

A subgeneric system for the cuckoo bee genus *Triepeolus* Robertson (Hymenoptera: Apidae)

BY MICHAEL S. ENGEL

Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024-5192, U.S.A.

Article history: Received: 21 April 2023; Accepted: 22 May 2023; Published: 27 October 2023

ABSTRACT

A system of subgenera is newly proposed for the diverse cuckoo bee genus *Triepeolus* Robertson (Epeolini: Thalestriina). *Eurepeolus* subgen. n. is proposed for *Triepeolus tristis* (Smith) and *T. ventralis* (Meade-Waldo), together spanning the Palaearctic, while *Mesepeolus* subgen. n. is established for *T. epeolurus* Rightmyer for a distinctive *Epeolus*-like group found in Mesoamerica.

Keywords: Anthophila, Apidae, Apoidea, identification key, subgenera, Eurasia, Mesoamerica

INTRODUCTION

The bee genus *Triepeolus* Robertson is a widespread and diverse lineage of epeoline cuckoo bees, with almost all of its 145 species found in North and South America. Two species are known in the Eastern Hemisphere: one in the western Palaearctic, spanning Europe and south to Turkey and east to central Russia and eastern Kazakhstan, and another in Eastern Asia (Russian Far East, Korean Peninsula, Japan, and eastern China). Where known, species of *Triepeolus* are cleptoparasites of eucerine bees, although to a lesser extent some are known to victimise species of Anthophorini, Centridini, Emphorini (all Apidae), Dieunomiini (Halictidae), Caupolicanini (Colletidae), and Oxaeinae (Andrenidae) (Michener 2007).

The purpose of this brief note is to propose a subgeneric classification and provide brief diagnoses and a key for subgenera of *Triepeolus*, emphasizing the unique morphological features and biogeographic occurrence of the Eastern Hemisphere species relative to the considerable diversification of species throughout the Western Hemisphere as well as a distinct clade within Mesoamerica (Rightmyer 2004; Michener 2007). The distributions of these two groups certainly call to mind the many biogeographic connections between Asia and North America, and particularly those between Eurasia and Mesoamerica (e.g., Xie *et al.* 2014). The article is registered under ZooBank LSID urn:lsid:zoobank.org:pub:00C90308-0DA2-4D26-8635-E20B197CA9BF.

SYSTEMATICS

Genus *Triepeolus* Robertson

Key to subgenera of *Triepeolus*

- 1 Flagellomere I of female shorter than flagellomere II (Fig. 14); preoccipital carina restricted to genae, typically absent dorsally (present dorsally in *Mesepeolus*); metasomal sternum III of male without long, suberect, posteriorly directed, curved setae apically (such setae present and restricted to sterna IV and V) [Western Hemisphere] 2
- Flagellomere I of female as long as flagellomere II (Fig. 5); preoccipital carina always present dorsally (Figs 3, 4, 9, 10, 13); metasomal sternum III of male with long, suberect, posteriorly directed, curved setae medioapically (Fig. 15) [Eurasia] *Eurepeolus* subgen. n.



Figs 1-2. — *Triepeolus (Eurepeolus) tristis* (Smith), lateral habitus: 1, ♀; 2, ♂.

Figs 3-6. — *Triepeolus (Eurepeolus) tristis* (Smith): 3, ♀ dorsal habitus; 4, ♂ dorsal habitus; 5, ♀ facial view; 6, ♂ facial view.



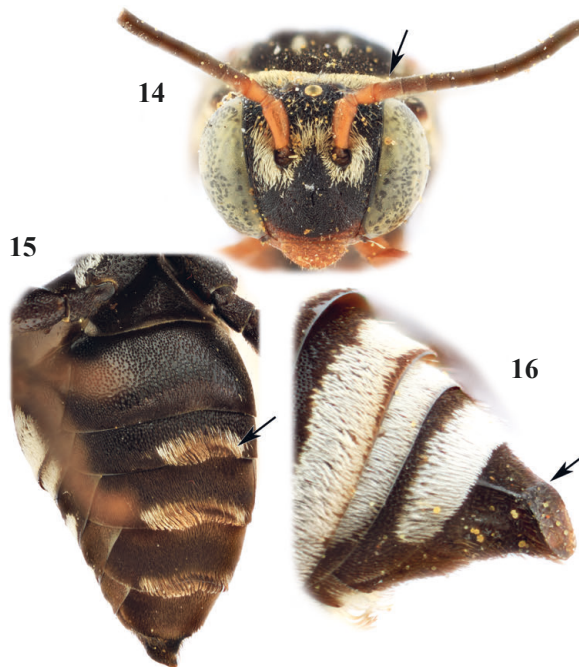
Figs 7–8. — *Trypeolus (Europeolus) ventralis* (Meade-Waldo), lateral habitus: 7, ♀; 8, ♂.

Figs 9–12. — *Trypeolus (Europeolus) ventralis* (Meade-Waldo): 9, ♀ dorsal habitus; 10, ♂ dorsal habitus; 11, ♀ facial view; 12, ♂ facial view.

- 2 Pseudopygidial area of female with transverse band of silvery setae (Fig. 25); preoccipital carina present dorsally but not laterally (*i.e.*, not on gena), carina low on posterior surface of head, lower than and rounded down from plane of vertex and lateral ocelli; labrum with medioapical scoop-like process (Fig. 23) [southwestern Mexico to Costa Rica] *Mesepeolus* subgen. n.
- Pseudopygidial area of female without band of silvery setae; preoccipital carina restricted to genae or *if* present dorsally, then carina at peak of posterior surface of head and roughly on plane with lateral ocelli [in *Triepeolus distinctus* (Cresson)]; labrum variable, often with medial depression between paramedial apical tubercles (Fig. 14), but never with scoop-like process [Canada to northern Argentina] *Triepeolus* Robertson s. str.



Fig. 13. — *Triepeolus* (*Eurepeolus*) *tristis* (Smith), ♀, dorsal view of head, with arrows pointing to preoccipital carina.



Figs 14–16. — Characters of *Triepeolus* Robertson: 14, *Triepeolus* (*Triepeolus*) *lunatus* (Say), ♀, facial view (arrow points to long flagellomere II); 15, *T. (Eurepeolus) tristis* (Smith), ♂, metasoma, ventral view (arrow points to setae of sternum III); 16, *T. (Eurepeolus) ventralis* (Meade-Waldo), ♂, metasomal apex (arrow points to angle between dorsal and posterior surfaces of pygidial plate).

***Eurepeolus* subgen. n.**

Type species: Epeolus tristis Smith, 1854 (Smith 1854).

Diagnosis: This subgenus encompasses the two Eastern Hemisphere species of *Triepeolus* (Figs 1–12), not only highlighting their distinctive biogeographic occurrences but also their notable differences from most other members of the genus. *Triepeolus tristis* (Smith) and *T. ventralis* (Meade-Waldo) have a continuous preoccipital carina, complete with sections dorsally and on genae, and the dorsal section is situated at the peak of the posterior surface and vertex (Fig. 13). Additionally, both species have flagellomere I of the female as long as flagellomere II (Figs 5, 11) (rather than shorter in the Western Hemisphere *Triepeolus*: Figs 14, 21), and males have long, suberect, posteriorly directed, curved setae apically on metasomal sternum III (Fig. 15) (absent in their Western Hemisphere congeners). Additional characters include: maxillary palpus trimerous; lateral process of female tergum VII not elongate (as in *Mesepeolus* and differing from the elongate lateral process found in *Triepeolus* s. str.); pygidial plate of male angulate, with distinct dorsal and distal surfaces (Fig. 16). A true metabasitibial plate, like other *Triepeolus*,



Figs 17–18. — *Triepeolus (Mesepeolus) epeolurus* Rightmyer, lateral habitus: 17, ♀; 18, ♂.

is seemingly absent. The purported presence of the plate as represented by a slight apical demarcation appears to be difficult assertion to corroborate. Admittedly, the homology is challenging, but the slight tubercle at the apex of where a plate would be seems to be the same as the other setigerous tubercles along the metatibia and that this is merely the proximal-most of these, rather than the apical indication of a vestigial plate.

Etymology: The new subgeneric name is a combination of the Latin noun *eurus*, meaning, 'East' or 'east wind') and the generic name *Epeolus* Latreille [a name formed of Macaronic Latin, *i.e.*, combining a French vernacular with a Latin ending, in this case *épée*, meaning, a 'a blunted sword used in fencing', and the Latin suffix *-olus*, a diminutive used in place of *-ulus* whenever preceded by an *i* or *e* and taking the form *-eolus* with nouns ending in *eus*; Latreille (1802) notes the short spines of the mesoscutellum as distinct for his genus, '*écusson souvent armé de pointes ou échancré*', and appears to have based the name on this feature of Epeolini]. The name refers to the Eastern Hemisphere distribution of the group. The gender of the name is masculine.



Figs 19–22. — *Triepeolus* (*Mesepeolus*) *epeolurus* Rightmyer: 19, ♀ dorsal habitus; 20, ♂ dorsal habitus; 21, ♀ facial view; 22, ♂ facial view.

ZooBank: urn:lsid:zoobank.org:act:05B15F9D-59C6-496E-AA8A-13B708C57204.

Mesepeolus subgen. n.

Type species: Triepeolus epeolurus Rightmyer, 2004 (Rightmyer 2004).

Diagnosis: This subgenus includes a remarkable Mesoamerican species that in many respects is annectant between *Triepeolus* and *Epeolus* (Figs 17–22), at least superficially given that the two genera are not sisters (although see Lim *et al.* 2022). The similarity to *Epeolus* comes from the presence of a band of silvery setae on the pseudopygidial area (Fig. 25), a character not found elsewhere in Epeolini except for *Epeolus*, and in the presence of discontinuous preoccipital carina with a dorsal portion on the posterior surface of the head, albeit lower down on the posterior surface rather than on the upper and posteriormost edge of the vertex as is the case in *Triepeolus* s. str. and *Eurepeolus*. Like other Western Hemisphere *Triepeolus* flagellomere I of the female is shorter than flagellomere II (Fig. 21) and metasomal



Figs 23–25. — Characters of *Triepeolus (Mesepeolus) epeolurus* Rightmyer: 23, ♀ labrum; 24, ♂ metasomal apex; 25, ♀ metasomal apex, pseudopygidial area (with lunule of silvery setae proximally), pygidial plate, and apices of lateral apical processes of sternum VI.

sternum III of the male lacks the long, suberect, posteriorly directed, curved, apical setae of *Eurepeolus*. The form of the labrum is unique to the group, with a distinctive medioapical scoop-like process (Fig. 23), rather than the typical paramedial tubercles bordering a medioapical depression. Additional characters include the dimerous maxillary palpus; lateral process of female tergum VII not elongate (as in *Eurepeolus* but differing from the elongate condition found in *Triepeolus* s. str.); and the weakly angulate pygidial plate of the male (Fig. 24), with weakly differentiated dorsal and posterior surfaces.

Etymology: The new subgeneric name is a combination of the Ancient Greek adjective μέσος (*mésos*, meaning, ‘middle’ or ‘amidst’) and the generic name *Epeolus* Latreille. The gender of the name is masculine.

ZooBank: urn:lsid:zoobank.org:act:0092BBA6-472C-4A25-8677-AC8B63B92F16.

ACKNOWLEDGEMENTS

The author is grateful to Jennifer C. Thomas and Rebecca K. Hawkins for their assistance with microphotography, to an anonymous reviewer for their detailed and helpful critique, to the late Donald B. Baker for lively conversation on the classification of Eastern Hemisphere *Triepeolus* (although we ultimately differed in our conclusions: he advocated for them to be generically distinct, while I consider them to share far too many similarities to be so segregated), and to the late Charles D. Michener for discussions on the classification and character homologies of these and many groups of bees.

REFERENCES

- Engel, M.S. 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.
- Latreille, P.A. 1802. *Histoire Naturelle des Fourmis, et recueil de memoires et d'observations sur les abeilles, les araignées, les faucheurs, et autres insectes*. Paris: Crapelet.
- Lim, K., Lee, S., Orr, M. & Lee, S. 2022. Harrison's rule corroborated for the body size of cleptoparasitic cuckoo bees (Hymenoptera: Apidae: Nomadinae) and their hosts. *Scientific Reports* **12**: 10984 [1–12].
- Michener, C.D. 2007. *The Bees of the World* [2nd Edition]. Baltimore: Johns Hopkins University Press.
- Rightmyer, M.G. 2004. Phylogeny and classification of the parasitic bee tribe Epeolini (Hymenoptera: Apidae, Nomadinae). *Scientific Papers, Natural History Museum, University of Kansas* **33**: 1–51.
- Smith, F. 1854. Part II. Apidae, pp. 199–465. In: *Catalogue of Hymenopterous Insects in the Collection of the British Museum*. London: Trustees of the British Museum.
- Xie, L., Yang, Z.-Y., Wen, J., Li, D.-Z. & Yi, T.-S. 2014. Biogeographic history of *Pistacia* (Anacardiaceae), emphasizing the evolution of the Madrean-Tethyan and the eastern Asian-Tethyan disjunctions. *Molecular Phylogenetics and Evolution* **77**: 136–146.