

1st June 2020

In memoriam Richard Seidenbusch (1944 – 2020)

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Received and accepted 25th February 2020

Abstract. Personal recollections and anecdotes of a friendship that lasted almost 30 years are given. The full odonatological bibliography of Richard Seidenbusch is appended.

Further key words. Dragonfly, Odonata, larvae, exuviae, determination, obituary

The Odonata of Zapata peninsula (Matanzas, Cuba), the largest wetland system of the Caribbean

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Received 24th February 2020; revised and accepted 12th April 2020

Abstract. This study describes the fauna of odonates of nine localities in the Zapata peninsula in the South-west of Cuba, sampled in June 2017, January 2018, and September 2019. We failed to find *Enallagma truncatum*, an endemic species of the area, even though we visited the type locality, Zarabanda, in June and January. We found 37 species in 25 genera and five families, including the first records of 11 taxa for the area: *Lestes forficula*, *L. tenuatus*, *Leptobasis candelaria*, *Neoneura maria*, *Aphylla caraiba*, *Celithemis eponina*, *Crocothemis servilia*, *Erythemis plebeja*, *Erythrodiplax berenice naeva*, *Perithemis domitia* and *Tamea onusta*. A dichotomous key for the separation of the four species of females of Cuban *Lestes* is given.

Further key words. Dragonfly, damselfly, faunistic records, *Lestes scalaris*, *Leptobasis candelaria*, *Enallagma truncatum*

On the distribution of *Sympetrum croceolum* in the Russian part of its range (Odonata: Libellulidae)

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Received 10th September 2018; revised and accepted 25th March 2020

Abstract. We used literature data, museum collections, and fieldwork to compile a list of records and produce a distribution map of *Sympetrum croceolum* in the Russian part of its range from where the species was little known to odonatologists outside of Russia for a long time. A detailed description of the fourth record of the species in Western Siberia (Chernyy Mys village, Kolyvanskiy District, Novosibirsk Province), which is globally the northernmost record of the species, is given. We suppose that the West Siberian *S. croceolum* populations originate from westward migrations from the eastern core part of the species' range. Morphometric analysis of specimens from different populations showed that variation of the hind wing size is within the individual variability of *S. croceolum*. By breeding *S. croceolum* in an aquarium from an egg clutch, information on the period of embryonic development and morphometric characteristics of eggs and larvae of younger instars was obtained. The subspecies *Sympetrum croceolum fuscoatrum* Belyshev, 1964, is synonymised with the nomotypical subspecies.

Further key words. Dragonfly, Anisoptera, biology, ecology, Western Siberia.

**A misleading representation of the Asian distribution
of a most intriguing dragonfly,
Somatochlora sahlbergi Trybom, 1889:
a critique of KOHLI et al. (2018)**

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Received 29th October 2019; revised and accepted 5th February 2020

Abstract. Recently KOHLI et al. (2018) published a phylogenetic analysis of *Somatochlora sahlbergi*, including extensive supplementary material listing global distribution records for the species. The compilation of literature data on records of *S. sahlbergi* in Siberia includes an unacceptable level of false pseudo-data and incorrect statements.

Further key words. Odonata, Anisoptera, Corduliidae, Russia, Siberia, geographical distribution, circumpolar species

Ejection, ingestion and fragmentation of mesoplastic fibres to microplastics by *Anax imperator* larvae (Odonata: Aeshnidae)

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Received 2nd March 2020; revised and accepted 23rd April 2020

Abstract. Exposure to plastic litter in ecosystems is increasing globally. Marine and terrestrial ecosystems, as well as freshwater ecosystems, are affected. Despite this, the impact of increased exposure to plastics on the freshwater fauna is largely unexplored. The present work investigates the reactions of 42 *Anax imperator* larvae to plastics in their habitat. Mesoplastic fibres (ca 8 mm long) were presented with a *Chironomus* sp. larva that was placed behind the fibre. In the majority of the observations, ejection attempts using the labium and the front legs were observed. When ingestion occurred, macerated plastic fibres (0.5-3.5 mm) appeared in the faeces of several individuals. Consequently, Odonata larvae turned mesoplastics into microplastics. It is assumed that the mechanical comminution was achieved by the action of the gizzard, which contains strong chitinous teeth.

Further key words. Dragonfly, Anisoptera, faeces, gizzard, microplastic fragmentation by freshwater organisms, digestive fragmentation

Suppression of *Aedes* mosquito larvae using dragonfly larvae released into ovitraps (Diptera: Culicidae; Odonata: Libellulidae)

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Received 29th January 2020; revised and accepted 6th April 2020

Abstract. There has been a marked increase in the number of dengue cases reported in Japan. In 2014, 162 people contracted dengue fever from the virus transmitted by *Aedes albopictus*. The increased prevalence of the disease in Japan implies that climate change and globalization have accelerated the risk of dengue fever spreading to Japan. This study aimed to develop a method for using dragonflies as biocontrol agents for mosquito control. We conducted a field study to determine whether dragonfly larvae could suppress populations of *A. albopictus* larvae. Eighth instar larvae of *Sympetrum frequens* were released into an ovitrap in which they preyed upon mosquitos. Compared to the control treatment, mosquito larvae decreased significantly in ovitraps containing *S. frequens* and *S. infuscatum* (i.e., experimental treatment). The mean number of mosquito larvae remaining in *S. frequens* and *S. infuscatum* ovitraps was 1.5 ± 4.6 (mean \pm SD) and 0.6 ± 1.1 , respectively. The results showed that *S. frequens* and *S. infuscatum* preyed on 410 to 710 and 339 to 592 mosquito larvae per ovitrap at each site. Based on estimates of the number of mosquito eggs laid in ovitraps during the field trial, *S. frequens* larvae consumed approximately 20.3 to 45.0% of mosquito eggs in the ovitrap. Suppression effects of *S. frequens* and *S. infuscatum* lasted 41 ± 13 and 35 ± 13 days, respectively. The results obtained suggest that *S. frequens* in ovitraps is effective for regulating larval populations of mosquito vectors.

Further key words. Anisoptera, ovitrap, biological control, mosquito larvae suppression, *Aedes albopictus*, *Sympetrum frequens*, *S. infuscatum*

Reproductive behaviour of Chlorocyphidae. Part 2. Genus *Disparocypha* Ris, 1916 (Odonata)

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Received 18th April 2020; revised and accepted 22nd April 2020

Abstract. The reproductive behaviour of the damselfly *Disparocypha biedermanni* (Chlorocyphidae) was studied in various streams, mainly in the Lake Poso area of Sulawesi. Flight styles of males were analysed in detail for the first time using high speed cinematography. Protracted threatening flights were particularly common between territorial neighbours. Males flew with regular counter-stroking wing beats and the abdomen held horizontally. Occasionally one of the males performed short ascending flights, pausing the wing beat. These threatening flights were interrupted periodically by short bursts of increased intensity with higher stroke frequency where males arched their abdomens. The escalated threat display could be intensified by tremulous horizontal changes in position. Unlike most Chlorocyphidae, mating took place without courtship and oviposition was in vertical mossy structures well above the water. The female was guarded by the male only at the start of oviposition. Possibly the mating system evolved in such a way as to avoid interspecific competition with other Chlorocyphidae but this needs more supporting evidence.

Further key words. Dragonfly, damselfly, Zygoptera, *Disparocypha biedermanni*, threat display, lack of courtship, oviposition, wing beat frequency, Sulawesi

A new damselfly of the genus *Forcepsioneura* from the Atlantic Forest of south-eastern Brazil (Odonata: Coenagrionidae)

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Received 23rd October 2019; revised and accepted 21st January 2020

Abstract. A new Brazilian Protoneurinae damselfly, *Forcepsioneura lopii* sp. nov. (holotype male deposited in DZUP: Brazil, São Paulo State, Cananéia, Ilha do Cardoso State Park) is described, and diagnosed based on two males and one female. This small dark yellow-orange *Forcepsioneura* Lencioni, 1999, inhabits typical *restinga*-like formations in southern Brazil. The coloration and short ventrobasal process of the male cercus of *Forcepsioneura lopii* sp. nov. make it similar to the larger montane species of the orange-black group, *i.e.*, *F. grossiorum* Machado, 2005, *F. itatiaiae* (Santos, 1970), *F. janeae* Pimenta et al., 2019, *F. lucia* Machado, 2000, and *F. serrabonita* Pinto & Kompier, 2018. However it occurs in lowlands and the cercus is slender as in the light blue group, *i.e.*, *F. gabriela* Pimenta et al., 2019, *F. garrisoni* Lencioni, 1999, *F. haerteli* Machado, 2001, *F. regua* Pinto & Kompier, 2018, and *F. sancta* (Hagen in Selys, 1860). The very acute, spur-like process on the mediobasal process of male cercus is unique. This is only one of several undescribed species recently discovered in *Forcepsioneura*, and it reaffirms the necessity for additional investigations to understand the richness and diversification of this genus.

Further key words. Dragonfly, Zygoptera, Protoneuridae, systematics, taxonomy, South America

***Onychogomphus cazuma* sp. nov. from Spain:
Molecular and morphological evidence supports
the discovery of a new European dragonfly species
(Odonata: Gomphidae)**

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Received 31st March 2020; revised and accepted 27th April 2020

Abstract. *Onychogomphus cazuma* Barona, Cardo & Díaz sp. nov. is described from the mountainous inland area of Valencia in central-eastern Spain. The new species presents a combination of morphological characters that distinguishes it from all other species of the genus and can be readily identified by the morphology of the male appendages and the female vulvar scale, and by the shape of the median lobe of the prementum and the labial palps of the exuvia. Molecular analysis of two genetic markers, one nuclear and one mitochondrial (PRMT and COII), supports the full species rank for this new taxon, which is sister to the north-western African endemic *O. boudoti*. Despite its small known distribution and the vulnerability of its habitat, available data are still insufficient to place this new species into an IUCN Red List of Threatened Species category.

Further key words. Anisoptera, Iberia, Valencia, taxonomy, phylogeny

Taxonomic and biological notes of the South Korean Odonata revised since 2000

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Received 2nd April 2019; revised and accepted 3rd April 2020

Abstract. This study provides annotated descriptions of six anisopteran species that were either recently recorded from South Korea or that were subject to taxonomic revision since 2000: (i) Details of *Boyeria karubei* specimens from South Korea are provided for the first time and they are compared with the congeneric *B. maclachlani*. The name *Boyeria jam-jari* Jung, 2011, is an unavailable name and the same as *B. karubei*. (ii) *Nihonogomphus minor* Doi, 1943, is for the first time designated a junior synonym of *N. ruptus* (Selys, 1858). (iii) Anal appendages of *Stylurus annulatus* from Korea are compared with those of the Japanese population. (iv) A slight structural difference between *Orthetrum internum* from Korean Peninsula and Japan is highlighted. (v) New records of *Sarasaeschna pryeri* from Jeju Island are detailed and its habitat environment and behavioural ecology are described. (vi) *Brachydiplax chalybea*, a tropical/subtropical immigrant, has successfully colonised Jeju Island, expanding its range to the south-western region of the mainland.

Further key words. Dragonfly, Anisoptera, synonym, *Boyeria karubei*, *Nihonogomphus ruptus*, *N. minor*, *Stylurus annulatus*, *Orthetrum internum*, *Sarasaeschna pryeri*, *Brachydiplax chalybea*

***Agriocnemis lepida* sp. nov.**
from the Annamite Range in Lao PDR
(Odonata: Coenagrionidae)

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Received 4th February 2020; revised and accepted 5th April 2020

Abstract. *Agriocnemis lepida* sp. nov. is described and figured (holotype ♂: 20-ii-2003, Lao PDR, Khammouan Province, 2.5 km WNW Ban Tathot, Tham Kamouk, 17.6316°N, 105.1250°E, 200 m a.s.l., P. Jäger leg.; deposited at the Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany). Additionally, illustrations of the male appendages and the posterior lobe of the prothorax of *A. clauseni*, *A. minima*, and *A. nana* as well as photographs and a Selys watercolour of the female holotype of *A. carmelita* are provided. *Agriocnemis carmelita* is shortly discussed with references to the genus *Mortonagrion*.

Further key words. Damselfly, Zygoptera, new species, cobra-hood, *Agriocnemis carmelita*, *Mortonagrion*