

Species status and new distribution records for *Lithurgus huberi* Ducke (Hymenoptera, Megachilidae, Lithurginae)

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Abstract

Notes are provided on the morphology of males and females of the enigmatic *Lithurgus huberi* Ducke (Lithurginae: Lithurgini), a species historically believed to have been introduced into South America from Asia and to be a possible synonym of the more widespread *L. atratus* Smith. Distinctive differences are documented between *L. huberi* and *L. atratus*, perhaps indicative of separate species. In addition, we provide new records of *L. huberi* in Argentina and Paraguay.

Keywords

Anthophila, bees, Apoidea, wood-boring bees

Introduction

Megachilid bees of the subfamily Lithurginae Newman are commonly known as wood-boring bees because they usually excavate burrows in dead, dry, often decayed wood (Michener 2007). The subfamily is unquestionable monophyletic and the sis-

ter group of Megachilinae (Roig-Alsina and Michener 1993, Engel 2001, Michener 2007, Gonzalez et al. 2012). Lithurginae consists of two tribes, Protolithurgini Engel, an extinct lineage preserved in mid-Eocene Baltic amber, and Lithurgini Newman, an extant taxon containing about 60 species in three genera: *Lithurgus* Berthold (currently with two subgenera), *Microthurge* Michener, and *Trichothurgus* Moure. Although the subfamily is relatively small in number of species, it is found on all continents except Antarctica. Only species of *Lithurgus* s.str. are found in the Eastern Hemisphere except for *Lithurgus huberi* Ducke, which occurs in Brazil and Argentina (Roig-Alsina 2006, Moure and Melo 2007). Snelling (1983) suggested that *L. huberi* was adventive to South America and probably a synonym of the Indo-Australian species *L. atratus* Smith given the morphological similarity between the two. Such a hypothesis is also supported by the wood-nesting habits of *Lithurgus*, which facilitates dispersion across great distances.

We confirmed the close morphological similarity between *L. atratus* and *L. huberi*, as noted by Snelling (1983). However, we also noted some morphological features in both sexes of *L. huberi* that seem to be consistent and that may prove to be useful in species recognition. Accordingly, the purpose of this note is to document and illustrate those characters, as well as record *L. huberi* for the first time for Paraguay and supplementing this with new distribution records for Argentina (*vide infra*).

Materials and methods

We examined (V.H.G. & M.S.E) the type series of *L. atratus* as well as of *L. dentipes* Smith, a species that has been considered a synonym of *L. atratus*, deposited in The Natural History Museum, London (NHML). Additionally, we examined 42 specimens of *L. atratus* from India, Celebes, Borneo, Solomon Islands, and Australia deposited in the Snow Entomological Collection (SEMC), Division of Entomology, University of Kansas Natural History Museum, Lawrence, Kansas, USA, and the U.S. National Pollinating Insects Collection, Bee Biology and Systematics Laboratory (BBSL), Utah State University, Logan, Utah.

Photomicrographs were prepared using a Canon 7D digital camera attached to an Infinity K-2 long-distance microscope lens, and were assembled with the CombineZM™ software package. Specimens are deposited in SEMC and the entomological collection of the Museo de La Plata, Argentina (MLP). Occurrence data for *L. huberi* were plotted using CorelDRAW® X5 and were taken from the literature (*i.e.*, Ducke 1907, 1908, 1910, Camillo et al. 1983, 1994, Wittmann and Hoffmann 1990, Roig-Alsina 2006, Pick and Schindwein 2011) as well as from specimen data retrieved from the Inter-American Biodiversity Information Network (IABIN) provided by the USDA, Agricultural Research Service Pollinating Insect Research Unit, Logan, USA, and the Coleção de Entomologia do Laboratório de Biologia Vegetal, Universidade Federal de Pernambuco, Recife, Brazil.

Results

Females of *L. huberi* primarily differ from those of *L. atratus* by the facial prominence. In *L. huberi* it is more strongly punctate and more depressed along the epistomal sulcus than in *L. atratus* (cf. Figs 1, 3 vs. 2, 4). Likewise, males of *L. huberi* differ from those of *L. atratus* in the inner glabrous surface of the metabasitarsus, which is broader and more projected (cf. Figs 5 vs. 6). Although subtle, such morphological differences appear to be consistent across the specimens examined. However, we have had access to a limited number of individuals from a restricted set of localities and cannot rule out that such differences represent mere geographic variations.

Despite the small number of species in *Lithurgus* s.str., the status of most of them remains questionable, particularly those from Southeast Asia. For example, at least eight 'species' that are closely related to *L. atratus* have been suggested to represent a single taxonomic unit (Michener 1965), although they could be a complex of rather cryptic species. Some of these are practically indistinguishable from *L. atratus*, differing mostly in body size (e.g., *L. atratiformis* Cockerell). Undoubtedly, a revision of the group that includes a great number of specimens from multiple locations (thereby necessitating extensive fieldwork as existing collections have significant gaps for *Lithurgus* across its distribution) is needed before any taxonomic action can be taken with certainty. Such a work would ideally be accompanied by molecular data to further test putative species boundaries as well as to elucidate possible routes and times of dispersion.

In conclusion, we support the view that *L. huberi* is closely related to the Indo-Australian *L. atratus* species or species group and, if dispersed by human activity, it might have reached South America at least 100 years ago when it was described (Ducke 1907). However, we show here consistent, albeit somewhat subtle, morphological features to distinguish *L. huberi* from *L. atratus*. For the time being we recommend that they should be treated as separate species.

Taxonomy

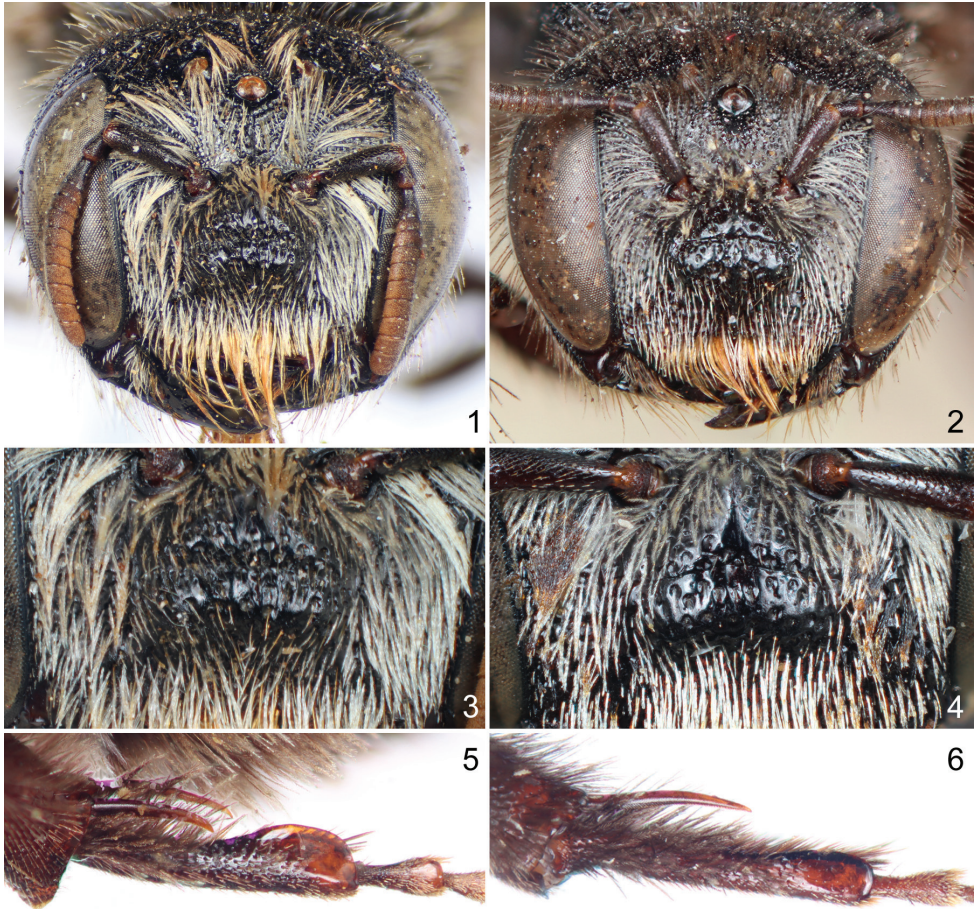
Lithurgus (Lithurgus) huberi Ducke

http://species-id.net/wiki/Lithurgus_huberi

Figs 1, 3, 5, 7

New records. Argentina: 1♂, Buenos Aires, Berazategui (Parque Pereyra Iraola), 24-1-2011, Col. Alvarez. L-Lucia. M (MLP) (foraging on *Ipomoea purpurea* (L.) Roth); 1♀, Misiones, Loreto, February 1954 (SEMC). Paraguay: 2♀♀, 4♂♂, Itapua Vega, Dec 1955, Juan Foerster (SEMC).

Additional material examined. Brazil: 3♀♀, 3♂♂, B. Horizonte, Minas, Brasil. A. Costa Jr. 20-4-49; 1♂, Para, Conceição do Araguaia, July 1959, M. Alvarenga; 1♂, Paraíba, Santa Luzia, Mun. Serra do Brandão dos Chandoca, 4/8 December 1955, Sebastidos Madeiros (SEMC).



Figures 1–6. Details of *Lithurgus huberi* Ducke from Minas Gerais, Brazil (left column: **1, 3, 5**) and *L. atratus* Smith (NHML syntypes) (right column: **2, 4, 6**). Facial views (**1, 2**), detail of facial prominence (**3, 4**), and inner surface of metabasitarsus emphasizing the apical expansion and glabrous surface (**5, 6**).

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Figure 7. Distribution records of *Lithurgus huberi* Ducke, including the new records discussed herein.

References

- Camillo E, Garófalo CA, Campos MJO, Serrano JC (1983) Preliminary notes on the biology of *Lithurgus huberi* (Hymenoptera, Megachilidae). *Revista Brasileira de Biologia* 43(2): 151–156.
- Camillo E, Garófalo CA, Serrano JC (1994) Nesting activities and nest reuse of *Lithurgus huberi* (Hymenoptera, Megachilidae). *Revista Brasileira de Biologia* 54(2): 183–194.
- Ducke A (1907) Contribution a la connaissance de la faune hyménoptérologique du Nord-Est du Brésil. *Revue d'Entomologie* 26: 73–96.
- Ducke A (1908) Contribution à la connaissance de la faune hyménoptérologique du Nord-Est du Brésil. *Revue d'Entomologie* 27: 57–87.

- Ducke A (1910) Explorações botânicas e entomológicas no Estado do Ceará. *Revista Trimestral do Instituto do Ceará* 24: 3–61.
- Engel MS (2001) A monograph of the Baltic amber bees and evolution of the Apoidea (Hymenoptera). *Bulletin of the American Museum of Natural History* 259: 1–192. doi: 10.1206/0003-0090(2001)259<0001:AMOTBA>2.0.CO;2
- Gonzalez VH, Griswold T, Praz CJ, Danforth B (2012) Phylogeny of the bee family Megachilidae (Hymenoptera: Apoidea) based on adult morphology. *Systematic Entomology* 37(2): 261–286. doi: 10.1111/j.1365-3113.2012.00620.x
- IABIN (2012) Inter-American Biodiversity Information Network. Available at: <http://www.IABIN.net> [accessed on 19 September 2012]
- Michener CD (1965) A classification of the bees of the Australian and South Pacific regions. *Bulletin of the American Museum of Natural History* 130: 1–362.
- Michener CD (2007) *The Bees of the World* [2nd Edition]. Johns Hopkins University Press, Baltimore, MD, 953 pp.
- Moure JS, Melo GAR (2007) Lithurgini Newman, 1834. In: Moure JS, Urban D, Melo GAR (Eds) *Catalogue of Bees (Hymenoptera, Apoidea) in the Neotropical Region*. Sociedade Brasileira de Entomologia, Curitiba, Brazil, 914–917. [total volume pages xiv+1058 pp.] [updated at URL: <http://www.moure.cria.org.br/catalogue> (last accessed 20 September 2012)]
- Pick RA, Schlindwein C (2011) Pollen partitioning of three species of Convolvulaceae among oligolectic bees in the Caatinga of Brazil. *Plant Systematics and Evolution* 293(1/4): 147–159. doi: 10.1007/s00606-011-0432-4
- Roig-Alsina A, Michener CD (1993) Studies of the phylogeny and classification of long-tongued bees (Hymenoptera: Apoidea). *University of Kansas Science Bulletin* 55(4): 124–162.
- Roig-Alsina A (2006) *Hylaeus punctatus* (Brullé) (Colletidae), a Palearctic bee long established in South America. *Journal of Hymenoptera Research* 15(2): 286–289.
- Snelling RR (1983) The North American species of the bee genus *Lithurge* (Hymenoptera: Megachilidae). *Contributions in Science, Natural History Museum of Los Angeles County* 343: 1–11.
- Wittmann D, Hoffman M (1990) Bees of Rio Grande do Sul, southern Brazil (Insecta, Hymenoptera, Apoidea). *Iheringia, Série Zoologia* 70: 17–43.