



## *Arge pyracanthae* n. sp. (Hymenoptera: Argidae) feeding on *Pyracantha fortuneana* in Hunan Province, China

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### Abstract

*Arge pyracanthae* Wei & Shinohara, n. sp. is described from Mt. Hupingshan, Hunan Province, China, including COI sequences from two specimens. Larvae are solitary external leaf feeders on *Pyracantha fortuneana* (Maxim.) H. L. Li (Rosaceae). Field observations and rearing experiments showed that this species has a multivoltine life cycle. This is the first record of an argid sawfly associated with *Pyracantha*.

**Key words:** new species, host plant, life history, DNA barcode

### Introduction

Chinese fauna of the sawfly genus *Arge* is very rich. Wei *et al.* (2006) listed 112 species and several additional species have been described thereafter (Hara & Shinohara 2008; Nie & Wei 2008; Wei 2008; Zhang & Wei 2008; Shinohara *et al.* 2009, 2011b). However, there should remain many more species to be described or newly recorded from this vast country and the host plants and immature stages are unknown for almost all species recorded.

In May, 2013, Shinohara found some argid larvae feeding on the leaves of *Pyracantha fortuneana* (Maxim.) H. L. Li (Rosaceae) in Shinianzigou on Mt. Hupingshan, Hunan Province, and succeeded in obtaining the adults by rearing them. An examination of the adults has revealed that they belong to an undescribed species closely related to *Arge qinlingia* Wei, 1998, from central and northern China. Here we describe and illustrate the new species under the name of *A. pyracanthae* and give notes on its life history based on the rearing records. It is a multivoltine species with cryptic solitary larvae. This is the first record of Argidae associated with *Pyracantha*. The DNA barcoding data (partial COI sequences from two larval specimens) have been deposited in GenBank (Accession No. KP193141 and KP193142).

### Material and methods

The material used in this work is kept in the National Museum of Nature and Science, Tsukuba (NSMT) and Central South University of Forestry and Technology, Changsha (CSCS).

For obtaining barcoding data (Hebert *et al.* 2003), total genomic DNA was extracted using DNeasy® Blood & Tissue Kit (QIAGEN) by the standard protocol. About 650bp fragment of COI was amplified by polymerase chain reaction (PCR) using TksGflex™ DNA Polymerase (TaKaRa) and universal primer pair, LCO1490 (5'–GGT CAA CAA ATC ATA AAG ATA TTG G–3') and HCO2198 (5'–TAA ACT TCA GGG TGA CCA AAA AAT CA–3') (Folmer *et al.* 1994) by the following thermal cycle parameters for 20 µl final volume: initial denaturation for 4

The genus *Pyracantha* belongs to the subtribe Pyrinae (*sensu* Potter *et al.* 2007, =subfamily Maloideae of former authors), a large monophyletic group of 30 genera including such *Arge* hosts as *Amelanchier*, *Aria*, *Aronia*, *Cotoneaster*, *Crataegus*, *Photinia* (incl. *Pourthiaea*), *Malus* and *Sorbus* (Potter *et al.* 2007). The intergeneric relationships within the Pyrinae are largely unresolved (Potter *et al.* 2007) and the sister-group of *Pyracantha* is unknown. In East Asia, only two species of *Arge* were known to be associated with the pyrine genera, *A. jonasi* (Kirby, 1882), an oligophagous species feeding on *Aria*, *Cotoneaster*, *Crataegus*, *Photinia* and *Sorbus* (Hara & Shinohara 2014) and *A. mali* (Uchiyama, 1906), a monophagous species feeding on *Malus* (Hara 2010). The three *Arge* species, *A. jonasi*, *A. mali* and *A. pyracanthae*, apparently have no close phylogenetic relationship and it is very interesting that their host plants do not overlap at the generic level. The ecological and evolutionary significance of this phenomenon remains to be investigated.

**Life history.** The records given above, though all under rearing conditions, strongly indicate that *A. pyracanthae* has a multivoltine life cycle. We know the length of the cocoon period of the new species but the duration of the egg and larval period is unknown. Shinohara *et al.* (2011a) summarized the length of the egg and larval stages of ten species of *Arge*. The egg period is about six to 12 days and the larval period is about 11 to 24 days for most species. If the egg and larval durations of *A. pyracanthae* also fall within these ranges, which is quite likely, one generation of *A. pyracanthae* would take 30 to 52 days without prolonged diapause. The eggs of the field-collected larvae should have been deposited in early to late May and the adults that emerged at the end of June to early July could produce another generation within the same year. The adults of this generation may appear in August and the larvae may mature and go into prolonged diapause in the cocoons in September to October. Following this putative scenario, *Arge pyracanthae* may possibly have three generations a year at the type locality. The existence of the polymodal emergence of the adults, which is common in *Arge* (e.g. Shinohara & Hara 2009; Shinohara *et al.* 2009), may be suggested by the late and isolated occurrence of a male adult (no. 11 in Table 1), but this should be confirmed by adding further examples.

As discussed above, *A. pyracanthae* is one of the three known East Asian species associated with the rosaceous subtribe Pyrinae. Two other species, *A. jonasi* and *A. mali*, differ greatly from each other in their life history strategies. *Arge jonasi* is a basically univoltine and oligophagous species with gregarious and aposematic larvae (Hara & Shinohara 2014), whereas *A. mali* is a multivoltine and monophagous species with solitary and cryptic larvae (Hara 2010). As far as we know, *Arge pyracanthae* is similar to *A. mali* in the life history traits.

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