

**PAPE, T., BICKEL, D. & R. MEIER, (eds.).** 2009, *Diptera Diversity: Status, Challenges and Tools*. Koninklijke Brill, Leiden; 459 pages, ISBN 978-90-04-14897-0.

The order Diptera constitutes a hyperdiverse taxon of worldwide distribution with more than 150,000 species, i. e. 10% of all described animal species. Although rather inconspicuous compared to some of the flashier insects such as butterflies or beetles, flies have a tremendous impact on mankind regarding health and economic issues. They have therefore always received much scientific interest and still do so today. In the foreword Quentin Wheeler introduces dipterists as a productive scientific community always at the vanguard of taxonomic progress. At the same time he complains that “the depth of our ignorance of the world’s species is at once awesome and inexcusable.” Both statements are ever so true and this book serves well to elucidate both the state of progress as well as still existing shortcomings and impediments of dipterological biodiversity research today.

To compose this impressive overview, the editors Thomas PAPE, Daniel BICKEL and Rudolf MEIER have cooperated with 19 more of today’s world elite dipterists. The first part comprises nine chapters on dipteran diversity and dipterological research in the major biogeographic regions, with separate chapters for Hawaii, the Galapagos and the Southwest Pacific. Each chapter is authored by one or more renowned experts for the respective region.

Part two contains chapters on three exemplary issues of biodiversity research in Diptera. Daniel BICKEL provides an insight into the problems with “open ended”, i. e. extremely species rich, taxa which might never be fully described. One such taxon, the phorid genus *Megaselia*, is one of the largest genera of living organisms with some 1500 described species. Bickel comes to the conclusion that “proposals to taxonomically describe all life on Earth fail to understand the diversity of highly speciose taxa.” But he philosophically points out that the present immense diversity is in itself wonderful, even if we will never be able to name all species individually. Marc POLLET discusses the use of Dolichopodidae as ecological indicators. Finally, a team of authors led by Torsten DIKOW evaluates the prospects of biodiversity research based on metadata from published taxonomic revisions, e.g. for estimating species richness for certain areas or to establish conservation priorities. This evaluation is carried out on the example of Asilidae.

The third part comprises three chapters on DNA barcoding and biodiversity informatics. The chapter on DNA barcoding and DNA taxonomy by Rudolf MEIER and Guanyang ZHANG constitutes a real highlight. Instead of chiming in to the omnipresent “hype“ on these topics, the authors undertake a fresh evaluation of more than 4000 dipteran COI sequences derived from GenBank. Their unprejudiced statistical approach comes up with rather sobering results. An identification success of 89%, with 7% ambiguous and 4% misidentifications can be expected if the tested species is already represented in the data set. If the species is not yet represented, the risk of misidentification is much higher. Such rates are not sufficient for far reaching scientific decisions, let alone legal ones. The authors identify a number of underlying problems such as misidentification of the deposited sequences and the large overlap of inter- and intraspecific barcoding gaps. Furthermore they point out that the price of sequencing all Diptera species will be astronomic but still nothing compared to the price and effort to get hold of the necessary sequencable specimens. Therefore it is extremely unlikely that all species, and especially rare ones, will be covered any time soon. Overall, in spite of ample practical applications for DNA barcoding as a layman’s tool, the prospects for COI as a diagnostic tool for science are limited. The authors come to the conclusion that “DNA provides an important new source of data but is only component of a scientifically defensible modern taxonomy and no replacement for thoughtful, informed scholarship about morphology and other complex characters.“ Although the chapter is not designed as a review on DNA barcoding and taxonomy, it is followed by impressive eleven pages of references.

The following chapter by Shaun WINTERTON deals with the Brave New World of digital biodiversity informatics which has evolved over the last decades. This world contains taxonomic, genetic, phylogenetic, image, specimen-level and other databases as well as sophisticated software tools such as geographic mapping tools and interactive identification keys. A three page table lists useful bioinformatics sites on Diptera from the Internet or published on CD. Such sites provide a wealth of metadata to be studied in turn. Whereas “the study of insects has relied traditionally upon a simple experimental process” now the “tedious analysis of primary data is no longer the dictum.” The author rightly points out that more resources are needed for digitizing specimen label data so that this information can be made available for the metadata analyses. Apparently somebody still has to do the tedious work of compiling the primary data.

The last chapter deals with a specific software for tracking specimens, nomenclature and literature data called MANDALA. It is followed by an appendix listing the species numbers in each dipteran family in total and for the separate geographical regions. A fifteen page index concludes the volume.

M. KOTRBA

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