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A New Species of *Nemozoma* Latreille, 1804 (Coleoptera: Cleroidea: Trogossitidae) from the French Antilles and New Distributional Records for *Nemozoma fleutiauxi* Lepesme, 1947

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Abstract

Nemozoma lepesmei Kippenhan, **new species** is described and illustrated from specimens collected from the islands of Montserrat and Guadeloupe in the French Antilles. This new species is compared to other West Indian species and a key to the species known to inhabit the West Indies is provided. Recent distributional records for *Nemozoma fleutiauxi* Lepesme, 1947 are included.

Keywords: canopy fogging, smooth bark-gnawing beetles, taxonomy

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Introduction

The 21 species of *Nemozoma* Latreille, 1804 inhabiting the New World are distributed from southwestern British Columbia, Canada southward to Bolivia, Brazil, and Paraguay (Barron 1971; Kippenhan 2023; Kolibáč 2005, 2013). In the United States, the genus has been recorded only from west of the Great Plains (Barron 1971). As known predators of xylophagous beetles, primarily Scolytinae (Curculionidae), associated with conifers, both adults and larvae of *Nemozoma* have been observed in wood-boring beetle galleries, under bark, or externally on the limbs and trunks of infested trees (Bright 1976; Hinson and Buss 2016; Leschen 2002; Van Dyke 1915, 1916). Considering the number of species and broad geographic distribution within the New World, adult specimens remain poorly represented in museum collections, possibly due to their very small to medium size (1.5–9 mm) and specialized ecological niche.

In his account of the Trogossitidae: Trogossitinae (as Ostomatidae: Temnochilinae) of the French Antilles, Lepesme (1947) documented only two *Nemozoma* species, each known only from individual islands: *Nemozoma fleutiauxi* Lepesme, 1947 (Figs. 4, 5) from Guadeloupe, and *Nemozoma landesi* Léveillé, 1901 (Fig. 6) from Martinique. Despite the limited geographic scope covered by Lepesme (1947), both *N. landesi* and *N. fleutiauxi* represented the only species of this genus recorded from the entire West Indies (Blackwelder 1945; Léveillé 1901, 1910). Subsequent to Lepesme (1947), the only additional West Indian records for *Nemozoma* are from Schiller (2004), who encountered *N. fleutiauxi* on Guadeloupe, and Ivie *et al.* (2008), who listed two specimens of "*Nemosoma* sp." from Montserrat. Collected during intensive surveys to document the coleopterous fauna of Montserrat as part of the West Indian Beetle Fauna Project (WIBP) directed by M. A. Ivie at Montana State University, the two specimens recorded by Ivie *et al.* (2008), and an additional three discovered during subsequent sorting and mounting efforts, represent a hitherto unknown species which is described below. This new species brings the total number of described New World *Nemozoma* species to 22.

Materials and Methods

Species concepts for *Nemozoma* are based on Lepesme and Paulian (1944), Lepesme (1947), and the author's examination of primary types as outlined in Kippenhan (2023). The author utilizes the phylogenetic species concept of Wheeler and Platnick (2000).

Institutional abbreviations mentioned in the text are as follows:

MNHN	Muséum National d'Histoire Naturelle, Paris, France (Antoine Mantilleri)
NMNH	United States National Museum of Natural History, Smithsonian Institution, Washington, DC, USA
WIBF	West Indian Beetle Fauna Project Collection, Montana State University, Bozeman, MT, USA (Michael A. Ivie)

Morphological characters of adult specimens utilized during this study were examined with an

AmScope SM745 stereomicroscope. Measurements were taken with a Bioquip 5-mm hand-held microruler and follow Kippenhan (2023) where measurements for the head, pronotum, and elytra were taken independently from one another: head length (HL) was measured from the tips of the bilobed projections to the anterior margin of the pronotum; head width (HW) was the maximum width across the eyes; pronotal length (PL) was measured along the midline from the anterior to posterior margins; pronotal width was measured across the maximum width; elytral length (EL) was measured from the humeral angles to the apex; elytral width (EW) was measured across both elytra at the maximum width which occurs in the posterior quarter. Quoted specimen label data utilizes a forward slash (/) to represent line breaks and a double forward slash (//) to separate labels. All data is presented verbatim. All labels are typeset unless otherwise noted.

One of the five specimens comprising the type series is missing its abdomen; of the remaining four, two were relaxed, after which the abdomen was removed and placed in 10% KOH solution until partially cleared. Both proved to be female. Since there are no discernible external morphological differences between the specimens, it is presumed that all five are female. The two remaining complete specimens were left intact to facilitate future studies.

Illustrations were created by the author as follows: a photograph of the subject was taken through the eyepiece of the AmScope SM745 stereomicroscope utilizing a hand-held iPhone. The resulting image was next opened in Adobe Photoshop® where it was converted to grayscale and "Image > Levels" adjusted to obtain the desired contrast. The image was then printed on a black-and-white laser printer, after which it was traced by hand and refined while comparing it to the actual subject. This initial sketch was enlarged to the desired size and further refined through a series of comparative tracings to capture the details, proportions, and perspective of the subject. Once a sketch was determined to best represent the subject, it was rendered on translucent Mylar film utilizing a Koh-I-Noor Rapidograph® pen where details and shading were applied.

Taxonomy

Nemozoma lepesmei Kippenhan, new species

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(Figs. 1, 2, 3A)

Diagnosis. Body (Figs. 1A, B) slender; head, pronotum, and scutellar shield castaneous to piceous, elytra testaceous with piceous lateral margin expanded slightly inward in central portion; antenna comprised of 10 antennomeres with compact club (Fig. 2A); frontoclypeus bifurcated with short, stout, tapered anterior projections; mentum not produced, bidentate (Fig. 2C); head with uniformly spaced, elongate punctures (Fig. 3A); elytral punctation seriate, deeply corrugated at apex, elytra together 2.74 times as long as wide on average; not brachypterous.

Type Specimens. Holotype female: "MONTSERRAT: Hope Ridge / 16.7695°N, 62.2123°W / 19JUNE2002, 320m,K.Marske / J.Boatswain & L.Martin / canopy fogging, dawn // [Barcode] WIBF 087736" // [red label] HOLOTYPE / *Nemozoma lepesmei* / M. Kippenhan". Specimen in WIBF, to be deposited in the NMNH. **Paratypes:** 1 — "MONTSERRAT: Hope Ghaut / 16.7628°N, 62.2123°W / 01 AUG 2003, 320m / J.Boatswain & L.Martin / canopy fogging, dawn // [Barcode] WIBF 089263" (WIBF). 1 — "MONTSERRAT: Fogerty / 16°46.24' N. 62°12.53' W / 30 JULY 2003, 1224ft. / J.Boatswain & M.Hulme / Canopy fogging, dawn // [Barcode] WIBF 079310 // [hand written and typeset] Nemosoma / det. M. A. Ivie 2004" (WIBF). 1 — "GUADELOUPE: BasseTerre / Gourbeyre / 10-20 JULY 2003 / J. Touroult colr" (WIBF). 1 — "GUADELOUPE: BasseTerre / Gourbeyre / JULY 2003 / J. Touroult colr // [hand written and typeset] Nemosoma / n. sp. / det. M. A. Ivie 2006" (WIBF). All paratypes with: "[yellow label] PARATYPE / *Nemozoma lepesmei* / M. Kippenhan".

Description. Female: Overall length: 2.7–3.3 mm; HL: 0.76–0.90 mm, HW: 0.50–0.65 mm; PL: 0.65–0.82 mm, PW: 0.52–0.65 mm; EL: 1.48–1.75 mm, EW: 0.50–0.65 mm. **Head** uniformly castaneous to piceous with central area of bilobed frontoclypeus projections rufous; width slightly tapered to basal margin, shorter than pronotum; frontoclypeus deeply bifurcated with two short, stout, lobe-like extensions covering the base of the mandibles (Fig. 3A); with medial conical depression and wide, well-defined median longitudinal sulcus extending to center of eyes; labrum very short, broadly concave, visible only slightly beyond base of frontoclypeal emargination, anterior margin with long setae, testaceous; mandibles short, thick, hypognathous, teeth castaneous with rufous central area, with uniformly spaced, elongate punctures; head punctate, dorsal surface with well impressed, medium-sized, elongate punctures approximately three to four times as long as wide, directed more-or-less longitudinally inward, punctures in posterior area widely spaced, becoming more densely spaced anteriorly; lateral and ventral surfaces of head with small, slightly elongate, widely spaced punctures; mentum (Fig. 2C) trisinuate, impunctate; eye large, raised slightly above contour of head, subovate, coarsely faceted, dorsal margin situated slightly above lateral centerline of head. **Antenna** short, middle of terminal antennomere extending to anterior lateral edge of pronotum, composed of

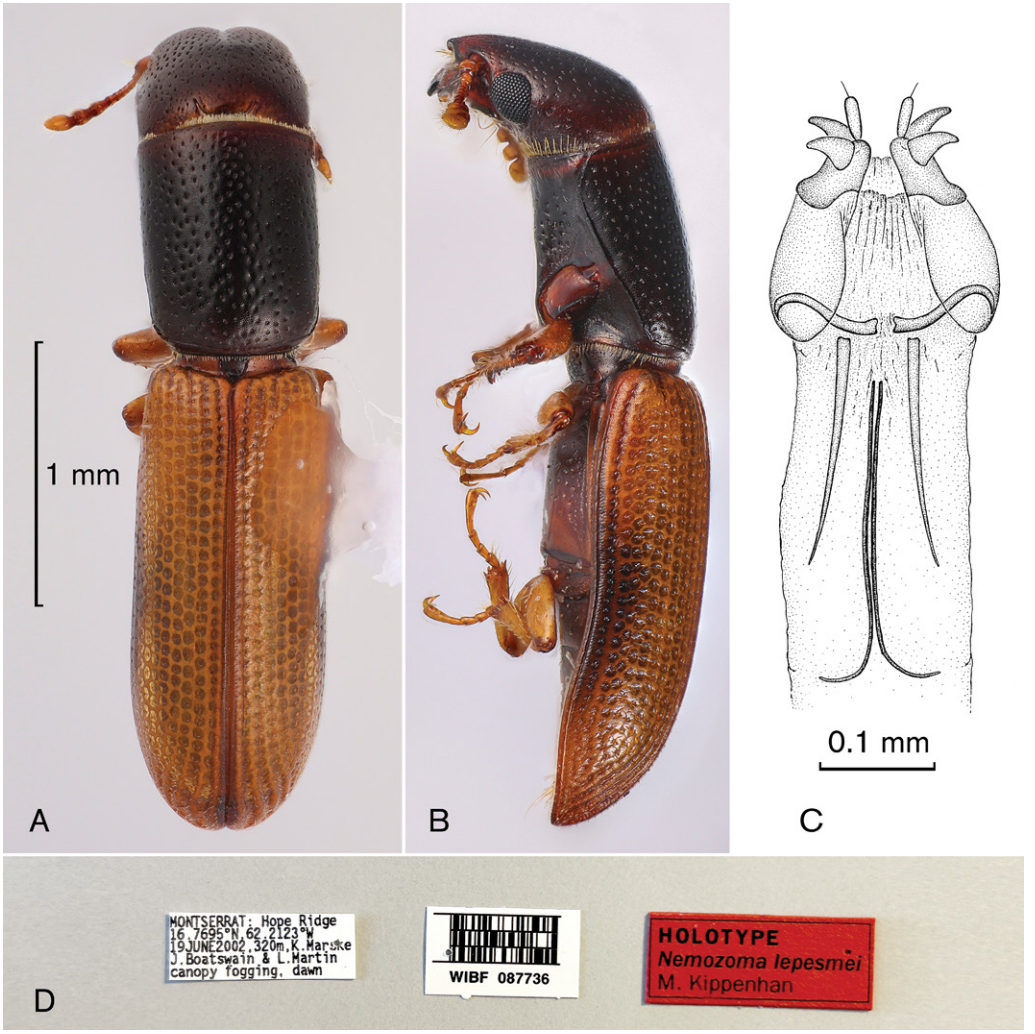

Fig. 1. *Nemozoma lepesmei*, **new species** (WIBP). A) Holotype, dorsal habitus, B) Holotype, lateral habitus, C) Paratype, female genitalia, D) Holotype, labels.

10 antennomeres, each testaceous with a dark base; scape large, globose, with three long setae on anterior face; pedicel subcylindrical, slightly wider than antennomeres 3–7; antennomeres 3–7 very small, gradually larger from 3 to 7, densely spaced; antennomeres 8–10 unilaterally expanded into a compact club (Fig. 2A), with dense setae on sensorial fields; sensorial fields on antennomere 8 covering approximately 15% of surface, on antennomere 9 covering approximately 20% of surface, on antennomere 10 covering approximately 30% of surface; antennomere 10 pentagonal, longer than wide, with apical corners rounded. **Pronotum** uniformly castaneous to piceous with anterior margin slightly lighter; elongate, approximately 1.5 times longer than wide, widest at anterior margin; sides relatively parallel, tapering slightly inward to basal margin; anterior margin almost straight; basal angles obtuse; disc with well defined, uniformly spaced, small, subcircular punctures, punctures in longitudinal centerline more widely spaced; raised lateral bead well defined, anterior portion thinner, curved upward at anterior angle; scutellar shield castaneous to piceous. **Elytra** uniformly testaceous with piceous lateral margin expanded medially in central portion; elytral length greater than head and pronotal length combined, elytral combined width slightly narrower than that of pronotum and head, in dorsal view slightly constricted near middle, widest at apical four-fifths, apical margin rounded; elytron with 10 rows of

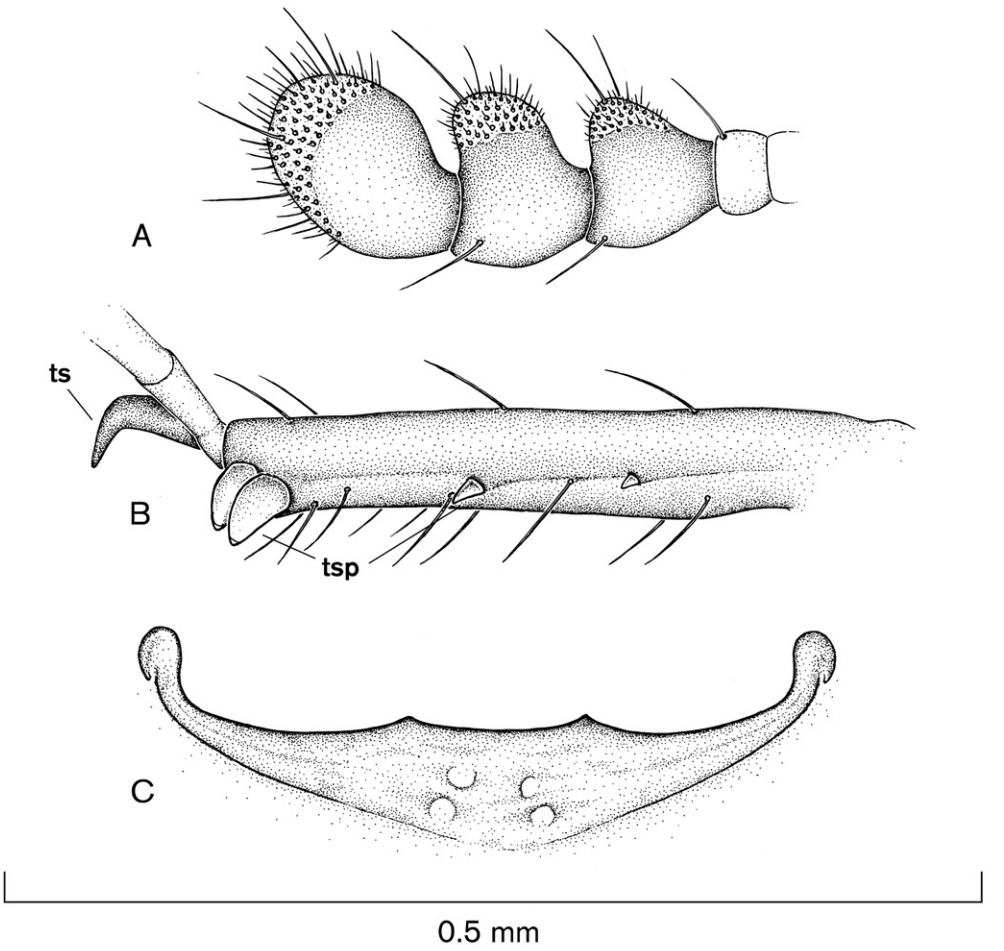

Fig. 2. Adult structures of *Nemozoma lepesmei*, **new species**, paratype. A) Left antennal club, B) Left protibia (ts = tibial spur, tsp = tibial spine), C) Mentum. Scale bar is for A–C.

large, deep, serially arranged punctures, rows 1–5 extending entire length of elytra, becoming more deeply impressed in apical quarter to form strial corrugations, 10th row with largest and deepest punctures; elytra with subcircular translucent area around all punctures; epipleuron complete; basal marginal bead of epipleuron extending onto and becoming slightly discernible on humeri; humeral angles broadly rounded. **Prosternum** uniformly castaneous to piceous with widely spaced, shallow, medium- to large-sized, circular punctures; notosternal suture obscured; hypomeron impunctate; intercoxal process with sides slightly concave, widest in anterior quarter, with raised bead along coxal cavities. **Mesoventrite** uniformly castaneous to piceous with a few scattered, small punctures in central area. **Metaventrite** castaneous to piceous with medium- to large-sized, shallowly impressed punctures in anterior half, punctures decreasing in size posteriorly; metanepisternum impunctate. **Abdomen** with ventrites 1–4 castaneous, ventrite 5 testaceous, mostly impunctate with scattered setae over surface. **Legs** with femora testaceous, piceous to castaneous at apex, thick, wider at base than apically; tibiae testaceous, castaneous along margins, longer than femora, narrow at base and gradually expanded to broad apex; tarsal formula 5-5-5 with tarsomere 1 minute, but discernible, and fused to tarsomere 2; protibia (Fig. 2B) with three castaneous spines on outer margin, two large, stout, piceous, posteriorly facing spines on outer margin at apex, one very small spine on inner margin at apex, and one large, curved apical spur subequal in length to tarsomeres 1–3 combined; mesotibia with same

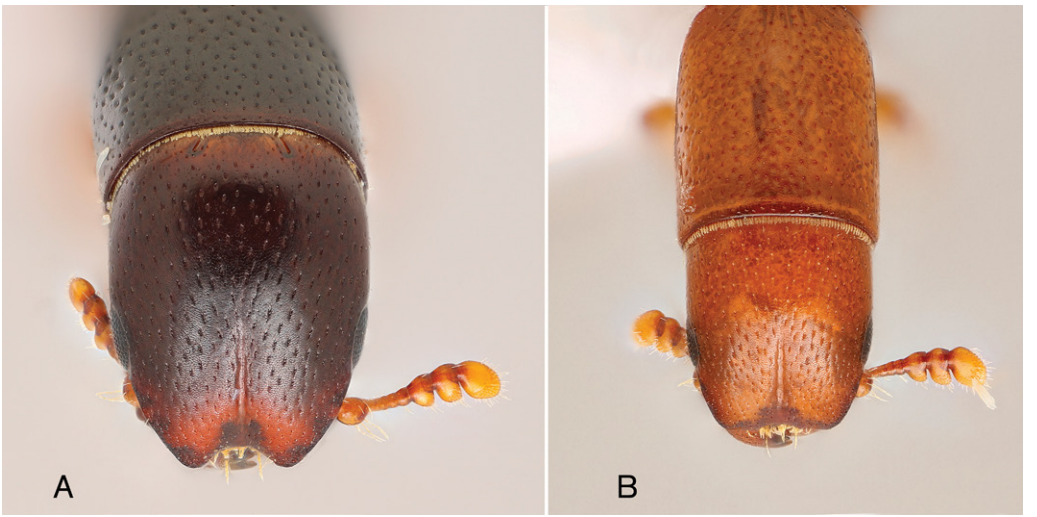

Fig. 3. Heads of adult *Nemozoma* species. A) *N. lepesmei*, **new species**, holotype (WIBP), B) *N. fleutiauxi* (WIBP).

spine pattern as protibia, with one small apical spur; metatibia without spines on outer margin, two small spines at apex, and one small apical spur; all tibiae with few scattered setae over surface; protibia with additional long setae along inner margin and at apex; mesotibia with additional setae along inner margin. **Ovipositor** coxite with two large, robust, claw-like appendages near apex, stylus small (Fig. 1C).

Variation. One paratype has the elytra slightly lighter in color. The dark elytral margin and corresponding lateral expansion vary slightly in size, including one specimen without lateral expansion.

Distribution. The French Antillean islands of Montserrat and Guadeloupe. On Montserrat, the holotype and two paratypes were collected along the northwestern boundary of the Centre Hills, a high-elevation montane forest reserve believed to be home to over 90% of Montserrat's invertebrate species (Ivie *et al.* 2008). The two paratypes collected on Guadeloupe are both labeled as "Gourbeyre", a small town in the far south of Basse-Terre; unfortunately, no further details regarding these two specimens are available.

Etymology. This species is dedicated to the French entomologist Pierre Lepesme (1913–1957) whose studies on *Nemozoma* (Lepesme and Paulian 1944) and the Trogossitidae of the French Antilles (Lepesme 1947) have been central to my understanding of this fascinating family of predatory beetles.

Remarks. *Nemozoma lepesmei* is morphologically similar to *N. landesi* and *N. fleutiauxi* in sharing an antenna with 10 antennomeres and a compact, unilaterally expanded club, the posterior margin of the elytra with deep, corrugated striae, and small overall length.

Kippenhan (2023) observed that the genitalia of Trogossitidae (*sensu* Gimmel *et al.* 2019) remain understudied. In regards to female genitalia, Tanner (1927) illustrated the ovipositor of *Temnoscheila chlorodia* (Mannerheim), commenting that the structures were of the cantharoid type. Barron (1971) also illustrated the ovipositor of *T. chlorodia* while Kolibáč (2005) illustrated ovipositors from representative worldwide genera. As far as *Nemozoma* taxa, only the ovipositors of *Nemozoma gymnosternalis* Kolibáč and *Nemozoma woodi* Kippenhan have been illustrated (Kippenhan 2023; Kolibáč 2014). According to these prior studies, all ovipositors from all genera have simple coxites similar to those depicted by Tanner (1927). The ovipositor of *N. lepesmei*, however, is striking in that it has two outwardly facing, claw-like appendages near the apex of the coxite on either side of the stylus (Fig. 1C), the function of which can only be guessed. These unique claw-like appendages indicate that the female genitalia of the Trogossitidae deserve further study to determine their value for species-level delimitation.

Key to the Species of *Nemozoma* of the West Indies

1. Frontoclypeal bifurcated margin with short, stout, conical anterior projections (Fig. 3A); head and pronotum uniformly castaneous to piceous (Figs. 1A, B); elytra testaceous with darker lateral margins, darker coloration extended medially in center portion (Fig. 1B)..... .....***N. lepesmei* Kippenhan, new species**
1′. Frontoclypeal bifurcated margin with very short, blunt anterior projections (Fig. 3B); coloration not as above 2

2. Pronotum uniformly testaceous; elytra testaceous in basal half, remainder piceous with ovate testaceous patch on each elytron (Figs. 4A, B, 5A, B) .....***N. fleutiauxi* Lepesme**
2′. Pronotum testaceous in anterior half, remainder castaneous; elytra testaceous with piceous band across center (Figs. 6A, B) .... ***N. landesi* Léveillé**

New Distribution Records

Nemozoma fleutiauxi Lepesme, 1947
(Figs. 3B, 4, 5)

Nemosoma fleutiauxi Lepesme 1947: 177.
Nemozoma fleutiauxi: Kolibáč 2013: 69.

Lepesme (1947) described this species from a single specimen, 1.5 mm in length, collected on the island of Guadeloupe and housed in the Grouvelle Collection at MNHN (Fig. 4). The overall coloration of the single specimen from Montserrat (WIBF) is noticeably lighter and appears more similar to *N. landesi* in color pattern; however, this may be due to the specimen being teneral when collected. Schiller (2004) recorded *N. fleutiauxi* from Guadeloupe under the bark of *Tabebuia pallida* (Lindl.) Miers (Bignoniaceae).

To these records, the following can be added: **GUADELOUPE:** "GUADELOUPE: Basse T. / Gourbeyre, Palmiste / 05-20 JAN 2003 / J. Touroult colr. // [hand written and typeset] Nemosoma / fleutiauxi / Lepesme / det. M. A. Ivie 2022" [1, WIBF]. "GUADELOUPE: / Basse-Terre, Gourbeyre / Foret de Moscou / 01-07 FEB 2003 / J. Touroult colr. // [hand written and typeset] Nemosoma / fleutiauxi / Lepesme / det. M. A. Ivie 2022" [1, WIBF]. **MONTSERRAT (new island record):** "MONTSERRAT: Underwood Ght / 16° 46.327'N, 62°11.734'W / 1230 ft, 21 FEB 2003 / J.Daley & L.Aymer / canopy fogging, dawn // [hand written and typeset] Nemosoma / n. sp. / nr. fleutiauxi / det. M. A. Ivie 2006 // [Barcode] WIBF 079311" [1, WIBF]. **NEVIS (new island record):** "NEVIS: St.James Widwrd Par / Camps Watershed / 17.1894°N 62.5780°W / 30 MAY 2017. 70m / WIBF crew.uv light // [Barcode] WIBF 055877 // [hand written and typeset] Nemosoma / fleutiauxi / Lepesme / det. M. A. Ivie 2022" [1, WIBF].

Discussion

Of the 22 species of New World *Nemozoma*, only three—*N. fleutiauxi*, *N. landesi*, and *N. lepesmei*—have been recorded from the West Indies. Interestingly, of the three archipelagos comprising

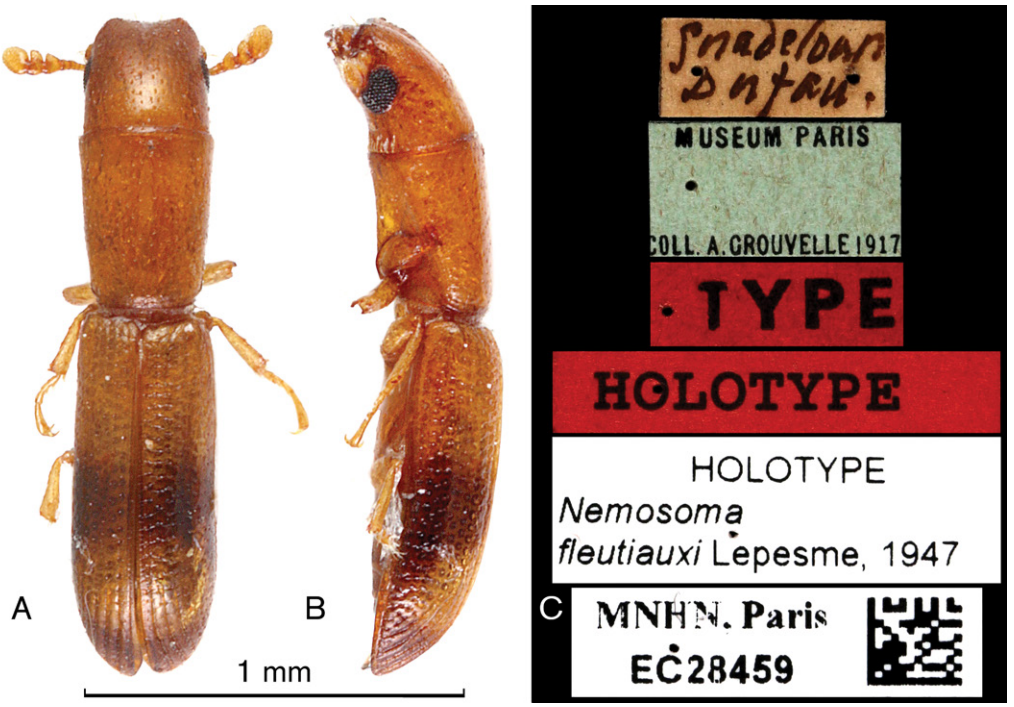

Fig. 4. *Nemozoma fleutiauxi*, holotype (MNNH). A) Dorsal habitus, B) Lateral habitus, C) Labels. Scale bar is for A and B. Images © 2024 MNHN/Christophe Rivier.

Fig. 5. *Nemozoma fleutiauxi* (WIBP). A) Dorsal habitus, B) Lateral habitus. Scale bar is for A and B.

Fig. 6. *Nemozoma landesi*, holotype (MNHN). A) Dorsal habitus, B) Lateral habitus, C) Labels. Scale bar is for A and B. Images © 2022, MNHN/Christophe Rivier.

the West Indies—Lucayan, Greater Antillean, and Lesser Antillean—these species are known from only three islands within the Lesser Antilles. The absence of *Nemozoma* from the remainder of the Lesser Antilles and entirely from the Lucayan and Greater Antillean archipelagos is incongruous with the other trogossitid genera inhabiting the West Indies: *Airora* Reitter, 1876, *Corticotomus* Sharp, 1891 [as *Colydobius* Sharp, 1891 in Léveillé (1910), Lepesme (1947), and Blackwelder (1945)], *Temnoscheila* Westwood, 1830, and *Tenebroides* Piller and Mitterpacher, 1783. These all have a broader distribution, and appear to be more speciose, in the West Indies than represented in the catalogs of Léveillé (1910), Blackwelder (1945), and Kolibáč (2013). On the other hand, more localized distribution within the bioregion is seen in the genera *Calanthosoma* Reitter, 1876 and *Eupycnus* Sharp, 1891, each with only a single recorded species (Kolibáč 2013). Due to the complex geologic history of the West Indies and lack of a phylogenetic analysis of *Nemozoma*, any discussion as to the present-day biogeographic pattern or origins of ancestral lineages through either overwater dispersal or vicariance models (Hedges 2001) would be premature. This is especially true considering that it is unclear whether the apparently limited present-day West Indian distribution of *Nemozoma* species reflects their true distribution or is an artifact of collecting.

The labels of museum specimens of *Nemozoma* taxa, as well as literature accounts, indicate that the majority were collected by traditional hand techniques centered around the examination of fallen/dead trees. Modern advances in collecting techniques such as Lindgren funnel trapping (Griswold 2015; Kippenhan 2023; Sakamoto 2007) have demonstrated that this technique can be effective for collecting *Nemozoma*. While canopy fogging has proven an especially effective technique when trying to ascertain arthropod diversity and communal composition (Erwin 1982; Floren *et al.* 2022), the only accounts of *Nemozoma* collected via this method the author is aware of are the aforementioned distributional records for both *N. fleutiauxi* and *N. lepesmei.* Given that the three West Indian *Nemozoma* species represent some of the smallest-bodied members of the genus, future applications of canopy fogging may be worthwhile when attempting to collect these rare and elusive beetles. The infrequency of their collection is well illustrated by the fact that during the course of intensive sampling on Montserrat conducted by members of the WIBP, only one specimen of *N. fleutiauxi* and three specimens of *N. lepesmei* were found among the over 35,000 arthropods collected (M. A. Ivie, personal communication). Ultimately, it will take a variety of focused collecting techniques to help yield further insights into the biogeography of *Nemozoma* in the West Indies as well as the inter-island distribution of individual species.

Acknowledgments

This project could not have been possible without the assistance and hospitality of Antoine Mantilleri during my visits to the MNHN. Christophe Rivier (MNHN) provided the invaluable images of the types of *N. fleutiauxi* and *N. landesi.* Joshua Dunlap (Oregon Department of Agriculture, Wilsonville, OR, USA) provided the excellent images for the type of *N. lepesmei* and additional images of *N. fleutiauxi*. Richard Leschen (New Zealand Arthropod Collection, Auckland, NZ) provided suggestions for the examination and insights into understanding of beetle genitalia. Two anonymous reviewers provided helpful suggestions. This project could not have been possible without the guidance and encouragement of Michael A. Ivie (Montana Entomological Collection, Bozeman, MT, USA) who allowed me to examine the trogossitids housed in the West Indian Beetle Fauna Project collection and describe this unique species.

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