (Fig. 495-500) and illustrate the use that these structures

may serve. They can be seen hooked into the integument of the male aedeagus and holding it in place; it must be a rare occurrence to completely extract it from the male's body! Although the old "lock and key" theory for the magnificently modified male genitalia may be involved sometimes, it appears that the female is in control with these moveable spines. Additional ideas about female selections have been discussed by Eberhard (1987, 1990).

Specimens examined. Total 260, all DOMINICAN REPUBLIC: **Prov. Dajabon:** (2) 13 km S. Loma de Cabrera, 20-22-V-1973, D. and M. Davis, ca. 400 m [USNM]. **Prov. Elias Piña:** (56) Rio Limpio, 26-27-IV-2000, R.E. Woodruff, T.J. Henry, 2400 ft, blacklight trap [FSCA, MHND, INHS]. **Prov. La Estrelleta:** (1) 4 km SE Rio Limpio, 24-25-V-1973, D. and M. Davis, ca. 760 m [USNM]. **Prov. La Vega:** (2) Constanza, 2-6-VI-1969, Flint and Gomez [USNM]; (4) Constanza, 10-V-1972, J. and S. Klapperich, 1250 m [NHMB]; (1) Jarabacoa, 21-VII-1980, A. Norrbom, 600 m [CMNH]; (1)Convento, 12 km S. Constanza, Flint and Gomez [USNM]; (2) Cordillera Central, 4.1km SW El Convento, 18-50-30N, 70-42-48W,and 18-50-33N, 70-42-44W, 31-V-2003, Rawlins, Davidson, Young, Nuñez, Acevedo, 1730 m, dense secondary evergreen forest with pine, UV light [CMNH]; (9) Cordillera Central, Loma Casabito, 15.8 km W. Bonao, 19-02-12N, 70-31-08W, 28-V-2003, Rawlins, Davidson, Young, Nuñez, Acevedo, 1455 m, evergreen cloud forest, east slope, hand collected [CMNH]; (1) 15 km. N. Jarabacoa, 21-VII-1987, J. Rawlins, R. Davidson, 240 m [CMNH]; (57) 5 km. W. Manabao, Paso de la Perra, Finca Eladio Fernandez, 19-23-IV-2000, R.E. Woodruff, T.J. Henry, 3050 ft, blacklight trap [FSCA]; (6) same, except 14-16-V-2001, R.E. Woodruff [FSCA]; (18) La Cienega de Manabao, [Parque Nacional Armando Bermudez], Pk. Hdqtrs. 3-5-VII-1999, R.E. Woodruff, 3000 ft [FSCA]; (1) same, except 11-V-2001 [FSCA]; (59) same, except 20-21-IV-2000, R.E. Woodruff, T.J. Henry [FSCA]. **Prov. Puerto Plata:** (1) La Cumbre, 25-IV-1978, R.E. Woodruff, G.B. Fairchild, 1300 m, blacklight trap [FSCA]. **Prov. San Juan:** (33) Sierra de Neiba, 9.4 km SSW El Cercado, 18-39-18N, 71-32-51W, 22-VI-2003, 1974 m, Rawlins, Davidson, Young, Nuñez, Acevedo, de la Cruz, meadow near mature pine forest, hand collected [CMNH]; (1) same, except 18-39-15N, 71-32-52W, 1974 m, mature pine forest, malaise trap [CMNH]; same, except Sabana de Silencio, 10 km SSW El Cercado, 18-39-07N, 71-33-21W, 2009M, cloud forest along Danthonia savannah, UV light [CMNH]. **Prov. Santiago:** (1) Mata Grande, 4-IV-1970, E.J. Marcano #6889 [FSCA].

Taxonomic notes. The pruinosity of the elytra of *mella* is characteristic, because the irregular surface refracts light in such a way as to vaguely resemble spots. This phenomenon is noticeable on the male of *canoa,* and to a lesser degree on *imprima* (smaller, L. 10.5-12 mm) and *espina* (male aedeagus with long flexible filaments). As mentioned above, the genitalia of both sexes are unique and easily distinguished from all others by our SEM photographs.

Ecology. Although it has been collected in good numbers, little is known of its habits or food plants. It has been taken from 400 to 1974 m elevation, in evergreen cloud forest, dense evergreen forest with pine, and broad leaved forest in the Cordillera Central, the Sierra de Neiba, and one record for the Cordillera Septentrional. Few higher altitude species have such wide distribution. It has been collected by hand, in Malaise traps, and blacklight traps.

Phyllophaga minutissima Wolcott
(Fig. 95, 501-512)

Phyllophaga minutissima Wolcott, Wolcott 1928b: 76 (corrected genitalia figure).
Cnemarachis minutissima (Wolcott), Blackwelder, 1944: 223.
Phyllophaga minutissima Wolcott, Sanderson, 1951: 266-7; Fig. 26, 27, 71; Evans, 2003: 125.

As the name implies, this is an extremely small species (L. 6-7, W. 3 mm) that can be recognized from all others in Hispaniola by its size. Unfortunately, Saylor (1943) also used the same name in *Phyllophaga* (*Phytalus*) for a Mexican species. For this homonym, Evans (2003: 91) created the replacement name *diminuta*. Wolcott described his species "...from an abundance of males and a few females collected at light at Port-au-Prince, Haiti, March 17 to May 5, and only males September 21 to 31, 1927". The holotype (examined) and allotype are deposited in USNM. Unfortunately, the illustration (Fig. 5, p. 29) of the male genitalia was incorrectly labeled, and represented *hogardi*. Later, in another issue of the same journal, Wolcott (1928b: 76) corrected this mistake and provided a new illustration.

Specimens examined. In addition to the holotype and 2 paratypes, I have seen only 2 additional specimens: HAITI: (1) Petionville, 29-III-1972, B.K. Dozier

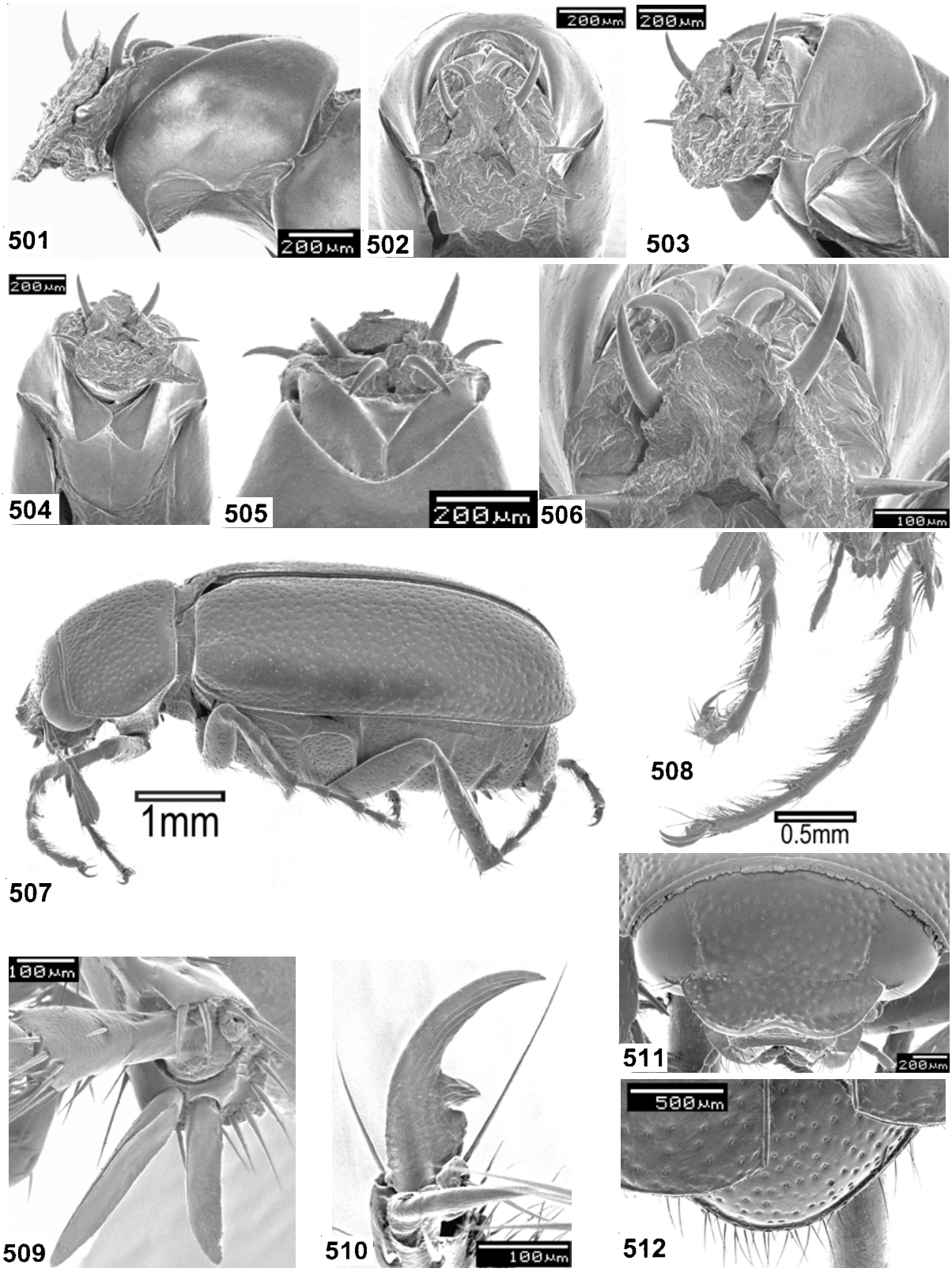

Fig. 501-512. ***Phyllophaga minutissima*** **Wolcott**. Male. 501-506 Genitalia: 501) lateral; 502) caudal; 503) caudo/lateral; 504) ventral; 505) dorsal; 506) aedeagal tip, caudal; 507) beetle, lateral; 508) protarsi (note long setae); 509) metatibial apex; 510) protarsal claw; 511) head, dorsal; 512) pygidium and elytral apices.

[FSCA]. DOMINICAN REPUBLIC (**new country record**): Prov. Dajabon, Rio Massacre, Balneario Don Miguel, 7 km SW Dajabon, 26-V-1973, D. and M. Davis, 40 m [USNM]. Sanderson (1951) saw only 2 paratypes and 10 additional specimens, all from Port-au-Prince. It would be interesting to learn whether the species is still as abundant at Port-au-Prince as it was nearly 80 years ago.

Taxonomic notes. Although recognizable by its small size, other characters include the glabrous surface, shiny, parallel sided, protarsi with exceptional brush of setae ventrally (Fig. 508), the elytra are pale straw-colored with darker border, tarsal claws with middle tooth short, arrow-shaped, neared base and the notch behind is uniquely narrow, constricted (Fig. 510), metatibial spurs (Fig. 509) nearly straight, face flattened, and the distinctive genitalia (Fig. 501-506). The male genitalia have paramere tips directed posteriorly, the face flattened and triangular, the aedeagus with 6 exceptionally large, slightly curved spines, nearly evenly spaced, arranged like a crown. No females were available for SEM photographs; reference is made to the illustration in Sanderson (1951: Fig. 71) which has inferior plates separated, rounded internally, the superior plates fused, nearly straight or truncate apically, the lateral angles barely produced, with 4 long setae. He compared it to *cartaba* (his Fig. 70), which has the superior plates emarginate medially, the lateral angles more produced, with 5 setae.

Phyllophaga neglecta (Blanchard)
(Fig. 96, 513-522)

Ancylonycha neglecta Blanchard 1850: 137.
Ancylonycha neglecta Blanchard, Burmeister 1855: 336.
Phyllophaga neglecta (Blanchard), Wolcott (1928a: 27).
Cnemarachis neglecta (Blanchard), Saylor 1942: 159.
Phyllophaga neglecta (Blanchard), Sanderson, 1951: 271-272, Fig. 37-39, 75.

Superficially and in genital characters, this species resembles *mali,* but it is usually smaller. Sanderson (1951: 271-272) gave measurements as follows: *mali* (L. 17.5-22, W. 9-11 mm); *neglecta* (L. 15-19, W. 7-9 mm). Both are pruinose and ferrugineous, with *mali* often more reddish and *neglecta* more yellow brown. The male genitalia (Fig. 513-518) are as indescribable as those of *mali*, but the aedeagus in *neglecta* does not terminate in a bifurcate ("nail puller") projection (Fig. 453-456), and the median projection is not long, acuminate, and pointed; paramere apices (caudally) truncate in *neglecta*, teat-like in *mali*. Female genitalia are similar, but in *neglecta* inferior plates (Fig. 519-522 vs. 458-460) are basally separated (usually for most of entire sutural length), the constriction on lateral margins not deep or rounded below, and more truncate at apices ("subquadrate" *fide* Wolcott, 1928a).

Although there seems little doubt of the correct association of this name, neither Wolcott nor Sanderson mention examination of Blanchard types; I did not locate or see them either. The original identifications for Haitian specimens of Wolcott (1928a) were provided by G.J. Arrow and E.A. Chapin. At that time only Blanchard's 2 species (*hogardi* and *neglecta)* were known from Haiti.

Specimens examined. Total 150, from Haiti and Dominican Republic. Sanderson (1951: 272) listed the following localities in Haiti: Port-au-Prince, Petionville, Ennery, Mannville, Diquini, and Grand Riviere. Wolcott (1928a: 27) listed only Port-au-Prince, and I can add only Dept. du Nord, Pignon, 5-VI-1969, R.L. Armistead [FSCA]. For the Dominican Republic, Sanderson listed only Constanza, the following being new records: **Prov. Azua:** (12) 8 km NE Padre las Casas, Rio las Cuevas, 18-46N, 70-53W, 7-VIII-1990, Rawlins, Thompson, 580 m [CMNH]; (1) Azua, 29-VIII-1985, C. Nuñez, at light [FSCA]. **Prov. Independencia:** (54) 4 km S. Los Pinos, Loma de Vientos, 18-35N, 71-46W, 23-VII-1992, Davidson, Rawlins, Thompson, Young, 455 m, semiarid deciduous forest w/pastures; (4) same, except 12-X-1991, 475 m. [CMNH]; (2) Sierra de Neiba, nr. crest, 5.5 km NNW Angel Feliz, 18-41N, 71-47W, 21-22-VII-1992, Davidson, Rawlins, Thompson, Young, 1750 m, dense cloud forest [CMNH]. **Prov. San Juan:** (34) El Capá, 1 km off Rd. to Vallejuelo, 21-V-1985, R.E. Woodruff, C. Nuñez, blacklight trap [FSCA]; (9) 8 km NE Vallejuelo, 18-42N, 71-16W, 8-IX-1973, Rawlins, Onore, Davidson, arid thorn scrub/woodland [CMNH].

Ecology. As can be seen from the above records, it has been found from sea level to 1750 m elevation, although much more common at lower altitudes, and in arid landscapes. It may be another "South Island" species, although the Sierra de Neiba records negate this. Sanderson's single record from Constanza should be re-examined; it has not been duplicated, and the specimen was not in the INHS. It does appear to be common at times and has been recorded from March to October.

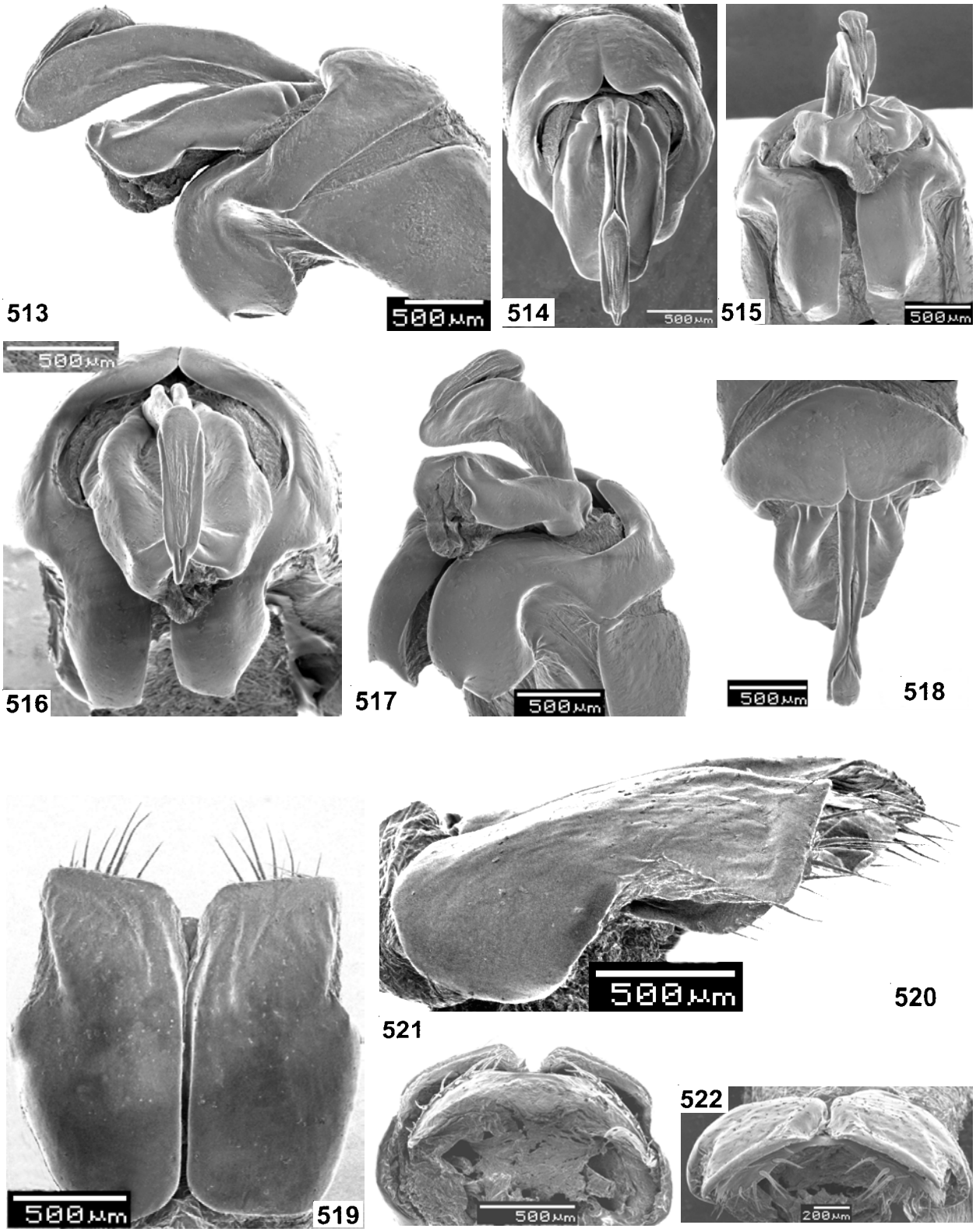

Fig. 513-522. ***Phyllophaga neglecta*** **(Blanchard)**. 513-518 Male genitalia: 513) lateral; 514) caudo/dorsal; 515) ventral; 516) caudal; 517) caudo/lateral; 518) dorsal; 519-522 female genitalia: 519) ventral; 520) lateral; 521) dorsal; 522) caudal.

Immatures. Although no larvae or pupae have been positively identified, Böving (1942a: 170) curiously mentioned larvae of *neglecta* from Puerto Rico, as being indistinguishable from *vandinei* . I have found no other records of *neglecta* from Puerto Rico and believe these represent misidentifications.

Phyllophaga nunezi Woodruff, **new species**
(Fig. 97, 523-537)

Holotype male. DOMINICAN REPUBLIC: Prov. Monseñor Nouel, Rio Blanco, Muro del Embalse, 600 m, 12-V-2001, 18°53' 11.1"N, 070° 33' 38.1"W, R. E. Woodruff, C. Nuñez, H. Matzusawa, blacklight trap [FSCA]

General description (Habitus, Fig. 97). Small (L. 8, W. 4 mm). Dorsum and legs exceptionally hirsute, antennae large, head and pronotum reddish brown, elytra bi-colored, base color yellowish with sutural margin red-brown and dark areas resembling spots on apical tumosities. Tarsal claws extremely cleft, middle tooth larger than apical one (Fig. 528).

Head (Fig. 529). Clypeus barely emarginate, anterior angles broadly rounded, barely noticeable, obtusely angled to juncture of eye and frontal suture; lateral angle continuous with eye canthus, which is weakly carinate, with 5 or 6 long setae; posterior angles prominent. Clypeus much shorter than frons (about 1/3), margin reflexed its entire length, surface densely, coarsely, punctate, many punctures coalescing, glabrous. Frontal suture impressed, more so at sides. Frons somewhat flattened, densely pubescent, setae arising from dense, coarse punctures; posteriorly margined by convexity before posterior band. Color of head with a metallic sheen, base color dark. **Antenna** (Fig. 530) exceptionally long, 9-segmented, club 3-segmented. Lamellae somewhat flattened, 7th more convex on outer surface, receptors noticeable, antennomeres 3, 4, 5 elongate, subparallel, 3 and 4 subequal in length, 5 longer than wide, 2/3 length of fourth, sixth reduced slightly, produced internally, wider than long, middle lamella of club as long as combined antennomeres 2 through 6; club length subequal to clypeus between anterior angles.

Pronotum (Fig. 529, 533). Longer than wide, anterior margin slightly raised, gently curved, glabrous, shiny. Surface densely pubescent with long yellowish setae, base color dark with metallic reflections, densely, coarsely punctate, more so anteriorly and at sides; anterior angles not produced; lateral angles not prominent, nearly parallel to posterior angles, which are nearly quadrate; lateral margin crenulate at origin of lateral setae; posterior margin carinate for its entire length, less pronounced medially.

Scutellum (Fig. 523, female). Barely wider than long, punctures dense in 2 lateral sections but margin, posterior, and medial area impunctate, translucent.

Elytra. Nearly parallel sided, base color light yellow-orange, densely pubescent, setae often going in opposite directions, but some arranged in rows. Sutural costa barely raised, but darker in color, more so posteriorly to declivity. Elytral punctures coarse, less dense than pronotum, but denser along lateral and apical margin, appearing more alutaceous also. Color pattern of elytra producing "eye-like spots" at tumosity just anterior to declivity, elytral suture weakly carinate on posterior fourth at declivity, not terminating in a spine. Elytral apices broadly rounded, barely curved before sutural apex; elytral margin barely reflexed, more so on anterior half.

Pygidium. (Fig. 531-532). Hirsute with some hairs pointing posteriorly and some ventral, arising from coarse, contiguous punctures, some forming wrinkles. Color darker than light elytra and similar to abdomen.

Legs. Protibiae tridentate, teeth nearly equally spaced, basal tooth pointing more proximal than usual, tibial face with a long linear carina, with light colored parallel setae; anterior spur acuminate, pointed, but short, barely reaching base of first tarsal segment. First protarsal segment longer than each of the next 3, which are subequal, fifth 1.5X longer. Claws distinctly cleft (Fig. 528), cleft very narrow, lower tooth broader and nearly same length as apical tooth. Mesotibial transverse carina nearly complete, legs heavily sculptured and clothed with setae; longitudinal carina present, from which a row of long golden setae arise; apical spurs acuminate, outer longer than inner (unusual), longest about half length of first tarsal segment. Apical fringe of 8 spines; tibial apex less expanded than many species. Mesotarsal segments 1 through 4 progressively shorter, fifth subequal to 1. Claws as in protibia. Metatibial transverse carina not noticeable, obscured by sculpture and setae; longitudinal carina indicated by long row of setae, but weakly indicated otherwise; apical spinule of 7 or 8, short, widely spaced spines; apical spurs flattened and curved but narrow and acuminate, interior face

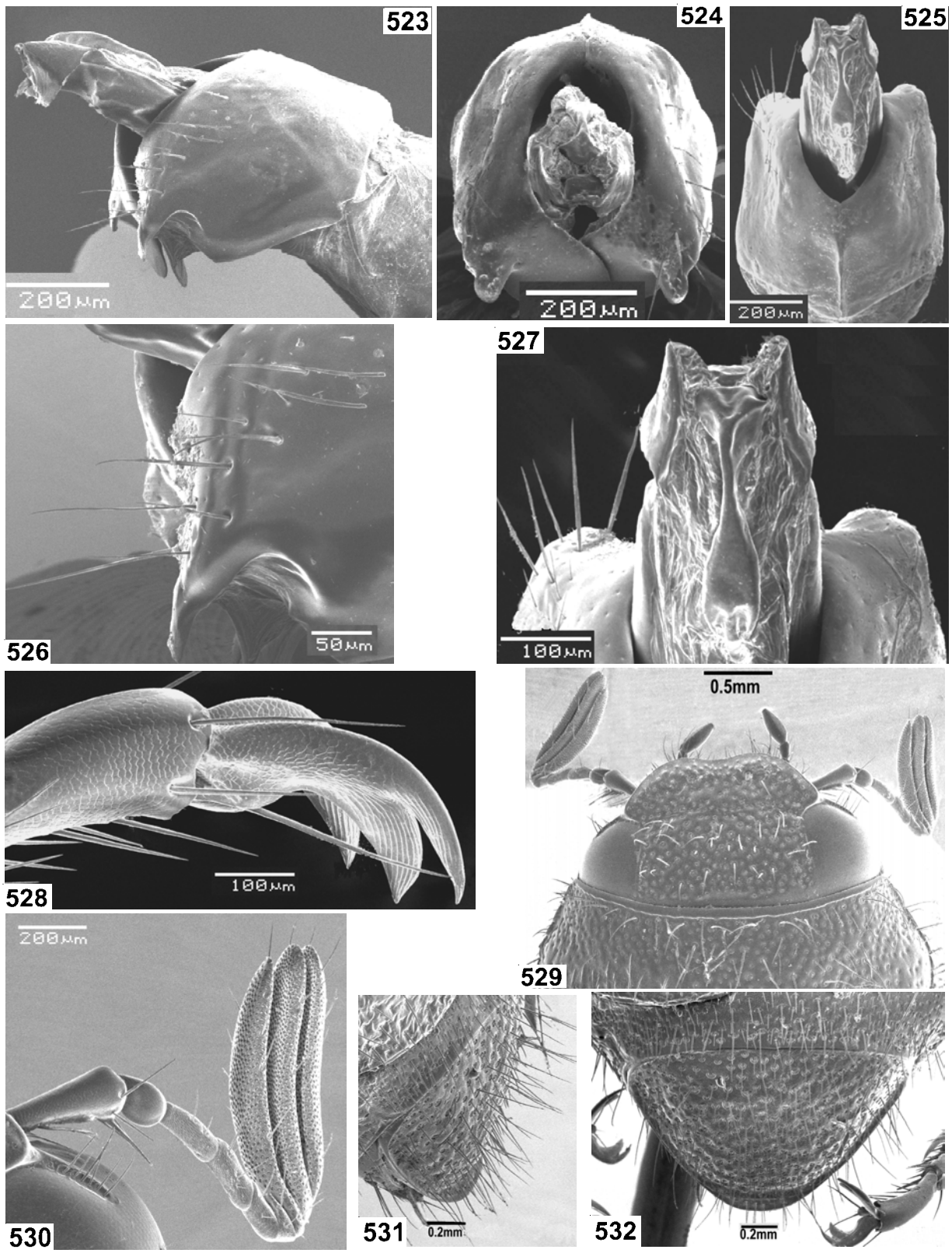

Fig. 523-532. ***Phyllophaga nunezi* Woodruff**. Male. 523-527 Genitalia: 523) lateral; 524) caudal; 525) dorsal; 526) paramere tip, lateral; 527) aedeagal tip, dorsal; 528) protarsal claw; 529) head, dorsal; 530) antenna; 531) pygidium, lateral (note long setae and coarse punctures); 532) pygidium, caudo/dorsal.

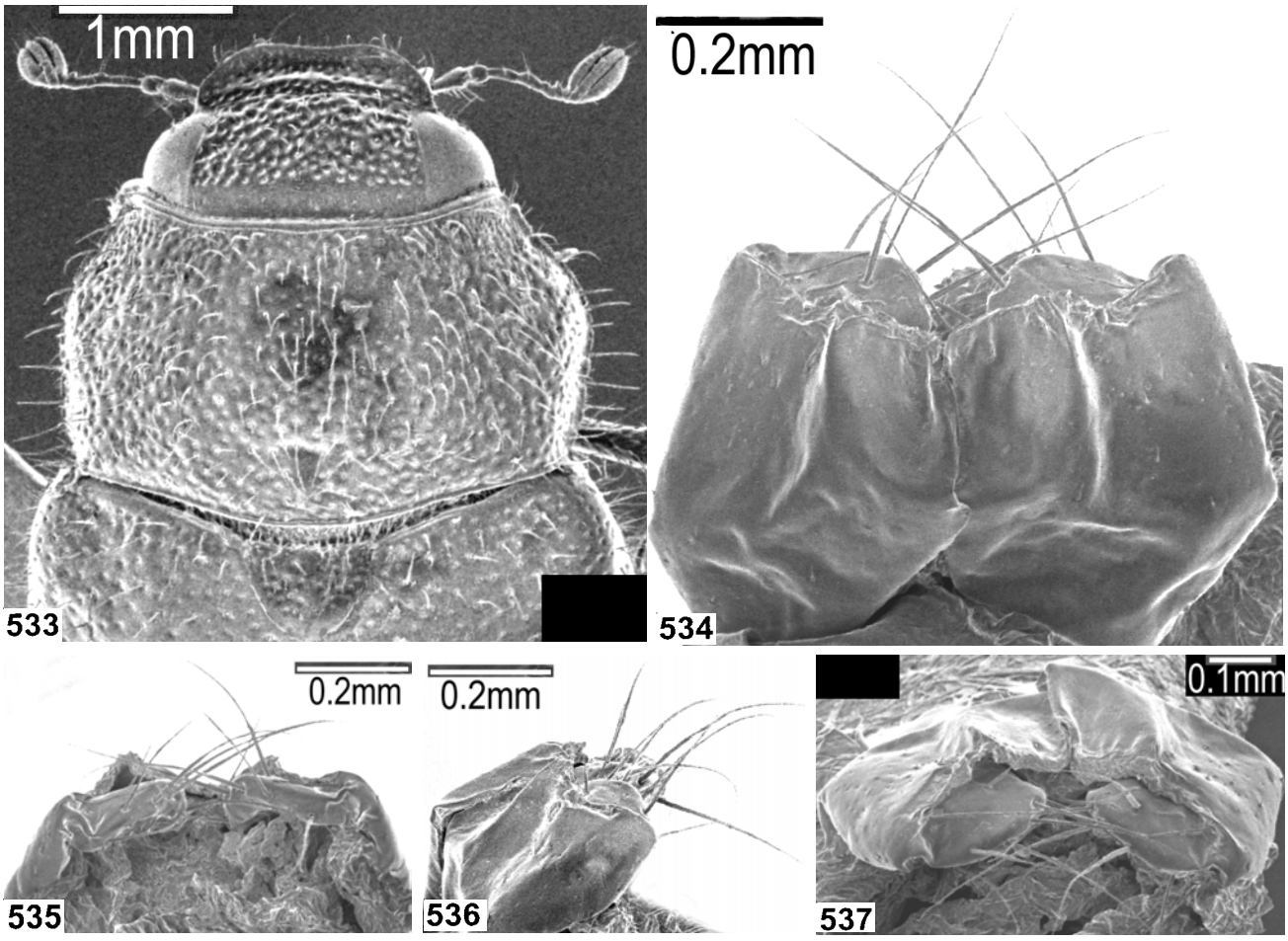

Fig. 533-537. ***Phyllophaga nunezi*** **Woodruff.** Allotype female: 533) Head, antennae, pronotum, and scutellum, dorsal; 534-537 female genitalia: 534) ventral; 535) dorsal; 536) lateral; 537) caudal.

flattened, barely concave; inner spur reaching middle of second tarsal segment, outer spur slightly longer than first tarsal segment; first tarsal segment reduced and expanded at tip, but not prolonged into spines; segments 3 and 4 subequal, 2 and 5 subequal in length. Metatarsal claws as in protibiae.

Abdomen. Venter of each sternite heavily clothed with several rows of golden, elongate setae, longest on penultimate and ultimate sternites. Median area of most sternites without setae, shiny. Venter somewhat alutaceous, but heavily punctured on all sternites, color darker than dorsum; penultimate sternite medially with more setae and a band of denser punctures, ultimate barely modified.

Genitalia, male (Fig. 523-527). Generally similar to the *fossoria* type, with numerous setae on phallobase and parameres; aedeagus weakly sclerotized, but dorsally with a unique structure (Fig. 527).

Allotype female (Fig. 533-537). DOMINICAN REPUBLIC: Prov. La Vega, Jarabacoa, 3-4-VI-1969, Flint and Gomez [USNM]. The only female known is similar to the male, except antennal club much smaller (Fig. 529, 533); metatibial apical fringe of 15 spines (7-8 in male), apical spurs nearly equal in length, flattened and gently curved inward. **Female genitalia** (Fig. 534-537) with about 5 (each side) exceptionally long hairs on superior plates which appear to be fused laterally to inferior plates (as they are in *fossoria* and relatives). Inferior plates nearly fused, with prominent longitudinal ridge middle of each plate; no triangular plate sealing sutural base.

Comparisons. The small size (L. 8 mm), exceptionally hairy body, and color pattern provide a unique habitus (Fig. 97). It shares the cleft tarsal claws (Fig. 528) with *aliada, fossoria, androw*, and *n. sp. near fossoria* (to be described elsewhere; see text). Genitalia are distinctive, including lateral fusion of superior and inferior plates in the female (Fig. 534).