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## BOOK REVIEW

KLUGE N.: THE PHYLOGENETIC SYSTEM OF EPHEMEROPTERA. Kluwer Academic Publishers, Dordrecht/Boston/London, 2004, xiii + 442 pp. ISBN: 1-4020-1974-2 (hardcover). Price EUR 220.00, USD 242.00, GBP 152.00.

At present, 37 families of the order Ephemeroptera are recognized, including 376 genera and approximately 3,100 species. Despite the relatively small species diversity, in comparison with the orders like, e.g., Coleoptera or Diptera, the higher systematics and phylogeny of Ephemeroptera is far from being fully resolved.

This volume by Nikita Kluge of the St. Petersburg State University, Russia, has been one of the most anticipated among ephemeropterists, since he has published numerous new and provoking theories on mayfly phylogeny over the past two decades that have at least affected the traditional systematics of this order. In fact, this volume is an extended treatment of the order in the author's book "*Sovremennaya Sistematika Nasekomykh. Principi Sistematiki Zhivykh Organizmov i Oobshchaya Sistema Nasekomykh s Klassifikaciey Pervychnobezkrylykh i Drevnekrylykh*" [*Contemporary Systematics of Insects. Principles of the Systematics of Living Organisms and General System of Insects with Classification of Primary Apterygotes and Primitive Pterygotes*] (Kluge 2000, Lan' Publishing House, St. Petersburg, 336 pp., in Russian) and a final version of the preliminary draft have been available online in English and Russian at the website Ephemeroptera Galactica (http://www.famu.org/mayfly/) since 1998. All recent as well as extinct genera of mayflies are treated, except for the most diversified families Baetidae and Leptophlebiidae, which are to be treated in the same way in a separate volume. Lists of nearly all the species ever described is added to paragraphs on the respective genera.

The book consists of four main parts. Introductory chapter briefly summarizes the history of Ephemeroptera classification, methods of associating larvae and adults and, first of all, elucidates Kluge's principle of the relationship between "circumscription-based, consistently non ranking zoological nomenclature" to hierarchy-based nomenclature. The general part (chapters I–II) deals with the systematic position of the order and morphology of mayflies, describing integumental and internal organs of all life stages and the arrangement of internal organs. The special part (chapters III–VII) is devoted, in addition to characteristics of the Ephemeroptera "in wider and narrower senses" (chapter III) to a detailed treatment of the authors' higher taxa Euplectoptera Posteritorna (chapter IV), Euplectoptera Anteritorna and Tridentiseta (chapter V), Anteritorna Bidentiseta and Brachitergaliae (chapter VI), and Bidentiseta Furcatergaliae (chapter VII). List of references contains more than 700 items. Naturally, references to descriptions, diagnoses and species, species-groups and generic revisions prevail, but those on mayfly ecology are also cited. In my opinion, this list includes all the important literature published since Linnaean times. The excellent transliteration of titles originally written in Russian is very valuable. Quick orientation in such a voluminous book is facilitated by concise indexes of morphological terms and larval, imaginal, subimaginal and egg characters. Indexes of species names and "supraspecies taxa names" give readers a chance to understand their relationships.

There is no doubt that the numerous authors that accept Hennigian phylogenetic systematics realise that the traditional supraspecific higher categories from the family to even phylum level are in fact subjective. According to the strictly cladistic point of view, only phylogenetic sister taxa possess the same rank and some authors in fact resignated to characterize respective hierarchy. Kluge's system looks for the oldest available taxon name assigned to a specific higher taxon and combines it with letters and numbers to indicate its relative rank. The author believes that his new method of phylogeny description and reconstruction "has general biological significance due to usage of the new non ranking nomenclature and the rational layout of taxonomic text, which can be qualified as post-Linnean sytematics" and provide a way out of a crisis. Moreover, the system "appears to be successful and can be applied to any zoological taxa (although its application in botany could be possible only after further elaboration)". A highly complicated nomenclature, that is not in accordance with ICZN in many cases, requires maximal concentration and really deep knowledge of tens of "circumscriptional names", seven of which (namely Discoglossata, Geminovenata, Fimbiatotergaliae, Pantricorythi, Tricoryptera, Afrotricorythi, and Tricorygnatha) are used for the first time. I do not understand why, e.g., the genus *Ecdyonurus* of the family Heptageniidae is classified as "2.2; 1, 2–2 / 2.1; 2. Ecdyonurus / fg1 (Heptagennota Pentamerotarsata Radulipalpata Heptagenia / f5 = g4 Ecdyonurus / fg1)" or mayflies named "Ephemera / fg3", Insecta "Scarabaeus / fg2", Arthropoda "Araneus / fg7", or Eumetazoa "Homo / g1 (incl. *Fasciola*, *Medusa*, *Gordius*, *Ascaris*, *Lineus*) [g: *Homo* Linnaeus, 1758: 20, type species *Homo sapiens* Linnaeus, 1758]" (!) according to Kluge (2000, 2004). All the cladograms are presented in this cumbersome nomenclature, and are extremely time-consuming to translate into conventional terms. Retaining clearly paraphyletic taxa like, e.g., "Tridentiseta" called here "plesiomorphons" is definitively not the best solution.

Fortunately, in the text section the reader will also find the common taxon names in small print (under headings "Nomen hierarchicum" and "In circumscription matches") so that everyone is able to trace the relationships with regular (or at least widely used) taxa. In contrast, formal nomenclature requirements are ignored in many places. For instance, synonymization is proposed without comment (and obviously without studying type material, as in *Oligoneuriella*), new combinations are not traceable (as in *Thalerosphyrus* or *Ecdyonuroides*), *nomina nuda* are numerous (e.g. *Isonychia vschivkovae* on p. 135, *Notacanthella quadrata* on p. 306, extinct genus *Baba* of family Babidae on p. 351 even lacks its type-species). Such mistakes are very numerous and it would go beyond the scope of this review to discuss all of them in detail.

A relatively large part of the book's content (chapters I–II) is already generally known to mayfly researchers interested in the phylogeny and higher systematics of mayflies or insects morphologists, so even when accompanied by excellent illustrations and a chapter on associating larvae and adults is superfluous. His treatment of thoracic structures, legs (in particular the "patella-tibial suture") and the maxillary "dentisetae" complex is worthy of our attention although some earlier mistakes are perpetuated (e.g. the tegula and structures equivalent to the 3rd axillare in the Neoptera are never present in paleopterous

insects). The entire chapter is unlikely to be easily understood by general insect morphologists. There is really no need to rename or introduce complicated new terms for well-known structures of insects. For instance, the tracheal gills that are evidently of different origin, are called indiscriminately "tergalii" or cerci "lateral paired caudalii". Moreover, treatment of internal organs is very disappointing. Some organ systems (e.g. circulatory system or those responsible for humoral regulation) are entirely omitted and the significance of internal anatomy, except for malpighian tubules, is underestimated and not used in the otherwise very valuable evaluation of apomorphies.

This is a pity, because this book is an important milestone in Ephemeroptera phylogeny and should be mandatory reading for everyone interested in mayfly systematics. It is mainly an enumeration of the putative apomorphic characters of fossil and extant mayfly taxa, mostly accompanied by excellent line-drawings, which are very informative. However, in my opinion, Kluge's nomenclature is unlikely to become widely accepted, but used as a tool by scientists for communicating with one another.

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