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The first report of *Lissomus* Dalman (Coleoptera: Elateridae: Lissominae) from the Greater Antilles, with two new species from the Dominican Republic

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0911: 1–10 **INSECTA MUNDI** 2022

The first report of *Lissomus* Dalman (Coleoptera: Elateridae: Lissominae) from the Greater Antilles, with two new species from the Dominican Republic

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Abstract. *Lissomus quisqueya* **new species** and *L. woodruffi* **new species** are described. Both species are reported from the Dominican Republic on the island of Hispaniola. These are the first species of *Lissomus* Dalman reported from the Greater Antilles. *Lissomus quisqueya* is recorded from montane mesic forests in the Cordillera Central from Dajadon and La Vega provinces. *Lissomus woodruffi* is recorded from Barahona, Independencia and Pedernales provinces from montane mesic forest in the Sierra de Bahoruco. Morphologically, these species are most similar to members of the *L. discedens* Bonvouloir species group from Mesoamerica and South America. Known sites of occurrence of *L. quisqueya* and *L. woodruffi* are remnants of formerly more extensive mesic forests. Some of the specimens were found in secondary forests and ecotonal areas at sites near to primary forest or remnants, and all these forests are threatened by anthropogenic activities and stochastic climate changes.

Key words. Taxonomy, click beetle, cloud forest, Neotropical, climate change, endangered habitat, species discovery, paleo-island geography.

Resumen. Se describen por primera vez especies nuevas de *Lissomus quisqueya* y su especie hermana *L. woodruffi*. Ambas especies son de República Dominicana en la isla Hispaniola. Éstas son las primeras especies de *Lissomus* Dalman reportadas en las Antillas Mayores. *Lissomus quisqueya* se registra en bosques mésicos premontanos en la Cordillera Central de las provincias de Dajadon y La Vega. *Lissomus woodruffi* se registra en las provincias de Barahona, Independencia y Pedernales del bosque montano mésico de la Sierra de Bahoruco. Morfológicamente, este par de especies es muy similar a los miembros del grupo *L. discedens* Bonvouloir de Mesoamérica y Sudamérica. Los sitios conocidos de ocurrencia de *L. quisqueya* y *L. woodruffi* son ahora remanentes de bosques mésicos anteriormente más extensos. Aunque algunos de los escarabajos se encontraron en bosques secundarios y áreas ecotonales, dichos sitios estaban cerca de bosques primarios o remanentes, y todos están amenazados por actividades antropogénicas y cambios climáticos estocásticos.

Palabras clave. Taxonomía, elateridos, escarabajo, bosque nuboso, neotropical, calentamiento climático, hábitat en peligro de extinción, descubrimiento de especies, geografía de las islas paleo.

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Introduction

Lissomus Dalman, 1824 (Coleoptera: Elateridae: Lissominae: Lissomini) currently includes 28 valid species recorded from mesic forests of the tropical Americas, from northern Argentina to Mexico. Another seven species presently assigned to the genus are from mesic tropical forests in southern India and Sri Lanka, and comparable forests in Africa from Sierra Leone to the DR Congo and São Tomé to Kenya and Zimbabwe. The genus was established based on two species from “Brasilia”, *L. foveolatus* Dalman and *L. punctulatus* Dalman, with both species collected by George Wilhelm Freyreiss somewhere during his travels in Bahia, Espirito Santos, Minas Gerais and Rio de Janiero (Papavero 1971).

Lissomus species were first reviewed by Bonvouloir (1859). Gerstäcker (1860) described additional species but did not consider all the species treated by predecessors. Bonvouloir (1860) synonymized three of Gerstäcker’s species and described two others. Both Bonvouloir and Gerstäcker provided keys to the species known to them. Gemminger and Harold (1869) cataloged the then known species. Horn (1890) treated the species of Mesoamerica, adding three new species, but did not provide an updated key or other methods sufficient for separation and determination of the species treated by him. Subsequently there is only a world catalog by Schenkling (1928) as part of the Throscidae, and a checklist of the American taxa by Blackwelder (1944, 1957). Unfortunately, all of the above authors variously interpreted, often in error, the presence of the South American *L. discedens* Bonvouloir, *L. foveolatus*, *L. gagatinus* Bonvouloir, *L. punctulatus*, and *L. ustulatus* Bonvouloir in tropical North America. Since then, Cobos (1967, 1970) described *L. argenteocaudus* and *L. mediotestaceus* from Peru, *L. insularis* from Guadeloupe, *L. beckeri* from Guyana and *L. gibbosus* from Ecuador, and Johnson et al. (2018) described *L. carmen* from Peru and Johnson (2021) described *L. cacique* from Costa Rica and Panama. Only Cobos (1967), in describing *L. insularis*, previously treated any endemic species from the Antilles.

Published taxonomic records for *Lissomus* species in the West Indies are limited to *L. punctulatus* from Guadeloupe (Fleutiaux 1911, 1947) and Martinique (Touroult and Poirier 2012; Touroult et al. 2017), *L. insularis* from Guadeloupe, and an undetermined species from Barbados (Peck 2009). Fleutiaux and Sallé (1890) listed *L. impressifrons* Bonvouloir from Guadeloupe, but this is a distinct Mesoamerican species. Chassain and Touroult (2012) repeated the Guadeloupe records but illustrated mature and immature color forms of what appears to be *L. robustus* Gerstäcker, rather than *L. impressifrons* and *L. punctulatus* as they indicated. *Lissomus robustus* is found across northern South America and in the eastern Andes to Peru, while *L. punctulatus* is from southeastern Brazil. *Lissomus insularis* was the only presumptively endemic species in the Antilles and is similar to *L. gibbosus* Cobos and related species across northern South America and along the eastern Andes regions. Until now, only two species of *Drapetes* Megerle represented Lissominae from Hispaniola (Perez-Gelabert 2020), so the discovery of specimens attributable to *Lissomus* from there or any other island of the Greater Antilles is notable for species discovery, biodiversity, taxonomy, biogeography, and phylogeny hypothesis generation.

Adults of *Lissomus* are generally distinguished from other click beetles by an ovoid and strongly convex body, shining to submetallic integument, deep and oblique antennal fossae, legs and antennae retractile into depressions and excavations, metasternum with an arcuate carina extending laterally from the mesocoxa, the prosternal process evenly rounded and not carinate or finely sulcate laterally, and tarsi with four large membranous lobes, amongst other traits in the genus description below. Some smaller *Lissomus* species can sometimes be mistaken for species of Chelonariidae in general facies, or larger *Drapetes*, but members of the latter genus are distinguished by longitudinal antennal fossae, metasternum with an elongate and linear carina extending posterolaterally from the mesocoxa, a bicarinate or laterally sulcate prosternal process, a less convex body, and elytra frequently brightly bicolored. At this time, many of the brown or black and shiny *Lissomus* are very difficult to separate at the species level without reference to the aedeagus of each species.

Here, two new species from the Dominican Republic and Hispaniola are described, these being the first species of *Lissomus* from the Greater Antilles. These two species are considered sister-species based on their morphological similarity and unique Hispaniolan occurrence. They are otherwise morphologically most closely related to species of the *L. discedens* Bonvouloir group (incl. *L. asteriscus* Gerstäcker, *L. carmen*, *L. discedens*, *L. sericeus* Bonvouloir) from Trinidad to Colombia, south to Bolivia and north to Costa Rica.

Materials and Methods

Specimens seen of the new species were from the Florida State Collection of Arthropods, Gainesville (FSCA), the National Museum of Natural History, Washington, D.C. (NMNH), the Carnegie Museum of Natural History, Pittsburgh (CMNH), the West Indian Beetle Fauna project at Montana State University, Bozeman (WIBF), and the Canadian Museum of Nature, Ottawa (CMNC). The holotypes and paratypes will be returned to these collections as indicated below.

Morphological terms and concepts generally follow Calder (1996), Lawrence et al. (2010), and Costa et al. (2010), and the descriptions are comparable to those in Johnson (2021). Measurements were made with an ocular micrometer at 0.1 mm and 0.01 mm increments between 10–50 magnifications. Body length was measured from the anterior margin of the frons to the elytral apices, and width was measured across the elytral humeri.

Antennomere length ratios were calculated for antennomeres 2–11 as measured along the lateral midline from base to apex, values rounded to one decimal place, and given as a ratio string. Pronotal length is along the midline from anterior margin to the posterior margin at the ante-scutellar emargination, and width across the base of the hind angles. Scutellar shield length was measured along the midline, and width across the widest dimension. Tarsomere lengths were measured along their dorsum from base to apex, values rounded to two decimal places, and given as a ratio string. Aedeagus total lengths were measured from the median lobe apex to the anterior margin of the basal piece (phallobase); paramere length from apex to the anterior-most point of the basal lobe; and basal piece length from basal lateral angle to apex of shoulder junction with paramere. Aedeagal ratios of taxonomic value measured and calculated to two decimal places are median lobe length/total length, paramere length/total length, and basal piece length/total length.

Images of adults were made with a Nikon D7200 and an AF-S MicroNikkor 105mm 1:2.8G lens, 68 mm of Kenko extension tubes, with a Sigma EM-14DG strobe flash all mounted on a Cognisys Stackshot system. Images of each aedeagus for composites were made at 40x magnifications with an Olympus C-5050 Zoom digital camera mounted via phototube on an Olympus SZX-12. Multiple images of, 45–50 each adult and 12–15 for each aedeagus, were stacked with ZereneStacker 1.04 and edited in Adobe Photoshop 21.1.

Label data are presented verbatim. Information from separate labels is separated by a slash (/) bracketed by single spaces. Interpolated information is given within brackets as needed for clarity or supplementation.

Taxonomy

Subfamily Lissominae

Tribe Lissomini

Genus *Lissomus*

Lissomus Dalman, 1824: 13
Type species: *Lissomus punctulatus* Dalman 1824: 14 (designation of Fleutiaux 1947: 138)
Lissodes Latreille 1829: 452 (as synonym, not available, ICZN 1999, Art. 11.6, Art. 12.2)
(treated as a synonym of *Drapetes* "Dejean" by Smetana 2007)
Cymbium Gerstäcker 1860: 136 (not Röding 1798: 151, Gastropoda) (as synonym, not available, ICZN 1999, Art. 11.6).
Lissernus Fleutiaux 1911: 263 (misspelling)

An historical nomenclatural bibliography for *Lissomus* and its synonyms was given by Johnson (2021) and these references are not repeated here.

Diagnoses. Lissominae, Lissomini (Costa et al. 2010), *Lissomus* (Dalman 1824), with a new full description by Johnson (2021). The body is moderate in length, about 6-16 mm; dorsum shallowly to strongly convex, venter shallowly convex. Integument smooth, shining between fine to moderate-sized punctures; each puncture with either a minute seta on pronotal and elytral discs, appearing glabrous, or setae long, thin, hair-like especially venter and lateral areas of pronotum and elytra. Antennal insertion deep, transverse; antennomere 2 subcylindrical, 3 subserrate; 4-10 moderately to strongly serrate, 11 oval to lachrymiform. Hypomeron excavate posteriorly to receive front legs, posterior margin a thin perpendicular lamelliform wall; pronotosternal margin anterior deeply and obliquely fossate to receive antenna. Mesoventrite with deep median fossa, broadly U- to V-shaped, walls planar, to slightly below or slightly elevated to metaventrite; anterior angles formed as crural impressions to receive mesothoracic legs, usually with an arcuate carina from mesocoxal margin directed laterally, reaching partly or completely to lateral margin. Tarsomeres 1–4 with progressively enlarging ventral membranous lobes, rarely with tarsomere one with densely setose ventral pad.

Lissomus quisqueya and *L. woodruffi* will not trace to any described species in the keys of Bonvouloir (1859) or Gerstäcker (1860), nor do they closely resemble any other known species of the genus. Their general gestalt in the combination of body form, the pubescence of long hair-like setae evenly distributed, relatively narrow serrations of midlength antennomeres, and the densely punctured elytra with evanescent striae are unique in the American *Lissomus*, being most similarly found on *L. asteriscus*, *L. carmen*, *L. discedens*, and *L. sericeus*, here regarded as the *L. discedens*-group of species within *Lissomus*.

Lissomus quisqueya Johnson, new species

(Fig. 1, 3, 5, 7, 8)

Description. Body (Fig. 1, 3) length 8.4–9.9 mm, width 3.9–4.6 mm; elongate-oval to laterally subparallel, moderately convex dorsally. Integument shining, castaneous to brunneo-piceous, with rufous to piceous highlights on margins and carinae. Pubescence aureus, fine and hairlike, appressed, directed posteriorly, except directed anteriorly on head.

Head evenly convex; frons moderately-densely punctured, punctures separated by ca. 0.2–0.5 times their own diameter, irregular and sparse on frons, denser along eye margins and center of discal area. Antenna with antennomeres infuscate to variably flavous on 3-10 serrations, reaching short of apex of hind angle of pronotum by length of antennomere 11; antennomere 2–11 length ratio 1.0:1.2:1.4:1.4:1.4:1.4:1.4:1.7:1.7:1.7:2.4.

Pronotum with median length 0.51–0.52 times width at basal margin across posterior angles; punctures simple, deep, dense, separated by ≤0.5 times own diameter, becoming smaller posterolaterally; carina of lateral margin fine, polished; hind angles slightly divergent, incurved apically, dorsal carina obtuse, evanescent anteriorly, reaching 0.38 times distance to anterior margin. Prosternum shallowly convex, moderately-sparsely, coarsely punctured.

Scutellar shield length 1.0–1.1 times width, obovate, moderately convex, obtuse posteriorly.

Elytral bases each with four short longitudinal impressions, striae 1–8 fine, narrow, shallow, indistinct; punctation evenly distributed, dense, separated by ≤0.5 times own diameter; striae subtended by transversely oval trabeculae visible in lighter colored specimens; stria 9 sulcus deep basally and merging with humeral groove, becoming progressively shallower apically, with costal side of sulcus with obsolescent to obsolete carina from metafemoral notch to end; intervals flat to shallowly convex, setal punctures shallow; epipleuron coarsely, punctured, posthumeral lateral margin ecarinate; ventrally with narrow ventrite locking flange in apical third. Metasternum disc punctures sparse, separation 1.0–2.0 times own diameter, denser anterolaterally; with a fine arcuate carina extending toward anterolateral angle. Metatarsomere 1–5 length ratio 1.0:0.4:0.3:0.3:1.1.

Abdomen with ventrites coarsely, moderately-densely punctured, punctures separated by 1.0-1.2 times own diameter; first ventrite laterally with elytral locking flange, becoming cariniform posteriorly, carina extended along ventrites 2–5. Aedeagus (Fig. 5) with median lobe broadly obtuse at apex, 0.71 of total length; lateral lobe with lateral margin slightly undulate, apex hooked laterally, 0.75 of total length; basal piece 0.41 of total length.

Females not distinguishable from males without examination of genitalia.

Type material. Holotype, male: La Vega, Cordillera Central, Loma Casabito, 15.8 km NW Bonao, 19-02-12W, 70-31-08W, 1455 m, 28 May 2003 / J. Rawlins, C. Young, R. Davidson, C. Munez, P. Acevedo; evergreen cloud forest, east slope, UV light, Sample 21212 / CMNH-356,424 (1, CMNH).

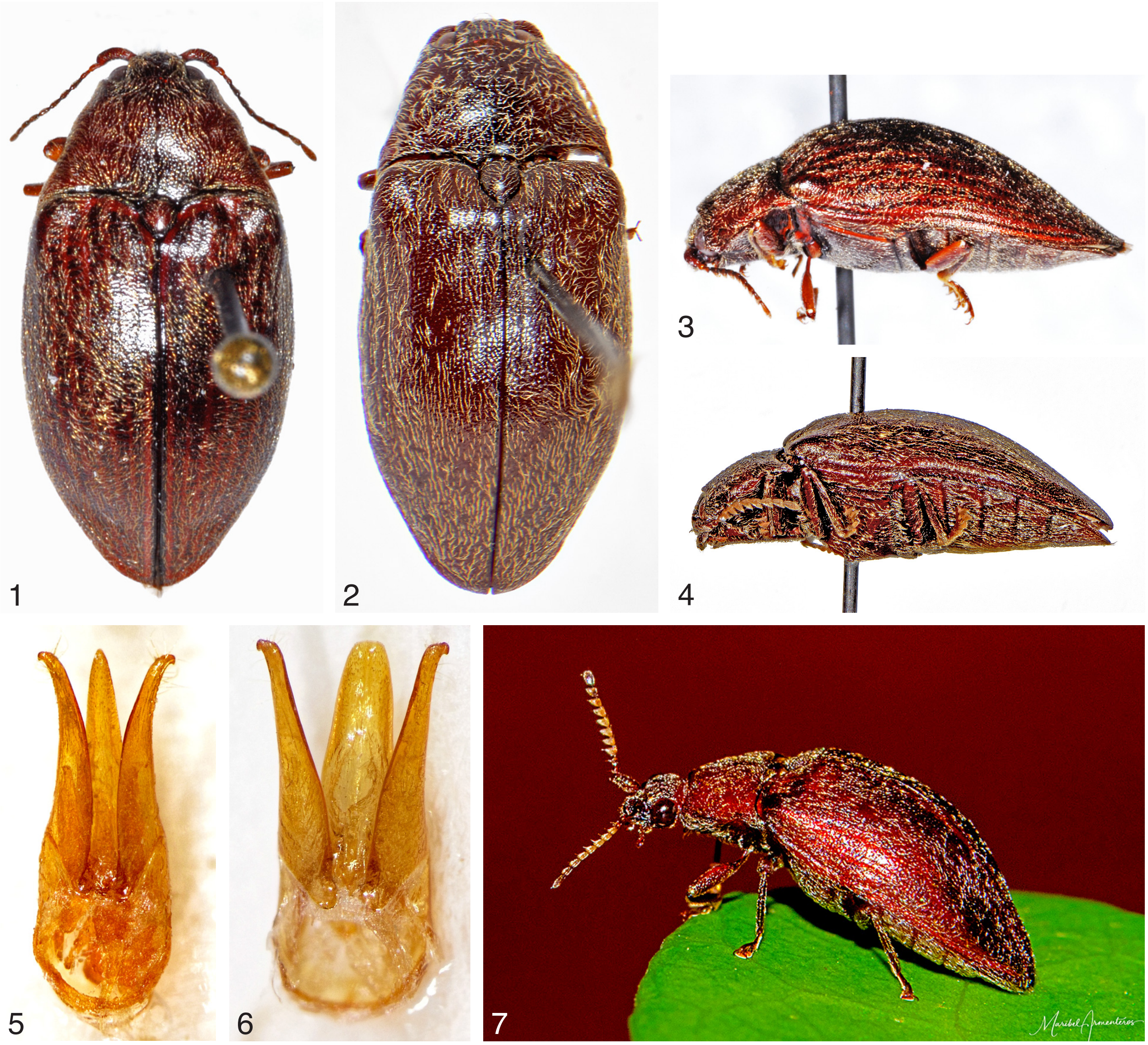
Paratypes: **Dajabon Province:** 13 km S Loma de Cabrera, ca. 400 m, 20-22.v.1973, Don & Mignon Davis (1, NMNH); **La Vega Province:** PN. A. Bermudez, Cienaga, 19.vii–2.viii.[19]95 1000 m, trop. evgrn.fr., FIT, S.+J. Peck, 95-32 (1, CMN); Par. Nac. Arm. Bermúdez, 1100 m, 19°04.07′N, 70°51.68′W, La Cienega, 29.vii.1999, light, M.A. Ivie & K.A. Guerrero (1, WIBF); PN Armando Bermudez, km 1–3 along trail W of La Cienaga, 900–1100 m, 19°01.753′N, 70°54.654′W, 6.vi.2005, G. Nearns (2, FSCA; 2, NMNH).

Additional material examined. Thirteen (13) photographic images attributed to this species were examined, see example Fig. 7. Two specimens were collected at Las Castilla, Arroyo Frío, La Vega Prov., 1170 m elevation, 5.vii.2018, ca. 10:00 pm, and were imaged and submitted for determination by Maribel Armenteros de Chotin, La Vega.

Etymology. The specific epithet "*quisqueya*" is treated as a noun in apposition and is derived from Quisqueya, a traditional Taino name for the island, with a meaning translated to English as "Mother of all Lands."

Distribution. Island of Hispaniola, Dominican Republic, Dajadon and La Vega provinces.

Notes. Known *L. quisqueya* localities are among premontane cloud forests. Three specimens were collected at lights, and two were found active at night on the abaxial surfaces of a leaf in a garden near primary forest (Fig. 5) (M. Armenteros, pers. comm.).



Figures 1–7. Adult habitus and aedeagus each of *Lissomus quisqueya* and *L. woodruffi*. **1)** *Lissomus quisqueya*, adult, dorsal aspect. **2)** *Lissomus woodruffi*, adult, dorsal aspect. **3)** *Lissomus quisqueya*, adult, lateral aspect. **4)** *Lissomus woodruffi*, adult, lateral aspect. **5)** *Lissomus quisqueya*, aedeagus, dorsal aspect. **6)** *Lissomus woodruffi*, aedeagus, dorsal aspect. **7)** *Lissomus quisqueya*, live adult on leaf edge, oblique aspect. Photo by M. Armentero de Chotin; used with permission.

Lissomus woodruffi Johnson, new species

(Fig. 2, 4, 6, 8)

Description. General morphology as for *L. quisqueya*. Body (Fig. 2, 4) length 8.0-12.8 mm, width 4.2-5.2 mm; elliptical in dorsal silhouette, dorsum strongly convex basally, tapering apically.

Antennomere 2-11 length ratio 1.0:1.0:1.2:1.2:1.1:1.1:1.2:1.2:1.2:1.9.

Pronotum with median length 0.51-0.53 times width; hind angles slightly divergent, incurved apically, dorsal carina obsolescent to obsolete.

Scutellar shield length 1.1–1.3 times width, obovate, shallowly convex, attenuate and narrowly rounded posteriorly.

Elytra stria 9 sulcus deep basally and merging with humeral groove, becoming progressively shallower apically, with costal side of sulcus finely carinate from metafemoral notch to end; Metatarsomere 1–5 length ratio 1.0:0.3:0.2:0.2:1.1.

Aedeagus (Fig. 6) with median lobe gradually narrowing from base, apex narrowly obtuse to subacute, 0.61 of total length; lateral lobes evenly arcute laterally, with apex rounded, hooked laterally, venter membranous in basal half, 0.62 of total length; basal piece 0.44 of total length, with broadly rounded anterior margin.

Type Material. Holotype, male, labelled: **DOMINICAN REP**[**UBLIC**]: **Prov. Barahona**, nr. [La] Filipinas, Larimar Mine, 26.vi–7.vii.1992, R.E. Woodruff & P.E. Skelley, at light (NMNH-Sta. Domingo, Dominican Rep., on permanent loan to FSCA). Paratypes labeled with identical labels as the holotype (19, FSCA); [**Barahona**] same, 20-26.vi.1992 (4, FSCA); same, beating misc. at night (2, FSCA); same, 6–11.vii.1993, R.E. Woodruff, mercury vap. light (l, FSCA); 2 km. E. Payoso, mv + bl. 13. July 1996, R. Turnbow (1, Turnbow); 9.2 km NW Paraiso, confluence of Rio Nizao / and Rio Coltico, 18-03N, 71-12W, 230m, 9–10 Aug 1990, J. Rawlins, S. Thompson / CMNH-341,395 (1, CMNH); 6 km NW Paraiso, Rio Nizao, 18-02N, 71-12W, 170m, 25–26 July 1990, C. Young, J.E. Rawlins, S.A. Thompson / CMNH-341,063 (1, CMNH); 5 km SE Polo, slopes of Loma La Torre, 18-03N, 71-16W, 980 m, 18 July 1992, disturbed forest with coffee, C. Young, R. Davidson, S. Thompson, J. Rawlins / CMNH-340,754 (1, CMNH), same CMNH-341,952 (1, CMNH). **Independencia**, Sierra de Bahoruco, north slope, 13.5 km SE Puerto Escondido, 18-12-18W, 71-31-08W, 1789m, 24–26 Mar 2004 / R.

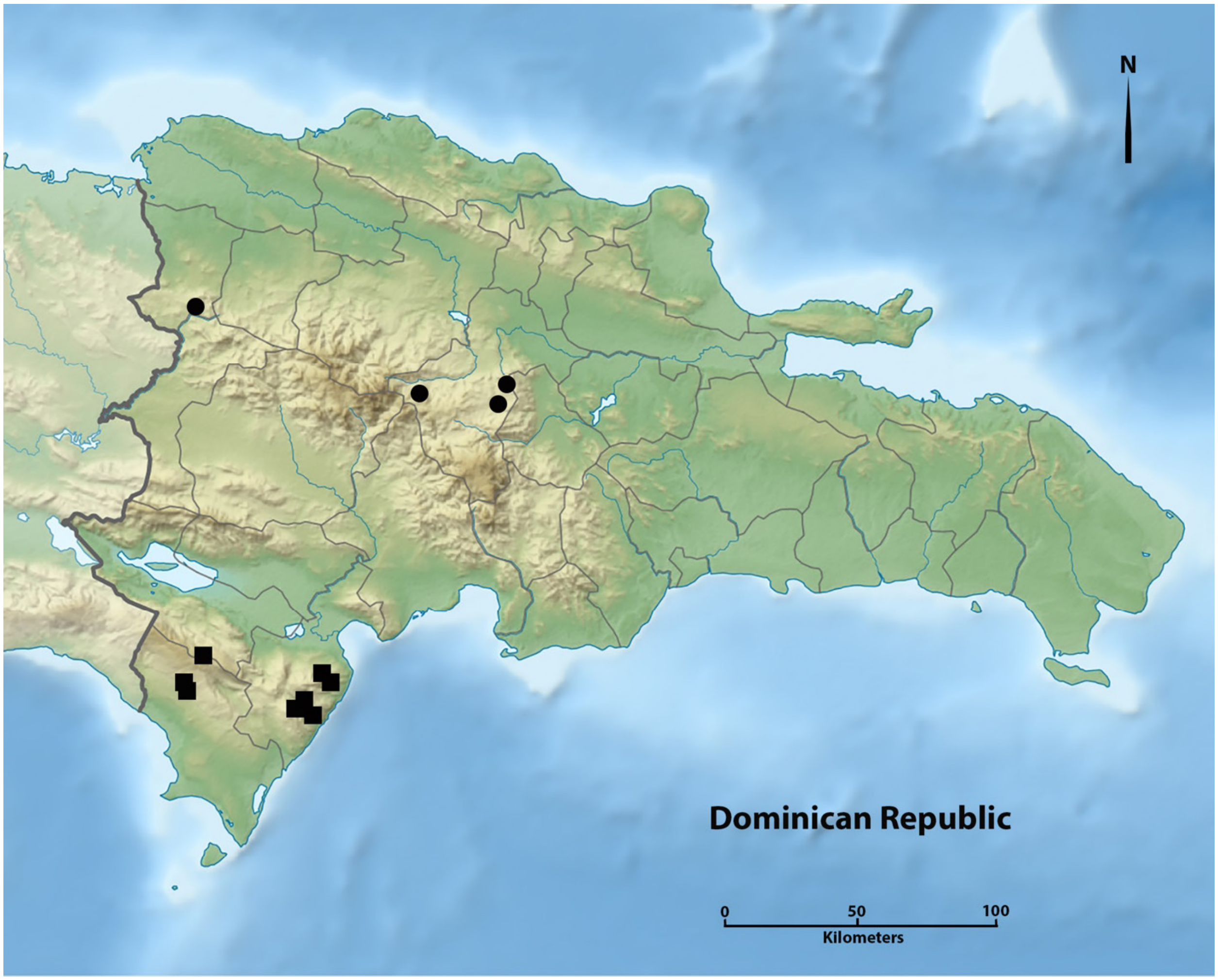


Figure 8. Approximate locations of *Lissomus* species in Dominican Republic; dots for *L. quisqueya* and squares for *L. woodruffi*.

Davidson, J. Rawlins, C. Young, C. Munez, M. Rial; ecotonal Pinus grassland, hand collected, sample 41143 / CMNH-355,682 (1, CMNH). **Pedernales**, RD-215 c. 2 km on trail to Carlitos, Parque Nacional Jaragua, 124 m, 18°06.591′N 71°37.234′W, 7.iv.2004, D. Perez, B. Hierro, R. Bastado (d) (1, NMNH); PN Sierra de Baoruco, Las Abejas, 18°09.011′N, 71°37.342′W, 1150 m, 18.vi.2005, G. Nearns (1, FSCA; 1, NMNH); Par.Nac. Sierra de Bahoruco, Las Abejas, 09.viii.1999, 1250m, 18°09.023′N, 71°37.387′W, M.A. Ivie & K.A. Guerrero / at light (1, WIBF).

Etymology. The specific epithet "*woodruffi*" is in in honor of the late Robert "Bob" E. Woodruff, Gainesville, Florida, who collected much scientific material in the Dominican Republic during his numerous visits, including many of the first specimens known of this species.

Distribution. Island of Hispaniola, Dominican Republic, and Barahona, Independencia, Pedernales provinces.

Notes. The collecting site for the largest series of this species was among "old coffee groves neighboring virgin forests" at approximately 1000 m elevation (P. Skelley, pers. comm.). Other specimens were collected at remnant mesic forest sites in ravines, or in primary or older secondary forests. Adults were obtained at night by lights and during daylight periods by gleaning, beating, or sweeping vegetation, especially along trails and at forest edges and openings.

A key to the *Lissomus* species of the Dominican Republic

1. Body oblong in dorsal aspect (Fig. 1). Pronotal hind angle with dorsal carina distinct. Aedeagus (Fig. 5) with median lobe broadly obtuse at apex, lateral lobes shallowly sinuate at midlength. Known from the western regions in the Cordillera Central . . . . ***L. quisqueya* Johnson, new species**

— Body ovoid in dorsal aspect (Fig. 2). Pronotal hind angle with dorsal carina obsolescent. Aedeagus (Fig. 6) with median lobe narrowly rounded at apex, lateral lobes arcuate at midlength. Known from southwestern regions in the Sierra de Barohuco . . . . ***L. woodruffi* Johnson, new species**

Discussion

Ecological attributes of lissomine elaterids are poorly documented. Adults are frequently found on abaxial surfaces of leaves along trails and in forest openings and edges, and one specimen from La Vega was reported active on a garden plant leaf surface near to primary forest at about 10:00 p.m. (Fig. 7) (M. Armenteros, pers. comm.). Some of the specimens of *L. woodruffi* from Barahona were collected at lights. Kirmse and Chaboo (2019) and Kirmse and Johnson (2020) reported *L. obconicus* Bonvouloir feeding nocturnally at flowers and extrafloral nectaries in tree canopies, and on immature leaves of *Senna* cf. *silvestris* (Vell.) H. S. Irwin and Barneby in the laboratory. A number of lowland-forest shining black or brown *Lissomus* species are frequently collected at light traps or at light sheets in Mesoamerica and South America, supporting nocturnal activity observations of both *L. quisqueya* and *L. woodruffi*. Floral or extrafloral associations for *L. quisqueya* and *L. woodruffi* need investigation.

Immature stages of either species remain unknown. Larvae may be subcortical in senescent and decaying wood as is known for other American *Lissomus* species (Costa et al. 1988; Johnson 2021).

All examined specimens were collected from lower montane and premontane wet forest habitats. *Lissomus woodruffi* specimens were labelled as collected from between 124–1789m in the Sierra de Bahoruco, while *L. quisqueya* was collected from 400–1455m in the Cordillera Central. Collector labels indicate adult activity from January through August at lower elevations and June to early August at higher elevations, with most collecting dates from mid-April through early June.

Known sites for *L. woodruffi* are in the Sierra de Barohuco in the southwestern-most provinces. This area is part of the Bahoruco-La Selle region that contains the highest diversity of endemic plants near to or at cloud forest elevations and is a floral hotspot on Hispaniola (Cano-Ortiz et al. 2016). Similarly, all known sites for *L. quisqueya* are in the Cordillera Central, among or near cloud forest elevations and this is the region with the second most diverse floral hotspot reaching to the highest elevations on the island (Cano-Ortiz et al. 2016). Known locations for *L. quisqueya* and *L. woodruffi* place their occurrence within these floral endemicity hotspots and add to the biodiversity uniqueness of these regions.

Geographically, the separation of *L. quisqueya* and *L. woodruffi* by apparent endemicity to the Cordillera Central and the Sierra de Barohuco reflect distributions of other beetles within the paleo-island composition of Hispaniola along with the aforementioned floral hotspots. Woodruff (2004a,b) showed distinct endemicity patterns to montane and paleo-island regions for *Phyllophaga* Harris (Coleoptera: Scarabaeidae) and discussed the geographic context. Skelley (2009) indicated a number of pleasing fungus beetles (Coleoptera: Erotylidae) may be restricted to these same mountains, as did Perez-Gelabert (2011) for fireflies (Coleoptera: Lampyridae), Peck and Cook (2014) for leiodid fungus beetles, Androw (2016) for a new species of *Phyllophaga*, and Anderson (2018) for some species of *Sicoderus* Vanin (Coleoptera: Curculionidae). Other arthropods likely express similar distributions (see Perez-Gelabert 2020). These patterns seem to indicate habitat and distributional restrictions to premontane elevations, especially those near to or above 1000m in mesic and cloud forests. However, disjunct sites at lower elevations suggests broader natural elevational ranges of these species that were reduced or eliminated anthropogenically. Still, these *Lissomus* species separations based on montane landform characteristics seem to support hypotheses for faunal distinctions between the ancient landforms comprising Hispaniola.

Deforestation and conversion of the landscape to mining, forestry, and agriculture and rural and urban development, otherwise known as "progress", has created large areas inimical to mesic forest insects, such as *L. quisqueya* and *L. woodruffi*, within the elevation ranges of each species. These landscape conversions are readily seen and easy to distinguish apart from intact forest in publicly available aerial and satellite imagery, such as GoogleEarth™. Forest removal in high arable valleys and mountain slopes for agriculture and development enhance the geological separation and reduced extent of habitats. This activity forms disjunctions of reduced habitats on mountain areas due to the combinations of anthropogenic and stochastic climate warming impacts. As such, these habitats and their constituent organisms should be considered endangered.

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