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A review of *Billaea* Robineau-Desvoidy of the eastern Palearctic and Oriental regions (Diptera: Tachinidae)

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Abstract

The species of *Billaea* Robineau-Desvoidy (Diptera, Tachinidae) from the eastern Palearctic and Oriental regions are revised. Ten described species are recognized, viz. *B. atkinsoni* (Baranov) (new records for Japan, Laos, Malaysia, Pakistan and Thailand), *B. ficorum* (Townsend), *B. fortis* (Rondani), *B. impigra* Kolomiets (new record for China), *B. kolomyetzi* Mesnil, *B. malayana* Malloch, *B. morosa* Mesnil, *B. robusta* Malloch, *B. steini* (Brauer et Bergenstamm) and *B. triangulifera* (Zetterstedt) and nine species are described as new to science, *B. brevicauda* Zhang et Shima **sp. nov.** (China), *B. carinata* Zhang et Shima **sp. nov.** (China), *B. chinensis* Zhang et Shima **sp. nov.** (China and Vietnam), *B. flava* Zhang et Wang **sp. nov.** (China), *B. kurahashii* Zhang et Shima **sp. nov.** (Laos and Thailand), *B. micronychia* Zhang et Shima **sp. nov.** (China and Japan; previously misidentified from China as *B. irrorata* (Meigen)), *B. papei* Zhang et Shima

sp. nov. (Malaysia), *B. setigera* Zhang et Shima **sp. nov.** (China) and *B. verticalis* Shima et Zhang **sp. nov.** (China). *Billaea fasciata* (Townsend, 1928) is treated as a junior synonym of *B. ficorum* (Townsend, 1916), syn. nov. *Billaea irrorata* is no longer recorded from the eastern Palearctic. A key to 19 species of *Billaea* from the eastern Palearctic and Oriental regions and 101 figures of male terminalia, bodies, heads and abdomens are given.

Key words: Calypttratae, Dexiinae, Dexiini, new species, key, East Asia

Introduction

The dexiine *Billaea* Robineau-Desvoidy is a large genus of worldwide distribution (O'Hara 2014): 17 species from the Palearctic Region (Herting 1984; Herting & Dely-Draskovits 1993), 5 from the Oriental (Crosskey 1976), 23 from the Afrotropical (Crosskey 1980), 2 from the Australasian and Oceanian (Cantrell & Crosskey 1989), 9 from the Nearctic (O'Hara & Wood 2004), and at least 8 species from Neotropical Region (Guimarães 1971, 1977; Toma & Nihei 2006). Since Robineau-Desvoidy (1830) erected the genus *Billaea* with one species, many genera were proposed for the same or different species from the Palearctic or Oriental regions by Robineau-Desvoidy himself or other authors. These genera were revised by Crosskey (1976) and Mesnil (1980) and placed as junior synonyms of *Billaea*. Meanwhile, some species were added to *Billaea* from the Palearctic, Afrotropical and Neotropical regions.

The reason for the different systematic treatments of *Billaea* is mainly due to the morphological similarity among dexiine genera. We follow here Crosskey (1976) and Mesnil (1980) in the treatment of *Billaea* and characterize the genus by the combination of the following features: vertex narrow in male, less than 1/4 head width in dorsal view, fronto-orbital plate with more or less dense fine hairs, facial carina usually low and sometimes developed; flagellomere 1 1.5–4.5 times as long as pedicel, palpus developed; proepisternum haired, postpronotal lobe with 3–5 setae, 4 dorsocentral setae on postsutural scutum, 2 or 3 katepisternal setae, 1 developed anepimeral seta; second costal sector of wing bare ventrally, cell r_{4+5} open, bend of vein M angulated, usually with a short appendix; legs medium in length, fore tarsi about as long as head height, mid tibia with 2–3 anterodorsal setae, hind tibia of male usually with a row of regular anterodorsal setae of equal length and spacing; abdomen ovate to long ovate, syntergite 1+2 medially excavated to its posterior margin, usually without median marginal setae in both sexes, tergites 3 and 4 without median discal setae, and tergite 5 with median discal setae in male.

In the course of our systematic study of Dexiini of East Asia, we have found that *Billaea* is more diverse in China and southeastern Asia than previously known, and report here 8 Palearctic species (including 2 new species) and 11 Oriental species (including 7 new species). A key to 19 eastern Palearctic and Oriental species is provided and 101 photos of heads and abdomens and diagnostic illustrations of male terminalia of species from East Asia are given.

Material and methods

Institutional Abbreviations. The acronyms of collections cited in this work are as follows:

BLKU	Biosystematics Laboratory, Kyushu University, Fukuoka, Japan.
BMNH	Natural History Museum, London, UK.
BPBM	Bishop Museum, Honolulu, Hawaii, USA.
CNC	Canadian National Collection of Insects, Ottawa, Ontario, Canada.
ITBC	Institute for Tropical Biology and Conservation, University Sabah Malaysia, Sabah, Malaysia
IZCAS	Institute of Zoology, Chinese Academy of Sciences, Beijing, China.
KUM	Kyushu University Museum, Kyushu University, Fukuoka, Japan
MZF	Museo Zoologico “La Specola, Firenze [Florence], Italy.
MZLU	Museum of Zoology, Lund University, Lund, Sweden.
NHMW	Naturhistorisches Museum, Wien, Austria.
SEMC	Shanghai Entomological Museum, Chinese Academy of Sciences, Shanghai, China.
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany.
SYNU	Insect Collection of Shenyang Normal University, Shenyang, China.

Petersburg), helped us with the description of *B. impigra* and sent a figure of the male terminalia of the type. This study was supported by the National Natural Science Foundation of China (Nos. 31272279, 30870331, 31093430, 31493021), and the Director Foundation of Ecology and Environmental Science Center of Shenyang Normal University (EERC-K-201301), and was also supported by a Grant-in-Aid for International Scientific Research Program (Field Research) from the Ministry of Education, Science, Culture and Sports, Japan (Nos. 04041043, 05041099, 07041141) and a Grant-in-Aid for Scientific Research (B) (1) from the Japan Society for the Promotion of Science (No. 12440241).

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