

Homology of the gonostylus parts in crane flies, with emphasis on the families Tipulidae and Limoniidae (Diptera, Tipulomorpha)

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Abstract

The study of the morphology of the gonostylus – a structure of major importance for the taxonomy and systematics of crane flies – has shown that the terminology currently applied to the branches of this organ in Tipulomorpha and its implied primary homology hypothesis are inconsistent in the different families. In this paper, such inconsistencies are discussed, some basic criteria for the proper recognition of the homologous parts are given, and a revised nomenclatural system is proposed. The terms “clasper of gonostylus” and “lobe of gonostylus” are proposed for the gonostylar branches on the basis of the known functions of these structures.

Key words: Diptera, Tipulomorpha, Limoniidae, Tipulidae, gonostylus, homology

Introduction

The Tipulomorpha (*sensu stricto*) is one of the largest groups of lower Diptera, including more than 15,000 species in four families worldwide. The Limoniidae, with more than 10,000 described species, is the largest family, followed in size by the Tipulidae (more than 4,000 species), Pediciidae (slightly more than 400 species), and Cyndrotomidae (71 species) (Oosterbroek 2005). Whether the family Trichoceridae is the sister group of the other families is still debated. But despite its great diversity and abundance, the Tipulomorpha remains a vastly unknown group, as many aspects of the morphology, biology, and consequently the phylogenetic relationships among its subgroups are poorly explored and understood.

The morphology of the male genitalia has been of major importance in the taxonomy and systematics at different levels of generality, not only in the Tipulomorpha but also in the Diptera in general. For many groups, species-level taxa can be recognized only by details of the male genitalia. In other instances, the conservative nature of some structures