



Taxonomy of the Oriental genus *Bolbochromus*: a generic overview and descriptions of four new species (Coleoptera: Geotrupidae: Bolboceratinae)

JAN KRIKKEN¹ & CHUN-LIN LI^{2,3}

¹Naturalis Biodiversity Center / National Museum of Natural History, 2300 RA Leiden, Netherlands.

²The Experimental Forest, National Taiwan University, Nantou 557, Taiwan, Republic of China.

E-mail: jan.krikken@naturalis.nl; chunlin21@hotmail.com

³Co-corresponding author

Abstract

A taxonomic overview of the essentially Oriental genus *Bolbochromus* Boucomont, 1909 is given. Two new southeast Asian subgenera are proposed: *Metabolbochromus* (type species *Scarabaeus sulcicollis* Wiedemann, 1819), characterised by unique male genitalia (lacking separated parameres), and *Bolbochromops* (type species *Bolboceras ludekingi* Lansberge, 1886), with a distinctly two-horned head (but with separated parameres). The remaining known *Bolbochromus*, apparently all with a distinct pair of parameres and a distinct frontovertexal protrusion only, are left in the nominotypical subgenus, awaiting a reappraisal of the poorly sampled continental fauna. Four new species are described and compared with close relatives, all in the nominotypical subgenus: *Bolbochromus* (*Bolbochromus*) *dumogensis* (Sulawesi), *B.* (*Bolbochromus*) *mindanaicus* (Philippines), *B.* (*Bolbochromus*) *pumilus* (south India), and *B.* (*Bolbochromus*) *sinensis* (south China). Identity of type species of *Bolbochromus* to be established (type of *Bolboceras laetus* Westwood, 1852 not found, and type locality Ceylon doubtful). All named *Bolbochromus* taxa are listed and characterised (some of them tentatively) in a synoptic table. The southeast Asian island taxa are all keyed and diagnosed, along with notes on variation, range extensions, taxon ranking, and illustrations.

Key words: Coleoptera, Geotrupidae, *Bolbochromus*, key, genus description, new subgenera, new species, Oriental Region

Introduction

For almost a century the genus *Bolbochromus* Boucomont, 1909 has barely been mentioned, but lately there has been a modest surge of papers, *i.e.*, Li *et al.* (2008), Ochi *et al.* (2010), Ochi *et al.* (2011), Keith (2012), and Li *et al.* (2013). The genus ranges throughout the Oriental Region (north to the Ryukyu Islands), now comprising 19 named species (12 described before 1915, one in 1984, six during the past few years, see list below). In this paper, four new species are added. Li *et al.* (2013) just published a review of *Bolbochromus* focusing on continental southeast Asia; here the emphasis is on the *Bolbochromus* of the southeast Asian islands. Really informative material remains hard to come by, and is particularly wanting from large tracts of continental south Asia. Without informative series of specimens, populational and individual variation, in several *Bolbochromus* species particularly obvious in their dorsal colour patterns, is difficult to interpret taxonomically. This applies to ranking (like species versus subspecies), and to the recognition of any parallelisms in similar patterns between different species. Note also that some species seem to have a very limited distribution (like *B. dumogensis* new species from Sulawesi).

Additionally, the genus as currently conceived appears internally heterogeneous, *i.e.*, in a way justifying formal supraspecific clustering of at least some of the species. Differences in the basic structure of the male genitalia and in the configuration of certain forebody details support the recognition of new subgenera in the southeast Asian islands, where the genus ranges east to Mindanao, Sulawesi and the Lesser Sundas. Although an overview of the total set of *Bolbochromus*-like taxa is given in this paper, the focus is here indeed on the identification of the southeast Asian island fauna (by way of a key, species diagnoses, and illustrations). The new subgenera are diagnosed, and two new island species are described. As implied above, the continental fauna

Acknowledgements

The former and present owners and curatorial staff of the collection material used in preparing this overview are sincerely thanked for their patient collaboration (see list of collections under Material and methods). Some specimens stem from the field work of colleagues, including J. Huijbregts (The Netherlands) and A. J. Davis (United Kingdom). The new Sulawesi species was collected during Project Wallace 1985 of the Royal Entomological Society of London and the first author is grateful to the sponsors and organisers. Our colleague A.B.T. Smith (CMNC) kindly looked at the final draft of this paper.

References cited

- Bouchard, P., Bousquet, Y., Davies, A.E., Alonso-Zarazaga, M.A., Lawrence, J.F., Lyal, C.H.C., Newton, A.F., Reid, C.A.M., Schmitt, M., Ślipiński, S.A. & Smith, A.B.T. (2011) Family-group names in Coleoptera (Insecta). *ZooKeys*, 88, 1–972. <http://dx.doi.org/10.3897/zookeys.88.807>
- Boucomont, A. (1909) Notes sur quelques sous-genres de *Bolboceras* (Col.) et description d'un sous-genere nouveau. *Bulletin de la Société Entomologique de France*, 1909, 116–118.
- Boucomont, A. (1912) Scarabaeidae: Taurocerastinae, Geotrupinae. *Coleopterorum Catalogus*, 46, 1–47.
- Boucomont, A. (1914) Les coprophages de l'Archipel Malais. *Annales de la Société Entomologique de France*, 83, 238–350.
- Boucomont, A. & Gillet, J. (1921) *Faune entomologique de l'Indochine française. Fasc. 4. Fam. Scarabaeidae. Laparosticti (Coléoptères)*. Portail, Saigon, Vietnam, 1–76.
- Carpaneto, G.M. & Mignani, R. (2005) A new species of the genus *Odonteus* (Coleoptera: Geotrupidae) from northern Pakistan. *Zootaxa*, 968, 1–10 + erratum.
- Drake, C.J. (1957) An undescribed apterous Aradid from the Philippines (Hemiptera). *Proceedings of the Entomological Society of Washington*, 59, 169–171.
- Hua, L.-Z. (2002) *List of Chinese insects. Vol. II. Zhongshan (Sun Yatsen) University Press, Guangzhou, China*, 612 pp.
- Keith, D. (2012) Description de deux nouvelles espèces de Scarabaeoidea d'Asie (Coleoptera, Melolonthidae, Bolboceratidae). *Nouvelle Revue d'Entomologie (Nouvelle Série)*, 28, 3–10.
- Král, D., Löbl, I. & Nikolajev, G.V. (2006) Family Bolboceratidae Mulsant, 1842, *In: Löbl, I. & Smetana, A. (Eds.), Catalogue of Palaearctic Coleoptera. Vol. 3*. Apollo Books, Stenstrup Denmark, pp. 82–84.
- Krikken, J. (1977) The genus *Bolbelasmus* Boucomont in Asia, with notes on species occurring in other regions (Coleoptera: Geotrupidae). *Zoologische Mededelingen Leiden*, 51, 277–292.
- Krikken, J. (1979) The genus *Bolbocerosoma* Schaeffer in Asia (Coleoptera: Geotrupidae). *Zoologische Mededelingen Leiden*, 54, 35–51.
- Krikken, J. (2013) Oriental *Bolboceras*: Introduction to the genus and taxonomy of the *nigricans* group of species (Coleoptera: Geotrupidae: Bolboceratinae). *Tijdschrift voor Entomologie*, 156, 35–56. <http://dx.doi.org/10.1163/22119434-00002018>
- Lansberge, J.W. van (1886) Description de quelques Scarabéides des Indes néerlandaises appartenant au Musée de Leyde. *Notes from the Leyden Museum*, 8, 131–137.
- Li, C.-L., Wang, C.-C., Masumoto, K., Ochi, T. & Yang, P.-S. (2008) Review of the tribe Bolboceratini s.l. from Taiwan (Coleoptera: Scarabaeoidea: Geotrupidae) with a key to the Eurasian genera. *Annals of the Entomological Society of America*, 101, 474–490. [http://dx.doi.org/10.1603/0013-8746\(2008\)101\[474:ROTTBS\]2.0.CO;2](http://dx.doi.org/10.1603/0013-8746(2008)101[474:ROTTBS]2.0.CO;2)
- Li, C.-L., Yang, P.-S., Krikken, J. & Wang, C.-C. (2013) Three new species of *Bolbochromus* Boucomont (Coleoptera, Geotrupidae, Bolboceratinae) from Southeast Asia. *ZooKeys*, 290, 39–54. <http://dx.doi.org/10.3897/zookeys.290.4696>
- Masumoto, K. (1984) New coprophagous Lamellicornia from Japan and Formosa. *Entomological Review of Japan*, 39, 167–173.
- Nikolajev, G.V. (1970) [Taxonomic position of groups included in the subfamily Geotrupinae (Col., Scarabaeidae)]. *Materials of the Second Scientific Session of Young Specialists and PhD Candidates (Thesis of Lectures), Kazakhstan*, 31–34. [in Russian]
- Ochi, T., Kon, M. & Kawahara, M. (2010) A new species of *Bolbochromus* from the Philippines (Coleoptera, Scarabaeidae). *Kogane*, 11, 97–99.
- Ochi, T., Kon, M. & Kawahara, M. (2011) Four new taxa of Scarabaeoidea (Coleoptera) from southeast Asia. *Special Publications Japanese Society of Scarabaeoidology (Tokyo)*, 1, 153–162.
- Paulian, R. (1945) *Faune de l'Empire Français. III. Coléoptères Scarabéides de l'Indochine. Première partie*. Larose, Paris, France, 228 pp.
- Pouillaude, I. (1914) *Bolbochromus Walshii* et *B. niger*. Nouvelles espèces de Bolbocerini (Col. Scarabaeidae). *Insecta (Rennes)*, 1914, 143–145.

- Shokhin, I.V. (2008) Contribution to the fauna of lamellicorn beetles (Coleoptera, Scarabaeoidea) of southern Russia, with some nomenclatural changes in the family Scarabaeidae. *Kavkazskii Entomologicheskii Byulleten*, 3 (2007), 105–185.
- Westwood, J.O. (1848a) Descriptions of some new or imperfectly known species of *Bolboceras*. *Proceedings of the Linnean Society of London*, 1, 384–387.
<http://dx.doi.org/10.1111/j.1096-3642.1852.tb00496.x>
- Westwood, J.O. (1848b) Descriptions of some new or imperfectly known species of *Bolboceras*. *Annals and Magazine of Natural History*, 2 (2), 353–356. [same text as 1848a]
- Westwood, J.O. (1852) Descriptions of some new or imperfectly known species of *Bolboceras*, Kirby. *Transactions of the Linnean Society of London*, 21, 19–30.
<http://dx.doi.org/10.1111/j.1096-3642.1852.tb00496.x>
- Wiedemann, C.R.W. (1819) Neue Käfer aus Bengalen und Java. *Zoologisches Magazin*, 1 (3), 157–183.
- Wiedemann, C.R.W. (1823) Zweihundert neue Käfer von Java, Bengalen, und dem Vorgebirge der guten Hoffnung. *Zoologisches Magazin*, 2 (1), 1–153.