1st December 2016

Man-made lakes form species-rich dragonfly communities in the Brazilian Atlantic Forest (Odonata)

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Abstract. One of the forest types occurring in Southern Brazil is the Mixed Ombrophilous Forest (MOF), a subtype of the Atlantic Forest and one of the biodiversity hotspots on Earth. We sampled adult Odonata at 30 locations in the Floresta Nacional de São Francisco de Paula (FLONA-SFP), Rio Grande do Sul, Brazil, a national reserve which is divided into several sectors of MOF, planted *Araucaria angustifolia*, *Pinus elliottii* used for sustainable and financial purposes, and open fields. There are three types of aquatic environments in the reserve: lakes, swamps, and rivers/streams. Our aim was to obtain an overview of the species' distribution patterns in the three types of aquatic environments and to evaluate the species occurring in lakes, an exclusively man-made habitat in this area. We recorded 46 species from seven odonate families; 25 species ($\overline{x} = 5.71 \pm 1.77$ SD) occurring in rivers/streams, 24 in lakes (11.57 ± 2.15) and 21 in swamps (5.22 ± 3.60). Using Non-metric Multidimensional Scaling (NmDS), we showed that the species composition differed clearly between the three types of aquatic habitats. While swamps and rivers/streams had a relatively similar and uniform species composition, species in the lakes were more varied but the total species number was almost as high as that of the rivers/streams. The lake communities also differed distinctly from those of the other habitats, and we assume that the lake species originate from other degraded areas in the vicinity, indicating that the remains of the Atlantic Forest has already been strongly altered by humans. Given the poor knowledge of the Odonata in the Atlantic Forest/MOF, we hope that our study may increase the understanding of the communities, and contribute to the development of conservation measures for this fragmented biome.

Further key words: Dragonfly, South America, Neotropics, Rio Grande do Sul, species assemblages, habitat integrity, conservation

1st December 2016

How to survive the brief water-coverage of vernal ponds? Early hatching date and rapid larval development in *Aeshna affinis* (Odonata: Aeshnidae)

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Abstract. The objective of our study was to identify mechanisms enabling typical inhabitants of vernal ponds in temperate climate zones to complete their larval development under the time-constrained conditions of temporary larval habitats. We compared both hatching phenology and larval development of *Aeshna affinis* with those of its permanent water congener *A. mixta* under semi-natural conditions and with literature data on other European Aeshnidae. We identified the following traits enabling rapid univoltine development in vernal ponds: i) Seasonally early hatching: *A. affinis* hatched significantly – on average 22 days – earlier than *A. mixta*. ii) Relatively small size difference between the second and the final larval stadium: Second-stadium larvae of *A. affinis* were significantly larger than those of all other European Aeshnidae, but the exuviae are among the smallest of this family in Europe. Therefore, larval growth coefficient and the number of larval stadia are smaller than in any other European Aeshnidae. iii) A low degree-day sum during larval development, being significantly lower than that of *A. mixta.* Although median larval development time of the vernal pond species *A. affinis* was longer than that of *A. mixta*, the first emerged significantly – on average 18 days – earlier than the latter.

Further key words. Dragonfly, Anisoptera, hydroperiod, life history, hatching phenology, time constraints

1st December 2016

Mud sediments on anal pyramids of *Libellula quadrimaculata* larvae – accidental phenomenon or bioindicator of heavy metal pollution? (Odonata: Libellulidae)

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Abstract. The morphology and morphometry of 1 089 *Libellula quadrimaculata* exuviae, collected at three selected sites in Upper Silesia, were examined with regard to their potential use as bioindicators of habitat quality. The biometric parameters of exuviae were only weakly linked to water quality, i.e., to heavy metal contamination. However, terminal thickenings on the anal pyramid, which were originally thought to be teratogenic, were finally identified as sediments that had been deposited on the anal appendages. These modifications were observed in *ca* 12 % of the exuviae that had been collected from a site on which river contamination by metals had reached extreme values, thus probably having caused a long-lasting and complex change of the water habitat.

Further key words. Dragonfly, Anisoptera, cyanobacteria, Upper Silesia, Poland

1st December 2016

Aeshna grandis larvae detect chemical cues derived from carrion: evidence of chemically-mediated food detection? (Odonata: Aeshnidae)

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Abstract. Odonate larvae locate live, moving prey using a range of predominantly visual and mechanical cues. However, this does not explain observations of larval Odonata in association with submerged corpses, i.e., whether larvae are attracted by chemical cues emanating from submerged dead bodies. Hence the chemosensory capabilities of larval *Aeshna grandis* previously fed on living prey were tested under circumstances in which visual and mechanical perception was impossible, using model 'corpses', i.e., solid, homogenised, and dialysed tilapia, in link-tank test chambers. Results indicated that *A. grandis* larvae recognised cues emanating from the 'carrion' responding by moving in the source direction. Larval behavioral choice tests in link-tanks were also carried out on a selection of amino acids known to be released on tissue decomposition. Larvae responded positively to taurine, proline, L-glutamic acid, and glycine by moving in the direction of the source. These amino acid triggers were assessed electrophysiologically by recording from the antennal nerve. Responses depended on both the amino acid and its concentration. A positive electrophysiological response was noted for glycine at concentrations from 10^{-4} to 10^{-8} g l^{-1} and for taurine, proline, and L-glutamic acid at a concentration of 10^{-5} g l^{-1}. No response was recorded for glutamate over a range of concentrations from 10^{-2} to 10^{-6} g l^{-1}. Therefore *A. grandis* larvae are able to respond to non-visual cues, such as some of the chemicals released during tissue breakdown, suggesting that, in the absence of live prey, their search for food may be chemically-mediated.

Further key words. Dragonfly, Anisoptera, chemoreception, amino acids, electrophysiology, attraction

1st December 2016

The 'waterfall spectacle' of *Libellula quadrimaculata*-aggregations (Odonata: Libellulidae)

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Abstract. A hitherto unknown swarming flight behaviour of *Libellula quadrimaculata* that included spectacular waterfall-like manoeuvres was observed and photographically documented in May and June 2015 in the steppes of the Kazakh Uplands. This unusual flight behaviour was connected to communal roosting aggregation. It is analysed and compared with common hypotheses and literature on communal roosting and swarm dynamics in Odonata and other animals.

Further key words. Dragonfly, Anisoptera, Korgalzhyn State Nature Reserve, Kazakhstan, Central Asia, mass occurrence, selfish herd theory

1st December 2016

Larva of one of the world's rarest and most threatened damselflies: *Spesbona angusta* (Odonata: Platycnemididae)

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Abstract. *Spesbona angusta* is Red Listed as Endangered and a conservation plan for it is urgently required. Quantifying population levels of its larva is part of that plan, yet the larval morphology is poorly known. Four final instar larvae were collected from the only known site in Western Cape, South Africa, in August 2015 and are described here in detail for the first time. The larval morphology is further compared with other South African platycnemidids and its Oriental sister genus *Copera*. Some biological notes are also given.

Further key words. Dragonfly, damselfly, Zygoptera, larval description, Endemic, Western Cape, South Africa

1st December 2016

Revision of the genus *Celebargiolestes* Kennedy, 1925 (Odonata: Argiolestidae)

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Abstract. An overview of the study of the dragonflies of Sulawesi is presented and genera in need of revision are listed. One of those genera, *Celebargiolestes*, is revised, a definition of the genus *Celebargiolestes* is given and the male and female of the only hitherto described species, *C. cincta*, are redescribed. Three species are described as new to science: *Celebargiolestes askewi*, *C. orri* and *C. toli*. A key to the males is presented and habitat and distribution of the genus are discussed.

Further key words. Dragonfly, damselfly, Zygoptera, Sulawesi, bibliography, biogeography

1st December 2016

Records of *Neurothemis nesaea* from Sulawesi, with taxonomic annotations on the *N. intermedia*-group (Odonata: Libellulidae)

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Abstract. Several specimens of *Neurothemis nesaea* from Central and South Sulawesi were examined. This species hitherto was only known from the original description. Figures of both sexes, annotations concerning the habitat and the type specimens are given (two syntypes deposited at SMF and one at ZMH). For comparison, figures of the wings of *N. intermedia intermedia* (holotype is deposited at RBINS), *N. intermedia atalanta* (two syntypes are deposited at NMS) and *N. intermedia excelsa* are provided, as well as figures of *N. degener* (three syntypes are deposited at RBINS). *Neurothemis degener* is not associated with *N. intermedia* but considered to represent a full species. *Neurothemis septentrionis* (holotype is deposited at UMMZ) is synonymized with the nominate subspecies of *N. intermedia*.

Further key words. Dragonfly, Anisoptera, *Neurothemis degener* stat. nov., *Neurothemis septentrionis* syn. nov., morphology, taxonomy

1st December 2016

Six new species of *Nosoticta* Hagen, 1860 from Papua New Guinea (Odonata: Platycnemididae)

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Abstract. The males and, when available, females of six new species of the damselfly genus *Nosoticta* are described from the upper Fly, Strickland, and Kikori River basins in southern Papua New Guinea. They are *Nosoticta caelestis* sp. nov. (♂ holotype, 10-viii-2014), *Nosoticta chrismulleri* sp. nov. (♂ holotype, 04-viii-2013), *Nosoticta makrodon* sp. nov. (♂ holotype, 01-viii-2013), *Nosoticta megantereon* sp. nov. (♂ holotype, 03-viii-2013, ♀ described), *Nosoticta ovimacula* sp. nov. (♂ holotype, 29-vii-2013, ♀ described), and *Nosoticta paraconifera* sp. nov. (♂ holotype, 02-viii-2013, ♀ described).

Further key words. Dragonfly, damselfly, Zygoptera

1st December 2016

A new species of *Gynacantha* Rambur, 1842, from Papua New Guinea (Odonata: Aeshnidae)

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Abstract. *Gynacantha nuda* sp. nov. is described based on a male from Southern Highlands Province, Papua New Guinea. It is the largest known species of the genus to be reported from New Guinea. Characters of the adult male are illustrated, the affinities of the new species are discussed, and a key is presented to males of the *Gynacantha* species recorded from New Guinea.

Further key words. Dragonfly, Anisoptera, *Gynacantha nuda* sp. nov.

1st December 2016

Two decades of progress in over one hundred years of study: Present status of Odonata research in Colombia

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Abstract. This study documents the results of a bibliometric analysis of 135 indexed publications concerning Odonata research in Colombia. A database including publications since 1868 was built through reliable sources on the Web of Knowledge. The publications were classified by time frame, departments (geography), study categories, and origin. All other categories were sub-classified according to the origin of the researcher, except for geographical classification. Contingence tables were constructed and analysed with Pearson's chi-squared test in the following analysis: i) number of papers per time frame according to the origin of the researcher; ii) separated number of papers for foreign researchers, network or Colombian authors over time; iii) number of papers per subject in accordance with the origin of the researcher; and iv) national or international publication according to the origin of the researcher. The number of documents per period, department, subject, and international or national publication were analysed by using chi square. The results showed the number of publications highest in Cundinamarca, Antioquia, Magdalena, Meta, and Valle. Departments least studied have been Arauca, Cesar, Guajira, Nariño, and San Andrés. The largest number of publications was taxonomic (83.7 %) and most studies (78.5 %) were published in international journals. The greatest progress in Odonata research in Colombia has been achieved since 2010. Current and future Odonata research in the country should cover more territory and prioritise research to provide information in order to generate conservation strategies in severely threatened Colombian ecosystems.

Further key words. Bibliometrics, dragonfly, damselfly, Latin America

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Addendum to Odonatologica 44 (3): 279-342

Update of the Odonata fauna of Georgia, southern Caucasus ecoregion

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Addendum. In the study by Schröter et al. (2015) the presentation of *Crocothemis erythraea* is erroneously missing in the species list. Data on *C. erythraea* is to be added and presented results adjusted accordingly. On page 279, the first sentence of the abstract therefore is to be corrected the following way:

A total of 64 odonate taxa were recorded in Georgia during nationwide surveys in June–July 2014, and June and July–August 2015, corresponding to at least 85 % of the country's Odonata fauna.