BioOne COMPLETE

Dragonflies and Damselflies. Model Organisms for Ecological and Evolutionary Research

Author: Cannings, Rob

Source: Florida Entomologist, 94(3) : 727-728

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/024.094.0350

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Nov 2020
Terms of Use: https://bioone.org/terms-of-use

CORDOBA-AGUILAR, A. [ED.]. 2008. Dragonflies and Damselflies. Model organisms for ecological and evolutionary research. Oxford University Press, Oxford, UK. xii + 290 pp. Hardback, ISBN 978-0-19-923069-3. £73 (£18.25—special discount for direct orders to publisher). Paperback, ISBN 978-0-19-956758-4. £32.50.

Steve Brooks of The Natural History Museum entitled his review (Brooks 2009) of this book, "Aren't dragonflies great study organisms?" His enthusiastic statement sums up the purpose of the volume: to review the use and value of dragonflies and damselflies (Order Odonata) in the development of ecological and evolutionary theory. The intent of the editor, Alex Córdoba-Aguilar, is to approach the subject via some of the fundamental issues of ecology and evolutionary biology rather than by treating the Odonata from an evolutionary and ecological perspective, which was done magnificently by the late Philip Corbet (1999). It's a testimonial to these animals as superb and successful subjects for a wide array of experimental and theoretical studies, and the book encourages biologists to develop new, innovative and effective ways to expand the use of odonates in this research.

Compared to most other insects, odonates are large, easy to observe and identify, even on the wing. They are easily located—they are widely distributed geographically and are frequently abundant and concentrated near water. They are readily captured and marked for experimental purposes in the field. Even the larvae of many species, which generally are less well-known but longer lived than the adults, are often rather easy to collect, rear and study in the laboratory. The diverse and fascinating behavior of odonates invites the testing of a myriad of hypotheses important in understanding evolution. For example, consider the contributions that Jon Waage's (1979, 1984) ground-breaking discoveries of sperm displacement behavior and morphology in Odonata contributed to our understanding of reproductive behavior, reproductive success, mating systems and sexual selection. Dragonflies and damselflies are especially suited for studies of topics such as natural and sexual selection, sexual interaction and reproductive isolation, competition, demographics, phenology and the evolution of polymorphism and color patterns. With the increased interest in conservation, habitat deterioration and climate warming, odonates are high on the list of organisms useful in conservation biology.

The book consists of a *Forward* by Philip Corbet, that most influential of odonatologists, an *Introduction* by the editor and 19 chapters written by some of the best known contemporary researchers of the Odonata. Eight of the chapters are ecological in content; eleven are more in the realm of evolutionary biology. There is a glossary of terms. The book is a useful overview of ecology and evolution in the Odonata but, more importantly, as the editor stresses, it showcases many of the ways that dragonflies and damselflies have been used as research tools in the examination of a wide variety of biological questions.

For example, in the Ecology section, some topics range from mark-recapture studies and demography to dragonfly migration; from community structure to seasonality-imposed plasticity in larval life histories; from the use of dragonflies in the assessment and monitoring of aquatic habitats to their suitability as research subjects in conservation biology. One innovative paper that caught my eye is *Valuing dragonflies as service providers,* by John Simaika and Michael Samways, which introduces a framework for quantifying the value of services provided by ecosystems and their components. The service-providing unit (SPU) quantifies the quality of the ecosystem services provided by particular species or groups of species. Such evaluations are a practical tool for the conservation of biodiversity. Odonata species provide services at the population level in diverse ways—pest regulators, indicators of habitat health, cultural icons, food in some societies, and so on. They also may have negative effects and such populations are deemed service antagonizing units (SAU). The predation of pollinators is an example.

The Evolution chapters examine issues such as larval morphological defenses (abdominal spines), territoriality, flight mechanics and performance, sexual dimorphism and polymorphism, cryptic female choice, parasite-mediated selection and premating reproductive isolation. There is one glaring omission. It's disappointing that systematics is so frequently left out of discussions of evolutionary research. Perhaps it's a result of the erroneous idea that phylogenetic systematics is not hypothesis-based. Cladograms, with their data matrices, are testable hypotheses of evolutionary relationships and are powerful predictors—critical to the elucidation of evolutionary patterns of all sorts. The order Odonata is tailor-made for systematic studies, for there is an extensive array of useful characters present in both adult and larval stages. These characters range from morphological to behavioral, from ecological to molecular. The fossil record is unusually rich. Biogeographical and other research is enhanced because large collections of accurately identified material from many regions of the world are available. There is a wealth of cladistics work on the Odonata that should have been explored and summarized in at least one chapter—from biogeographical hypotheses of Quaternary radiations (Turgeon et al. 2005) and the effects of Gondwana's breakup (Carle 1995) to studies of evolutionary rates (Hasegawa and Kasuya 2006); from the adaptive radiation of the endemic Hawai-

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Nov 2020
Terms of Use: https://bioone.org/terms-of-use

ian *Megalagrion* (Jordan *et al.* 2003) to more general investigations of taxon evolution (Ware *et al.* 2007) and the evolution of structure (Bybee *et al.* 2008).

Most of the authors present a brief summary and a few lines about potential future research in each of the chapters. Nevertheless, it would have been instructive to see a final concluding chapter, written by the editor or another contributor, summarizing the merits of dragonflies and damselflies in broad ecological or evolutionary research agendas. Future research possibilities in the various topics could be explored in a more integrated manner. One obvious theme for discussion would be the encouragement of more research on the larval stage, which is poorly represented in this volume. This is largely because larvae are harder to study than adults, show less fascinating behavior and consequently are more poorly known. This is not to say that there is little in the literature about them. They are logical subjects for all kinds of studies from water quality and pollution to habitat fragmentation, from predation to life-histories, from population dynamics to adaptation.

This is an impressive book prepared by experts who successfully promote the value and potential of dragonflies and damselflies as subjects of ecological and evolutionary research. The benefits of studying these wonderful insects should be examined by anyone committed to research in these fields.

References Cited

BROOKS, S. J. 2009. Aren't dragonflies great study organisms? Book review. Trends Ecol. Evol. 24(1): 6-7.

BYBEE, S. M., OGDEN, T. H., BRANHAM, M. A., AND WHITING, M. F. 2008. Molecules, morphology and fossils: a comprehensive approach to odonate phylogeny and the evolution of the odonate wing. Cladistics 24(4): 477-514.

CARLE, F. L. 1995. Evolution, taxonomy and biogeography of ancient gondwanian libelluloids, with comments on anisopteroid evolution and phylogenetic systematics. (Anisoptera: Libelluloidea). Odonatologica 24: 383-424.

HASEGAWA, E., AND KASUYA, E. 2006. Phylogenetic analysis of the insect order Odonata using 28S and 16S rDNA sequences: a comparison between data sets with different evolutionary rates. Entomol. Sci. 9: 55-66.

JORDAN, S., SIMON, C., AND POLHEMUS, D. A. 2003. Molecular systematics and adaptive radiation of Hawaii's endemic damselfly genus *Megalagrion* (Odonata: Coenagrionidae). Syst. Biol. 52: 89-109.

TURGEON, J., STOKS, R., THUM, R. A., BROWN, J. M., AND MCPEEK, M. A. 2005. Simultaneous Quaternary radiations of three damselfly clades across the Holarctic. Am. Nat. 165: E78-E107.

WAAGE, J. K. 1979. Dual function of the damselfly penis: sperm removal and transfer. Science 203: 916-918.

WAAGE, J. K. 1984. Sperm competition and the evolution of odonate mating systems, pp. 251-1290 *In* R. L. Smith [ed.] Sperm competition and the evolution of animal mating systems. Academic Press, New York.

WARE, J. M., MAY, M. L, AND KJER, K. 2007. Phylogeny of the higher Libelluloidea (Anisoptera: Odonata): An exploration of the most speciose superfamily of dragonflies. Molec. Phylogen. Evol. 45: 289-310.

Rob Cannings
Royal British Columbia Museum
675 Belleville St., Victoria BC
Canada, V8W 9W2
RCanning@royalbcmuseum.bc.ca

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Nov 2020
Terms of Use: https://bioone.org/terms-of-use