

DNA but not always morphology help to recognise monophyletic genera within ‘*Cercyon*’ terrestrial water scavenger beetles: a case study of *Asiacyon* gen. nov. (Coleoptera: Hydrophilidae)

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ABSTRACT

DNA-based studies have revealed that the terrestrial water scavenger beetle genus *Cercyon* Leach, 1817 (Coleoptera: Hydrophilidae: Sphaeridiinae: Megasternini) is polyphyletic, grouping similarly looking but unrelated species that were not assigned to other genera due to the absence of unusual morphological characters. In this study, we analyse the morphology, DNA data and species diversity of one of the Asian clades of ‘*Cercyon*’ to test whether a natural, phylogeny-based generic classification can be established. We add DNA data (five nuclear and three mitochondrial fragments) for additional species and specimens of the clade to test its monophyly and reveal phylogenetic relationships among species. We perform a detailed morphological study of all species, including SEM micrographs, to reveal synapomorphies of the DNA-based clades. We demonstrate that the lineage, described here as *Asiacyon* Mai, Jia, Ryndevich & Fikáček, gen. nov., is strongly supported by DNA data, has limited distribution (eastern Asia), and its species share similar biology (inhabiting fresh or decaying plant tissues), though it can be only diagnosed by a combination of plesiomorphic characters. A detailed treatment is provided for the Chinese species, including species diagnoses, illustrations of habitus and male genitalia, (re)descriptions and a key to species. A total of 14 Chinese species are recognised, of which 11 are described as new: *Asiacyon pax* sp. nov. (Guangdong, Hong Kong, Hunan), *A. pseudincretus* sp. nov. (Anhui, Jiangxi, Taiwan, Zhejiang), *A. vicincretus* sp. nov. (Guangdong, Guangxi), *A. zhengyucheni* sp. nov. (Yunnan), *A. huilanae* sp. nov. (Yunnan), *A. cornipenis* sp. nov. (Yunnan), *A. belousovi* sp. nov. (Yunnan), *A. liangchengi* sp. nov. (Yunnan), *A. paraequalis* sp. nov. (Yunnan), *A. pengzhongji* sp. nov. (Hunan) and *A. xiuzhenae* sp. nov. (Hainan, Yunnan). Three Chinese species previously classified in *Cercyon* are transferred to *Asiacyon*: *A. incretus* (d’Orchymont, 1941), comb. nov., *A. primoricus* (Ryndevich & Prokin, 2017), comb. nov. (newly recorded from China) and *A. indicus* (d’Orchymont, 1926), comb. nov. (newly recorded from China and Laos). Additionally, seven Asian species previously classified in *Cercyon* are transferred to *Asiacyon* based on their external morphology, but not studied in detail: *A. aequalis* (Sharp, 1884), comb. nov., *A. conjiciens* (Walker, 1858), comb. nov., *A. dilutus* (Régimbart, 1903), comb. nov., *A. placidus* (Sharp, 1884), comb. nov., *A. pseudodilutus* (Satô, 1979), comb. nov., *A. retius* (Ryndevich & Prokin, 2017), comb. nov., and *A. rubicundus* (Sharp, 1884), comb. nov. In total, the genus now comprises 21 named species and several undescribed species from India, Myanmar and Indonesia.

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Keywords: Asia, China, Hydrophilidae, identification key, Megasternini, molecular systematics, morphology, natural classification, new combination, new genus, new species, Sphaeridiinae.

Introduction

As the largest tribe of the family Hydrophilidae (water scavenger beetles), the predominantly terrestrial Megasternini contains ~1000 species, of which ~550 have been named so far (e.g. Short and Fikáček 2013; Jia *et al.* 2020; Arriaga-Varela *et al.* 2021). Nearly half of them (260 species) have been traditionally classified in the globally distributed