## Libellen – Allgemeines zur Biologie



Appel, Esther & SN Gorb (2014) Comparative functional morphology of vein joints in Odonata. Reihe: Zoologica Volume: 159. 104 Seiten 53 Abb. 1 Tabelle. The authors present a thorough study on the distribution of resilinbearing wing vein joints in wings of Odonata. 22 species of 20 different families of dragonflies and damselflies, showing various wing morphologies and flight kinematics, are examined and reveal interesting evolutionary trends. Dragonflies and damselflies show an exceptional high lift production and are some of the most maneuverable flying insects. The important role of their corrugated wing profile in increasing lift production has been shown in various studies. As odonate wings lack internal muscles, their aerodynamic performance relies on passive deformations, such as pleat angle widening and camber formation. The rubber-like

protein resilin has been shown to play a crucial role in wing joint flexibility. Thus, it may be assumed that the specific distribution of either stiff or flexible, resilin-bearing vein joints may influence the overall wing deformation during flight. Using fluorescence light microscopy and scanning electron microscopy, the dorsal and ventral wing sides of different species are compared with respect to the distribution patterns of four types of vein joints, five types of resilin patches, and joint-associated spines. The results reveal a significant difference between dragonflies and damselflies. Variations of the distribution patterns suggest a classification into five different pattern groups. Their occurrence within the two suborders shows some evolutionary trends and gives insight into the wing functionality. In particular, we discussed how the combination of joint morphology, kinematics, and wing morphology may allow different passive wing deformations during flight. This study, generously illustrated with 53 mostly coloured figures is of great interest to biologists studying insect flight, functional morphology, and evolution of Odonata. Furthermore, the described distribution patterns of different vein joints in combination with wing shape and flight kinematics may possibly inspire their biomimetic imitation in micro air vehicles. 119 €



Christophe Brochard, Dick Groenendijk, Ewoud van der Ploeg, Tim Termaat (2. Auflage) Fotogids Larvenhuidjes van Libellen – libellenlarven. Compleet voor Noordwest-Europa - ruim 80 soorten - meer dan 2000 unieke foto's. 320 Seiten im Format 17 cm x 21 cm 52,95 €

Huidjes van libellenlarven van Noordwest Europa determineren.

De eerste Nederlandstalige veldgids waarmee alle larvenhuidjes van libellen van Noordwest-Europa kunnen worden gedetermineerd. Beschrijft de huidjes van de 84 soorten libellen en waterjuffers geïllustreerd met meer dan 2000 spectaculaire foto's. Met achtergrondinformatie over

de ecologie van libellen, het zoeken, verzamelen en conserveren.

- meer dan 2000 unieke foto's van de larvenhuidjes, de larven, de volwassen libellen en de biotoop

- beschrijft 84 soorten libellen (Anisoptera) en waterjuffers (Zygoptera)
- uitgebreide soortbeschrijvingen en determinatiesleutel voor de huidjes
- vergelijkende platen: larvenhuidjes & belangrijke details zoals vangmaskers
- foto's van de volwassen libel en biotoop met daarin de uitsluipplaatsen aangegeven
- inleiding over de ecologie van libellen en libellenlarven

- achtergrondinformatie over het zoeken, verzamelen, prepareren en aanleggen van een eigen collectie



Brochard, Christophe & Ewoud van der Ploeg (2014) Fotogids Larven van Libellen

Noordwest Europa - meer dan 80 soorten - uniek beeldmateriaal. Libellenlarven van Noordwest Europa determineren

Libellen brengen het grootste deel van hun leven door als larve. Niet alleen liefhebbers, maar ook onderzoekers willen deze larven graag op naam brengen. De aanwezigheid van libellenlarven zegt namelijk veel over de kwaliteit van het water.

De praktische Fotogids Larven van Libellen is een handig hulpmiddel voor determinatie.

•Een logische aanvulling op de succesvolle 'Fotogids Larvenhuidjes van Libellen'

- •800 unieke foto's van de larven en hun leefmilieu
- •Meer dan 80 soorten
- •Heldere soortbeschrijvingen

•Praktische informatie over het zoeken naar en opkweken van larven

•Handige verwijzingen naar het 'larvenhuidjesboek'

Christophe Brochard is bioloog en gedreven natuurfotograaf. Ewoud van der Ploeg is een veelzijdig ecoloog en preparateur van insecten. Beide auteurs zijn al jarenlang gefascineerd door de vlinder- en libellenwereld. 272 Seiten 17 cm x 24 cm. Gebunden 51,95 €



Buchwald, Rainer (Hrsg) (2006) Habitatwahl, Fortpflanzungsverhalten & Schutz mitteleuropäischer Libellen (Odonata) - Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3.2004, Oldenburg. 128 Seiten, zahlr. sw Abb 17x24cm Pb 14,80 €

Chandler, David & Steve Cham (2013) Dragonfly. 128 Seiten, 80 Farbfotos. Supremely colourful, among the most voracious predators of the insect world & on the wing for more than 300 million years, dragonflies & damselflies capture the imagination in so many ways. Yet many aspects of their fascinating lives are little-known to humans. Dragonfly provides an insight into a hidden world through engaging text and stunning close-up photography. Dragonfly combines insightful writing with rarely seen images of the life and behaviour of the world's dragonfly & damselfly species. There are chapters on subjects such as hunting, courtship and the emergence of the nymphs & their subsequent transformation into adult dragonflies. These insects are further brought to life through the personal experiences of the author & photographers & these are woven into the text. Ca 20 €





Richard Crombet-BeolensEponym (März 2018) Dictionary of Odonata

The Eponym Dictionary of Odonata is a comprehensive listing of all people after whom damselflies and dragonflies have been named in scientific or common names. Each entry provides details of the species and a brief biography of the person. It is also cross-referenced so that the relationships between scientific authors, entomologists and others can be followed. Many entries have been contributed by the people so honoured who are not necessarily odonatologists, entomologists, zoologists or even great men of science. Many damselflies and dragonflies are named for the author's family members, friends and those who collected the species holotypes, while others are figures from myth or history. In fact, it could be anything from the author's mother to a favourite musician.

Because entries may include details of dates, places, educational and work institutions, it is possible to discover information about each

person and for a picture to be built of how the science sometimes follows groupings of colleagues or those significantly influenced by charismatic teachers. The Dictionary includes other names which might, at a glance, be thought to be eponyms yet are not in the truest sense. These may be species named after characteristics embodied in characters from literature, whole peoples, acronyms or toponyms, etc. To some extent it can read like a canon of the great women and men of science over the last several centuries. Interestingly there are species named after as many as three generations of the same family, veiled references to old lovers, sycophantic homage, financial patronage, etc., as well as all the more `legitimate' reasons for naming species. Not surprisingly, odonatologists exhibit a range of opinion on the practice, from naming all species after people, to wanting all eponyms banned; they can be totally humourless and pedantic or full of fun and irreverence. Like all of us they have as many reasons for their namings as ordinary folk have for naming their children or pets.

Underlying all this, however, is the value of Eponym Dictionary of Odonata in cataloguing this fascinating aspect of science for all users, whether scientists or interested lay readers. Format 240 × 170mm, ca. 352 pages Hardback Preis ca. 50  $\in$ 



Ann Cooper (2014) Dragonflies: Q&A Guide : Fascinating Facts about Their Life in the Wild.

Paperback 102 pages. black & white illustrations, colour illustrations, colour illustrations

Dimensions 15 cm x 22 cm 230 g ca. 20 €

Got a question about dragonflies? This book has answers. Dragonflies: A Q & A Guide is a lively, illustrated guide for anyone looking to learn more about dragonflies and their lives in the wild. Easy-to-read format for readers looking to dip in or read straight through Hundreds of questions posed and answered about the dragonfly's anatomy, history, and life cycle Dozens of stunning color photos of dragonflies in their habitats Special sections on record-breaking dragonflies and the relationship between dragonflies and humans"



Corbet, Philip & Stephen Brooks (2008) Dragonflies. (NEW NATURALIST SERIES 106) erschienen. 454 Seiten, zahlreiche Farbfotos, Diagramme & Verbreitungskarten. Dragonflies are among the most ancient of living creatures - few insect groups fascinate as much or are more immediately recognisable. In this seminal new work, Corbet & Brooks examine the behaviour, ecology & distribution of dragonflies in Britain & Ireland, placing emphasis on the insects' habitats & on measures needed to conserve them. Published in 1960 volume 41 of the New Naturalist series provided the first indepth study of the biology of British dragonflies, helping to inspire many people to take an interest in these intriguing insects. In this new volume, Corbet has teamed up with Stephen Brooks, offering a fascinating new outlook on the natural history of dragonflies. The authors have combined their knowledge & experience to help illuminate the

relevance of British dragonfly species, placing them in the overall context of natural history from a broader, worldwide perspective. Illustrated with beautiful photography throughout, Dragon-flies explores all aspects of the biological significance of dragonfly behaviour, thus revealing the beauty & hidden complexity of these powerful, agile, flying predators. Paperback 29,80  $\in$  gebunden ca. 55  $\in$ 



Cordoba-Aguilar, Alex (Hrsg 2008) Dragonflies & Damselflies -Model Organisms for Ecological & Evolutionary Research. Ca. 260 Seiten Dragonflies & Damselflies documents the latest advances in odonate biology & relates these to a broader ecological & evolutionary research agenda. Despite being one of the smallest insect orders, dragonflies offer a number of advantages for both laboratory & field studies. In fact, they have been crucial to the advancement of our understanding of insect ecology & evolution. This book provides a critical summary of the major advances in these fields. Contributions from many of the leading researchers in dragonfly biology offer new perspectives & paradigms as well as additional, unpublished, data. The editor has carefully assembled a mix of theoretical & applied chapters (including those addressing conservation & monitoring) & achieves a balance of emerging & established research topics,

providing suggestions for future study in each case. This accessible text is not about

dragonflies per se but an essential source of knowledge that describes how different sets of evolutionary & ecological principles/ideas have been tested on a particular taxon. It will therefore be suitable for graduate students & researchers in entomology, evolutionary biology, population & behavioural ecology, & conservation biology. It will of course be of particular interest & use to those working on insects & an indispensable reference text for odonate biologists. Gebunden ca. 120  $\in$  paper 52  $\in$ 





Dodds, RM (April 2014). The Dragonfly Diaries: The Story behind Europe's first Dragonfly & Damselfly Sanctuary. 216 pages, plates with colour photos. Britain is home to some 40 species of dragonfly, and public interest in their plight is high right now thanks to their primeval beauty, aerobatic grace and a growing realisation of their importance for water ecosystems. In The Dragonfly Diaries, Dodds shares his quirky fascination for these remarkable creatures over the 25 years he has been photographing and working with them. Combining fascinating description of the lives of dragonflies, with a diary chronicling the ups and downs of establishing Britain's first public dragonfly sanctuary, The Dragonfly Diaries is a must for nature buffs and for anyone who wants to be inspired by the resolve & dedication of a man on a mission to save these critically important insects Ca 15 €

Earley, Chris G (2013) Dragonflies: Hunting - Identifying - How and Where They Live. 32 pages, colour photos an illustrated guide to observing, catching and releasing dragonflies. Dragonflies are as fascinating as they are beautiful. In Dragonflies: Hunting - Identifying - How and Where They Live readers will learn how to observe them in the wild and have them hover as close as their nose! Dragonflies and their close relatives, damselflies, have been around longer than dinosaurs and can be found on all continents except Antarctica. One dragonfly species makes the longest migration of any insect in the world. Dragonflies: Hunting - Identifying - How and Where

They Live can be found in wetlands, forests, fields and even back gardens. This illustrated guide to dragonflies and damselflies is packed with all the facts about what they are, what they eat, and what eats them. Their life cycle is explored, beginning from eggs that hatch into wingless nymphs that live underwater and breathe through gills. With the help of this detailed guide featuring close-up photographs, readers will learn tips and tricks for how to properly catch, hold and let a dragonfly go. An identification section allows the reader to quickly and easily identify the most popular species and illustrates how each is unique, from darners to clubtails, spiketails to cruisers, and emeralds to skimmers. Plastic laminated hardcover ca  $16 \in pb$  ca  $10 \in$ 



Fleck, G. & Nel, A, (2003) Revision of the Mesozoic family Aeshnidiidae. 170S 148 Abb 3 Tab in: Zoologica 153. 88 €

In this volume Aeschnidiidae are described and species are revised. Also several new Upper Jurassic and Lower Cretaceous genera and species are described. Data on adult and larval aeschnidiid morphology are discussed, several new larval, venational and adult body characters are described. An analysis of the inner phylogeny of the Aeschnidiidae is also performed, suggesting that a tendency towards a decrease of wing size occurred within this group, from very large Upper Jurassic forms to very small Lower Creatceous taxa. The possible causes of extinction of this highly specialised Mesozoic group of Odonata are discussed: bird predation versus important changes in the freshwater ecosystem which occurred during the Cenomanian.

Garrison, RW, N v Ellenrieder & JA Louton (2006) Dragonfly Genera of the New World - An Illustrated & Annotated Key to the Anisoptera. 384 pp. 24 color illus., 31 halftones, 1595 line drawings Info: This is a beautyfully illustrated & comprehensive guide to the taxonomy &



ecology of dragonflies in North, Middle, & South America. A reference of the highest quality, this book reveals the striking beauty & complexity of this diverse order. Although Odonata are among the most studied groups of insects, until now there has been no reliable means to identify the New World genera of either group. This volume provides fully illustrated & up-to-date keys for all dragonfly genera with descriptive text for each genus, accompanied by distribution maps & 1,595 diagnostic illustrations, including wing patterns & characteristics of the genitalia. For entomologists, limnologists, & ecologists, Dragonfly Genera of the New World is an indispensable resource for field identification & laboratory research. Reviews: "Dragonflies have been moving up to join butterflies as a model group for natural history & scientific study. This well-organized & readable book will help speed that trend on a hemispheric basis. Hardcover 99 €



Garrison, Rosser W, Natalia von Ellenrieder & Jerry A Louton (2010) Damselfly Genera of the New World: An Illustrated & Annotated Key to the Zygoptera. 490 pages, 24 col plates, line illus, dist maps.. This companion to "Dragonfly Genera of the New World" provides a comprehensive, fully illustrated guide to the damselflies of North, Central, & South America. Damselflies are more diverse & harder to identify than dragonflies. This reference contains original, up-to-date keys to the 125 genera of Zygoptera in North, Central, & South America; descriptive text for each genus; distribution maps; and, highly detailed diagnostic illustrations. Each account lists all known species & generic synonyms, information on the status of classification, & references to larval descriptions. Features more than 2,500 illustrations. Hardcover 90 €



Gorb, Stanislav: Functional morphology of the headarrester system in Odonata. 1998. IV,132 S., 92 Abb., 9 Tab, 2 Anh. 30x23cm (Zoologica 148) Hard ca 85 € pb ca 74 €

Attachment organs of the Arthropoda are diverse in both structure and function. One such organ system may serve the fixation of structures of the body, an example of which is the head-arrester system which only occurs in adult dragonflies (Odonata). The design of the head-prothorax transition in adult Odonata does not have analogues in the Insecta. The area, which connects the head with the neck, is very small, compared to the size of the head. It is virtually a single point, providing high head mobility in the roll, pitch and yaw planes. The disadvantage of such a design is the weak mechanical strength of this "joint". The arrester has the function to stabilize the head. Arrester

system involves organs of two body segments: the head and the neck. It consists of a skeleton-muscle apparatus that sets the arrester parts in motion. The parts comprise formations covered with complicated microstructures - fields of microtrichia on the rear surface of head (MFH) and postcervical sclerites of the neck (SPC). The arrester immobilises the head during feeding or when the dragonfly is in tandem flight. Thus it may serve as an adaptation to save the head from violent mechanical disturbance and to stabilise gaze in the variety of behavioural situations. Gorb"s work summarizes results of his morphological, physiological and ultrastructural studies on the head-arrester system in Odonata, and gives an overview on diverse attachment systems occurring in arthropods. It shows the evolutionary trend of the arrester in the order Odonata by using scanning electron microscopy and measurements of arrester structures in representatives of 26 odonate families. The arrester design occurring in the Epiophlebiidae, Gomphidae, Neopetaliidae, Petaluridae, and Chlorogomphinae is suggested to be the basic one. Two convergent pathways of head-arrester evolution among Zygoptera and Anisoptera are proposed. This work includes 23 plates and 25 photoplates of SEM pictures to give a thorough impression of the design of the arrester system in different odonate taxa. Arrester function is discussed on the basis of the morphology of skeleton-muscle system, cuticle microsculpture, histochemical data, the location of the sensory organs.



Matti Hämäläinen (2015) Catalogue of individuals commemorated in the scientific names of extant dragonflies, including lists of all available eponymous species-group and genus-group names.

International Dragonfly Fund – Report - Journal of the International Dragonfly Fund Volume 80 2015

172 Seiten im DIN A 5 – Format, mit 24 Farbabbildungen 19,90 €

Abstract: In der wissenschaftlichen Literatur werden Arten mit einem Gattungs- und Artnamen eindeutig identifizierungsbar beschrieben. Dabei werden Ortsbezeichnungen, Körpermerkmale,

aber auch Namen von Personen verwendet. Eponym ist die Bezeichnung (einer Art), die auf einen Personennamen zurückgeht. Mätti Hämäläinen. Finnland, hat in monatelanger detektivischer Arbeit versucht, die Libellenarten zu identifizieren, die nach Personen benannt wurden. Neben der erdweiten Zuarbeit durch viele Libellenkundler, wurden in Gemeindeverwaltungen oder Archiven von Museen und Missionsgesellschaften die Archivare gebeten, Daten von Menschen zu recherchieren, die einer Libelle ihren Namen gegeben haben. Viele bisher unbekannte Lebensdaten wurden so ausfindig gemacht, und trotzdem gelang es

Protosticta foersteri d

nicht, zu allen Namensgebern (vollständige) Lebensdaten zu recherchieren.

Fig. 7. *Protosticta foersteri*Laidlaw, 1902. Named after Johann Friedrich Nepomuk Förster (1865-1918), a German entomologist. After studying natural sciences at Heidelberg University (1886-1890) he worked as teacher in various secondary schools, the longest period being in Bretten (1899-1914) and later in Oberkirch. He was at first interested in botany, but with help and encouragement from Edmond de Selys Longchamps he became an odonate taxonomist. He corresponded regularly with Selys from May 1896, and on 18 August 1899 he visited Liège and spent two hours studying Selys' collections, after which, at 6 PM, Selys took him todine at the HôtelMohren. Förster named 164 species or subspecies of Odonata. His collection is

# now in the University of Michigan Museum of Zoology. F.F. Laidlaw named this species, which he himself had collected in Perak, in honour of Förster with whom he had previously collaborated. Artwork by A.G. Orr (2005).

Endergebnis ist ein Katalog von 1.257 Personen nach denen Libellen benannt wurden. Die Arten werden zusammen mit knapp gehaltenen Informationen zur Person, Vor- und Nachnamen und Geburts- und Todesdaten gelistet. Personenbezogen werden die Arten, Unterarten. Gattungs- und Untergattungsnamen dargestellt. In der Summe wurden 1.928 Arten und 54 Gattungen zu Ehren von Personen benannt. Jedoch sind darin auch die Synonyme und Homonyme enthalten. In der Summe ergibt sich, dass von den rezent vorkommenden Libellenarten 8.400 beschrieben wurden, und 23% dieser Beschreibungen personenbezogen sind. Unter diesen 8.400 Arten verstecken sich jedoch etwa 3.000 Synonyme. Von den 933 seit dem 1. Januar 1995 bis zum 10. März 2015 beschrieben Arten sind 42,9% Eponyme.

Für alle, die Interesse an der Geschichte der Libellenkunde haben, wird dieses Buch immer wieder zu Hand genommen werden, um die Geheimnisse hinter den Namen zu lüften.



Ott J. (Hrsg) (2010) Monitoring climate changes using Dragonflies. 16x24cm, collection of papers, illustrated with b/w & color figures, photos & graph. In English. Hardback, 250 pp. Climate change impacts on biodiversity: the ALARM approach for the assessment of multiple risks & the consequences for dragonflies by J Settele et al. - Trends in occurence of thermophilous dragonfly species in NRW - AK Libellen NRW by KJ Conze ua. - Do climatic changes influence dispersial & population dynamics of dragonfilies in the western Peruvian Andes? J Hoffmann - Impacts of extreme weather & climate change on South African dragonflies by M Samways - Climate & evaluational range in a South African dragonfly assemblage M Samways & A Niba - Southern dragonflies expanding in Wallonia (S-Belgium): a consequence of global warming? By P Goffart - Dragonfly & Damselfly Distributions in Ontario, Canada: Investigating the Influence of Climatic Change by CD Beatty ua. - The local species richness of Dragonflies in mountain waterbodies: an indicator of climatic warming? by B Oertli - Monitoring of Odonata in

Britain & possible insights into climate change by Ad Parr - Effects of climatic changes on dragonflies - results & recent trends in Europe by J Ott - When south goes north: Mediterranean dragonflies conquer Flanders (N-Belgium) - G De Knijf & A Anselin - Changes in the range of dragonflies in the Netherlands & the possible role of temperature change by T Termaat ua. - Monitoring the effects of conservation actions in agricultural & urbanized landscapes - the dragonfly example - by H Wildermuth - Anthropogenic climate change impacts on ponds: a thermal mass perspective by J Matthews. The ecological problems of climatic changes have become more & more apparent & obvious, in Europe in particular after the hot summer of 2003. The future of some very attractive & well known species - like the polar bear - entered even the public discussions. Insects play in general a much smaller role, beside the problems caused in forest (e.g. bark beetles - Scolytidae), agriculture (different parasites) & human health. On the other hand Naturalists & Scientists observe changes in the natural fauna since decades, e.g. with an intervention of Mediterranean species in Northern Europe & presently the invasion of African species to southern Europe. This may indicate a general change of the natural ecosystems as the process is ongoing & even increasing. Similar processes are now found in several other parts of the world. Dragonflies

are in this context a nearly perfect group, as they are easy to determine & observe, their ecology is mostly well known, they react directly on changes in the climate & they are widespread. As they have aquatic larval stages & the adults are terrestrial, they are also perfect indicators for both worlds. This volume puts together the results of studies which were carried out in Europe, but also in several other countries & continents, as well as some reviews of recent trends. For the first time in the climate change discussion an invertebrate group is documented to this extent. The book is addressed to researchers & lecturers in entomology, nature conservation & ecology, but also to practical conservationists, planners & decision makers 100 €



Pfau, Hans Klaus (2011) Functional Morphology and Evolution of the Male Secondary Copulatory Apparatus of the Anisoptera (Insecta: Odonata). In this study, the functions and mechanical interactions of different parts of the secondary copulatory apparatus of Anisoptera are reconstructed in detail and possible evolutionary pathways are described. Whereas in Zygoptera and Anisozygoptera the vesica spermalis of the third abdominal segment is a single segmented intermediate sperm-storage, this organ is subdivided into four segments in the Anisoptera. The evolutionary consequences of acquiring new functions as secondary (in reality tertiary) "penis" and sperm-syringe are one focus of this study. The secondary copulatory apparatus of male dragonflies (Odonata), located at the second and third abdominal segment, consists of a number of sequentially arranged devices. These serve (1) as support of the female ovipositor, (2) for carrying

out preparatory actions for filling an intermediate sperm-storage, (3) for levering and inserting a secondary "penis" (in the primitive case the ligula) and (4) as transmitter of sperm to the female vagina. Each subtask affords a sequence of actions of the corresponding sclerites and muscles of this apparatus. An impressive variety of different solutions to perform and secure the filling of the sperm-reservoir of the vesica spermalis in the Anisoptera is described. In the primitive case a laborious and time-consuming procedure - which probably depends on interrelated functions of the ligula and female ovipositor - is carried out. Reduction of the ovipositor in different lines of the Anisoptera apparently initiated evolutionary modifications, which finally led to more sophisticated modes of preparing filling and protection. Another focus are the auxiliary devices and techniques in the Anisoptera for emptying the sperm-reservoir of the vesica spermalis. For instance, two different types of sperm-pumps are incorporated in its distal segment ("glans"). These pumps - which extend the function of a hydraulically working gland-structure, the erectile organ - show an opposite co-ordination of spermsuction and -ejection in connection with compression and decompression movements. It was tried to reconstruct a transitional system to close a serious gap in the phylogenetic interpretation. A comparative investigation of different "glans" led to the discovery of different "ways" of combining the emptying-mechanism of the spermreservoir with an intensification of the sperm-jet and a "washing out" of sperm of the male predecessor (sperm displacement). The different stages of evolution of the glans, which reflect phylogenetic splittings, are outlined and discussed. This study is of great interest to biologists interested in the functional morphology of the Odonata. It does not merely rely on painstaking comparisons of morphological details, but integrates functional points of view to use the heuristic power of hypothetical approach. 103 S. - 31,0 x 23,0 cm Paperback 118,-€



Rivera, A.C. (2006): Forest and Dragonflies. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. Collection of 14 papers on dragonflies, graphs, tables & col.fot. 300 S. Over the world, forests provide diverse habitats for a range of organisms, including dragonflies and other animals, that at a first sight seem not to depend on forests. For instance, Macromia splendens, one of Europe's most endangered dragonflies (cover), uses forest roads as hunting places, and larvae are sometimes found amongst tree roots. As the authors of this book show, dragonflies are highly dependent on forest cover and composition, and this is true from the boreal forests to the tropics. The aim of this book is therefore to explore the ways in which forests affect dragonfly life, and to show that forests are much more than places where timber is produced. gebunden 78 €

#### Inhalt:

ADOLFO CORDERO RIVERA Introduction: Dragonflies as forest-dependent animals CORBET, P.S. Forests as habitats for dragonflies (Odonata) GRAÇA, M. Allochthonous organic matter as a food resource for aquatic invertebrates in forested streams

#### THE IMPORTANCE OF FORESTS FOR DRAGONFLIES IN DIFFERENT CONTINENTS

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HADRYS, H The present role and future promise of conservation genetics for forest Odonates .



van Dokkum, Pieter (2015) Dragonflies - Magnificent Creatures of Water, Air, and Land. 176 p 172 color illus. Almost without our noticing, dragonflies dart through our world, flying, seeing, hunting, mating. Their lives are as mysterious as their gossamer wings are beautiful. In this book Pieter van Dokkum reveals many of the dragonfly's secrets, capturing the stages of this striking insect's life cycle in unprecedented close-up photographs. He documents scenes of dragonfly activity seldom witnessed & rarely photographed. The book begins on a moonlit summer night, when an

alien-looking larva crawls out of the water and transforms into a fully formed dragonfly. In the following chapters we witness dew-covered dragonflies sparkling in the morning sun, then a pair of mating dragonflies moving through the air in a twelve-legged, eight-winged dance. In the final chapter, one generation dies as the next prepares to leave the water and begin its own winged journey. Each stage is documented through van Dokkum's inquisitive lens & accompanied by information on various species of dragonflies & damselflies, their metamorphosis, & their ecological importance as insect predators. van Dokkum is Sol Goldman Family Professor of Astronomy and chair of the Astronomy Department at Yale University. He is also an expert in insect photography, with a focus on dragonflies. Ca 35 €

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