

Molecular Systematics of the Tribe Blondeliini (Diptera: Tachinidae) in East Asia with a Taxonomic Review of Japanese Species

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<https://hdl.handle.net/2324/6787688>

出版情報 : Kyushu University, 2022, 博士 (理学), 課程博士

バージョン :

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論 文 名 : Molecular Systematics of the Tribe Blondeliini (Diptera: Tachinidae) in East Asia with a Taxonomic Review of Japanese Species

(東アジアにおける Blondeliini 族 (双翅目, ヤドリバエ科) の分子系統学と日本産の分類学的再検討)

区 分 : 甲

論 文 内 容 の 要 旨

Tachinidae are the second most species-rich family in the order Diptera, comprising approximately 6.5% dipteran species. Tachinids have highly diverse in morphological features, from their sizes to colorations. With such high diversity and variety of homoplastic external characters, the study of phylogeny of Tachinidae is always difficult. The tachinid tribe, Blondeliini, is considered heterogeneous due to the high diversity of body shapes and character states of the species in the tribe. Phylogenetic reconstruction of Blondeliini using nuclear protein-coding genes shows that the majority of species of the tribe forms a strongly supported monophyletic clade that is split into two main groups; however, the inter-generic relationships between the latter clade are poorly resolved, suggesting: “an early explosive radiation” of the clade. Monophyly occurs when the members of a taxon are all descendants from a common ancestor, and it is considered crucial for classification to reflect the phylogenetic relationship.

In Chapter 1 of this thesis, the following genetic markers, including 16S, 28S, white, and CAD sequence, were amplified and sequenced to reconstruct the phylogenetic tree using IQtree and MrBayes for analyzing maximum likelihood (ML) and Bayesian Markov chain Monte Carlo (MCMC) inference (BI), respectively. The phylogenetic trees were reconstructed to redefine the blondeliine taxa, unravel the relationships among the members, and reassess the characteristics of the tribe. A total of 27 genera belonging to the Blondeliini tribe from East Asia were examined in this study. In addition, the placements of some rogue genera were reassessed, and a new classification was proposed.

Based on the constructed phylogenetic trees, the tribe Blondeliini was reconstructed as a polyphyletic group. Most blondeliine genera were reconstructed as a strongly supported monophyletic clade, redefined Blondeliini. The “redefined Blondeliini” clade comprised a moderately supported basal clade with *Prodegeeria* and *Meigenia* sister to the other blondeliine genera, which is different from the two-clade result of Stireman *et al.* (2019). In the redefined Blondeliini clade, *Medinodexia exigua* and *M. sp. 1* were treated as a new genus, *Shimamyia*.

In addition, two new tribes were proposed in this study: Phyllophilopsiini (comprising *Dolichocoxys*, *Phyllophilopsis*, *Uroeuantha*, and *Uromedina*) and Gastroleptini (comprising *Eophyllophila* and *Gastrolepta*). *Anechuromyia* and *Charitella* were moved from Blondeliini to

the tribe Ethillini; *Trigonospila* was reconstructed as sister to *Paratryphera* (an ethilline genus), and both genera are treated as unplaced in this thesis.

Moreover, ancestral state reconstruction was carried out in Mesquite while considering the morphology of ovipositors and reproductive strategies. The character states were mapped on the ML tree from IQtree, and then ML analysis was conducted to trace character history. The common ancestor of Blondeliini was oviparous and had an unmodified ovipositor. The ovipositors independently modified within Blondeliini at three instances: at the clade of the *Blondelia* group, the clade of *Medina* and *Medinodexia*, and the clade of *Shimamyia*, respectively. Oviparity evolved twice within Blondeliini, one at *Blondelia* clade, and the other at the clade of *Medinodexia*.

In Chapter 2 of this thesis, the taxonomy of the tribe Blondeliini in Japan was revised. To provide a clear identification system for all blondeliines in Japan and review the characteristics of the male postabdomen, 54 species from 21 genera of Blondeliini and four genera (*Anechuromyia*, *Charitella*, *Trigonospila*, and *Uromedina*) that were previously treated as blondeliines were included in this study. Among them, four species, *Belida angelicae*, *Ligeria angusticornis* (newly recorded genus), *Istocheta ectinohopliae* and *I. zimini* were newly recorded from Japan. *Biomeigenia sagensis* and *Oswaldia kagoshimensis* were newly described here. The key to the genera and species, the photos of the specimens, and the figures of the male postabdomens are provided.