

## Immature stages of three Japanese species of the genus *Plecia* Wiedemann (Diptera: Bibionidae)

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### Abstract

The eggs, larvae, and pupae (male and female) of three Japanese species of the Bibionidae, *Plecia adiaistola*, *P. membranifera*, and *P. hadrosoma*, are described and illustrated, and ecological notes are included. Morphological characters of the immature stages of *Plecia* species are compared for the first time, and a diagnosis is presented. The taxonomic and phylogenetic importance of morphological characters, especially of the larval head and the arrangement of the larval and pupal body processes, is discussed.

**Key words:** Diptera, Bibionidae, *Plecia*, immature stages, Japan

### Introduction

Bibionids are small to medium-sized, mainly dark-colored flies. This family is currently divided into two subfamilies, seven genera, and approximately 700 species worldwide. A classification of the Palaearctic genera and species of this family was presented by Skartveit (1997), and is followed here. The large, sclerotized head capsule, well-developed mouthparts, and holopneustic respiratory system of Bibionidae larvae are generally considered to be primitive states in dipteran larvae (Brindle 1962, Freeman & Lane 1985). Currently, most knowledge of the morphology of the immature stages in this family is restricted to that of the Palaearctic species of *Bibio* and *Dilophus* studied since Morris (1917, 1921, 1922). Bibionid larvae are phytosaprophagous, living gregariously in the upper layers of damp soil and, rarely, in rotten wood. Ecological studies indicate that they feed not only on decayed plant materials, but also on their own excrement, consuming