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## The fauna of the family Bombycidae sensu lato (Insecta, Lepidoptera, Bombycoidea) from Mainland China, Taiwan and Hainan Islands

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## Abstract

Seventy-seven species of family Bombycidae s. lat., belonging to 25 genera in three subfamilies, that have been recorded from China are listed and described, with illustrations of the adults, preimaginal stages (if available), and their genitalia. Keys to subfamilies and genera are provided. Two new genera and four new species are described, two subgenera are raised to generic status, seven new combinations are made, and one genus and six species are newly recorded from China. The new taxa are as follows: *Rotunda* Wang, X. & Zolotuhin, **gen. nov.**, *Comparmustilia* Wang, X. & Zolotuhin, **gen. nov.**, *Triuncina daii* Wang, X. & Zolotuhin, **sp. nov.**, *Triuncina xiongi* Wang, X. & Zolotuhin, **sp. nov.**, *Gnathocinara boi* Wang, X. & Zolotuhin, **sp. nov.** and *Promustilia yajiangensis* Wang, X. & Zolotuhin, **sp. nov.** The taxa newly recorded for China are: *Sesquiluna* Forbes, 1955; *Trilocha friedeli* Dierl, 1978; *Bivincula kalikotei* Dierl, 1978; *Sesquiluna forbesi* Zolotuhin & Witt, 2009; *Mustilizans lepusa* Zolotuhin, 2007; *Smerkata brechlini* (Zolotuhin, 2007) and *Mustilia castanea* Moore, 1879. The seven new combinations are: *Rotunda rotundapex* (Miyata & Kishida, 1990), **comb. nov.**, *Triuncina nitida* (Chu & Wang, L.Y., 1993), **comb. nov.**, *Gunda sesostris* (Vuillot, 1893), **comb. nov.**, *Smerkata fusca* (Kishida, 1993), **comb. nov.**, *Comparmustilia sphingiformis* (Moore, 1879), **comb. nov.**, *Comparmustilia semiravida* (Yang, 1995), **comb. nov.**, *Comparmustilia gerontica* (West, 1932), **comb. nov.**. The two subgenera raised to generic level are: *Promustilia* Zolotuhin, 2007, **stat. nov.** and *Smerkata* Zolotuhin, 2007, **stat. nov.**. The distributions of the species in China were determined and distributional maps provided. All type specimens of the new species described here are deposited in the College of Plant Protection, Hunan Agricultural University, China (HUNAU); Department of Entomology, South China Agricultural University, China (SCAU); Kyushu University Museum, Kyushu University, Japan (KUM), and Entomological Museum Thomas J. Witt, Munich, Germany (MWM).

**Key words:** Lepidoptera, Bombycidae, taxonomy, new genus, new species, new record, morphology, immature stages, genitalia, larval host plants, geographical distribution, China

## Introduction

The family Bombycidae s. lat. belongs to the lepidopteran superfamily Bombycoidea and contains about 40 genera and 350 species (Lemaire & Minet, 1999). The best-known species is the silkworm, *Bombyx mori* (Linnaeus, 1758), which has been domesticated for several millennia. Another well-known species is wild silkworm, *Bombyx mandarina*, which is also native to Asia. Several other bombycid species are economically important pests in the agriculture, forestry, sericulture and horticulture industries. Bombycid moths are widely distributed around the world, of which twenty percent are recorded from China, which includes two of the twenty-five biodiversity hotspots in the world (Myers *et al.*, 2000).

Dierl (1978, 1979) reviewed the Oriental Bombycidae, which includes many of the species in China, and reported 42 species belonging to eight genera, including six new genera, eight new species and two new subspecies. Kishida (1992b, 1993a) recorded 13 bombycid species in eight genera from Taiwan. Chu & Wang (1993) reported nine genera and 28 species of Chinese bombycid moths, of which ten new species were described but many have subsequently been shown to be synonyms of previously known species. Subsequently, Chu & Wang (1996) presented detailed discussion of the morphology, biology and distributions of those 28 species. Finally, many important descriptions by Yang (1995a) and Yang and Mao (1995) were published in poorly known journals and have thus been overlooked by European scientists. However, despite these works, until now, a comprehensive study of the Chinese bombycid fauna has not been undertaken.

During the past 20 years, much scientific progress has been made in the classification and phylogenetics of the family Bombycidae, with great advances being made based on analysis of molecular data (Arunkumar *et al.*, 2006; Hwang *et al.*, 1999; Mahendran *et al.*, 2006a, 2006b; Zwick, 2008; Zwick *et al.*, 2011). Holloway (1987) was one of the first to consider members of the Oriental Bombycidae to comprise two lineages based on characters of wing venation and male genitalia. Zwick *et al.* (2011) placed three groups previously included in the bombycid subfamily Prismoctictinae in families Mirinidae and Endromidae. Subsequently, this treatment was followed by Nieuwerkerken *et al.* (2011) and Wu *et al.* (2013), but Kishida (2013) still followed Lemaire & Minet (1999), and treated Prismoctictinae and Oberthueriini as members of family Bombycidae. However, Zwick *et al.* (2011), did not include representatives of many bombycid genera and so although a useful basis for future study, we do not consider it a full confirmation of the evolutionary relationships of the family Bombycidae. Furthermore, they made no attempt to integrate genetic and morphological data, and thus separated apparently morphologically related groups of Bombycidae s. lat., into the so-far not morphologically supported family, “Endromi(di)dae s. lat.”. We consider that more data are necessary to fully analyze the systematic relationship of the subfamilies and genera in the family Bombycidae, the relationships among which are still unclear. In this paper, we continue to follow the systematic arrangement of Lemaire & Minet (1999).

Based on specimens in museums and materials collected from the field, all the bombycid species in China have been examined and confirmed. Distribution maps are presented, together with keys to the subfamilies, genera and species found in China.

## History

Chinese history is closely bound to the development of silkworm rearing and the silk production industry. The origin of silk has a very beautiful story in China. Once upon a time, Lei Zu, who was the wife of the Yellow Emperor, sat under a mulberry tree enjoying herb tea. Suddenly, a silkworm cocoon fell into her cup. The Empress took the cocoon out but was amazed to find that it began to unwind. The fine thread became longer and longer until it was meters long. At that moment, Lei Zu realized that it was a wonderful material to make into a textile. From that time, the Empress was called “The Goddess of Silk”. In her honor, the cocoons of silkworms were displayed on altars at special feasts.

History says that the cocoons and their amazing properties were discovered by ancient Chinese people almost 5 000 years ago, but the silkworm was first domesticated during the Shang Dynasty (1600-1046 B.C.).