

New record and redescription of *Phyllotreta buettikeri* Doguet (Coleoptera: Chrysomelidae: Alticinae)

David G. Furth

Abstract

Phyllotreta buettikeri Doguet, 1979 was described from two male specimens from a random survey of the insect fauna of Saudi Arabia and published in a series of volumes elucidating the poorly-known fauna of that country. In the current study this species is recorded for the first time from Israel and from a much larger series of both males and females, re-described in more detail complemented with digital images of the habitus and genitalia of both sexes.

Kurzzusammenfassung

Phyllotreta buettikeri Doguet, 1979 wurde nach zwei Männchen aus einer stichprobenartigen Übersicht über die Fauna Saudi-Arabiens beschrieben. Die Beschreibung wurde in einer Reihe von Bänden beschrieben, die die wenig bekannte Fauna dieses Landes erhellte. In der vorliegenden Arbeit wird die Art erstmalig für Israel und auf der Grundlage einer wesentlich größeren Serie von Männchen und Weibchen nachgewiesen, genauer nachbeschrieben und mit Digitalfotografien des Habitus und der Genitalien beider Geschlechter vervollständigt.

Key words: Leaf beetles, taxonomy, faunistics, morphology, Israel, *P. latevittata*.

Introduction

The Fauna of Saudia Arabia (renamed Fauna of Arabia in 1998) has been published in 25 volumes from 1979 until 2010. It is a survey of the animals and plants of the Arabian Peninsula, including surrounding countries. It contains a random assortment of articles by specialists from many countries about specimens collected in the Arabian Peninsula. DOGUET (1979) was published in the first volume of the Fauna of Saudia Arabia primarily from a few specimens of Alticinae collected by W. Wittmer and W. Buettiker in April/May 1976 and May 1977 from two regions of Saudia Arabia (mountains near Riyadh and the Persian Gulf area near Hofuf). DOGUET (1979) described *Phyllotreta buettikeri* as a new species from two male specimens – the holotype deposited at the Naturhistorisches Museum, Basel, and a paratype deposited in Doguet's private collection (now part of the national collection in Paris), both from Hofuf (23 May, 1977). His morphological description of these includes line drawings of the dorsal habitus and male aedeagus, colors of body parts, punctation of the head, pronotum, elytra, head and elytral calli, tarsi size, and a few other general items. With the discovery

of a much larger series of both sexes from Israel the present paper provides a significant extension of the distribution, as well as a much more comprehensive morphological description.

I dedicate this paper to the memory of Manfred Döberl, a much admired fellow flea beetle lover, taxonomist, and a kind and gentle man. We had many wonderful personal interactions.

Methods and Materials

The habitus photographic images of *P. buettikeri* were taken using the Visionary Digital™ BK Lab Imaging system outfitted with the Canon EOS 5D and a MP-E 65mm 1-5x Canon macro-lens. Stacked images were processed in part with Helicon Focus™; final editing was done with Adobe PhotoShop™. Figures 3a, b, c of *P. latevittata* were also done this way at Tel Aviv University with a Leica DFC495 camera mounted on a Leica M205C stereomicroscope using Helicon Focus 5.3 then Adobe PhotoShop CS4 Extended to clean the images. The images of the male and female genitalia were taken with Zeiss Axio Zoom V 16 scope and IAI

AT-200DE digital camera attached to it.

Measurements were made using a Leica M125 stereomicroscope (Department of Zoology at Tel Aviv University) with a reticle that was calibrated using an ocular micrometer, with a 10X/23 ocular at 10X magnification.

The original habitus figure (DOGUET 1979) was good enough for species identification; therefore, nei-

ther the type nor the paratype were examined.

The specimens (5 males and 22 females) are deposited at the Steinhardt Museum of Natural History: Israel National Center for Biodiversity Studies at Tel Aviv University (SMNHTAU).

Measurement abbreviations: Lb = length of body; Le = length of elytra; Lp = length of pronotum; Weh = width of elytra at humeri; Wem = width of elytra –

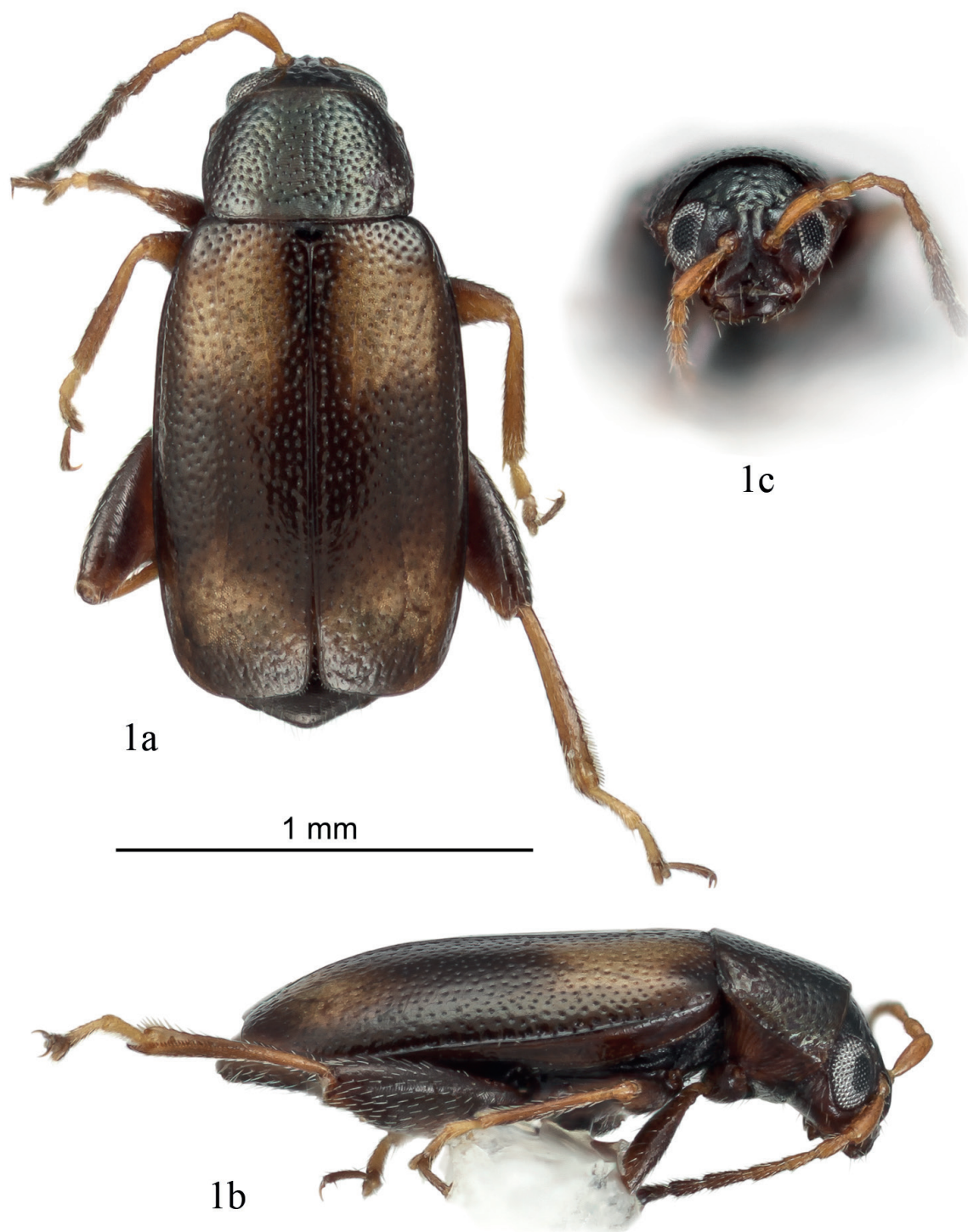


Fig. 1. *Phyllotreta buettikeri* habitus a) dorsal, b) lateral, c) frontal.

maximum; Wp = width of pronotum; Weye = width of eye; IOD = inter-ocular distance [4 males and 7 females measured]. Antennomere segments 1-6 are measured and given as absolute numbers rather than in millimeters, but the numbers refer to individual lines on the reticle scale of a Leica M125 with 10/23 oculars at the maximum (10.0X) that are 0.0122 mm each. Morphological terminology follows KONSTANTINOV & VANDENBERG (1996), and KONSTANTINOV (1998) (especially for the head).

Results

Redescription of *Phyllotreta buettikeri* Doguet, 1979

Head: Vertex dark (black), shiny, with sparse fine punctures vertically around midline. Frontal ridge and anterofrontal ridge pronounced and elevated. Frons often lighter brown color. Labrum darker brown. Antennal calli not evident, supraantennal and orbital sulci not evident [see Fig. 1c].

Antennae: Antennomeres 1-4/5 lighter (yellow to light brown), remaining antennomeres dark. Antennomere 1 longest, 2-4 subequal but 2 or 3 usually smallest, 2 apparently swollen, 3 shortest, 5 longer than 2-4.

Average antennomere lengths: male: 14-8-7-9-11-8. Female: 13-7-8-9-10-8.

Measurements: (4 males, 7 females; range in mm): Males: Lb = 1.1-1.67; Le = 1.1-1.6; Weh = .50-.55; Wem = .71-.82; Lp = .34-.46; Wp = .49; Weye = .11-.13; IOD = .21. Females: Lb = 1.59-2.01mm; Le = 1.14-1.27; Weh = .54-.63; Wem = .82-.95; Lp = .35-.40; Wp = .51-.59; Weye = .11-.15; IOD = .22-.24.

Pronotum: Rectangular, dark (black) color; punctuation medium to coarse, dense, confused, surface shagreened. Humeral calli evident. Antero-lateral angles slightly thickened, rounded; base clearly narrower than base of elytra [see Fig. 1].

Elytra: Elongate, subparallel-sided, slightly truncated apically. Punctuation medium to coarse, dense, confused. Suture and all lateral and apical (reaching elytral suture) margins darker, with sub-basal elongate and pre-apical yellow spots, sub-basal yellow spots 1.5 times longer than pre-apical spots, yellow longitudinal bands/stripes without well-defined margins, transverse black band broad and broadly "V"-shaped. Note: in DOGUET (1979) habitus figure the apical dark margin is not apparently complete to the elytral suture. Humeral calli apparent. Most specimens from Israel examined are apparently teneral, i.e., elytra shriveled somewhat [see Fig. 1].

Venter: Color dark (black). Male apical sternite with distinct concavity. Pygidium extending beyond elytral apex.

Legs: Male first tarsomere not at all swollen. Metafemora dark dorsally, lighter brown or yellow

ventrally. Pro and mesal femora basally darker, apically lighter brown/yellow. All tibia light brown to yellow. Tarsi basal tarsomeres yellow, apical segment evidently darker.

Genitalia, Male: Aedeagus (Figs. 2a, 2b): laterally parallel-sided, apically rounded with apex tapered into a nipple that in lateral view (Fig. 2a) is bent ventrally at about 90° angle.

Female: (Figs. 2c, 2d): Spermatheca with base rounded, swollen, bulbous, tapering into a parallel-sided distal part of the base. Vaginal palpi with each arm apically expanded into a "hatchet-shaped" apex (expanded part in lateral direction) with 3 setae apically and 2 setae subapically (laterally on most expanded part of vaginal palpi).

Distribution/Season: NEW – Israel: Dead Sea Area, Deir el Hajla, nr. Jericho, 19 May 1998, leg. A. Freidberg; *ibid.*, leg. L. Friedman; Qalya, 24 Nov 1998, leg. A. Freidberg; Lower Jordan Valley, Beit Shean, 5 Dec 1996, leg. V. Chikatunov. **Doguet** (1979). Saudi Arabia: Hofuf, near Persian Gulf, 23 May 1977, leg. W. Büttiker (2 males, holotype deposited in the Naturhistorisches Museum, Basel, and paratype in the S. Doguet Collection, now at Museum national d'histoire naturelle, Paris).

Host: Unknown. An attempt to discover the host plant at Deir al Hajla was made by the author on May 4 and 30, 2017, but no specimens were found.

Remarks: *P. buettikeri* is very similar to *P. latevittata*, but the elytral pattern distinctly different; despite the variation in the longitudinal elytral yellow stripes (FURTH 1976) and Figs. 3a-c. The longitudinal elytral yellow stripes are often faded to disappeared near the middle in *P. latevittata* (Figs. 3b, 3c). Also the transfrontal suture and orbital lines (not evident in *P. buettikeri*) are more distinct in *P. latevittata*. The male aedeagus of *P. buettikeri* is apically less pointed (not nipple-shaped) in ventral view and in lateral view its extreme apex is more sharply recurved ventrally than in *P. latevittata* (see Figs. 2a, 2b, and 4a, 4b). The female spermatheca of *P. latevittata* is more slender throughout (see Fig. 4c).

DOGUET (1979) also compares *P. buettikeri* to *P. tenuimarginata* Jacoby and *P. amabilis* Weise but he says that *P. buettikeri* has stronger punctuation and particularly the frontal punctuation and the coloration is different than these Afrotropical species. SERRI et al. (2016) report that *P. tenuimarginata* was mainly known from northern Africa, some areas of the sub-saharan Africa and Arabian Peninsula (Arab Emirate and Yemen), but they record a new record from the Karkhe protected region, Khuzestan province, Iran - the northernmost distributional limit of this species. DOGUET (1979) also says it can be compared with *P. latevittata* (var. *ruficollis* Weise) [see above].

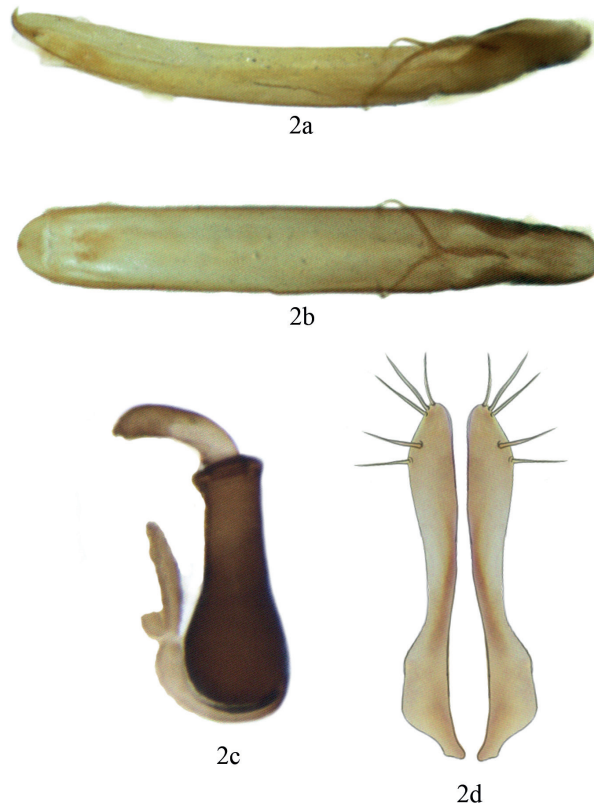


Fig. 2. *P. buettikeri* a) aedeagus, 0.74 mm long [lateral view], b) aedeagus [ventral view] c) spermatheca, 0.23mm long, d) vaginal palpi, 0.26 mm long.

Discussion

Morphologically *P. buettikeri* appears most similar to *P. latevittata* (Kutschera). This is based especially on the elytral pattern, male aedeagus, female spermatheca, but also the antennomeres, male foretarsi not swollen (FURTH 1976). Although the elytral pattern (i.e., the anterior-posterior, central, yellow band) can be variable in *P. latevittata* this variation is only through a darkening post medially of this band and, nevertheless is often visible as such (see Figs. 3a, 3b, 3c); the longitudinal elytral yellow bands have distinct margins, not so in *P. buettikeri*. Whereas, in *P. buettikeri* this elytral yellow pattern is clearly divided with no indication of any continual longitudinal band. Also, as mentioned above in the description of the elytra, the apical black color is complete, reaching the elytral suture on both sides. The male aedeagus of *P. buettikeri* in ventral view (Fig. 2a) is more rounded apically compared to that of *P. latevittata* which has a distinct nipple-shape, and in lateral view the apex of *P. buettikeri* is distinctly and strongly bent ventrally (Fig. 2b), much more so than in *P. latevittata* (Figs. 4a and 4b). The female spermatheca of *P. buettikeri* (Fig. 2c) is basally more distinctly bulbous and apically noticeably expanded as compared to the more narrowly tubular (with some apparent constriction medially) form in *P. latevittata* (Fig. 4c).

Biogeographically, although the distance from the type locality in Saudi Arabia to the newly recorded lo-

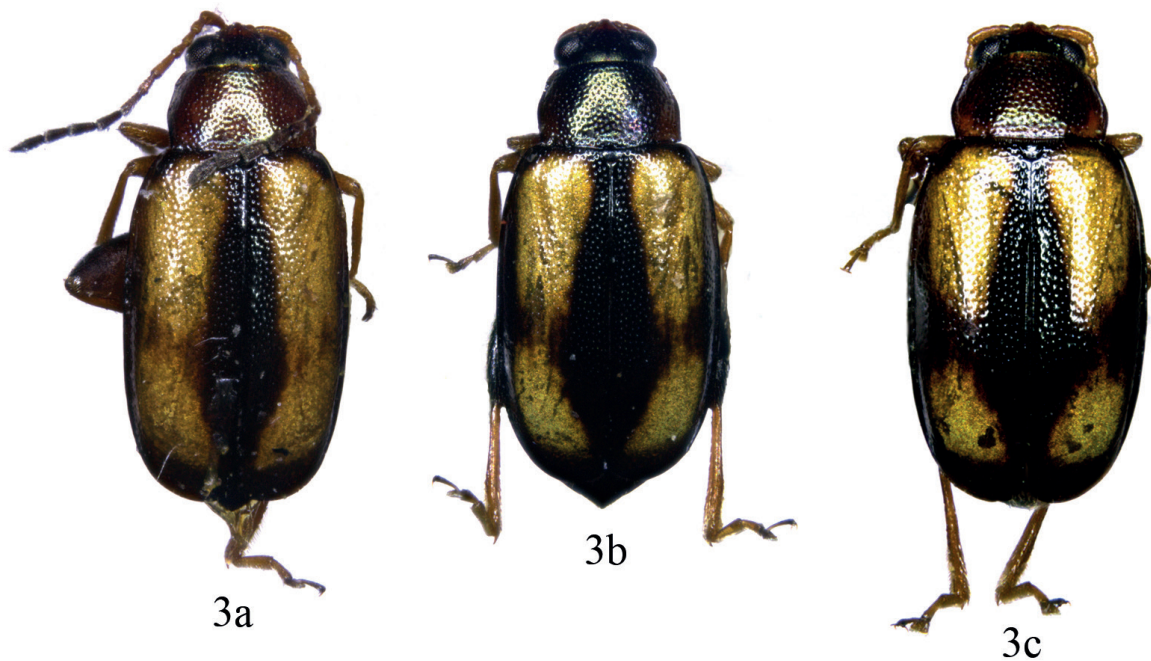


Fig. 3. *P. latevittata* dorsal elytral pattern, Lb = ca. 2.39 mm a) complete yellow stripes b) partial yellow stripe c) divided yellow stripe.

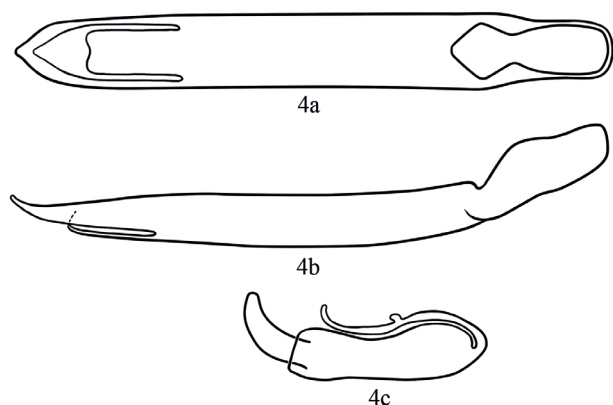


Fig. 4. *P. latevittata* a) aedeagus, ca. 0.87 mm long, ventral view b) aedeagus lateral view c) spermatheca, ca. 0.35 mm long (from FURTH 1976).

cations in Israel may not seem far (ca. 1600 km) there are some geographic and climatic barriers, as well as an almost seven-degree latitudinal difference. The type locality Hofuf is located in a wide area along the Persian Gulf near sea level that appears to be moist relative to the deserts to the west and north; with the average daily temp in May of 33.3 °C and an annual rainfall of 83.3 mm (Google). There are very harsh deserts and high mountains to the north and west of the type locality in Saudia Arabia, western Iraq, western Syria, and eastern Jordan. Therefore, continuous distribution and dispersal from the area of the type locality would not be expected. The biogeographical affinity of *P. buettikeri* is not completely apparent, but it seems to be an Eremian (or Saharo-Sindian) element (see FURTH 1979). The seasonality is the same for both locations, except that some specimens in Israel were also collected in winter months (November and December).

Given that 16 of the 23 previously-known *Phyllotreta* species in Israel feed on Brassicaceae, 4 on Resedaceae and 2 on Capparidaceae, the most likely host for *P. buettikeri* would be in the Brassicaceae, but needs to be verified through fieldwork. The author plans repeated visits to the Israeli locations to determine the host plant.

Acknowledgements

Special gratitude is due to Ms. Karolyn Darrow (Department of Entomology, Smithsonian Institution) for creating the beautiful habitus images and for improving the images of the genitalia for *P. buettikeri* and *P. latevittata*. I would like to thank Dr. Alexander Konstantinov for helping with the digital photos of the genitalia and for illustrating the female vaginal palpi. Also, I am indebted to Dr. Netta Dorchin (Department of Zoology, and Steinhardt Museum of

Natural History, Tel Aviv University – SMNH TAU) for access to good microscopes and other facilities while completing this paper. I also offer my gratitude to Mr. Laibale Freidman (SMNH TAU) who took photos for Figures 3a-c and to Dr. Floyd Shockley for assistance composing the figure plates.

References

- DOGUET, S. 1979: Insects of Saudia Arabia. Coleoptera: Fam. Chrysomelidae, Subfam. Halticinae. Fauna of Saudia Arabia 1: 308-316.
- FURTH, D. G. 1976: Alticinae of Israel, with special reference to the systematic, zoogeographic, and host plant relationships of *Phyllotreta* and *Longitarsus*. (Coleoptera: Chrysomelidae) of Israel. Copyrighted, unpublished Ph.D. dissertation, Cornell University, Ithaca, New York (USA).
- FURTH, D. G. 1979: Zoogeography and host plant ecology of the Alticinae of Israel, especially *Phyllotreta*: with descriptions of three new species (Coleoptera: Chrysomelidae). Israel Journal of Zoology 28(1):1-37.
- KONSTANTINOV, A. S. 1998: Revision of the Palearctic species of *Aphthona* Chevrolat and cladistic classification of the Aphthonini (Coleoptera: Chrysomelidae: Alticinae). Memoirs on Entomology 11: 1-429.
- KONSTANTINOV, A. S. & VANDENBERG, N. J. 1996: Handbook of Palearctic flea Beetles (Coleoptera: Chrysomelidae: Alticinae). Contributions on Entomology, International 2(3): 233-439.
- SERRI, S., NASSERZADEH, H. & BIONDI, M. 2016: First records of two flea beetles for the fauna of Iran. Proceedings of 22nd Iranian Plant Protection Congress, 27-30 August 2016. College of Agriculture and Natural Resources, University of Tehran, Karaj, Iran, p. 423.

Author's address:

DAVID G. FURTH
Department of Entomology
National Museum of Natural History
Smithsonian Institution
Washington, D.C. 20560
USA
E-Mail: furthd@si.edu

