

# AGRION

NEWSLETTER OF THE WORLDWIDE DRAGONFLY ASSOCIATION

PATRON: Professor Edward O. Wilson FRS, FRSE

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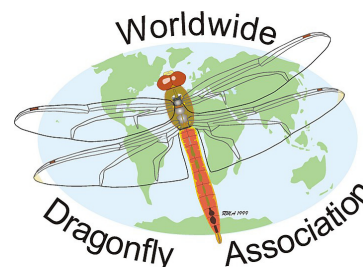




# AGRION

NEWSLETTER OF THE WORLDWIDE DRAGONFLY ASSOCIATION

AGRION is the Worldwide Dragonfly Association's (WDA's) newsletter, which is normally published twice a year in January and July. Occasionally a special issue may be produced, as was the case in May 2020 when a special issue was published in response to the ongoing Covid-19 pandemic. The WDA aims to advance public education and awareness by the promotion of the study and conservation of dragonflies (Odonata) and their natural habitats in all parts of the world. AGRION covers all aspects of WDA's activities; it communicates facts and knowledge related to the study and conservation of dragonflies and is a forum for news and information exchange for members. AGRION is freely available for downloading from the WDA website at [<https://worlddragonfly.org/about/agrion/>]. WDA is a Registered Charity (Not-for-Profit Organization), Charity No. 1066039/0. A 'pdf' of the WDA's Constitution and byelaws can be found at its website link at [<https://worlddragonfly.org/about/>].



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## Editor's notes

Keith Wilson [[kdpwilson@gmail.com](mailto:kdpwilson@gmail.com)]

### WDA Membership

Control of the membership signing up and renewal process is now being handled by WDA directly from the WDA website. There are several kinds of WDA membership available, either single (Regular) or family. Hitherto, membership options were with or without the WDA's journal (*The International Journal of Odonatology*) in electronic form or hard copy, but as from January 2021 the IJO will only be available in electronic form and will be freely accessible through Open Access (see "Big changes for International Journal of Odonatology" on page 4). There is a reduced membership category for students (grade school, undergraduate, graduate, etc.) and anyone (student or not) residing in a developing nation. You can sign up for a membership using the WDA's website [<https://worlddragonfly.org/membership-account/membership-levels/>] or by contacting the WDA secretary directly [[wda.secretary@gmail.com](mailto:wda.secretary@gmail.com)]. Sponsored memberships are also available for those who cannot afford the cost due to currency restrictions or other reasons.

### Paper dedicated to Wolfgang Schneider (1953 - 2019) past President of WDA

A recent paper published in August 2020 in the journal *Rendiconti Lincei. Scienze Fisiche e Naturali* 31: 571-605, titled: *Dragonflies of Dragon's Blood Island: Atlas of the Odonata of the Socotra Archipelago (Yemen)* was dedicated by the authors, Kay Van Damme et al., to Dr Wolfgang Schneider. The dedication read: 'This paper is dedicated to the late Dr. Wolfgang Schneider, an exemplary researcher known for his kindness and professionalism. Wolfgang has been a dear friend and an excellent odonatologist who contributed for decades to freshwater conservation in the Arabian Peninsula. His interest in the biodiversity of Yemen and Socotra, and his undying love for the dazzling dragonflies, will not be forgotten'. The paper can be viewed and accessed at [<https://rdcu.be/b6epb>] and [<https://link.springer.com/article/10.1007/s12210-020-00942-6>].

### Angelo Barbosa Monteiro Machado (1934 - 2020)

The Brazilian, *inter alia*, children's author, neuroanatomist and odonatologist Professor Dr Angelo Machado passed away on 6 April 2020 at the age of almost 86. A recent, short biography was provided in 2016 by Angelo Pinto in *Zootaxa* [4078(1): 008-027] celebrating his 80<sup>th</sup> birthday [[Link](#)]. An obituary and post 2016 Odonata biography is provided here by one of his past postgraduate students Déborah Soldati (see on page 18). Further personal recollections of the late Angelo Machado were provided in December 2020 by Dr Bastiaan Kiauta in *Odonatologica* 49: 191-198.

**Cover:** Golden-ringed dragonfly, *Cordulegaster boltonii* (Donovan, 1807), Old Lodge, Ashdown Forest, East Sussex, UK, 31 July 2020. This large dragonfly is the only representative species of the Cordulegastridae family occurring in a large part of northwest Europe.

## Conference & Meeting News

### The International Congress of Odonatology ICO2021

The next ICO will be held in Paphos, Cyprus at the Neapolis University. It was originally scheduled for 21<sup>st</sup> to 25<sup>th</sup> June 2021 but will now be organised by The Cyprus Dragonfly Society and Terra Cypria for 29 August to 3 September 2021. For further information consult the WDA website [Link] or contact David Sparrow, Chair of the Organising Committee [davidrospfo@hotmail.com]. See also ICO2021 news article by David and Ros Sparrow on page 5.



### European Congress on Odonatology (ECOO) 2020 postponed due to Covid-19

In view of the Coronavirus disease (Covid-19) outbreak, the Organisers and the Scientific Committee have carefully assessed the global situation and after due consideration regarding the health and safety of the participants have jointly agreed to postpone the 6<sup>th</sup> European Congress on Odonatology, which was scheduled from 29 June to 2 July 2020 in Kamnik, Slovenia. The Slovene Dragonfly Society now proposes to organize the 6th ECOO at the end of June 2022 on similar date period and at the same location. [<https://ecoo2016.wordpress.com/>].

### Sociedad(e) de Odonatología Latinoamericana (SOL) 3<sup>rd</sup> annual meeting 2020 postponed

The Sociedad(e) de Odonatología Latinoamericana 3rd annual meeting was rescheduled to be held in Cusco, Peru from 11-13 November 2020. Due to the continuing current global Covid-19 health crisis the organisers have been forced to postpone the SOL Odonata Congress for the year 2021 [Link]. See also Facebook [[facebook.com/OdonataSol](https://facebook.com/OdonataSol)] and the SOL website [[odonatasol.org/](https://odonatasol.org/)] for further updates in due course.

## Next issue of *AGRION*

For the next issue of *AGRION*, to be published at the beginning of July 2021, please send your contributions to Keith Wilson [kdpwilson@gmail.com] or Graham Reels [gtreels@gmail.com]. All articles, information and news items related to dragonflies or of interest to WDA members are most welcome and will be considered for publication. Please send all text and figure captions in a Word file by email. Please do not include artwork with the text but provide a separate file or files, ideally in a compressed format (e.g. 'tiff', 'jpeg' or 'gif'). Do not make up plates of multiple photos but send original photo images as separate files.

If you have an odonate photo illustrating any rarely observed aspect of dragonfly biology, or an unusual species, or simply a stunning dragonfly shot, please submit it for consideration for publication on the front cover of *AGRION*.

## Message from WDA President & Board of Trustees

December 2020

Dear WDA membership,

As we move from the month of December 2020, we have big news to announce, as detailed here in the January 2021 *Agrion*! From a new publisher, to growing membership, active social media engagement, and exciting new articles in IJO coming soon, we have a lot to be excited about!

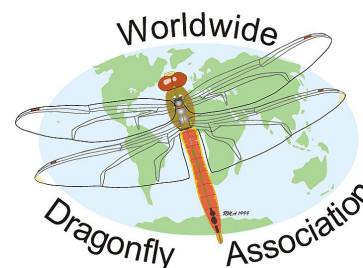
We have spent the year of 2020 working to increase membership. In addition, we have a new publisher, Wacholtz publishing! (see also John Abbott's article on page 4). Switching to this new publishing house means free open access publishing for all WDA members! We have also spent time in 2020 planning for research grant cycles, and building a stronger presence on social media [<https://twitter.com/WorldDragonfly> & <https://www.facebook.com/WorldwideDragonflyAssociation>]. In 2021, WDA will have new member benefits, such as our pdf library to be hosted on the members only section of the WDA site, and networking events/options for members.

If you are interested in getting more involved in volunteering with WDA? Please contact Jessica Ware [[jware@amnh.org](mailto:jware@amnh.org)].

Thank you for your support of WDA and let's make odonatology accessible for all!

Best wishes to all from your WDA board:

Jessica Ware, American Museum of Natural History, President of WDA; Frank Suhling, Yoshitaka Tsubaki, John Abbott, Christopher Beatty, Peter Brown, Manpreet Kohli, Will Kuhn, Göran Sahlén, Keith Wilson.



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### Big changes for *International Journal of Odonatology*

John C. Abbott [jabbott1@ua.edu], The University of Alabama  
Editor-in-Chief, *International Journal of Odonatology*

I am excited to announce some major changes coming to the *International Journal of Odonatology*. After 10 years being published by Taylor & Francis, the *Worldwide Dragonfly Association* (WDA) Board recognized a need for change and voted to have the journal published by Wachholtz starting with volume 24, in January 2021. This change in publisher will come with many other significant changes to the journal. First, we will have a new look to go along with becoming a **strictly online journal**. While I know becoming strictly an online resource will not thrill everyone, I believe it presents many favorable benefits. The journal will now appear in a larger A4 format with color throughout.

One of the most significant changes is that the journal will become **Open Access**. The corresponding author for each article will be required to be a member of the WDA, but there will be **no page charges**. This should result in greater reach and thus a greater number of citations for your articles. With this new benefit, we are hopeful that the odonate community will choose to support this initiative by becoming new members and that current members will appreciate this extra value when renewing their membership in WDA.

We are working to host all 23 current volumes of IJO on the WDA website, <http://worlddragonfly.org>. They will be freely available as PDFs starting in 2021. Starting with volume 24, the journal will be published on the Wachholtz website [<https://www.wachholtz-verlag.de/en/Science/Biology/International-Journal-of-Odonatology/>]. We are excited about these changes; it presents a great time to either renew your WDA membership or join for the first time! There are a number of benefits to joining, <https://worlddragonfly.org/resources/member-resources/>, in addition to supporting the society's goals of promoting Odonatology around the world. We appreciate your patience during this transition.

John Abbott, Editor-in-Chief, *International Journal of Odonatology*





**NEW DATE**

**The International Congress of Odonatology 2021  
29 August – 3 September 2021, Paphos, Cyprus**

**David and Ros Sparrow [davidrospfo@hotmail.com]**

ICO2021 was planned to be held in June 2021 but as a result of the uncertainty surrounding the Covid-19 pandemic, the WDA and ICO Organising Committee have decided to move the planned date for the Congress forward to give more time for the vaccines to be rolled out and hopefully for the virus to be brought under control. The new dates for ICO2021 are **Sunday 29 August to Friday 3 September, 2021** and the website will be regularly updated as the situation develops. As previously planned the Congress will be held at Neapolis University in Paphos, Cyprus, which has the huge advantage of having affordable on-site accommodation. The Congress will start with a welcome cocktail reception



on Sunday evening. Monday to Wednesday and Friday will be congress days and there will be a “mid-congress” field trip on Thursday. The Congress will end with the Congress Dinner on Friday 3 September.

The mid-congress field trip will get off at an early, but still very civilised time and explore sites along the Diarizos River, the most species rich of Cyprus’ rivers, ascending into the Troodos Mountain area with a late lunch beside the stream at a trout farm at 1300 m asl (4265 ft asl). Our Congress dinner on Friday 3<sup>rd</sup> September will be held on the patio of the Kamare Club, a relaxed venue on the hills overlooking Paphos and the Mediterranean sunset. There will be an optional three-day post-congress field trip and, since most sites are within easy reach of Paphos, we will stay based at Neapolis University, from which we will make daily excursions to the many interesting odonate habitats on the southern part of the island.

Cyprus has a modest 38 species of dragonflies, but with its position in the eastern Mediterranean at the crossroad of three continents, it has a unique mix of European, Asian and Africa species. It is the only place in Europe where the rare *Ischnura intermedia* (Persian Bluetail), which appears on the ICO 2021 logo, occurs and one of the few places in Europe where *Anax immaculifrons* (Magnificent Emperor - Europe’s largest dragonfly), *Orthetrum chrysostigma* (Epaulet skimmer), *Orthetrum sabina* (Slender Skimmer), *Orthetrum taeniolatum* (Small Skimmer), *Trithemis arteriosa* (Red-veined Dropwing) and *Trithemis festiva* (Indigo Dropwing) can be seen. All these species are on the wing in September.

Paphos is a major tourist destination and apart from sun, sea and sand has a rich cultural heritage. The island was first settled by humans at least 12,000 years ago and has many rich archaeological remains. Not far from Paphos lies the legendary birthplace of Aphrodite, the Greek goddess of love and beauty, and the ancient centre of the cult of Aphrodite and pre-Hellenic fertility deities. Paphos Archaeological Park, just 20 minutes’ walk from the Congress venue, is a UNESCO World Heritage Site featuring extensive, 2<sup>nd</sup> century Roman mosaics which are rated among the finest in the world. Other remains in the Park date from prehistoric times to the Middle Ages, and include monumental rock-cut tombs known as the Tombs of the Kings. Local bus routes link Neapolis University with the main tourist sites. Further afield, many tour operators offer day trips to visit Monasteries, wineries, and other places of note. Congress delegates, therefore, need not be concerned about their accompanying guests not being able to find things to do! In fact, delegates are also highly recommended to take an hour or so out of their dragonflying time, or maybe add an extra day, for sightseeing.

We hope to see you in Paphos for ICO 2021.

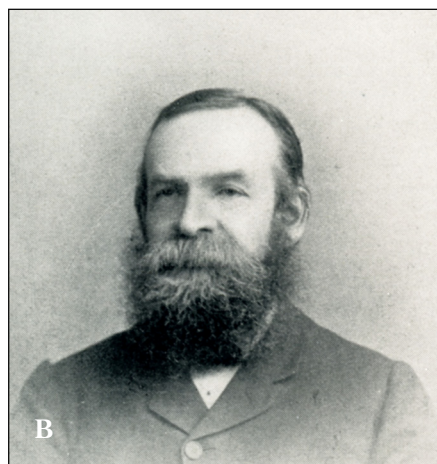
For further information consult the WDA website [\[Link\]](#) or contact David Sparrow, Chair of the Organising Committee [davidrospfo@hotmail.com].

**When ‘a few trifling alterations’ became ultra-radical  
changes in the nomenclature of Odonata –  
W. F. Kirby’s (1890) catalogue of the World Odonata  
seen through the eyes of Edmond de Selys Longchamps**

**Matti Hämäläinen (matti.hamalainen@helsinki.fi)**

In 1890, the English entomologist, linguist and folklorist William Forsell Kirby (1846-1912) published, at his own expense, the first catalogue of the dragonflies of the world. It was titled: *A synonymic catalogue of Neuroptera Odonata, or dragonflies. With an appendix of fossil species* (Kirby, 1890). Most of the relatively few odonatologists active at that time received this catalogue with mixed feelings. Although they mostly admitted that this pioneering catalogue was a very useful tool, many found the numerous changes in the then familiar nomenclature difficult to accept. The leading figure in the field, Edmond de Selys Longchamps (1813-1900), the ‘Father of odonatology’, was especially vexed by Kirby’s radical and unexpected changes in the nomenclature. Selys first learned of this project from Kirby in November 1885, and received news of its progress during the following years. Selys had promptly provided the author with information whenever requested and sent him his new publications. However, the final result was apparently not at all what Selys had come to expect from his correspondence with Kirby.

But let us first go back to the year 1883 when Selys and Kirby (Fig. 1A-B) met for the first time. On 2 June 1883, at the meeting of Royal Belgium Academy of Sciences, Selys had presented and submitted the manuscript of the first part of *Synopsis des Aeschnines* (Selys Longchamps, 1883), which included a generic classification of this dragonfly group. Then from 7-17 September 1883 he visited London. His purpose was to study the aeshnid specimens in the Zoological Department of the British Museum for the planned second part of the synopsis which was to contain the species descriptions.



**Figure 1. (A) Photograph of Edmond de Selys Longchamps. (B) Photograph of William Forsell Kirby taken in 1896.**

During this visit Selys met W. F. Kirby for the first time, the latter having joined the museum staff in 1879. Selys’ diary note<sup>1</sup> of 11 September 1883 reads: “Avec Walthere au nouveau British Museum, Kensington. Vu les *Aeschna* avec M. Kirby, puis les objets d’art et manuscrits historiques de South Kensington puis le musée du collège de Surgenne.” [With Walthere (his son) to the new British Museum, Kensington. View the *Aeschnas* with Mr Kirby, then objets d’art and historical manuscripts at South Kensington, then the College of Surgeons]. On the following day Walthere de Selys Longchamps left London, while his father remained to prepare descriptions of a few aeshnid species at the museum.

### **Kirby’s correspondence with Selys on the catalogue**

On 4 November 1885, Kirby wrote a letter (Appendix) to Selys informing him that he had spent several months arranging the odonate collection of the British Museum and that he planned to publish his private ‘working catalogue’ of the World Odonata. Kirby also inquired whether Selys would have any objection to him publishing this kind of catalogue, which would largely be based on Selys’ work. Kirby also asked when the second part of Selys’ *Synopsis des Aeschnines* was expected to appear, and expressed the hope that Selys would come to London again, where the Odonata collection was now much better organized than in September 1883.

Selys quickly replied on 6 November 1885. He expressed his satisfaction on hearing the news of the reorganisation of the museum’s Odonata collection, but he doubted whether he could visit London again on account of his age. Selys also wrote on his progress in his studies of the Agrionines and Aeschnines, and said that the Libellulines would remain a very difficult group to work on. In a postscript of his letter Selys wrote rather vaguely as follows (translated): “Reading your letter again, I see that you ask me very kindly if the catalogue, that



you plan, could conflict with the sequel of my ‘Synopsis des Odonates’. It is a question that is difficult for me to answer.” Ostensibly, not recognizing Kirby’s main question when reading the letter for the first time, as well as answering this question in a postscript, may have been intended as a diplomatic way of saying that he was not especially pleased with Kirby’s plan. Possibly Selys feared competition, or perhaps he doubted the extent of Kirby’s knowledge of Odonata. Although, Kirby was already a leading entomologist in 1885 – the author of several entomological books, including a synonymic catalogue of the butterflies of the World – at that time he was still a novice in the field of odonatology. Apart from a brief local faunistic note, published when he was just 15 (Kirby, 1859), he had written only a single brief taxonomic paper on dragonflies (Kirby, 1884), which listed 11 odonate species, including one species described as new – *Diplax pacificus* (a junior synonym of *Diplacodes bipunctata* (Brauer, 1865)).

Kirby was obviously aware of Selys’ doubts. Shrewdly, as well as diplomatically, he started his letter dated 20 November 1885 (Appendix; Fig. 2A) as follows: “I thank you for your letter, and I am pleased to find that you express no disapproval of my proposal to publish a Catalogue of Odonata.” He tried to assuage Selys’ doubts by repeating that the catalogue will not contain any descriptions. He also promised that: “I do not propose to make more than a few trifling alterations in synonymy and nomenclature, which occurred to me in going through the collection.” (Fig. 2B). However, Kirby did say he would list all subgenera as full genera—thus not following Selys’ classification in this point.

Several letters on this subject were exchanged during the next five years. I have been able to examine copies of Kirby’s letters to Selys, which are preserved in the Selys archives at the Institut Royal des Sciences Naturelles de Belgique in Brussels. Unfortunately, I have not seen Selys’ replies to Kirby<sup>2</sup>, with the exception of his first letter (6 November 1885), of which a draft copy is available in Selys’ archives. However, Kirby’s letters alone give a quite good idea of the drift of their correspondence. In his letters Kirby thanks Selys for papers received and he often asks when various of Selys’ coming publications are expected to appear. In six letters he repeatedly asks when the second part of *Synopsis des Aeschnines* will be available, obviously not receiving any definite date from Selys.<sup>3</sup> In one letter he asks where the genus name *Enallagma* was first published, and in another one he explains his taxonomic views concerning some New World libellulid taxa.

On 25 November 1886 Kirby wrote: “I am making steady progress with my Catalogue of Odonata, which will probably extend to about 160 pages, besides Index & c. I hope to send it to press early in January and that it will be ready for publication in the course of the spring.” He also wrote that he planned to start publishing papers describing a selection of new odonate species with coloured illustrations. “My next paper will probably include new species from Borneo, and some of the other Eastern Islands”. He again emphasized that his coming catalogue will not contain any descriptions, but is a mere synonymic list of all described species, and that the edition will be small.

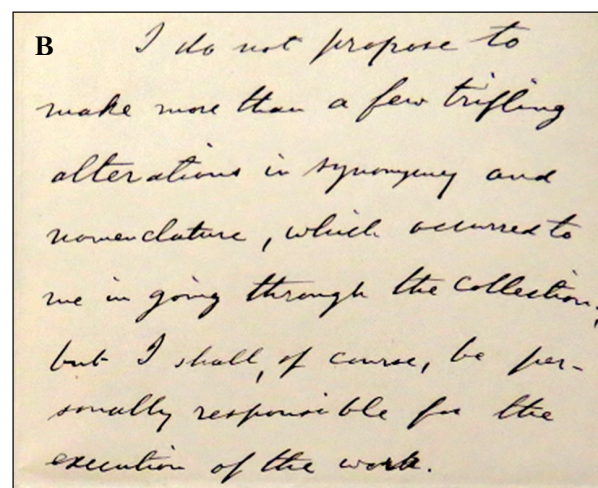
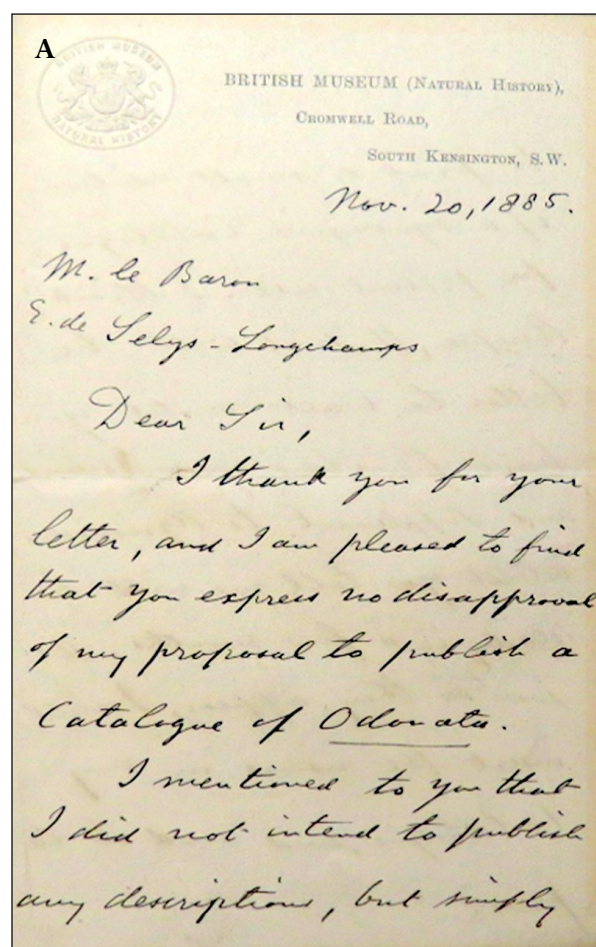


Figure 2. Two extracts (A, B) of Kirby’s letter to Selys (20 November 1885), where he promises to make only ‘a few trifling alterations’ in his planned catalogue. Photo credit: Marcel Wasscher.

<sup>2</sup> I am not aware if Selys’ letters still exist in some archive holding Kirby’s correspondence.

<sup>3</sup> Selys never published the second part of *Synopsis des Aeschnines*.

However, publication of the catalogue was delayed. On 16 August 1887 Kirby wrote that he had not published anything since his previous letter, and continued: “I have finished arranging the collection of Odonata in the British Museum, and as that collection is extremely rich in Libellulidae, much more than in any other family, I have prepared a generic revision of that group, characterizing many new genera and species.<sup>4</sup> As soon as this paper is in type, so that I can quote it, I shall print my Catalogue of Odonata, which is otherwise quite ready for press; and which of the two I shall have the pleasure of sending you first, I cannot yet say.” Kirby continued: “I trust that when you receive the two works of which I speak, you will find them useful, and that you will have no need to consider that I have anticipated any work which you may have had in preparation. Should you proceed with a Synopsis of Libellulidae after completing the Aeschnides, you will no doubt have very large material to add to all that has been done before.”

Eleven months later, on 4 July 1888, Kirby wrote: “You will no doubt be surprised not to have heard from me lately respecting the large works on Odonata which I was projecting. They have been completed for two or three years; but although the Zoological Society promised to publish my paper on Libellulinae last February, they were so deficient in funds last year, that my paper was postponed...” Then he gave some more details, saying that the catalogue must wait for the publication of the libellulid paper. Once again, this letter included the question: “When may we hope to see the continuation of your Synopsis of Aeschnides?” On 12 January 1889<sup>5</sup>, Kirby repeated the same question concerning the Aeschnides, and said that he was prepared to send the catalogue to press, but could delay doing so for a few weeks, in order to be able to add its contents, should this synopsis appear soon.

However, submitting the catalogue to press was delayed further. Kirby’s libellulid revision was finally published in November 1889 (Kirby, 1889). It had been in the hands of the publisher for two and half years. So, now the major obstacle delaying the catalogue was removed. The major part of the catalogue must have been submitted for printing at latest during the first months of 1890, since the numerous libellulid species described by Karsch (1890) were presented in ‘Appendix II (Additions and Corrections)’ of the catalogue; the journal issue, which included Karsch’s paper, was published in mid-March 1890. The preface of the catalogue was dated ‘July, 1890’.

### Selys receives the catalogue and invites Kirby for a visit

On 8 August 1890 Kirby was finally able to mail a just issued copy of his *A synonymic catalogue of Neuroptera Odonata, or dragonflies* to Selys (Fig. 3). In the attached letter Kirby said that he and his German-born wife Johanna (née Kappel)<sup>6</sup> were just about to leave for Germany to visit her parents at Hilden near Düsseldorf. Kirby provided their address in Germany in the hope of receiving Selys’ fresh opinion of his work. In his reply Selys invited the couple to visit Liège on their way back to England. He also wrote some polite words on the catalogue, but inquired why Kirby had rejected the genus name *Calopteryx* and used the name *Agrion* instead. In his letter of 22 August 1890, Kirby gratefully accepted Selys’ kind invitation and expressed his satisfaction that Selys’ preliminary impression of the catalogue had been favourable. Kirby also briefly explained his reason for rejecting the name *Calopteryx* (Fig. 4). Two days later on 24 August, Kirby wrote to Selys that they would arrive in Liège by train from Cologne (Köln) on

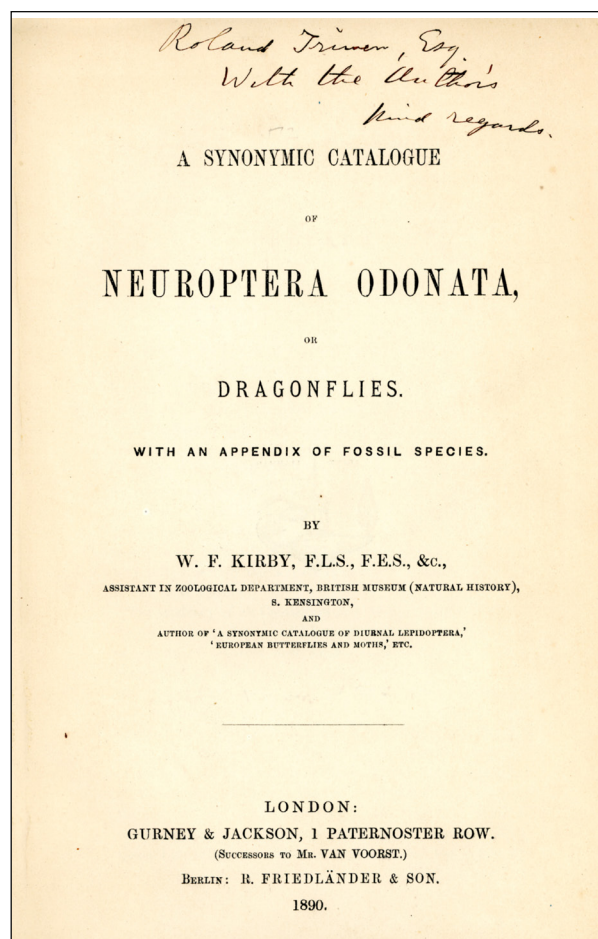


Figure 3. Title page of Kirby’s (1890) catalogue with author’s compliments. Photo credit: Rosser Garrison.

<sup>4</sup> The manuscript was submitted to the Zoological Society of London on 26 March 1887.

<sup>5</sup> This letter was the last one which Kirby wrote to Selys in English, all the following ones were in French.

<sup>6</sup> Kirby met Johanna Maria Kappel (1835-1893) while staying in Germany throughout most of 1866. They were married on 31 May 1866. They had one son, William Egmont Kirby (1867-1925), who became a Doctor of Medicine and authored or coauthored several books on insects. Among them is ‘British and European butterflies and moths’ with 30 beautiful coloured plates executed by Heinrich Deuchert and Shirley Slocombe (Kappel & Kirby, 1895). The first author, August Wilhelm Kappel (1840-1915), was Kirby junior’s uncle. For more information on the connections of the families Kirby and Kappel, see Kirby Brett (1996a; 1996b).



the following day at 2 PM, or perhaps later. Maybe the visitors arrived before the letter! In any case, on 25 August 1890 Selys wrote in his diary: "A 2 heures et demie, arrivée de M. et Mme Kirby, du British Museum, voir ma collection et le cour de palais. Logé avec eux à Longchamps. Ils ne comprennent presque pas le français et je ne comprends pas leur anglaise. M. Kirby n'a fait aucune question sur les odonates." [At 2.30 PM, arrival of Mr and Mrs Kirby from the British Museum; view my collection and the palace courtyard. Stayed with them at Longchamps. They hardly understand any French and I don't understand their English. Mr Kirby did not ask a single question about odonates.] On the following day Selys wrote: "Le matin, départ de M. et Mme Kirby pour Luxembourg." [In the morning departure of Mr and Mrs Kirby for Luxembourg].

Selys' comment on his communication problems with Kirby is somewhat surprising. Kirby was a recognised polyglot, versed in over a dozen languages (see, for instance Kheil, 1913). As Kirby's correspondence with Selys proves he could read and write French without problems, but obviously spoken French, or perhaps that of a Walloon such as Selys, caused him difficulties. Anyway, partly due to obvious communication problems Selys did not seem to be particularly pleased with this visit and apparently, he was annoyed by Kirby's failure to show interest by not asking questions about dragonflies.

### Selys' review of Kirby's catalogue

Although Selys admitted that: "the book had been before his eyes for too short a time" to enable a detailed discussion on the general classification and the species lists he prepared a rather comprehensive review (eight printed pages) of the catalogue, which he presented in the meeting of the *Société entomologique de Belgique* in Brussels on 6 September 1890, less than one month after he had received the book (Selys Longchamps, 1890). Selys started his review (translated): "This catalogue is an extremely useful list of the odonates described to date. I hasten to present a general analysis to entomologists who deal with this important group or sub-order."

In spite of very positive remarks initially and also later, Selys strongly criticized Kirby's strict application of the principles of priority (admitting that these principles are not Kirby's own invention), which had led to some "ultra-radical" (Selys' expression) changes in the genus-group classification and nomenclature widely used by other 19<sup>th</sup> century authors of Odonata, including Selys. For instance, Kirby considered the genus-group names *Aeshna* Fabricius, 1775 and *Aeschna* Illiger, 1802 to represent two distinct dragonfly groups. In Kirby's system the genus *Aeschna* included the typical aeshnids (in the present sense), such as the Linnean species *grandis* and *juncea*, whereas the Linnean *vulgatissimus* was listed as *Aeshna vulgatissima* (Fig. 5A). The genus *Gomphus* Leach, 1815 was downgraded to synonymy with the genus *Aeshna*. Selys correctly pointed out that Illiger's adding the letter 'c' to the name *Aeshna* was merely an emendation. Therefore, Kirby's act of making *Gomphus* a synonym was incorrect. Moreover, Selys opposed Kirby's downgrading the genus *Onychogomphus* Selys, 1854 as a synonym of *Lindenia* de

Je pense qu'il n'y a  
que deux types possible  
pour l'Agrion, Fabr.; la

A

Mais en 1802 Latreille  
a déjà indigné la Virgo, et  
je pense que son action réduit  
Calopteryx, Leach, de 1815,  
à une synonyme.

Recevez, cher Monsieur,  
l'expression de mes compliments  
les plus distingués.

Votre bien dévoué

W. F. Kirby.

B

**Genre. AGRION; agrion.** Antennes à troisième article allongé, et terminées par une soie qui n'est pas deux fois plus longue que la tête, sans articles distincts. Lèvre inférieure à trois pièces assez grandes; les latérales ayant une pièce palpiforme et un angle saillant; celle du milieu fortement échancrée.

Tête et corselet ne faisant que le tiers de la longueur totale du corps; tête courte, large. Yeux gros, écartés. Fessie frontale petite. Petits yeux lisses, très-apparens, sans élévation vésiculeuse au milieu d'eux. Ailes élevées. Abdomen très-long, menu, cylindrico-linéaire.

C Exemple. *Agrion virgo*. F.

Figure 4. (A-B) An extract of Kirby's letter to Selys (22 August 1890), where he explains the reason for rejecting the genus-group name *Calopteryx*. Photo credits: Marcel Wasscher. (C) The account in Latreille (1802, p. 428) on which Kirby based his decision.



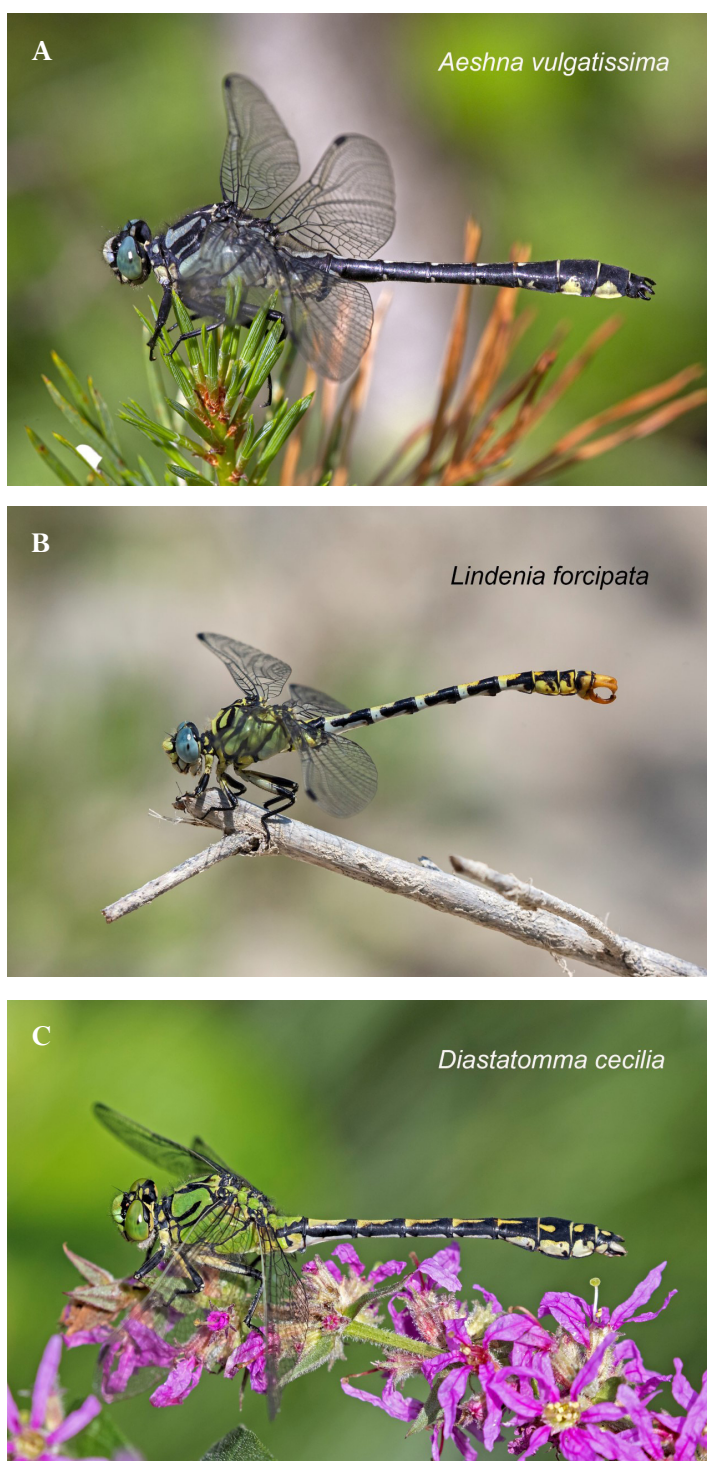
Haan, 1826 and the genus *Ophiogomphus* Selys, 1854 as a synonym of *Diastatomma* Burmeister, 1839 (Figs 5B & 5C). Selys concluded that Kirby's new genus *Vanderia* for the species, which Selys had called *Lindenia tetraphylla* (Vander Linden, 1825), was unnecessary. Selys also strongly opposed Kirby's placement of the genus name *Calopteryx* Leach, 1815 (Fig. 6) as a synonym of *Agrion* Fabricius, 1775, which meant that a new genus name—*Coenagrion* Kirby, 1890—was needed for those damselflies earlier placed in the genus *Agrion*. Selys wrote (freely translated): "It seems to me impossible that we adopt the transfer of names and the new names I just mentioned" and "Let us not try to resuscitate completely forgotten things, brought to light as a result of curious bibliographic searches carried out in works not often seen, and therefore not able to be verified. It is more in the interest of science to not upset general works and monographs patiently and skilfully compiled by recent specialists."

Selys also objected to Kirby not recognising any subgenera, instead ranking all as full genera. He also regretted that Kirby had not grouped the genera into 'sections' which would show their affinity, and claimed that his own classification with 'grands-genres' and 'sous-genres' was more informative in this respect. (Kirby also listed all 'varieties' [= subspecies], named by Selys, Hagen and some others, as full species, but the reviewer did not comment on this.)

Selys was annoyed at seeing himself listed as the author of the taxon names which he, in the various issues of the 'Synopses' had credited to Hagen, Bates or McLachlan as author. Selys wrote (translated): "I cannot accept this honour regardless of it being consistent with the 'Rules'. The failure to recognise the part of the entomologist who first studied the new form and proposed a name for it, seems to me likely to restrict or delay the convivial relationships that have been so useful in settling taxonomic issues among specialists." Selys' criticism of the authorships was largely correct, according to modern interpretation, and at present the authorships 'Hagen in Selys' and 'McLachlan in Selys' are commonly used in those cases where Kirby credited the authorship of the respective species solely to Selys.

Had Selys allowed more time for his review, he could have easily pointed out several misspellings in the species names and other errors. He did however briefly note that Kirby's list included a large number of dubious taxa, many of which other specialists had already criticized, such as the new European 'species' named by Heinrich Buchecker. (In retrospect, we know now that Kirby's catalogue includes slightly fewer than 1500 extant taxa which are presently considered as valid full species, the rest being either subspecies or synonyms.)

Due to the hurry to publish his review, Selys miscounted the total number of extant species listed by Kirby. Selys ended up to 1709 species, although a total of ca 1800 species was listed. In his table, Selys



**Figure 5. Three gomphid species from Finland, named using the binomials given in Kirby's catalogue: (A) *Aeshna vulgatissima*. (B) *Lindenia forcipata*. (C) *Diastatomma cecilia*. Photo credits: Risto Toivonen.**



counted ‘134 species’ for the “Agrioninae Kirby (Calopteryginae Selys)”, although Kirby listed 234 species. There were also smaller inaccuracies in the species numbers in some other families.

Selys’ criticism may have been exacerbated by the fact that Kirby’s most radical changes in the nomenclature came to him unexpectedly. Although in his letter of 20 November 1885 (Appendix), Kirby had informed Selys that he would not use subgenera, he also gave him to understand that there will be only: “a few trifling alterations in synonymy and nomenclature” (Fig. 2B). Replacing the genus names *Gomphus* with *Aeshna* and *Calopteryx* with *Agrion*, as well as many other changes, can hardly be called ‘trifling alterations’. It would be interesting to know whether Kirby had already made these changes in his ‘working catalogue’ when he sent this letter to Selys. Anyway, these were surely not last minute changes, and they must have been present in his manuscript at least by late 1886 or 1887, when it was almost ready to go to press. So, there would have been enough time to inform Selys and discuss these changes, had Kirby been more candid.

Evidently, Kirby never replied to Selys concerning his criticism in the review. I have seen half a dozen letters sent by Kirby to Selys between April 1891 and July 1894. In them neither the catalogue nor its review were mentioned.

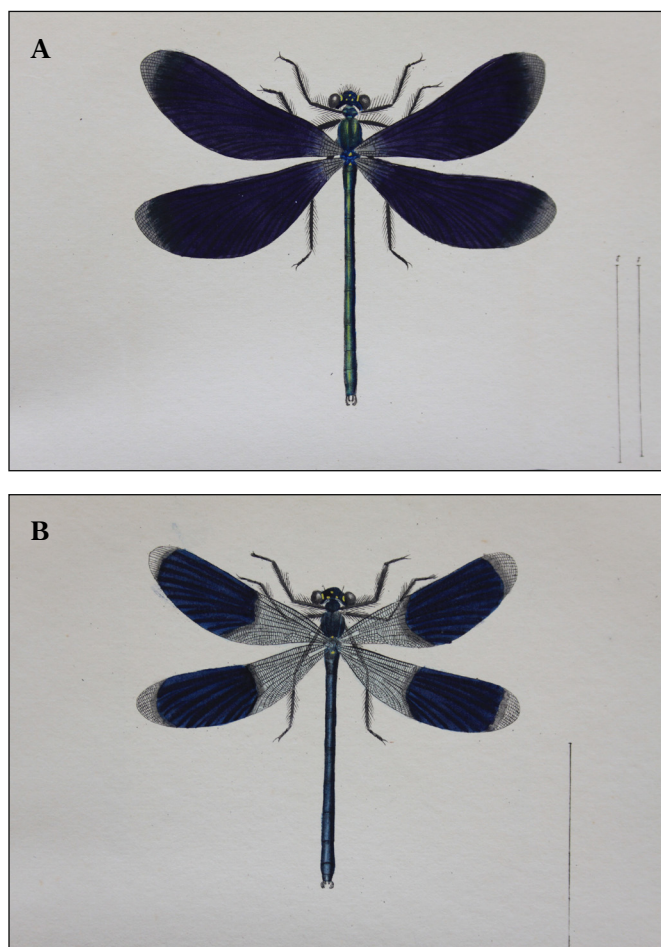
In his letter of 11 May 1886, Kirby wrote of his plans: “I prepare to print only a small edition; and this will be useful for students for the time; a revised edition can afterwards be issued, either by myself, or by someone better acquainted with the group, as soon as the first issue has become obsolete.” Half a year later (25 November 1886) he wrote: “...and as it [the catalogue] will doubtless become incomplete in a few years, I do not prepare a large edition.” In an obituary for Kirby (Skinner, Rehn & Calvert, 1913), Calvert refers to a letter sent by Kirby in January 1909. Kirby wrote: “I am just retiring from the Museum under the age limit but shall continue to work on semi-officially or unofficially for some little time probably, and it is not impossible that I may later on undertake a new Catalogue of Odonata for the Museum.”

In any event, no second edition was ever published, and odonatologists had to wait for nearly one hundred years until the next World catalogue (in two volumes) was published by Kirby’s compatriots Allen Davies and Pamela Tobin (Davies & Tobin, 1984; 1985).

### Support to Selys’ criticism

It is worth mentioning that Selys’ criticism was supported in another review of the catalogue, which appeared in January 1891. This was written by Philip Powell Calvert, aged 19 years! Calvert (1891) also objected to the strict application of the rule of priority in cases where a long established name was to be rejected. With all the self-assurance and life experience we might expect from a teenager, he wrote: “The rule of priority may be very good in the abstract, but when it conflicts with that better rule of long and common use, it is more to be honored in the breach than in the observance”. But, like Selys, Calvert also considered Kirby’s catalogue “a most useful and valuable work”, and he especially praised its index.

I am not aware of any other reviews of the catalogue, but in their publications, several authors have expressed criticism of it, either in general or concerning various taxonomic details. Ferdinand Karsch (1900) called Kirby’s catalogue ‘*Sitzfleischkatalog*’ (buttock-muscle catalogue), meaning that it is a product of stubborn doggedness, showing no ingenuity or inspiration (see Hämäläinen, 2017). At the end of his article on ‘*Calopteryx* versus *Agrion*: Again?’, Erich Schmidt (1948) expresses his sincere hope that “no Kirbyus redivivus might ever rise again!”



**Figure 6.** *Calopteryx* males illustrated in Charpentier (1840). Charpentier included these species, as well as all other zygopterans in the genus *Agrion*, and used the name *Agrion parthenias* for *C. splendens*. (A) *Calopteryx virgo*. (B) *Calopteryx splendens*. Photo credits: Matti Hämäläinen.

Kirby was a gentle, retiring and amiable man, who was always ready to assist those who required help or counsel. Therefore any criticism containing unfair personal attacks must have been especially hurtful to him. In his letter to Calvert on 25 April 1899, cited in Skinner, Rehn & Calvert (1913), Kirby wrote: “In many ways my Entomological work has been that of a pioneer, and I cannot complain of younger men taking it up and following it out in greater detail than I have had time or inclination to do. I never complain of *fair* criticism; but such attacks as ----- and ----- have made upon me I do not regard in that light. If I chose, I could often retaliate on ----- in the same way, but I usually confine myself to corrections when they fall into line with my own work, and I seldom go out of my way to reply to attacks unless they are too unfair. But you need never be afraid of offending me by fair comment.” No doubt also the criticism in Selys’ review was taken by him as fair. [Obviously the names deleted (by Calvert) refer to the malicious and ironic published comments of Karsch; see Hämäläinen (2017)].

Following Selys’ appeal in his review (translated): “So, let’s keep the genus *Gomphus*, rightly created by Leach in 1815, a genus whose name is accepted by all neuropterologists”. Kirby’s changes in the gomphid nomenclature were almost unanimously considered incorrect and were not adopted. However, many odonatologists (mainly from England and United States) accepted the rejection of the name *Calopteryx* in favour of *Agrion*, since this appeared to be consistent with the requirements of the Code, but most continental European authors continued to use the names *Calopteryx* and *Agrion* in the traditional sense in order to maintain stability. This disagreement among taxonomists culminated in ‘*Calopteryx* versus *Agrion*’ articles by several authors in the *Entomological News* in 1948–1949 (Schmidt, 1948; Calvert [Ed.], 1949<sup>7</sup>).

Fortunately, at present this conflict has been swept under the carpet, and for the last forty years or so it has been a common practice among odonatologists to use the genus names *Calopteryx* and *Coenagrion* and abandon the use of the genus name *Agrion*. The inconsistent use of the name *Agrion* by various authors had become too confusing. This was surely a very sensible solution, although it is a kind of ‘civil disobedience’, contravening the strict regulations of the Code.

### Kirby’s clairvoyance concerning the species numbers

On one point of his review Selys was completely wrong. Selys disagreed with Kirby’s statement: “... I have little doubt that the number of species of *Odonata* now known could easily be at least quadrupled if more workers were attracted to the subject; ...” Selys claimed that the number of (extant) species would scarcely be even doubled: “*Je doute que le nombre total de ce que nous connaissons actuellement puisse être doublé; le fût-il, cela ne nous conduirait qu’à environ 3500 espèces.*” [I doubt that the total number we currently know can be doubled; if it were, that would only lead to around 3500 species.] Now, after 130 more years of research by several hundreds of taxonomists from around the world, ca 6000 presently accepted extant species have been described, and numerous other new species are sitting in collections awaiting description. Moreover, even more new species probably remain undiscovered in nature, especially in tropical forest habitats. Kirby’s estimate of (at least) 7200 species might be vindicated; but this figure will only be reached if the destruction of our remaining tropical forests is slowed drastically, and the ever increasing prohibitions against collecting of insects (including scientific collecting) in most tropical countries are overturned. Proper funding of taxonomic research is also needed.

### Acknowledgements

Albert Orr improved the English expression of the manuscript and offered many valuable comments and other help. Marcel Wasscher sent scans of Kirby’s letters to Selys and Karin Verspui helped in interpreting and translating Selys’ handwritten French text. Rosser Garrison sent scans used for Figure 1B and 3 and provided important information. Risto Toivonen allowed me to include his excellent gomphid photos for Figure 5A-C.

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## Appendix

### Transcripts of Kirby's two first letters to Selys

#### Letter dated 4 November 1885

British Museum (Natural History),  
Cromwell Road,  
South Kensington, S.W.

Nov. 4, 1885.

Monsieur le Baron E. de Selys-Longchamps,

Dear Sir,

I write to inform you that during the last few months I have been engaged in arranging the collection of Odonata in the British Museum. It contains a great many rare and interesting species, including several new genera, but it is not my intention to publish any descriptions at present.

If, however, it would not be interfering with your work, I am thinking of publishing my MS. working Catalogue of Odonata, which is chiefly based upon your papers, and those by Prof. Brauer.

I would only publish a small edition, as a basis of future work in the family, but before resolving upon it, I write to inquire whether you would have any objection to my doing so; and also when the conclusion of your monograph of Aeschnides is likely to be published.

I hope that if you visit London again, you will find our collection more available for study. At present I have all the families uniformly arranged, except the Calopterygides (which were arranged by Mr. McLachlan some time ago) and the Agrionides. These I hope to complete shortly.

With kind regards and best wishes, believe me,  
Yours sincerely,  
W.F. Kirby

#### Letter dated 20 November 1885

British Museum (Natural History),  
Cromwell Road,  
South Kensington, S.W.

Nov. 20, 1885.

Monsieur le Baron E. de Selys-Longchamps,

Dear Sir,

I thank you for your letter, and I am pleased to find that you express no disapproval of my proposal to publish a Catalogue of Odonata.

I mentioned to you that I did not intend to publish any descriptions, but simply to print a small edition of a synonymic Catalogue for present use. I think, therefore, that it will be better to wait until you have finished your Aeschnides and supplement to Agrionides, which you tell me will be ready in a few months. As soon as they appear, I will insert the names in my catalogue, and send it to press.

I do not propose to make more than a few trifling alterations in synonymy and nomenclature, which occurred to me in going through the collection, but I shall, of course, be formally responsible for the execution of the work.

I do not propose to make use of subgenera, but shall treat all subdivisions lower than subfamilies provisionally as genera.

With kind regards, believe me,  
Yours sincerely,  
W.F. Kirby



## Observation of *Orthetrum schneideri* and *Orthetrum pruinosum pruinosum* occurring sympatrically in Sumatra, Indonesia

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### Introduction

Until recently *Orthetrum schneideri* Förster, 1903, described from Rayahborge, Sumatra, was considered to be a subspecies of *Orthetrum pruinosum* (Burmeister, 1839), which was described from neighbouring Java. A molecular genetic study of *Orthetrum* taxa conducted by Yong et al. (2014) revealed that *O. schneideri* was genetically distinct from the widespread subspecies *O. pruinosum neglectum* Rambur, 1842, known from continental South Asia and Japan, and was grouped closest with *Orthetrum chrysis* (Selys, 1891). The data set analysed by Yong et al. (2014) did not include nominate *O. pruinosum* or the subspecies *O. pruinosum clelia* (Selys, 1878) described from Sulawesi and resident in the Philippines and Taiwan (Lanyu [Orchid Island]). Nevertheless, *O. schneideri* is now accepted as a valid species (Paulson & Schorr, 2020). *Orthetrum schneideri* occurs in the Malay Peninsula, Borneo (Lieftinck 1954; Orr 2003, 2005; Sharma 2010) and Sumatra (Lieftinck 1935, 1954). According to several authors *O. pruinosum clelia*

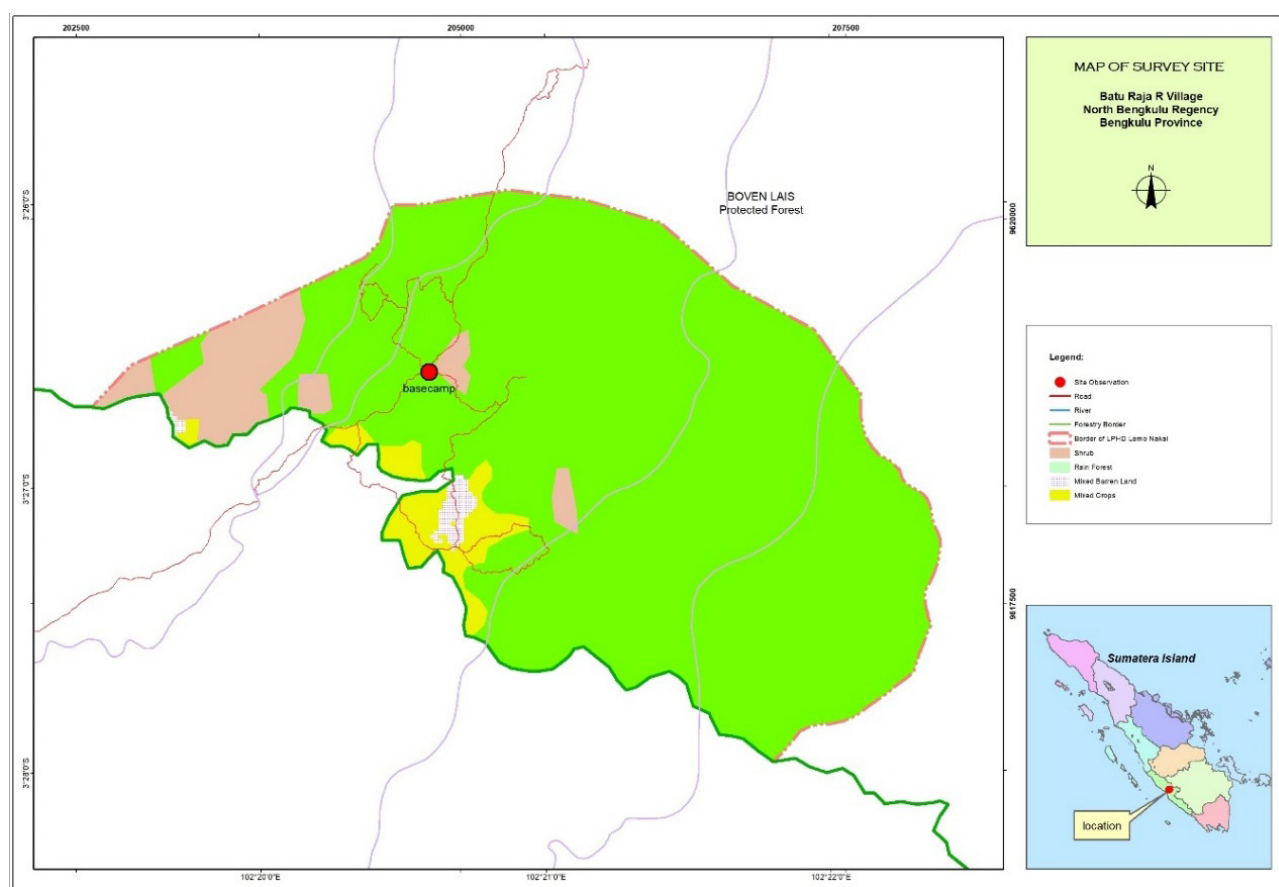


Figure 1. Survey area. Red dot marks our Basecamp location, which is the observation site for *Orthetrum schneideri*.

is possibly a senior synonym of *O. schneideri* (Ris 1909; Sharma 2010; Seehausen 2017).

*Orthetrum schneideri* adult males are heavily tinged blueish-white on the first three abdominal segments, similar to its pruinosed thoracic colouration (Ris 1927; Orr 2005), see Figure 2A. *Orthetrum pruinsum clelia* is similar to *O. schneideri* but only the first two abdominal segments are heavily pruinosed in the males (Figure 3).

### Observations

We observed a mature male individual of *O. schneideri* during a recent biodiversity survey at Mt. Bukit Daun, Sumatra which included the territory of the Society for Village Forest Management (LPHD) of Lemo Nakai, Batu Raja R Village, North Bengkulu Regency, Bengkulu Province (3°26'35.56" S, 102°20'35.70" E, 767 m above sea level). The survey was undertaken between 18-25 September 2020, in order to compile an inventory on floral and faunal diversity, as well as natural landscapes. The *O. schneideri* individual was seen perching on a site near to our Basecamp erected close to the forest edge (Figure 1). The observation site can be described as a small water puddle, filled with turbid water (presumably from direct rainfall) and surrounded by bushes and mixed secondary vegetation. It is located near an abandoned cultivation area that is frequently used for cattle grazing.

The dragonfly quickly attracted attention due to its conspicuous first three abdominal segments clearly marked pruinosed bluish contrasting with the bright red on the subsequent segments (Figure 2A). This feature differs from *O. p. pruinsum* individuals seen during the survey (Figure 2B), which have pruinescence restricted to the thorax. The *O. schneideri* individual showed close affinity to a puddled area, as it always returned to the same perching spot following disturbance. The same individual was observed during the following days of our stay in this area and it continued to occupy the same spot. We presume that it had established its territory at this puddle, in view of its prominent perching in open position indicating its intention to advertise its ownership. It also chased away any trespassing dragonflies. Some other odonates observed included *Neurothemis ramburii*, *N. terminata*, *Rhyothemis phyllis*, *Orthetrum sabina*, *O. testaceum*, along with two damselflies *Nososticta insignis* and *Archibasis viola*. The anisopterans were frequent trespassers that were all chased away by the *O. schneideri* individual. No other *O. schneideri* individual was encountered within the surveyed area, even though the survey covered approximately 5 km radius from the Basecamp.

### Discussion

Some recent publications list the occurrence of *O. schneideri* only in Peninsular Malaysia and Borneo (Orr 2005, Yong et al. 2014, Choong et al. 2018). However, the type-locality is Sumatra and the Indonesian Dragonfly Society maintains this taxon in their latest checklist of Sumatran Odonata (Buchori et al. 2019). Lieftinck (1935, 1954) reported *O. schneideri*, as *O. pruinsum schneideri*, from several localities in northeast and south Sumatra between 200 to 800 m above sea level, with unclear status on the satellite islands. In Bengkulu, it was historically collected from Kerinci portion of this province, around 162 km northwest of the current survey area (Lieftinck 1935).



**Figure 2. Two *Orthetrum* taxa observed at Lemo Nakai, Batu Raja R Village, North Bengkulu Regency, Bengkulu Province, Sumatra, September 2020. (A) *Orthetrum schneideri*. (B) *Orthetrum pruinsum pruinsum*.**



According to Lieftinck (1935) *O. schneideri* was very common in Sumatra and *O. pruinosum* was rare possibly restricted to high altitude. Lieftinck (1935) reported that both nominate *O. pruinosum* and *O. schneideri* occur in the same district at Asahan in north Sumatra. We confirm here that the two species also occur in the same locality in south Sumatra (Figure 2). This sympatric occurrence supports their status as separate species.

This is the first encounter with *O. schneideri* for the authors, despite previously having extensive odonate survey experience at various localities in Sumatra. The historical records and our recent encounter were all from altitudes between 200-800 m. During our 2019 survey at Protected Forest Management Unit (PFMU) Seluma, we only recorded *O. p. pruinosum* within the altitude range 200-800 m (Janra et al. 2019). *O. schneideri* was noted as

‘very common’ in historical references by Lieftinck (1935), however, it may be limited to certain localities and altitudinal ranges in Sumatra island. Hence, further survey work in this island is needed to establish the current distribution and population status of this two taxa in Sumatra.



**Figure 3. *Orthetrum pruinosum clelia*, Mindanao, Philippines. Credit: Naturalis Biodiversity Center, Leiden, Netherlands. [Link].**



### Acknowledgements

We are indebted to Choong Chee Yen for his advice and assistance in identifying the *O. schneideri* individual and other odonates observed in this survey, as well as providing literature. We also thank Komunitas Konservasi Indonesia WARSI and Kesatuan Pengelolaan Hutan Lindung (KPHL) Bukit Daun for jointly financing our survey through contract number 341/REDD+-WI/07.2020 and 002/KPHL-III/VII/2020.

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## Obituary

### Angelo Barbosa Monteiro Machado - the student charmer (1934–2020)

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The admirable trajectory of Professor Dr. Angelo Barbosa Monteiro Machado has multiple peculiarities, distinctive qualities, and talents. Father, teacher, doctor, scientist, writer, dramatist, composer, neuroanatomist, entomologist, environmentalist, eternal student, and a true naturalist of our time. Angelo was an enthusiast, with a brilliant, imaginative mind, and a sensible humble, supportive, optimistic, and charismatic character. His innate creativity and unique sense of humor made him a renowned storyteller - his lectures were hugely popular. Phrases like “Come soon! You don’t know what you’re missing!” and “Come and see what the funny old man is saying!” echoed both through the corridors and digital media.

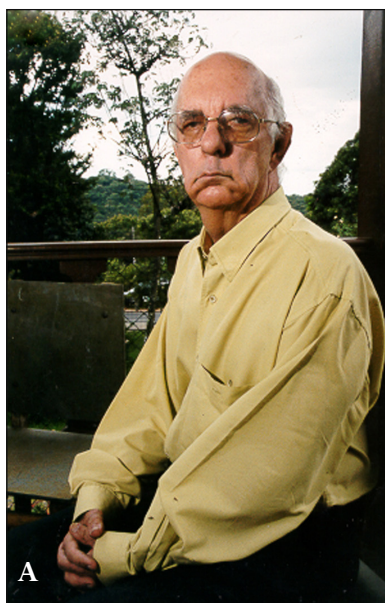
Angelo B. M. Machado was born in Belo Horizonte on May 22, 1934. He graduated as a physician at the Universidade Federal de Minas Gerais (UFMG) in 1958, but he never

practiced it. At the same university he obtained the title of Doctor of Medicine (1963), and a little later, a post-doctorate at the Northwestern University, Chicago (1965–1967), where he learned about electron microscopy. He founded the Neurobiology Laboratory of the Institute of Biological Sciences and the Center for Electron Microscopy of the Department of Morphology at UFMG, the latter being where he studied the morphology of egg-shells and penises of dragonflies (Figures 2c–d).

Between 1965 and 1990 he mentored seven master’s and six doctoral students at UFMG’s Department of Cellular Biology, on neuroanatomy related work. His first doctoral student, Conceição Ribeiro da Silva, became his wife and they had four children. In 1987 he retired from the Morphology department at UFMG and joined, as a professor, the Zoology department. In 1988 he mentored his first master’s student on the morphology of odonate chromosomes of the Aeshnidae family.

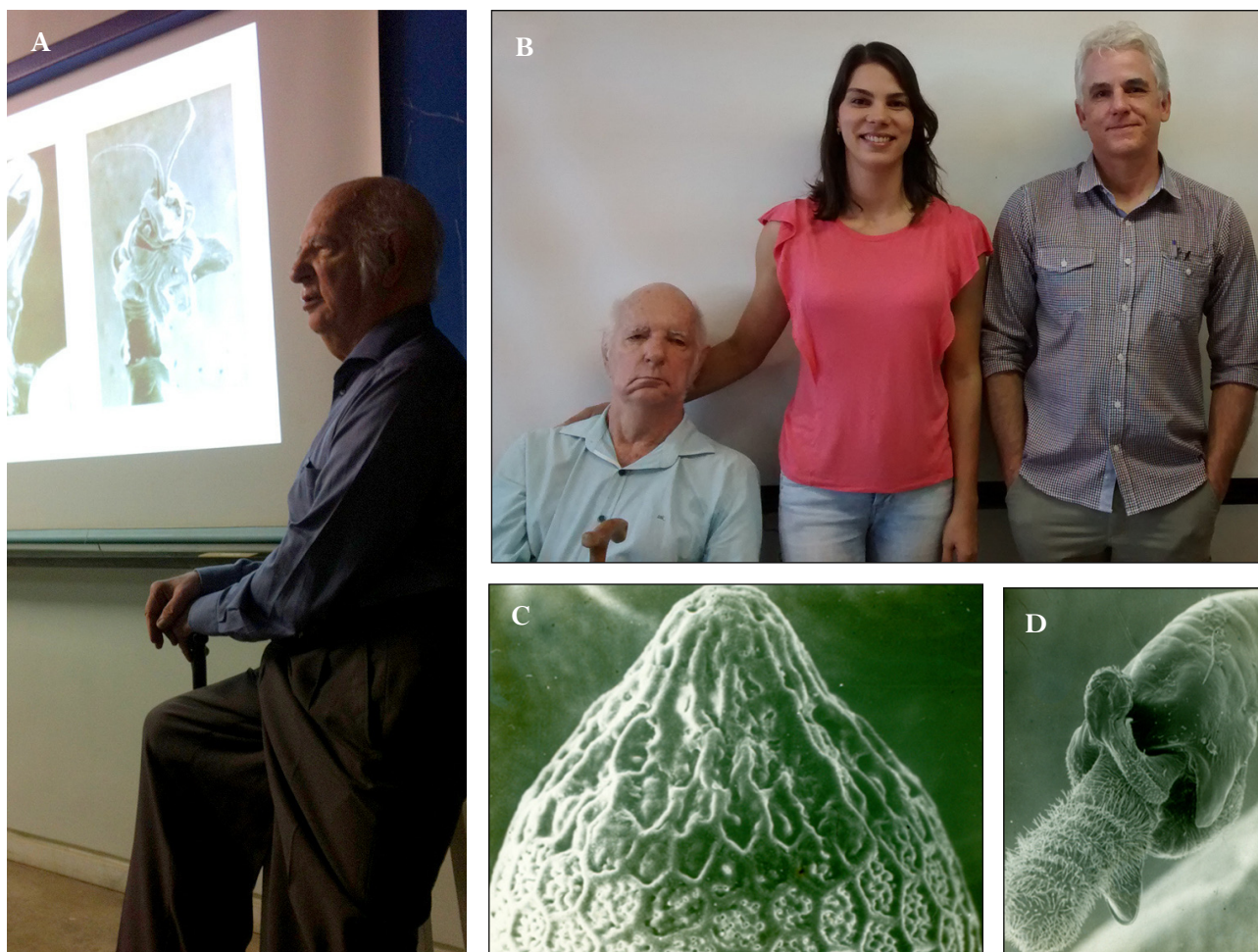
*“When I was a physician I saw a patient with earache - the pain was caused by an intruding little beetle, and of a possible new species - soon I realized that I paid more attention to the insect than to the patient. Then I discovered that I didn’t want to be a physician, but an entomologist, and the hobby became a profession”. (Machado, personal communication)*

In 2004 he retired from the Zoology department but continued teaching entomology voluntarily (Figure 2a), besides continuing his studies with dragonflies at his home lab (Figure 4). He supported and encouraged



**Figure 1. (A) Professor Angelo Barbosa Monteiro Machado. (B) Angelo with his entomological net collecting Odonata. Sources: Angelo Machado.**





**Figure 2. (A) Professor Angelo B. M. Machado teaching post-graduate students in the department of Zoology at UFMG in 2015. (B) Presentation of his master's student dissertation in 2017, at UFMG (from left to right: Professor Angelo Machado [advisor], Déborah Soldati [student], Lúcio Bedê [Thesis Defense Committee]). Sources (A-B): Déborah Soldati. (C-D) Electron microscope imagery taken at UFMG's Center for Electron Microscopy. Sources: Angelo Machado. (C) Morphology of the egg-shell of *Mecistogaster martinezi* Machado, 1985. (D) Morphology of the penis of a species of Anisoptera.**

many students in their studies with Odonata and, in 2015, he joined the post-graduation program at the Zoology department as a volunteer professor, to mentor his second and last master's student on dragonflies - this time, with emphasis on taxonomy (Figure 2b).

He spent most of his life as a researcher at UFMG, where he received the title of Emeritus Professor in 2005. Concomitant to these activities, Angelo was an active biodiversity conservationist, founding and presiding over the NGO Biodiversitas Foundation, as well as presiding over Conservation International in Brazil. In this line of work, he supported the creation and implementation of several public and private protected areas. That was the case, for example, of a nature reserve on the border of Bahia and Minas Gerais States (in eastern Brazil) created with support from Biodiversitas Foundation and the American Bird Conservancy to protect the endangered bird 'entufado-baiano' *Merulaxis stresemanni* Sick, 1960.

*"We need to attempt a view of the whole. I named the nature reserve 'Mata do Passarinho' (the Little Bird's Woods). By preserving this emblematic species, we have managed to preserve many others that live in this nature reserve".* (Machado, personal communication)

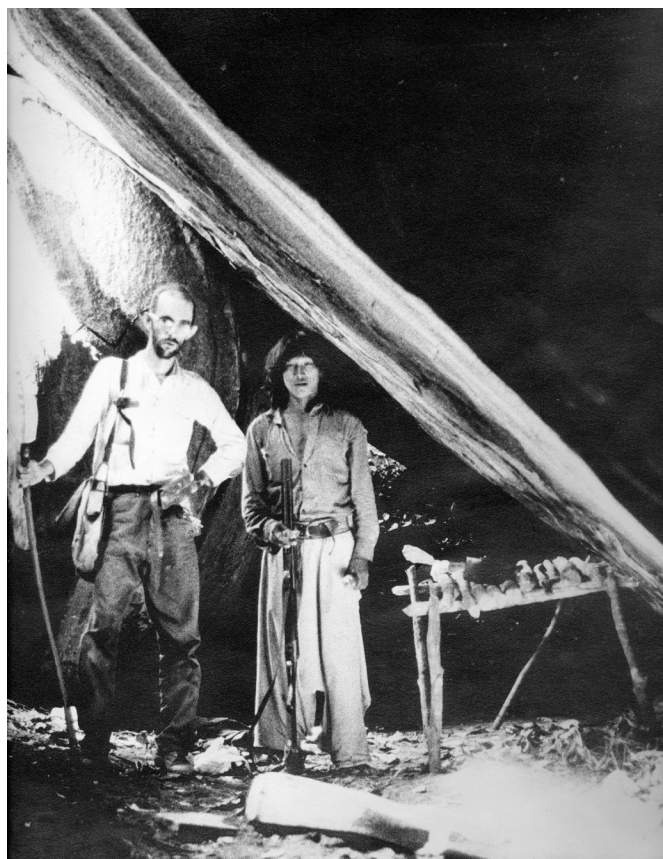
During his career, Angelo wrote 115 scientific papers on neurobiology and entomology. Those published from October 2015 onwards are listed below. Pinto (2016) presented Angelo's publications up to September 2015. His book on Functional Neuroanatomy (Machado & Haertel 2013)—the third edition of which he wrote together with his daughter Lúcia Machado Haertel—and the Red Book of Endangered Brazilian Fauna, that he published with collaborators (Machado *et al.* 2008), became standard references in these areas of expertise. He also published 37 children's books and three literature books for adults and wrote six theatre plays for

children and adults (for details see <http://lattes.cnpq.br/5343850000941639>). He also composed children's songs, "marchinhas" (carnavalesque march) and sambas. Before he died, Professor Angelo had resumed work on a memoir of his travels in the Amazon and was correcting his last finished work entitled 'Tratado de Guerra' ('Treaty of War'). He had been writing this book for the last 20 years and it will be published by his children.

*"When my hobby in entomology became a job, I needed a new hobby. That is how I started to write books and plays".*  
(Machado, personal communication)

During this journey, he received several awards for his contributions to Brazilian science, literature, art and culture. Even though he was a physician by training, on March 10, 2016, he received the title of Honorary Biologist from Brazil's Federal Council of Biology (CFBio), in recognition of his contributions to the Biological Sciences course and the biologist profession.

His remarkable didactics made learning from his classes very pleasant and light. He was able to stimulate other people's curiosity and interest in research and biodiversity conservation, a skill he learned early on as a teenage sacristan, by the time his interest in entomology began. During this period, Angelo Machado started collecting insects and met Father Francisco Silvério Pereira, a specialist in Scarabaeidae (a family of beetles), with whom he learned about the study of insects. Angelo Machado and Father Pereira became friends and made several expeditions to the Amazon. They met and lived with several indigenous tribes who helped them collect insects (Figure 3).



**Figure 3. Angelo Machado and Tiriyo indigenous Acewa in 1963 during a collection expedition in the Serra do Tumucumaque, state of Pará, Brazil. Source: Angelo Machado.**

*"On one of my expeditions to Roraima, an indigenous killed a coati. I took part of the coati meat and kept it in a can to rot, which would be an attraction for Father Pereira's beetles. During the flight the can opened, and the stench escaped. The poor pilot said nothing. How could he say anything about the friend of the governor of Roraima! When we arrived in Roraima, the priest told me to throw the animal away. I replied that this animal was the bait for the beetles, but that I would discard it as soon as I arrived at the hotel. Before I had the time to do it, the hotel clerk picked up our bags and carried them to our room. Now to discard it I would have to carry the stinky cannister back through the hotel lobby, which was full of people. The alternative was for Father Pereira to lower the can with the rotten coati through the bedroom window, using a rope. Then I threw the coati into the river and the waters carried the stench."* (Machado, personal communication)

Among the various achievements throughout his life, one of the most significant was the study of dragonflies. He himself said that "the dragonfly's greatest importance is making me a happy old man". His love of dragonflies—considered by him to be one of the most beautiful animals in the world—came early, at the age of 16, when he started studying these insects. After collecting a few dragonflies on a farm and curious to know their scientific name, Angelo took them to Professor Newton Dias dos Santos, a specialist in this group of insects at the National Museum of Rio de Janeiro. Wisely, Newton Santos challenged the young naturalist to name the dragonflies himself. Thus, began his entire odonatological history and his passion for dragonflies. At 18, under the guidance of Prof. Newton Santos, he published his first article describing the female, previously unknown, of a dragonfly (Machado 1953).

*"When I was a teenager, I collected some dragonflies and took them to Newton Santos thinking that I would leave with the names. He gave me an identification book so I could discover the scientific name on my own. A few days later I came back with the names to be confirmed. If Newton had identified them, I would have left with some names. As he didn't, I left with interest in studying more about dragonflies".* (Machado, personal communication)



His studies in Odonatology were focused on taxonomy, which generated the description of 98 species and 11 new genera, especially Protoneuridae and Coenagrionidae. He formed a collection at his home (collecting invertebrates and keeping them privately was legal in Brazil, until the promulgation of new regulations in 2006), consisting of more than 35,000 specimens and approximately 1,000 species of dragonflies from around the world, including 100 type specimens. After a fire accident destroyed many specimens kept at the National Museum, in Rio de Janeiro, this is currently considered to be the largest neotropical dragonfly collection (Figure 4). Amassing this collection took Professor Angelo more than 65 years of dedication and collection expeditions, sometimes with the help of colleagues and friends. The collection was donated to the Universidade Federal de Minas Gerais in 2015, but it would only be transferred to the university after his death.



**Figure 4. Part of Angelo's dragonfly collection at his home laboratory in Belo Horizonte, Brazil, 2020. Photo credit: Déborah Soldati.**

Among Angelo's vocations was also that for encouragement and motivation - he aroused a lot of admiration and respect from co-workers, politicians, students, and enthusiasts along his path. He loved welcoming people to his home and showing his dragonfly and book collections, as well as telling stories and jokes like "Do you know what the best pain medicine is? Good mood with a dose of morphine" and "I have traveled a lot to collect insects in the Amazon region. Do you know what my biggest adventure trip is now? It is from my office to the mailbox, a radical adventure!"

On April 6, 2020, our dear friend and teacher Angelo B. M. Machado passed away in Belo Horizonte, at the age of 85. This homage is more than deserved, it is necessary. We express here our admiration and pride in having met and lived with such a special and unique person and we deeply feel his death. A gap will eternally remain in Odonatology, science and culture. He left a beautiful legacy with extensive and original literary works, scientific papers and the largest collection of dragonflies in South America. He left a large group of admirers and friends in various parts of the world who enjoy all the knowledge he has provided. He was one of the most distinguished odonatologists and considered one of the fathers of Brazilian odonatology.

#### **Angelo's publication from October 2015 to April 2020**

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# Nine new species of dragonfly and damselfly for Bhutan (Insect: Odonata) with a note on *Calicnemia mortoni*

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## Abstract

Nine species mainly from three southern districts of the country (Samtse, Sarpang, and Samdrupjongkhar) are recorded as new to Bhutan. These records were largely collected during opportunistic sampling conducted between 20-vii-2018 and 10-vii-2020. In addition, records are also included based on photographs submitted to the Facebook page “Dragonflies and Damselflies of Bhutan-Eastern Himalayas”. The species recorded as new to Bhutan are: *Anax ephippiger* Burmeister, 1839, *Agriocnemis pygmaea* Rambur, 1842, *Neurothemis intermedia* Rambur, 1842, *Bradinopyga geminata* Rambur, 1842, *Indothemis limbata* Selys, 1891, *Brachydiplax sobrina* Rambur, 1842, *Rhyothemis variegata* Linnaeus, 1763, *Orthetrum chrysis* Selys, 1891 and *Tramea basilaris* Palisot de Beauvois, 1817. These records bring the number of species known from Bhutan to 128. The first field pictures of *Calicnemia mortoni* (Laidlaw, 1917) are also presented and the characters of this poorly known species are discussed.

Keywords: dragonflies, damselflies, southern Bhutan, new records, freshwater, Eastern Himalayas.

## Introduction

The knowledge on the Odonata of Bhutan has increased significantly over the past two decades. A bibliography and checklist of the dragonflies and damselflies of Bhutan published in 2017 already included 92 species (Gyeltshen et al., 2017). Additional records published by Gyeltshen, Kalkman & Orr (2017), Gyeltshen & Kalkman (2017) and Gyeltshen (2017) brought the number of known species to 110. The most recent additions to the checklist of Bhutan are *Anaciaeschna martini* Selys, 1897, Sherubtse College, Tashigang district (Conniff & Sasamoto, 2019) and eight new records by Gyeltshen (2020), which increased the species checklist to 119 (Kalkman et al., 2020).

Most of the new records published on Bhutanese odonates in recent years came from altitudes above 500 m and relatively little attention has been paid to lowland Bhutan. Here we report nine new records of odonates mostly from the districts of Samtse, Sarpang and Samdrupjongkhar, southern Bhutan. In addition, we present new records of the poorly known *Calicnemia mortoni* (Laidlaw, 1917) and discuss its identification characters.

## Materials and methods

Opportunistic sampling surveys were carried out from 20-vii-2018 to 10-vi-2020 by the authors in three districts of southern Bhutan at the altitudinal range of 240 m. a.s.l to 500 m. a.s.l. Species were photographed and recorded during random walks along ponds, wetlands, paddy fields and streams between 0900 and 1500 h. Habitat types of each species and GPS coordinates were recorded. In addition, this paper also includes records from various parts of Bhutan which are based on photographs submitted to the Facebook page “Dragonflies and Damselflies of Bhutan-Eastern Himalayas (DDoB-EH)” by citizen scientists. Identifications are based on the monograph of Fraser (1933, 1934, 1936) and several useful websites including Indianodonata.org (Joshi et al., 2020). No samples were collected except for one species, *Neurothemis intermedia* for which a male and female each were collected. The records are arranged in the alphabetical order of the families under Anisoptera and Zygoptera respectively.

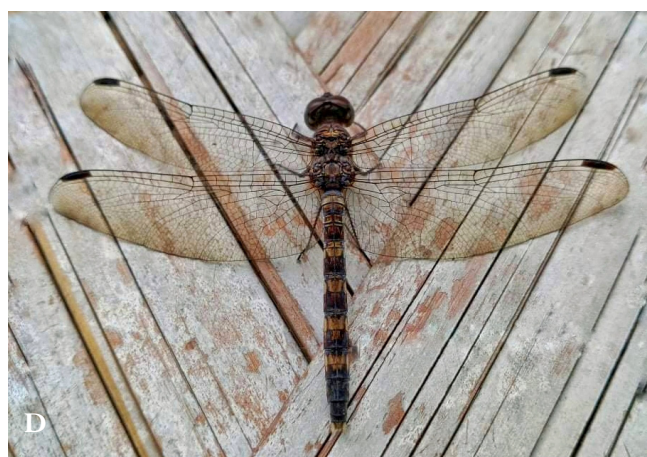
## New records of Odonata from Bhutan ANISOPTERA

### Aeshnidae

#### *Anax ephippiger* Burmeister, 1839 (Figure 1A)

A male *A. ephippiger* was photographed near a small stream on 07-viii-2020 at upper Langchenphu, Samdrupjongkhar district (26.902717°N 92.064553°E) where it was found resting on a twig. There are three *Anax* species currently





recorded from Bhutan: *A. guttatus* Burmeister, 1839, *A. indicus* Lieftinck, 1942 and *A. nigrofasciatus nigrolineatus* Fraser, 1935 (Gyeltshen et al., 2017). The sandy-yellow abdomen with the blue restricted to a 'saddle' on S2, the dark bar on the front of the frons and brown eyes are some of the diagnostic characters visible on the photograph.

*Anax ephippiger* is a widespread species whose main range is found in Africa, the Mediterranean and the Middle East. It is less common further east (Wijayathilaka et al., 2014). It is unknown if the species also breeds in Bhutan.

#### Libellulidae

##### *Brachydiplax sobrina* Rambur, 1842 (Figure 1B-C)

Two males and one female were photographed on 13-vii-2020 at Langchenphu village which is part of Jomotshangkha-Samdrupjongkhar district (26.993291°N 92.095266°E). They were found at ponds and small lakes covered with weeds and marshy areas near forest. The species is widely distributed across Bangladesh, India, Myanmar, Nepal, Sri Lanka and Thailand (Dow, 2009).

##### *Bradinopyga geminata* Rambur, 1842 (Figure 1D)

Unlike many other species of Libellulidae *B. geminata* is often difficult to spot due to its cryptic coloring. Two males were photographed from Themba-Sarpang district (26.887309°N 90.207979°E) on 24-vi-2019 and 16-vii-2020. In addition, a picture of a male, made

**Figure 1. (A) *Anax ephippiger* Burmeister, 1839. A male photographed at upper Langchenphu, Samdrupjongkhar district, 07-viii-2020. (B-C) *Brachydiplax sobrina* Rambur, 1842, Langchenphu villages-Samdrupjongkhar district, 13-vii-2020. (B) Male. (C) Female. (D) *Bradinopyga geminata* Rambur, 1842, male from Themba-Sarpang district, 24-vi-2019. (E) *Indothemis limbata* Selys, 1891, male from Langchenphu village-Samdrupjongkhar district, 16-vii-2020.**





by Namgyel Dorji on 16-vii-2020 at Phibsoo Wildlife Sanctuary (26.042111°N 90.012111°E), was sent to the senior author.

***Indothemis limbata* Selys, 1891 (Figure 1D)**

A male was spotted perching on a grass blade in Langchenphu village-Samdrupjongkhar (26.983017°N 92.046837°E) on 16-vii-2020. *I. limbata* prefers standing water habitats such as ponds and marshy wetlands with bushy riparian vegetation (Kompier, 2016; Dow, 2011). It can be recognized by its blackish body with brownish patches on hind wings and bluish pruinose abdomen (Kompier, 2016).

***Neurothemis intermedia* Rambur, 1842 (Figure 2A-B)**

A male and a female specimen were collected by Ashika Dhimel from Khanduthang-Samtse district (26.921204°N 89.066904°E) on 23-viii-2018, one male was photographed from Singye gewog-Sarpang district (26.878522°N 90.473594°E) on 23-vi-2019 and a further two males and a female were reported from Langchenphu-Jomotshangkha (26.533081°N 92.054771°E) on 11-vii-2020. Widespread across Cambodia, China, Indonesia, India, Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam (Subramanian, 2010a) and often found at ponds, lakes, marshes near forest and paddy fields.

***Orthetrum chrysis* Selys, 1891 (Figure 2C-D)**

A male and a female *O. chrysis* were photographed at Rongchuthang-Samdrupjongkhar (26.891483°N 92.044717°E) on 10-vi-2020 and 20-vii-2020 respectively. A male was photographed from Ugyentse-Samtse district (26.948965°N 89.015656°E) on 16-ix-2020. This species is common across a large part of tropical Asia mostly found at marshes, ponds, sluggish streams and lakes (Subramanian, 2010b).

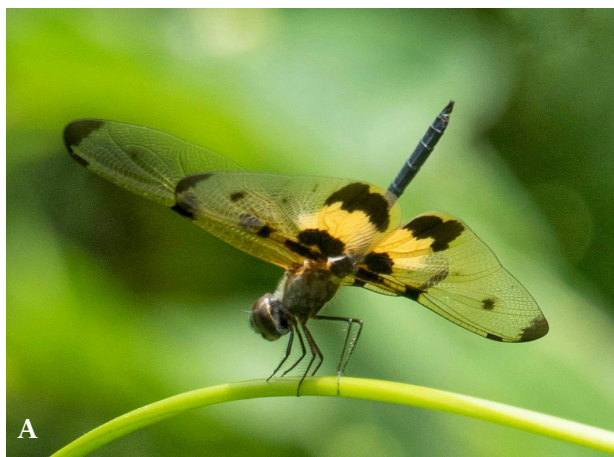
***Rhyothemis variegata* Linnaeus, 1763 (Figure 3A-B)**

A male *R. variegata* was recorded from Balatung river-Sarpang district (26.848991°N 90.214848°E) on 26-vi-2019. A photograph of another male from Gelephu,



**Figure 2. (A-B) *Neurothemis intermedia* Rambur, 1842, Khanduthang-Samtse district, 23-viii-2020. (A) Male. (B) Female. (C-D) *Orthetrum chrysis* Selys, 1891, Rongchuthang-Samdrupjongkhar district. (C) Male, 10-vi-2020. (B) Female, 20-vii-2020.**





near Civil Service Guest house (26.875836°N 90.488054°E) on 26-ix-2019 was shared in the Facebook page “DDoB-EH” by Tshulthrim Drukpa Wangyel and a third male was reported from Lower Dawathang-Samdrupjongkhar (26.882102°N, 92.096451°E) on 03-ix-2020.

This species prefers to breed at ponds, lakes, marshes and waterlogged paddy fields. Commonly distributed across Bangladesh, Cambodia, China, Hong Kong, India, Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam (Subramanian, 2020).

***Tramea basilaris* Palisot de Beauvois, 1817 (Figure 3B-C)**

*Tramea basilaris* was recorded at several places during 2019 and 2020. One male was spotted at Themba PWS division (26.898991°N 90.264848°E) on 27-vi-2019, two old males with worn-out hindwings were found at upper Langchenphu-Samdrupjongkhar (26.899901°N 92.099228°E) on 22-vi-2020. One male was photographed at the College of Natural Resources, Lobesa (26.8775833°N 90.488287°E) on 21-x-2020 by Sonam Tashi and 1 male from Royal Manas National Park (RMNP) (27.030686°N 90.715281°E) on 26-vi-2020 by Tshering Tobgay.

It prefers to occupy standing water habitats such as lakes and ponds.

**ZYGOPTERA**

**Coenagrionidae**

***Agriocnemis pygmaea* Rambur, 1842 (Figure D)**

Photographs of *Agriocnemis pygmaea* were taken at four locations: 1 male, road, Sarpang to Gelephu (26.861749°N 90.491171°E) on 25-vi-2019, 1 male from Gomtu-Samtse district (26.823277°N 89.187304°E) on 18-vii-2019 by Suraj Rai and 1



**Figure 3. (A-B) *Rhyothemis variegata* Linnaeus, 1763. (A) Male from Balatung river-Sarpang district, 26-vi-2019. (C-D) *Tramea basilaris* Palisot de Beauvois, 1817. (C) A mature male, upper Langchenphu-Samdrupjongkhar district, 22-vi-2020. (D) Immature male. (E) *Agriocnemis pygmaea* Rambur, 1842, male from Pamtsho-Thimphu district, 01-vii-2020.**





subadult male at a pond of Pamtsho-Thimphu (27.515006°E 89.636965°E) 01-vii-2020 by Eejay Eejay.

*A. pygmaea* can easily be confused with *A. femina* which is already recorded from Bhutan. Their preferred habitats are wetlands, waterlogged grasslands and most ponds in warm places.

## Notes

### Platycnemididae

#### *Calicnemia mortoni* Laidlaw, 1917 (Figure 4A-D)

1 male, Shingkharchhemgang (27.145112°N 90.687236°E) on 30-v-2019 (Figure 4A); 1 male (immature), 1 female, Wangdiphodrang (27.339428°N 89.908816°E) on 28-v-2018, (Figure 4B-C); 1 male, Tashiyangtse, Bumdeling Wildlife Sanctuary (27.815825°N 91.432587°E) on 20-vi-2020 (Figure 4D).

*Calicnemia mortoni* is a poorly known species found in the Himalayan region of central Nepal eastwards to Sikkim and Bhutan at an elevation of 1400-1800 m (Fraser, 1933; Lieftinck, 1977, 1984; Vick, 1989). Males are easily distinguished from other species of *Calicnemia* occurring in Bhutan, India and Nepal by the red on the abdomen being restricted to, depending on the locality, the first two or the first three segments. Figures 4A-D are to our knowledge the first photographs of males and females of this species. Figures 4A and 4D show mature males in which the red is restricted to segment 1 and 2 and Figure 4B shows a male with red on segments 1 to 3. It could be that two different species are involved, however, based on the colours of the thorax the male of Figure 4B is not fully mature. For the time being we consider all Bhutanese specimens of *Calicnemia* with the first 2 or 3 segments red and the remainder black as belonging to *C. mortoni*, so considering the presence or absence of red on segment 3 to be age related.

To the east two other species of *Calicnemia* with a similar abdominal pattern are known: *C. haksik* Wilson & Reels 2003 (China, Vietnam) and *C. uenoi* Asahina, 1996 (Vietnam). Both are redescribed and discussed in detail in Phan et al. (2017). The males of these two species are distinguished from each other based on the following differences:



Figure 4. *Calicnemia mortoni* Laidlaw, 1917. (A) Male from Shingkharchhemgang district, 30-v-2019. Photo credit: Sherab Jamtsho. (B-C) A male (B) and female (C) from Wangdiphodrang, 28-v-2018. Photo credits: Karen Conniff. (D) Male from Bumdeling Wildlife Sanctuary-Tashiyangtse district, 20-vi-2020. Photo credit: Nythri Tshering.



- 1) In *C. uenoi* only S2 and a minute part of S3 is reddish, but S1–3 in *C. haksik*;
- 2) Upper appendages of *C. haksik* with double teeth in lateral view but a single blunt tooth in *C. uenoi*;
- 3) Lower appendages of *C. uenoi* are boot-shaped at tip in lateral view, but in *C. haksik* the tip of paraprocts is not;
- 4) Genital ligula of *C. haksik* is more strongly incised at mid-dorsum than that of *C. uenoi*.

It is not impossible that one of these species occurs in Bhutan or is even a synonym of *C. mortoni*. For this reason, specimens from Bhutan need to be collected, preferably from several localities. This would allow for the material to be compared to the description of *C. haksik* and *C. uenoi* based on which characters between these species can be found or possibly the synonymy of one of these with *C. mortoni* can be established. In addition, it would be worthwhile to study one population in more detail in order to determine if the presence of red on segment 3 is indeed age related.

Table 1 gives an overview of *Calicnemia* species and can serve as aid when identifying specimens.

## Discussion

Based on the photographs of dragonflies and damselflies taken from southern Bhutan between 2018 and 2020, nine new records are reported for the country: *Anax ephippiger*, *Bradinopyga geminata*, *Brachydiplax sobrina*, *Indothemis*

### Abdomen looks dark, covered with blue pruinosity

<i>Calicnemia imitans</i> (Lieftinck, 1948)	Group 1	Bangladesh, China (Yunnan), India, Laos, Myanmar, Thailand, Vietnam
<i>Calicnemia pulverulans</i> (Selys, 1886)	Group 2	Bangladesh, India, Nepal

### Segment 2 and in some species also s3 red; s4-10 black

<i>Calicnemia mortoni</i> (Laidlaw, 1917)	Group 2	Bhutan, India, Nepal; [according to Phan et al 2017 records from Vietnam most likely refer to <i>C. haksik</i> ]
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### Black line along metapleural suture thin, with the yellow area above being clearly much broader

<i>Calicnemia erythromelas</i> (Selys, 1891)	Group 1	China (Yunnan), India, Laos, Myanmar, Thailand, Vietnam
<i>Calicnemia nipalica</i> (Kimmins, 1958)	Group 2	Nepal
<i>Calicnemia eximia</i> (Selys, 1863)	Group 1	Bangladesh, Bhutan, China (Tibet, Sichuan, Guizhou, Yunnan, Guangxi), India, Laos, Myanmar, Nepal, Taiwan, Thailand, Vietnam, Pakistan

### Black line along metapleural suture broad with the yellow area above being about as broad or smaller

<i>Calicnemia miles</i> (Laidlaw, 1917)	Group 2	China (Tibet, Yunnan, Guangxi), India, Laos, Myanmar, Thailand, Vietnam
<i>Calicnemia miniata</i> (Selys, 1886)	Group 2	Bhutan, China (Xizang (Yu & Chen 2012)), India, Nepal
<i>Calicnemia fortis</i> (Dow, Zia, Naeem & Rafi, 2014)	Group 2	Pakistan
<i>Calicnemia doonensis</i> (Sangal & Tyagi, 1984)	Group 1	India, Nepal

**Table 1. Overview of *Calicnemia* species found in Pakistan, India, Nepal and Bhutan. The species are placed into groups based on the abdominal patterns of fully mature males. The second column indicates to which group they belong based on the genital ligula (Lieftinck 1984): Group 1 - genital ligula with narrow lobe with two apical flagella, or Group 2 - genital ligula broad lobe without flagella. Distribution is largely taken from Kalkman et al. 2020 and Zhang 2020. *C. sinensis* is variable and therefore placed in two groups.**

*limbata*, *Neurothemis intermedia*, *Orthetrum chrysis*, *Rhyothemis variegata*, *Tramea basilaris* and *Agriocnemis pygmaea*. All these species are common and widespread over large parts of tropical Asia. These additions bring the number of species known from Bhutan to 128. The relative ease with which new species are found shows that probably several dozens of species remain to be found in Bhutan.

Some of the records presented in this paper were collected by students or citizen scientists. This shows the importance of encouraging citizen scientists to become active in the study of nature and submit their records to websites or social media. In the past decade the number of distribution records from Bhutan and the number of species known to occur in Bhutan has substantially increased. Nonetheless, there are still many areas which have hardly received any attention. It is likely that further field work in Bhutan will result in the discovery of at least two dozen additional species and the number of species occurring in Bhutan might be well over 150.

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## Garden monster - Giant Petaltail (*Petalura ingentissima*)

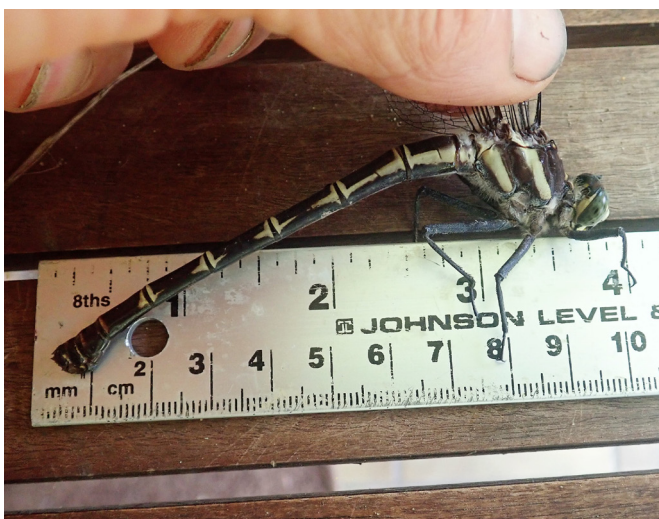
Keith Wilson [kdpwilson@gmail.com]

Knowing my interest in dragonflies, an old fisheries work colleague and good friend of mind, Dave Cook, contacted me from his home in Wonga Beach, Queensland, Australia, in March 2020, with some interesting news. He sent me several photographs of a monster dragonfly his wife Julie had noticed in one of their vegetable patches in their back garden. The dragonfly was trapped between two chicken wire fences around one of their 'veggie' patches. Its noisy fluttering attracted Julie's attention and she called out to Dave to take a look. Dave immediately recognised it as a female Giant Petaltail (*Petalura ingentissima*) and very kindly sent me a series of photos, which are provided here.

Female Giant Petaltails have a body length measuring up to 125 mm and a wingspan of up to 162 mm—although most specimens do not exceed 116 mm in length<sup>1</sup>. It is considered to be the third largest living odonate in terms of wingspan and certainly one of the longest Anisopterans in terms of body length. The largest African odonate, the Black Emperor (*Anax tristis*), has a similar body length with males up to 111-120 mm but much shorter wingspan up to 133 mm<sup>2, 3</sup> (see Figure 1 on page 34).

Although Dave and Julie are surrounded by the Daintree National Park, a stronghold for *Petalura ingentissima*, it is quite rare for this species to venture out of the rainforest into semiurban areas. The news even made the local Cairns Post newspaper [Link]. What a delight to have such a magnificent dragonfly visit your own garden!

Incidentally, the dragonfly was released and flew off unharmed. Thanks to Dave and Julie for sharing their photos.



<sup>1</sup> Wilson, K.D.P., 2009. Dragonfly Giants. *Agrion* 13(1): 29-31.

<sup>2</sup> Samways., M.J., 2008. *Dragonflies and Damselflies of South Africa*. Vol 70 Pensoft Series Faunistica. Pensoft Publishers

<sup>3</sup> Tarboton, W. & M. Tarboton, 2019. *A Guide to the Dragonflies & Damselflies of South Africa* 2<sup>nd</sup> ed. Penguin Random House South Africa pp 224.



## Building capacity for dragonfly research and conservation: Field Workshop on dragonflies of Sri Lanka – 2020

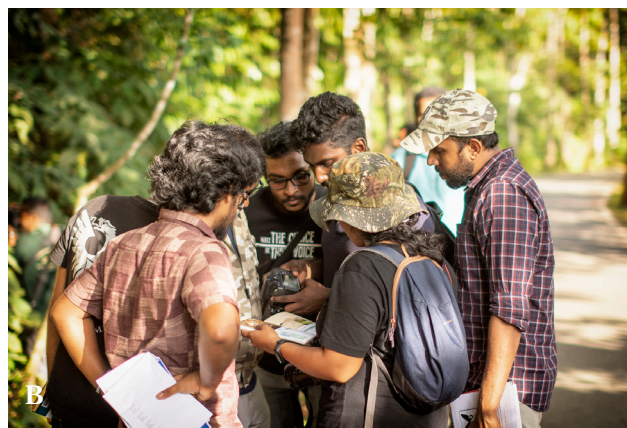
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Butterfly Conservation Society of Sri Lanka

Capacity building is an essential component in understanding and conserving biodiversity. Especially in biodiversity rich tropical countries like Sri Lanka with limited resources for conservation, it is of utmost importance to develop the capacity of local students and researchers so they can make a better contribution towards conservation. Understanding this, the Butterfly Conservation Society of Sri Lanka (BCSSL) is committed towards capacity building for research and conservation and organizes workshops on its local taxonomic groups, especially targeting students and amateur naturalists.



Figure 1. (A) Resource personnel, organizing team and the participants of Field Workshop on Dragonflies of Sri Lanka. (B) Workshop team at the entrance to Sinharaja Forest Reserve.





A field workshop on Sri Lankan dragonflies was organized by the BCSSL in collaboration with the DragonflySouthAsia community and held from 29 August to 1 September 2020. This was the second of its kind organized by the society, four years after the first workshop held in 2016. The workshop venue was the Sinharaja World Heritage Forest Reserve, one of the areas with the richest odonate diversity in Sri Lanka. The lowland tropical rain forest, numerous streams and marshlands in and around the Sinharaja Reserve provide ideal habitats for many endemic odonates in the country.

The workshop was fully funded by the Rufford Foundation as it was organized as a component of a project on Montane Damselflies of Sri Lanka funded under the Rufford Small Grant Program (Project Number: 26652-1). Applications were called for the workshop and from 150 applications received, 25 participants were selected based on their interests on biodiversity and research, and the potential to make a positive contribution towards the study and conservation of Sri Lankan Odonata. The majority of the participants were undergraduates and they represented eight universities. Apart from the students and amateur naturalists that were selected through applications, five members of the staff of Department of Forest Conservation in Sri Lanka were also facilitated to join the program as participants.

The workshop covered a diverse array of topics related to odonates and conservation. The activities comprised of both formal lectures and informal discussions as well as interactive sessions and hands-on activities. All participants were divided into teams which were named after common odonate groups. There were four teams; Darners, Skimmers, Gems and Sprites. On day one, the teams were asked to learn about several selected species in the groups that their teams were named after and coin names in local language (Sinhalese) for them. The participants came up with very interesting names and some of these will be used in the list of Sinhalese names that is being developed for the Sri Lankan dragonflies and damselflies.

Basic information on various aspects of odonates including diversity, taxonomy, ecology, biogeography, climate change impacts and conservation were discussed in a series of lectures and discussions. Research methods, applications of GIS in odonate and climate



**Figure 2.** (A) Participants conducting odonate surveys. (B) Identifying odonates in the field. (C) A team of participants preparing a conservation action plan. (D) Observing odonates in the field. (E) Prof. Devaka Weerakoon discussing conservation assessment criteria.

change studies, conservation assessments, and citizen science were also discussed during these sessions. Other than the lectures and discussions, many interactive group activities and field sessions were also conducted during the four days of the workshop. Under these activities the participants identified the odonates in the field using field guides and keys, formulated research questions and designed research projects to answer them and prepared conservation action plans for different scenarios presented to them, learning the concepts in research and conservation through practical approaches. On the last day, the teams conducted a rapid survey of adult and larval odonates and studied their habitats in the river running adjacent to the Sinharaja Forest.

Most of the sessions were conducted by the primary resource person, Mr Amila Sumanapala, while Prof. Devaka Weerakoon and Mrs Dilani Sumanapala conducted sessions on conservation and applications of GIS respectively. Mr Prosenjit Dawn and Dr Pankaj Koparde of the DragonflySouthAsia community, who initially intended to join the workshop but were unable to do so due to the pandemic situation, contributed through pre-recorded video lectures on Odonata larval taxonomy and citizen science.

During the field work, the participants recorded 40 species of odonates in and around the Sinharaja Forest Reserve and 24 of these were endemic (Table 1). Some of the highlights among the observed species were *Lyriothemis defonseikai*, *Hylaeothemis fruhstorferi*, *Macromidia donaldi* and *Libellago corbeti*. Other than odonates, the participants also observed the tropical rainforest ecosystem and its diverse fauna and flora in the field, under the guidance of the BCSSL members with different fields of expertise. On the final night of the workshop, the participants and BCSSL team also had the opportunity to have an informal open discussion with Prof. Devaka Weerakoon on his experiences as a researcher and views on conservation issues.

After four days packed with knowledge sharing and hands-on experiences, the Field Workshop on Dragonflies of Sri Lanka – 2020 concluded with participants equipped with better capacities and new collaborations.

On behalf of the BCSSL, the organizing team expresses its gratitude to the resource personnel, collaborators, Department of Forest Conservation in Sri Lanka, Rufford Foundation and all the participants for their contributions and encouragement which made this event a success.



Figure 3. (A) *Macromidia donaldi*. (B) *Vestalis nigrescens*



**Table 1: List of Odonata species observed during the field sessions.**  
**(\*Species endemic to Sri Lanka)**

Family	Species	Common Name
Calopterygidae	<i>Neurobasis chinensis</i>	Oriental Green-wing
Calopterygidae	<i>Vestalis nigrescens</i>	Black-tipped Flashwing*
Chlorocyphidae	<i>Libellago corbeti</i>	Corbet's Gem*
Chlorocyphidae	<i>Libellago greeni</i>	Green's Gem*
Euphaeidae	<i>Euphaea splendens</i>	Shining Gossamerwing*
Coenagrionidae	<i>Agricnemis pygmaea</i>	Wandering Wisp
Coenagrionidae	<i>Mortonagrion ceylonicum</i>	Sri Lanka Midget*
Coenagrionidae	<i>Ceriagrion cerinorubellum</i>	Painted Waxtail
Coenagrionidae	<i>Pseudagrion rubriceps</i>	Orange-faced Sprite
Coenagrionidae	<i>Archibasis lieftincki</i>	Lieftinck's Sprite*
Platycnemididae	<i>Elattonneura oculata</i>	Two-spotted Threadtail*
Platycnemididae	<i>Elattonneura caesia</i>	Jungle Threadtail*
Platycnemididae	<i>Elattonneura centralis</i>	Dark-glittering Threadtail*
Platycnemididae	<i>Elattonneura tenax</i>	Red-striped Threadtail*
Platycnemididae	<i>Prodasineura sita</i>	Stripe-headed Threadtail*
Platystictidae	<i>Ceylonosticta anamia</i>	Ana Mia's Shadowdamsel*
Platystictidae	<i>Ceylonosticta brincki</i>	Brinck's Shadowdamsel*
Platystictidae	<i>Ceylonosticta lankanensis</i>	Drooping Shadowdamsel*
Platystictidae	<i>Ceylonosticta bine</i>	Bine's Shadowdamsel*
Platystictidae	<i>Platysticta apicalis</i>	Dark Forestdamsel*
Platystictidae	<i>Platysticta serendibica</i>	Serendib Forestdamsel*
Gomphidae	<i>Megalogramphus ceylonicus</i>	Sri Lanka Sabretail*
Gomphidae	<i>Heliogramphus walli</i>	Wall's Grappletail*
Gomphidae	<i>Gomphidia pearsoni</i>	Rivulet Tiger*
Macromiidae	<i>Macromia zeylanica</i>	Sri Lanka Cruiser*
Synthemistidae	<i>Macromidia donaldi</i>	Forest Shadow-emerald
Libellulidae	<i>Hylaeothemis fruhstorferi</i>	Fuhrstorfer's Junglewatcher*
Libellulidae	<i>Tetrathemis yerburii</i>	Yerbury's Elf*
Libellulidae	<i>Brachydiplax sobrina</i>	Sombre Lieutenant
Libellulidae	<i>Lathrecista asiatica</i>	Pruinosed Bloodtail
Libellulidae	<i>Lyriotheemis defonseikai</i>	Sri Lanka Vermilion Forester*
Libellulidae	<i>Orthetrum chrysis</i>	Spine-tufted Skimmer
Libellulidae	<i>Orthetrum glaucum</i>	Asian Skimmer
Libellulidae	<i>Orthetrum luzonicum</i>	Marsh Skimmer
Libellulidae	<i>Orthetrum pruinosum</i>	Pink Skimmer
Libellulidae	<i>Orthetrum sabina</i>	Green Skimmer
Libellulidae	<i>Neurothemis tullia</i>	Pied Parasol
Libellulidae	<i>Trithemis festiva</i>	Indigo Dropwing
Libellulidae	<i>Pantala flavescens</i>	Wandering Glider
Libellulidae	<i>Zygonyx iris</i>	Sri Lanka Cascader

**Stories from social and cultural odonatology:  
Saint George and the rare  
Australasian Emperor dragonfly  
*Anax georgius* Selys, 1872**

**Matti Hämäläinen [matti.hamalainen@helsinki.fi]**

In 1872 Edmond de Selys Longchamps described two new *Anax* species: the very large *Anax goliath* and the somewhat smaller *A. georgius* (Selys Longchamps 1872) (Fig. 1).

He described *Anax goliath* from a single male from Madagascar, collected during Francois Paul Louis Pollen and Douwe Casparius van Dam's expedition to Madagascar and the Mascarene Islands in 1863-1866. The species name had already appeared as *nomen nudum* in Selys' first paper (Selys Longchamps 1869) on the results of this expedition. *Anax goliath* was later found to be conspecific with *Anax tristis* Hagen, 1867, a species described from a single female specimen from Guinea. The older name, *A. tristis*, remains valid.

The brief description (8 lines) of *A. georgius* appeared as a note appended to the description of *A. goliath* (Fig. 2). The origin of the single male specimen of *A. georgius* was given as 'Natal?'. However, the pinned specimen in Selys' collection (at IRSNB, Brussels) bears two labels in Selys' handwriting, both giving two alternative localities 'Natal' [in South Africa] and 'Timor' [in the Malay Archipelago]. Seehausen (2017, p. 11) published a photo of this specimen with all the attached labels (for the labels, see Fig. 3). As pointed out by Ris (1921, p. 371), the older handwritten label includes also the collector's name: 'Vanderh.' [Vanderhoffen]. In this label 'Timor?' is given with the same black ink as the collector's name; the locality name 'ou Natal?' being later added with blue ink. It remains unknown why Selys included only 'Natal?' in the published description; obviously he considered this alternative more likely, as did Ris (1921), presumably influenced by Selys' opinion.



**Figure 1.** The holotypes of *Anax goliath* (right) and *A. georgius* (left), figured to scale, showing their relative size difference. The scans of the original illustrations by Guillaume Séverin, archived at the Royal Belgian Institute of Natural Sciences, were kindly provided by Karin Vespui and Marcel Wasscher, [\[Link\]](#) & [\[Link\]](#) CC BY NC ND.



Finally, after over 100 years of uncertainty, Timor turned out to be the correct type locality of *Anax georgius*. Watson & Theischinger (1987) identified and illustrated a male specimen, collected in August 1974, in the Kimberley region of Western Australia, only ca 500 km south of Timor. Three years later, Asahina (1990) reported a male specimen collected in Timor in December 1973. The female was described by Seehausen (2017), based on two old specimens from Timor, which he had located in two museum collections.

### Why the species epithet *georgius*?

In the authoritative book *The naming of Australia's dragonflies* (Endersby & Fliedner 2015), only a few species remained without a definite explanation of the etymology of the species epithet. One of these was *Anax georgius*. The authors wrote (p. 11) that there is insufficient information in the original description or other relevant documents to determine whether this species is named for a person or a place. However, in the account of the name (pp. 149-150), the authors do speculate as to its origin, seeking a geographical toponym or an eponym.

Since the description of *Anax georgius* was given in apposition with the description of *A. goliath*—a species clearly named after Goliath, the Philistine giant of the Old Testament of the Christian Bible—the epithet *georgius* may also refer to someone from a traditional Christian source. Knowing Selys' earlier practice of naming new species after saints and other prominent religious persons from classical antiquity and medieval times (Hämäläinen 2020), I am quite confident that *Anax georgius* was named after **Saint George** (Sanctus Georgius), also known as George of Lydda. He is one of the most venerated martyrs in the Western and Eastern Christian churches, and is celebrated as the patron saint of several countries (such as England and Georgia), and other institutions worldwide.<sup>1</sup> He was an officer in the Roman army and was beheaded during a period of Christian

L'*Anax georgius*, de Selys (de Natal ?) y ressemble un peu par la stature et son long abdomen ; mais sa taille est beaucoup moindre, il a sur le front une tache en T noire, comme le *gibbosulus*, Ramb., et n'a pas de tache opaque à la base des ailes inférieures ; enfin, son appendice anal inférieur est plus long et le bout des supérieurs est arrondi, sans l'angle externe du *goliath* et sans la pointe en épine du *gibbosulus*.

Figure 2. The description of *Anax georgius*, scanned from a reprint of Selys' paper.



Figure 3. Labels attached to the holotype of *Anax georgius*. Photo credit: Malte Seehausen.



Figure 4. Saint George slaying the dragon, as illustrated by Antonio Cicognara; one of the numerous artworks on this subject. Photo credit: Bruno Passamani, Guide of the Tosio-Martinengo Art Gallery of Brescia, Grafo, Brescia, Italy. Public domain via [Wikimedia Commons](#).

<sup>1</sup> Also a municipality, Saint-Georges-sur Meuse, in Wallonia close to Selys' residencies in Liège and Waremme, is named after the Saint. Selys' diary notes reveal that he visited this place occasionally. A diary entry of 23 September 1894 says that it took one and three quarter hours to reach there from Liège by horse-drawn carriage.

persecution at the end of the third century or the beginning of the fourth century. The exact date of his death, 23 April 303 AD, given in many sources, is obviously unreliable.

The epithet *goliath*, based on a legendary giant from the Bible, was a perfect name for one of the largest dragonfly species, noted for the particularly long abdomen in the male. Naming another magnificent species after a prominent saint who (after a popular 11<sup>th</sup> century legend) was strong and brave enough to slay a dragon (Fig. 4), also seems consonant with Selys' practice. Hopefully this Saint George and the dragonfly story has more substance than the ubiquitous dragon-slaying legend.

### Acknowledgements

Albert Orr improved the English expression of the manuscript and provided help with the illustrations. Heinrich Fliedner kindly supported the conclusion on the given etymology and pointed out the existence of the municipality Saint-Georges-sur Meuse in Wallonia. Karin Verspui and Marcel Wasscher kindly sent the scans of Séverin's illustrations of *Anax goliath* and *A. georgius*. Malte Seehausen permitted me to use his photo of the labels attached to the holotype of *Anax georgius*.

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## Forthcoming Book

### Dragonflies and Damselflies of Costa Rica: A Field Guide

Series: Zona Tropical Publications / Antlion Media

Publisher: Comstock University Press

Scheduled publication date 15 May 2021

ISBN13: 9781501713163; ISBN10: 1501713167

Dimensions: 5.5 x 8.5 inches, pp 416

Authors: Dennis R. Paulson & William A. Haber

Among the largest of all insects, dragonflies and damselflies are conspicuous. Active during the day, often brightly colored, and extremely photogenic something about their appearance and dashing flight suggests a primeval world of tree ferns and dinosaurs.

The first guide of its kind, this book includes an in-depth introduction with an overview of Costa Rican biodiversity and illustrated morphological terms. The species accounts show males and females of most species, detailed illustrations and close-ups of key distinguishing features, and descriptions of habitat, behavior, and range. Dragonflies and Damselflies of Costa Rica gives readers the information they need to identify nearly every species in the country. Experienced dragonfly fans and new enthusiasts alike will find it an indispensable resource.

**Authors:** Dennis Paulson is a world authority on Odonata, which he has been studying for more than fifty years. His many books include *Dragonflies and Damselflies of the West (USA)*, *Dragonflies and Damselflies of the East (USA)* and a general text on *Dragonflies and Damselflies*.

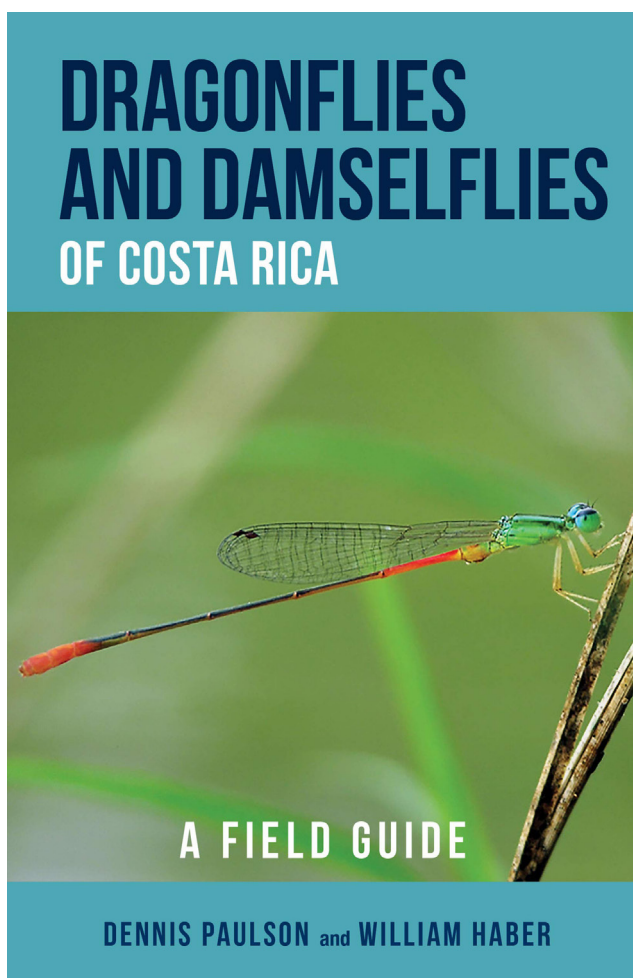
William Haber has been researching insects and plants in Costa Rica since 1972. He has described six new species of Odonata from Costa Rica, with more in the works.

“Written by two leading authorities, this handsome identification guide to the dragonflies and damselflies of Costa Rica is a first for any Central American country. Naturalists, researchers, and conservationists now have a richly illustrated resource with which to delve further into this important and beneficial group of insects. A splendid addition to the hiker’s backpack, it is sure to lure new enthusiasts to the Odonata.”

Ken Tennessen, author of *Dragonfly Nymphs of North America*

“This field guide covers the entire odonate fauna of Costa Rica, a biologically diverse country with nearly 300 species. It meets the high standards of Dennis Paulson’s previous photographic guides to North American species. This will certainly become essential reading for anyone with an interest in the insects of Costa Rica and, in fact, much of Central America and northern South America.”

Michael May, coauthor of *Damselflies of North America*



**Book reviews for  
two recent works on Korean Odonata**

**By Oleg Kosterin [kosterin@bionet.nsc.ru]**

**Two comprehensive and richly illustrated books  
on dragonflies and damselflies of Korea  
have recently been published:**

**Dragonflies of Korea by Cho Sung Bin**  
**20 January 2019 - Publisher: Kwangil Publishing Co. Ltd.**  
**Bilingual: in Korean with short English annotations**  
**ISBN: 9788986752670 - 394 pp.**  
**Paperback, 23.5 x 19 cm, 993 g**

**and**

**Kim J.-m., Song Y.-k., Lee J.-h. & Kim S.-s., 2020.**  
**The Damselflies and Dragonflies of Korean Peninsular**  
**[Publisher not indicated with Latin letters]. 292 pp.**  
**In Korean, with very short English annotations**  
**Hard cover with a supercover, 26.5 x 19.5 cm, 1,063 g**



This was a very generous present from Korean colleagues—more than one could hope for to become acquainted with the rich Korean fauna—that, hitherto, was poorly known outside of Korea. Both books cover both Koreas, although the data from North Korea are understandably scarce. The title of the book by Kim et al. specifies “Korean Peninsular” (sic, ending with “r”), although to be true most of the North Korea territory is on the mainland rather than peninsula. The merit of both books is hard to overestimate: they provide extensive information on identity, appearance, distribution, habitat, life cycle and life style of Odonata of Korea and include numerous photos



illustrating different aspects of their appearance, both in nature and as collected but still in life colour, and, sometimes, behaviour. So maybe it would be more curious to compare them in different respects, as far as it is possible without any idea of the Korean language.

The book by Kim et al. is presented in a high academic style, with references to the original descriptions and type localities and the nomenclatorial paragraph given for each species, which includes all names under which it has been reported for Korea. The book by Cho is a bit more informal. Both books have large and surely interesting general sections referring to different aspects of dragonflies, a part of which is slightly unusually moved to the end of the book by Kim et al. Both books provide regular lists of literature references, which include 60 items in Cho (2018) and 209 items in Kim et al. (2020).

Species included: Kim et al. delivered species in the systematic order throughout while Cho moved to appendices the species occurring only in North Korea and species migratory or possibly migratory to Korea. Without knowing Korean it is unclear which of the latter have been actually recorded and which are only expected in Korea, but none of these species are included in the Korean checklist by Kim et al. Cho included some species as occurring in North Korea which Kim et al. do not list for Korea, namely *Lestes dryas*, *Matrona basilaris*, *L. intermedia*, *Sympetrum vulgatum imitans*, *Epiophlebia sinensis* and two doubtful species of *Sympetrum* described from North Korea. At the same time Cho did not include *Aeshna caerulea* which is in the Korean list by Kim et al. In their Appendix Kim et al. discuss as many as 34 species, including the above mentioned *L. dryas*, *M. basilaris*, *L. intermedia*, *S. vulgatum* and the two doubtful species, but without Korean there is no means to learn how they are considered (e.g. the figure legends miss even Latin names); perhaps they are all excluded from the Korean fauna. Cho considers the species of *Nannophya* occurring in Korea as *N. pygmaea* while Kim et al. as *N. koreana* (to my taste the evidence in favour of the specific status of the latter could be more solid). Except for the above cases, both species lists coincide.

Identification: The book by Kim et al. includes identification keys entirely in Korean, including the species names. The book by Cho lacks keys but sometimes important characters are indicated on photos with arrows and notes are provided, even in English.

Illustrations: Those in the book by Cho are somewhat larger and hence easier to consider; they well utilise the page area. Those in the book by Kim et al. are on average smaller; particularly the collected specimens, which are presented in what I would call a Japanese style—small and very thoughtfully disposed on a very spacious white background—that are excellent aesthetically but an odonatologist maybe would prefer larger specimens rather than expansive areas of white space. Cho illustrated specimens in upper and side views in full and also exploited a smart idea to provide frontal photos of both sexes side by side, that is very helpful. Illustrations by Kim et al. are more academic in style: side view in full, abdomen in dorsal view, end of abdomen and sometimes also head and/or thorax in larger view, but no frontal view.

Distribution: A strong point of Kim et al. are dot maps, while Cho only outlined distribution verbally.

The book by Cho contains more information in English than that by Kim et al. At the same time the latter for some reason includes English names of species (although of little use outside English speaking countries).

For some reason, Cho considered his book as a kind of corrigenda to a book 'Odonata of Korea' by Jung, K.-s. (2007), so his numbered (!) checklists contain species names stricken through, for species which he excludes but which had been included in that book. Also a special sheet of paper with corrigenda to that book is provided along with the book. Such a homage to a preceding author is impressive but maybe it would be wiser just to present his own authoritative point of view as a starting point rather than contradict a predecessor, which a reader may not know.

No doubt, having either of these books will make one well acquainted with the rich and interesting fauna of Korea, and, the last but not least, adjacent territories of China and Russia, and make one capable of identifying each species, even without knowing Korean. Having both (like me, through the courtesy by the authors) would make him/her almost a Korean odonatologist.