

AGRION

NEWSLETTER OF THE WORLDWIDE DRAGONFLY ASSOCIATION

PATRON: Professor Edward O. Wilson FRS, FRSE

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WORLDWIDE DRAGONFLY ASSOCIATION



TWENTY YEARS IN FLIGHT

AGRION

NEWSLETTER OF THE WORLDWIDE DRAGONFLY ASSOCIATION

AGRION is the Worldwide Dragonfly Association's (WDA's) newsletter, published twice a year, in January and July. 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 http://worlddragonfly.org/?page_id=125. WDA is a Registered Charity (Not-for-Profit Organization), Charity No. 1066039/0.

Editor's notes

Keith Wilson [kdpwilson@gmail.com]

Conference News

5th European Congress on Odonatology (ECOO) 2018 is scheduled to be held in Brno, Czech Republic. For more info please contact Otakar Holuša, Mendel University in Brno, Faculty of Forestry and Wood Technology Dept. of Forest Protection and Wildlife Management, Zemědělská 3, CZ-613 00 Brno, Czech Republic, mob: +420 606 960 769, e-mail: [holusao@email.cz].

Entomology 2017 is scheduled to be held in Denver, Colorado, USA, 5-8 November 2017; for further information see Entomological Society of America's web site at: [<http://entsoc.org/events/annual-meeting>].

The International Congress of Odonatology 2017 (ICO2017)

The International Congress of Odonatology 2017 (ICO2017), originally scheduled to be held in Algeria, will be held in the Gillespie Centre at Clare College, Cambridge from 15-20 July 2017. For further information the ICO2017 web site at [<http://www.ico2017.org>].



Student Research News

In this issue of *Agrion* a new section has been introduced that focuses on WDA sponsored student research activities. It is our intention to invite one or more of WDA's sponsored student members to contribute news and information on their individual research studies and interests. In this issue Cornelio Andrés Bota Sierra from Colombia has kindly provided us with an article on his research activities (see "Exploring Colombian Odonata" on page 78) and Camila Rippel introduces her research on mosquito control using Odonata (see "Dragonflies and mosquitoes" on page 81).

WDA Conservation and Research Report

In February 2017 WDA received a WDA Conservation and Research Grant Report titled: *Dragonfly fauna of high mountain habitats of the Dinaric Alps in Bosnia and Herzegovina* by Dejan Kulijer and Iva Miljević. Dejan and Iva have kindly produced an article based on this report for this issue of *Agrion* (see "Dragonfly fauna of high mountain habitats of the Dinaric Alps in" on page 90).

Cover artwork: T-shirt front design celebrating the 20th anniversary of the WDA by Jessica L. Ware and Göran Sahlén. T-shirts will be available on sale at the forthcoming ICO Meeting to be held at Clare College, Cambridge from 15-20 July 2017. For members not attending who wish to obtain a t-shirt please contact the WDA Secretary Jessica Ware at email: [secretary@gmail.com].

WDA archivist reports and vision for the future of WDA

In 2003 the WDA Board approved the position of Archivist and produced a 'Terms of Reference' for the position. Philip Corbet was subsequently appointed as Archivist and Philip set out his vision for the role in the July 2004 issue of *Agrion* [11(2): 13-14]. Philip produced the first WDA Archivist's Report titled: 'The origin and development of WDA: the first ten years, 1997-2007', which was published in the January 2008 *Agrion* [12(1): 30-36]. It's been a decade since this report was published and in this issue of *Agrion* Nancy van der Poorten has kindly produced a second archivist's report covering the last 10 years - see "The second decade, 2007–2017" on page 53. Nancy also sets out her vision for the future of WDA in a follow-up article - see "WDA: Entering the third decade, 2017–2027" on page 60.

Renewal of membership to WDA/IJO

Renewal notices for 2017 were sent out earlier in the year. If you did not receive one, please get in touch with the WDA secretary at: wda.secretary@gmail.com. Your membership is vital to keeping the WDA/*IJO* active and we hope that you renew your membership this year. Even though many of you have access to *IJO* through your institution, your personal subscription is vital for the work of the WDA. It helps to support our grants program that supports research, education and conservation initiatives and our Sponsored Memberships program (see page 78) that makes membership in the WDA and a subscription to *IJO* available to those who cannot otherwise afford it. Your personal subscription to WDA/*IJO* also supports the WDA's involvement in the International Congresses held every two years. Even a regular membership without a subscription to the journal helps to support the initiatives of the WDA including *Agrion*. WDA members are eligible to apply for grants to support their research efforts.

WDA website

The WDA website can be accessed at [<http://worlddragonfly.org/>]. The site contains general information about dragonflies and the Society including the composition of its WDA Board of Trustees, details of its WDA Conservation and Research Grants, WDA meetings and publications. WDA membership application forms can be completed at [http://worlddragonfly.org/?page_id=141] or downloaded for completion and submission to WDA Secretary at [http://worlddragonfly.org/wp-content/uploads/2013/11/membership_application_form.pdf].

WDA Constitution

The WDA constitution and a 'record of constitutional changes' are now available on the WDA website [http://worlddragonfly.org/?page_id=111].

Next issue of *AGRION*

For the next issue of *AGRION*, to be published at the beginning of January 2018, 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').

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*.

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Worldwide Dragonfly Association: The second decade, 2007–2017

Nancy van der Poorten [nmgvdp@aim.com]

The inaugural meeting at which the formation of the WDA was proposed took place on 17 July 1997. The association was formally confirmed on 6/7 September 1997 and the Constitution and Bylaws formulated. They were ratified at the first Biennial General Meeting in 1999.

Philip Corbet wrote an account of the origins and development of the WDA and IJO: *The first ten years, 1997–2007* (*Agrion* 12(1): 30–36, Jan. 2008). This account is well worth reading particularly for our newer members.

Though the WDA was born out of contention, the aim of establishing a new association was to have an open, democratic and welcoming organization, and after reflection on the past 20 years, we can see that this aim has been fulfilled. The WDA continues as a vibrant association, one of the very few taxon-specific worldwide organizations. Despite the difficulties of people in different time zones and using different languages speaking to each other, we are united by our love of the object of our association—dragonflies and damselflies. ICO 2017, to be held in Cambridge England from July 15–20, will be attended by nearly 100 people, academics and amateurs, from 31 different countries.

The following account summarizes the major accomplishments and activities of the WDA from 2007–2017, but with references to 1997–2007 where appropriate.

What we do

1. International Congress of Odonatology (ICO)

The first international meeting of odonatologists sponsored by the WDA was held in July 1999 in the USA. Subsequent meetings were held in Sweden (2001), Australia (2003), Spain (2005), and Namibia (2007). The meeting in Mexico (2009), while organized by the WDA, was supported in principle by the FSIO (Foundation Societas Internationalis Odonatologica that had previously organized its own biennial meetings), many of whose members attended. From 2011, the WDA and FSIO agreed to hold combined meetings that would now be called the International Congress of Odonatology and named according to the year it was held.

The first such Congress was scheduled to be held in Japan in 2011 but was postponed due to the earthquake in March of that year; it was eventually held in July/August 2012 (organizer Yoshitaka Tsubaki, 75 participants, 16 countries). ICO 2013 was held in June in Germany (organizer Florian Weihrauch, 129 participants, 29 countries) and ICO 2015 was held in November in Argentina (organizer Javier Muzón, 90 participants, 21 countries). The upcoming ICO 2017 is being held in July in Cambridge, UK though it had originally been planned to be held in Algeria (organizer Richard Rowe; scientific coordinator Boudjéma Samraoui). ICO 2019 will be held in Austin Texas USA, hosted by IJO editor John Abbott.

The ICOs are run by the WDA and by individuals or groups in the host country that take care of organizing the scientific sessions, the locale, accommodations and other on-the-ground logistics. The FSIO participates on an irregular basis, having provided travel funds and student prizes for some of the ICOs. More recently, the GdO (Gesellschaft deutschsprachiger Odonatologen) and SOL (Sociedad(e) de Odonatología Latinoamericana) have been active participants, providing funding for students. The WDA has a dedicated Congress Coordinator, a position that has been handled by Richard Rowe since 2005, and an International Congress Committee that includes the organizers of the three immediately previous congresses plus the WDA President (ex-officio) & the Chair (currently Richard Rowe). In addition, from 2017 the WDA has committed to hosting the ICO website.

Grants are provided to selected students who have registered to either present a talk or a poster based on merit and need with preference given to students outside of the first world. These grants usually cover the cost of registration and other congress incidentals, but accommodation and travel costs are not usually covered.

Typically, each ICO features one or more Plenary Sessions: two- to three-hour sessions on one or more topics moderated and led by a chairman. A booklet of abstracts is provided at the congress and an account of each ICO is printed in *Agrion*. For ICO 2017, a special session devoted to Philip Corbet is planned as well as two special sessions, Dragonfly Vision and Flight. The rest of the sessions are grouped thematically: phylogeny, life history, distribution, behavior, etc. A selected panel of papers will be published in IJO.

Each ICO usually has a mid-week field trip as well as a post-congress tour. ICO 2007 held a mid-congress tour of the Namib desert with the highlight being the *Welwitschia* plants; the post-congress tour was a safari trip to the Okovango River and Etosha Pan. ICO 2009 had a mid-congress tour devoted to a cultural visit to the internationally famous El Tajin archaeological site; the post-symposium tour visited various locations within Veracruz State. ICO 2012 had a mid-week visit to the area of Fuji-Hakone-Izu National Park and a post-congress tour to Yamanashi, Nagano and Shizuoka prefectures in central Japan. ICO 2013 had a mid-week visit to the area around Freising and a post-congress visit to the countryside of southeastern Bavaria. ICO 2015 held a post-

Congress visit to Lanin and Nahuel Huapi National Parks in Patagonia; the mid-week trip was cancelled due to unfavorable weather. The mid-week trip for ICO 2017 is to Wicken Fen – Ely – Woodwalton Fen; no post-congress trip is planned.

The ICO is also the time when the WDA holds its Biennial General Meeting (BGM) and one or two meetings of the Trustees, one before the BGM in which the new board is installed and usually one after the BGM. Both the BGM and one Trustee meeting are mandated by the WDA's Constitution.

2. International Journal of Odonatology (IJO) (ISSN: 1388-7890)

One of the main priorities of the newly formed WDA was to establish a peer-reviewed scientific journal, now called *The International Journal of Odonatology* (IJO). The first issue came out in 1998, and in late 2008, IJO hit a milestone when it received ISI approval. It is now listed on Thomson's Web of Science, Current Contents and Zoological Record.

Following Henri Dumont, Reinhard Jödicke took over as editor from 2001–2008. The journal continued to be published by Backhuys Publishers until 2004 (issue 7(1)) and was then self-published by the WDA until 2010 (issue 13(2)). Mike May took over the editorship from 2008–2015. On January 1, 2011, Taylor & Francis Publishers were engaged to handle the mechanics of design, layout, final copy editing, printing and distribution for a 5-year renewable term, which was renewed in 2015 until 2020. T&F was also engaged to handle memberships. In 2011, a panel of six Content Editors was put into place instead of the system of Assistant Editors (Table 1). In 2013, IJO started using Scholar One for managing manuscript submissions. John Abbott took over as editor in 2016 (issue 19(1)).

Since the first Impact Factor for IJO in the Thomson-Reuters publications was released in 2011, IJO has received respectable Impact Factor ratings given its specialized field and relatively small numbers of subscribers: 0.791 (2010); 0.614 (2011); 0.426 (2012); 0.5 (2013); 0.686 (2014); 0.69 (2015) and 0.647 (2016). Its ranking has improved from 69/94 in the Entomology JCR Category in 2015 to 66/91 in 2016. Until 2011, 2 issues per year were published and starting in 2011, 4 issues per volume were published (Table 2).

In October 2009 a special issue dedicated to the memory of Philip Corbet was published (Vol 12(2)). Eighteen articles covered a range of topics from reproductive behaviour to the structure of the imaginal cuticle, the status of microsatellite loci in odonates, ecology and colonization. Seven new species were named after Philip Corbet: *Libellago corbeti* from Sri Lanka; *Risocnemis corbeti* from the Philippines; three species, *Cyanallagma corbeti*, *Tukanobasis corbeti* and *Castoraeschna corbeti*, from Brazil; *Aeolagrion philipi* from Bolivia; and *Orthemis philipi* from Argentina.

2b. Merger of IJO and Odonatologica

Many discussions took place throughout 2006–2007 with respect to a merger of IJO and *Odonatologica*, with extensive debate at the 2007 Namibia meeting and many negotiations after that by WDA president, Gordon Pritchard, but ultimately no consensus was reached and no merger took place. In 2012, the Board of the WDA received a petition that again requested a merger of the journals. The WDA approached Florian Weihrauch, the editor of *Odonatologica*, but again, the discussions did not result in a merger. The WDA published its response to the petition in *Agrion* 20(1), January 2016.

3. Newsletter: *Agrion*

Bylaw 7.2a mandates that the WDA produce a newsletter twice a year. Keith Wilson and Graham Reels took over editorship of *Agrion* from Jill Silsby in 2007 and continue as editors to this day. Their first issue was published in January 2008 followed by a special tribute edition to Philip Corbet published in May 2008. In 2008, *Agrion* was available only to members as a pdf with online access. In 2009, it was made available online free to anyone. Early in 2014, Regional Representatives were appointed to help gather and disseminate regional news. Ten regions were recognised. In 2017 the representatives included Rory Dow (Southeast Asia), Subbu - Subramanian Ka (South Asia), Hide – J.H. Natsume (East Asia), Elena Malikova (North Asia), Javier Muzón (South America), Geert De Knipe (Western Europe) and Viola Clausnitzer & KD Dijkstra (Africa). North America, Middle East and Australasia were vacant.

*Why is the newsletter called *Agrion*?

Here's the reason as given in the first issue:

“We have called our newsletter A G R I O N and would like to tell you why we chose this particular name. In the early days of Odonata classification, odonates were grouped under just two generic names: *Libellula* for anisopterans and *Agrion* for zygopterans. Since then they have been divided up and, as knowledge has increased, in several cases there has been a change of name more than once. But the name *Agrion* persists in many of today's generic names: *Acanthagrion*, *Ceriagrion*, *Coenagrion*, *Megalagrion*, *Neuragrion*, *Pseudagrion*, *Rhinagrion*, *Thermagrion*, *Xanthagrion*. And there are many more, spread all over the world — the name is known worldwide. We need say no more!”

To date, *Agrion* has published 21 volumes (42 issues, 1048 pages). The editor, Keith Wilson notes that articles in *Agrion* seem to score rather high on Google searches, bringing some publicity for the WDA.

4. Odonatological Abstracts

WDA members had access to the Odonatological Abstract Service as soon as it was started in 1998. The OAS was compiled by Martin Shorr and Martin Lindeboom of the International Dragonfly Fund. In 2000, the abstracts were made available on the WDA website. In May 2016, the last of the abstracts was published: the compilers were unable to continue this huge undertaking and the advent of the internet meant that much of what they documented was freely available by searching on the internet. The WDA canvassed for someone to take over the OAS but had no takers. A compilation of all OAS editions to date are available as a pdf: www.dragonflyfund.org/images/reports/OAS_complete_small.pdf

5. Website

The WDA has had a website presence since 1997; the first site was set up by Rob Arnold but it soon became out-of-date and could not be updated. In 1998 Colgate University in New York USA agreed to host it with Rob Arnold as webmaster. From 2007, it was hosted at the University of Vigo in Spain with Adolfo Cordero as webmaster and was redesigned in 2009. In 2014, the WDA finally had its own dedicated website [<http://worlddragonfly.org/>], which was set up by Rhainer Guillermo Ferreira and Christopher Hassall; Rhainer continues as the webmaster. It provides all the essential WDA information: membership, publications, constitution, BGM and Trustee Meeting notes, and since 2017, a subdomain for future ICOs.

6. Facebook

A WDA Facebook page (<https://www.facebook.com/WorldwideDragonflyAssociation>) was set up on November 3, 2013. It is administered by Melissa Sanchez-Herrera and Will Kuhn. From 2013–2015, 29 posts were made and the page had accumulated 897 “likes” from fans that are 39% women, 59% men, falling mostly into the 25–34 age class (9% of women, 17% men); however, fans range from the 13–17 age class to the 65+ age classes. Ten countries account for the top 67% of the total fanbase: USA (29% of likes), Indonesia (11%), UK (5%), Colombia (4%), Netherlands (4%), Italy (3%), Germany (3%), Spain (3%), Canada (3%), and Sweden (3%). Argentina is number 18 with 1% of the fanbase. Bogotá (Colombia, 18 likes), New York (USA, 16), and 3 cities in Indonesia - Surabaya (15), Bekasi (15), and Semarang (15) - comprise the top 5 (9%) fanbase cities. At the present time, the page has 1147 “likes” and 1136 followers. The most recent figures show a total of 1129 fans that are 38% women, 60% men, falling mostly into the 25–34 age class (10% of women, 17% of men). The fans, however, range from the 13–17 age class to the 65+ age class. Ten countries account for the top 67% of the total fanbase: USA (27% of likes), Indonesia (12%), UK (5%), Colombia (4%), Mexico (4%), Netherlands (3%), Spain (3%), Canada (3%), Italy (2.5%) and Brazil (2.5%). In terms of fanbase cities, the top city is Sidoarjo (East Java, 28 fans) followed by Bogotá (Colombia, 23), Semarang (Java Central, 14), Taipei (Taiwan, 14) and Bekasi (Java Occidental, 14).

7. Twitter

The WDA’s Twitter website may be found at the link: [<https://twitter.com/WorldDragonfly>]. It was also established in 2013. It is currently maintained by the Treasurer, Manpreet Kohli. At the present time, there are 33 tweets, 32 following, 78 followers and 8 likes.

8. International Network of Odonatological Information (INOI) and Odonata Database (ODAT)

Bylaw #9 stipulates that “...INOI shall be established, with the aim of becoming the centre of information about WDA and about Odonata on a computerised basis.” and that the WDA “.. shall also establish an Odonata Database (ODAT) containing, such items as an odonatological World Checklist and World Bibliography; electronic publications such as journals, newsletters, booklets, etc.” While many attempts have been made over the years, these two entities do not currently exist.

9. Archives

In 2004, the WDA amended the constitution to include a position of Archivist but that position has never been properly filled. Philip Corbet wrote a detailed plan (*Agrion* 8(2)) whereby the Archivist with help from others “shall solicit, assemble, curate and make available to members material (textual, photographic and other) likely to be of interest to present and future members of WDA in documenting the origin and continuing development of the Association.” He took on the role in a limited fashion to produce WDA Archivist’s Report No. 1: *The origin and development of WDA: the first ten years, 1997–2007* (January 2008, *Agrion* 12(1)). There has been no movement on this since then.

10. Codes of practice

The WDA has adopted two Codes of Practice. One of them (*Agrion* 6(2), July 2002) gives guidance to members in their dealings with each other. The other is a Code of Practice for Collecting Specimens (posted on the WDA website). It was passed in 2002 (the original Code appeared in *Agrion* 6(2): 22–23) and was amended in 2005 (*Agrion* 9(1): 2). The code is subject to review “at least once every five years”; the next review by the Trustees is due in 2017.

11. Conservation Fund

11a. Awards

In 2003, an award to honor and recognize excellence in odonatology was established. Two awards were given in 2005 and one award in 2007. In 2009, it was decided to abandon the WDA award and use the money for research and conservation grants instead.

11b. Grants

From the inception of the WDA, money has been made available for research grants. Depending on finances, €2000 are allocated annually (Table 3). In 2009, one grant of €1000 was given. In 2010, three grants were given (amount unknown). In 2011, approximately £1300 was disbursed. In 2012 and 2014, no grants were given. In 2013, one grant of €1000 was approved. In 2015, €600 was given for one grant, and in 2016, €1583 were given for two grants. In 2017 to date, €1780 have been given for two grants and two other grants are under consideration. The application procedure is outlined on the WDA website and applications are first evaluated by the Conservation & Fund Committee and then voted on by the Board. The procedures for the awarding of grants was reviewed in 2016 by the Board and some minor changes were instituted.

Who we are

12. Charity

The WDA is a Registered Charity (#1066039/0) in the UK; it was registered on 21 November 1997 and is required by its Constitution to promote the study and conservation of dragonflies and their natural habitats in all parts of the world. Bylaw 8 outlines some of the Charitable Exercises that the WDA is expected to undertake: 1. a scheme that will provide grants towards the funding of suitable conservation projects in areas where they are most needed; 2. A scheme to encourage and assist young enthusiasts, graduate students and young professionals with awards for significant basic odonatological research; and 3. a programme which will enable individuals, who may find it difficult to join or to remain in the WDA due to currency or other restrictions, to have their membership fully or partially supported by the Association or, preferably, by its members. Over the years the WDA has been able to fulfill these goals and continues to look for ways to further promote its charitable goals.

13. Constitution and Bylaws

The Constitution and Bylaws of the WDA were adopted on 6 September 1997 and ratified at the first BGM in 1999. Only two small changes have been made since 2007. In 2013, at the BGM the membership voted to change the word “Symposium” to “Congress” and to allow Japanese officers at the national office to be ratified within their own offices and not by international WDA vote (Bylaw #4).

14. Patron

In 2002, the WDA decided that having a Patron would be beneficial for the association and offered it to Professor E.O. Wilson, FRS, who graciously accepted* and continues to be our patron. Professor Wilson is one of the most distinguished living biologists and a well-known entomologist with a well-known commitment to in-depth taxon-focused biology, such as is exemplified by the WDA. Since taxon-focused biology is considered by some to be not very fashionable now and is not well-funded, the WDA felt that it could benefit from advocacy from such a respected source. Further, Professor Wilson has had major impacts on the direction of biology as exemplified by two of his major works, *The Insect Societies* (1971) and *Sociobiology: The New Synthesis* (1975).

*Professor Wilson’s acceptance letter: “I consider it a special honor indeed to be invited to serve as Patron of the Worldwide Dragonfly Association, particularly since, as you point out, our commitment to in-depth taxon biology is so closely matched. So I accept gladly.”

15. WDA National Group in Japan

In its early years, the WDA had several national or regional groups including Japan, UK, US, Netherlands, and Germany. The Japanese group continues to be the only one still active and they continue to hold local meetings and field trips and to be active in research, social education and the conservation of dragonflies.

16. Membership

The WDA began with a membership of 33 Founder Members and grew quite quickly after that. In the past few years, unfortunately, membership numbers have fallen from a high of 288 (40 countries) in 2008 to the current number of 158 from 29 countries (Table 4). The WDA surveyed the membership in 2015 and found that there were several issues related to joining as a new member and to renewing (being charged twice on their credit card, or not at all, and being sent too many renewal notices or none), and we have been working with T&F to correct these problems. In addition, several people commented that since they were able to access IJO online through the institution that they work for, they did not need to take out a personal subscription. Others were having to make financial choices that entailed choosing either IJO or *Odonatologica*. Difficulties with making payments due to restrictions on the flow of currency has also been a factor for some people.

A note from our board member, Dr. Mamore Watanabe, explains some of the reasons for the decline in the Japanese membership. When the renewals were first handled by T&F, many of the Japanese members had difficulties that discouraged them from renewing. In addition, the average age of the Japanese members is increasing. He said that most of the younger generations are not interested in odonates and there are very few posts available to study the Odonata in Japanese universities. Further, development in Japan seems to be detrimental to the survival of the resident species. Dr. Watanabe believes that Japanese Odonatology now seems to be facing some dangers.

There has also been a positive proliferation of more regional societies, such as the Latin-American Society of Odonatology SOL (Sociedad(e) de Odonatología Latinoamericana), that has likely deterred membership in the WDA.

Until 2011, the WDA handled its own memberships, after which Taylor & Francis (T&F) was contracted to handle WDA memberships when an agreement was made for T&F to handle the publication of the journal.

Since 2007, there have been several notable deaths of WDA members or prominent odonatologists as reported in *Agrion*: Philip Corbet (2008, *Agrion* 12(20)); Dr. Syoziro Asahina (2010, *Agrion* 15(2)); Bob Reimer (2012, *Agrion* 17(1)); Gordon Pritchard (2012, *Agrion* 17(2)); Norman Moore (2015, *Agrion* 20(1)); and Roland Müller (2016, *Agrion* 21(1)).

17. Sponsored Memberships

A special feature of the WDA is the offering of Sponsored Memberships to those who for financial or other reasons are unable to pay the membership fee. They have been offered from the inception of the WDA and have been partly financed by the editors offering their free journal subscription for this purpose. From 2007–2011, there were 7 sponsored memberships. When T&F took over the publication of IJO, they continued the tradition of offering a free journal subscription to the editors of IJO; most of them over the years have offered these subscriptions to be used for Sponsored Memberships. From 2013 to 2016, 22 sponsored memberships were offered. The Sponsored Membership program was unfortunately neglected from 2013–2015 but is now back on track. In 2017 we have 9 Sponsored Memberships to date (with members from Russia, Cuba, Pakistan, Argentina, Australia, Cameroon & Colombia) with 12 more available.

The memberships are reviewed by the Conservation & Fund Committee who make a recommendation to the Board. The application is accepted if no Board member is opposed, and it is valid for three years, but renewable yearly. Those who receive a Sponsored Membership are grateful to be able to receive IJO and to participate in the WDA, which they would otherwise not be able to do.

18. The Board

The Constitution outlines the composition of the Board. The Board consists of the three or four Honorary Members —president, president-elect, secretary and treasurer (the latter two positions may be combined) — and not less than three and not more than seven members, who serve from the conclusion of one BGM to the next. Table 5 lists the positions as held from 2007 onwards.

19. Finances

The WDA started with no funds except for memberships and a generous donation from an anonymous donor who matched donations given by others. Since then, most of the WDA's funds came from memberships. In the second decade, there was a small increase in dues in 2007, 2008 & 2009 in some currencies due to changes in exchange rates (Table 6). Dues were increased in 2013 but reverted to the 2010 rate by 2017. WDA maintains four accounts: Japan, Germany, UK, US. Until 2011, membership subscriptions were handled locally by D. Fitch (USA), L. Averill (UK), W. Schneider (Germany) and T. Kudoya (Japan). From 2012, subscriptions have been handled by T&F who we pay a set fee per journal member. Generally the WDA is in good financial shape and has funds to cover its conservation activities. Financial reports are presented at the BGM and printed in *Agrion*.

Compiled by Nancy van der Poorten (who takes responsibility for all errors!) with the great help and input from the following: Richard Rowe, Ola Fincke, Jessica Ware, Keith Wilson, Boudjéma Samraoui, Mamoru Watanabe, John Abbott and Melissa Sanchez Herrera.

Table 1: Assistant Editors and Content Editors for IJO

Year	Assistant editors	Editorial board
2007–2009	Gordon Pritchard, Frank Suhling, Hansruedi Wildermuth	Viola Clausnitzer, Philip Corbet, Adolfo Cordero, Jürg de Marmels, Ola Fincke, Oleg Kosterin, Elena Malikova, Andreas Martens, Michael May, Albert Orr, Dennis Paulson, Richard Rowe, Göran Sahlén, Wolfgang Schneider, Robby Stoks, Jan van Tol, Natalia von Ellenrieder, Keith Wilson
2010–2012	Albert Orr, Gordon Pritchard, Natalia von Ellenrieder	Klass-Douwe Dijkstra, Ola Fincke, Matti Hämäläinen, Elen Malikova, Andreas Martens, Michael May, Shannon McCauley, Dennis Paulson, Göran Sahlén, Kenneth Tennessen, Gunther Theischinger, Jan van Tol, Jessica Ware, Florian Weihrauch, Hansruedi Wildermuth, Keith Wilson
Year	Content editors	Editorial board
2011–2015	Klass-Douwe B. Dijkstra, Ola Fincke, Stanislav Gorb, Albert Orr, Frank Suhling, Jessica Ware	Matti Hämäläinen, Elen Malikova, Andreas Martens, Shannon McCauley, Dennis Paulson, Richard Rowe, Göran Sahlén, Kenneth Tennessen, Gunther Theischinger, Jan van Tol, Florian Weihrauch, Hansruedi Wildermuth, Keith Wilson
2016–2017	Same as 2011–2015	Michael L. May, Rosser Garrison, Rhainer Guillermo Ferreira, Kamilla Koch, Elen Malikova, Andreas Martens, Shannon McCauley, Dennis Paulson, Richard Rowe, Göran Sahlén, Kenneth Tennessen, Gunther Theischinger, Jan van Tol, Florian Weihrauch, Keith Wilson

Table 2. IJO: Page count and number of article

Year	Volume number	Number of issues/ Number of pages	Number of articles
2007	10	2/272	17
2008	11	2/276	21
2009	12	2/434	22
2010	13	2/328	22
2011	14	4/339	32
2012	15	4/318	24
2013	16	4/350	27
2014	17	4/258	25
2015	18	4/327	27
2016	19	4/282	24

Table 3. WDA Grants for Research and Conservation 2007–2017

Date	Recipient	Project	Report reference	Amount (Euros)
2007–2008	No information is available			
2009	Rory Dow	Odonata of the Upper Baram area and of Gunung Kalulong, Sarawak, Malaysian Borneo		1000
2010	Rafal Bernard	Fieldwork in the boreal part of European Russia		
2010	Do Mahn Cuong	Fieldwork in Vietnam	<i>Agrion</i> 15(1): 5–7	
2010	Travel fund	For 1 st European Symposium of Odonatology		
2011	No information is available other than an expense of 1294GBP			
2012	No grants given			
2013	Yusdiel Torres Cambas	Integrative taxonomy to study threatened West Indian damselflies		1000
2014	No grants given			

Date	Recipient	Project	Report reference	Amount (Euros)
2015	Dejan Kulijer	Dragonfly fauna of high mountain habitats of the Dinaric Alps in Bosnia and Herzegovina		600
2015	Issah Seidu	Using odonates as surrogate for biodiversity conservation and freshwater management in the Atewa Range Forest Reserve, Ghana.	<i>Agrion</i> 21(1): 26–27. January 2017	813
2016	Prosenjit Dawn	Dragonfly India Meet 2016	<i>Agrion</i> 21(1): 28–32. January 2017	770
2017	Slovene Dragonfly Society	Seventh Balkan Odonatological Meeting 2017 Slovenia (August 2017)		1000
2017	Dejan Kulijer	Dragonfly fauna of high mountain habitats of the Dinaric Alps in Bosnia and Herzegovina – II (Survey of habitats of regionally threatened dragonfly species).		780

Table 4: WDA Membership Numbers

Year	1997–2006	2007	2008	2009	2010	2011	2013	2014	2015	2016	2017
# members (# of countries)	Average 212 (30 – 40)	283 (42)	288 (40)	268	250 (39)	253 (39)	240	180 (35)	175 (28)	145 (28)	158 (29)

Table 5: WDA Board (x: not filled)

	Position	2007–2009	2009–2010	2011–2013	2013–2015	2015–2017
Honorary Officers	1. President	GP	WS	GS	BS	OF
	2. President-elect	WS	GS	BS	OF	NV
	3. Immediate past president	HU	GP	WS	GS	BS
	4. Secretary	LA	NvE	BR/SF	JW	JW
	5. Treasurer	DAF	DAF	DAF	MK	MK
Trustees	6. IJO Managing editor	RJ	RJ /MM	MM	MM	MM /JA
	7. <i>Agrion</i> editor	KW & GR				
	8. Conservation & Fund Chair	GS	VK/ GS	VK	x	NV
	8a. Sponsored Memberships	x	DP	DP	x	NV
	9. Congress chair	RR	RR	RR	RR	RR
	10. Webmaster	AC	AC	AC	AC	RG
	11. Trustee	VC	MW	MW	MW	MW
	12. Trustee	x	x	x	NV	PB
	13. Trustee	x	x	x	x	GS
National Representative for Japan		YT	YT	YT /HK	HK	HK

AC: Adolfo Cordero; BR: Bob Reimer; BS: Boudjéma Samraoui; DAF: David Allen Fitch; DP: Dennis Paulson; GP: Gordon Pritchard; GR: Graham Reels; GS: Göran Sahlén; HK: Haruki Karube; HU: Hidenori Ubukata; JA: John Abbott; JW: Jessica Ware; KW: Keith Wilson; LA: Linda Averill; MK: Manpreet Kohli; MM: Michael May; MW: Mamoru Watanabe; NV: Nancy van der Poorten; NvE: Natalia von Ellenrieder; OF: Ola Fincke; PB: Peter Brown; RG: Rhainer Guillermo; RJ: Reinhard Jödicke; RR: Richard Rowe; SF: Sónia Ferreira; VC: Viola Clausnitzer; VK: Vincent Kalkman; WS: Wolfgang Schneider; YT: Yoshitaka Tsubaki.

Table 6. WDA Membership Fees (in pounds sterling)

	2000	2009; 2010+	2013++	2017++
Sustaining*	n/a	74	80	74
Single with journal	30	52	55	52
Family with journal	40	66	68	66
Student with journal	22	34	35	34
Affiliated society with journal	42	69	70	69
Single without journal	13	24	25	24
Family without journal	23	35	36	35
Student without journal	5	7	8	7

* instituted in 2006; includes a voluntary donation

+ airmail costs an extra 5 GBP

++ includes airmail

WDA: Entering the third decade, 2017–2027

Nancy van der Poorten [nmgvdp@aim.com]

The WDA was established in 1997 by a small group of passionate people who wanted to belong to an open and democratic world-wide society to promote the study and conservation of odonates. I wonder what those pioneers would be thinking seeing the society as it stands today? Many of them are still members of the WDA and I hope they are proud of the WDA's achievements: a truly International Congress is held every 2 years; our well-respected, peer-reviewed journal, *International Journal of Odonatology*, is 20 years old; our membership is truly world-wide; and support for education, research and conservation is strong. And all the while the WDA has maintained the principles of openness, democracy, mutual respect and freedom of expression on which the association was founded.

What is ahead for the next and third decade of the WDA? We hope to expand our support of research and education, particularly in parts of the world where funding and other resources are few. Our program of Sponsored Memberships helps those who cannot afford membership or who live in a country where currency restrictions make it difficult to obtain membership. In addition, these Sponsored Members also receive our journal, IJO, and are eligible for grants for research and conservation.

The study of Odonata has gained increasing importance, not simply for understanding their biology, but as model systems for flight and vision and to shed light on basic biological questions including evolutionary processes and the effects of climate change. And as bioindicators for freshwater ecosystems, the Odonata are important in conservation initiatives.

Associations, however, are only as strong as their membership. We encourage odonatologists, amateur and professional, to join the WDA to support the activities of the association, and ultimately, the subject of our endeavours, the Odonata. Please remember, your membership, with or without a journal subscription, helps to fund programs that support research, education and conservation initiatives; it also supports the Sponsored Memberships program, and the International Congresses. With your valuable input and participation, these initiatives will certainly keep the WDA strong into its third decade.

Nancy van der Poorten
President-elect 2015–2017

From Princess Lovisa Ulrika to the Gyalsey, Dragon Prince of Bhutan – Royalty in dragonfly names from 1746 to 2017

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In the summer of 1744 a great excitement gripped Swedish high and middle society. On the 17 of July their Crown Prince Adolf Fredrik was married *per procura* (i.e. with the groom absent) to Luise Ulrike, Princess of Prussia (Fig. 1) in Berlin. A few weeks later the beautiful and accomplished 24 year old princess (Lovisa Ulrika in Swedish) arrived in Sweden to meet her groom. On 18 August the royal couple was welcomed by King Frederick I at the Drottningholm Palace where followed a second wedding ceremony the same day, followed by a state ball and court reception.

Among those caught up in the fever of the occasion was the 37-year-old Carl Linnaeus, professor of medicine at Uppsala University. At that time he was writing the manuscript of *Fauna svecica*, a synopsis of the 1,357 animal species known to him from Sweden, published in 1746. He had not yet developed his system of binomial nomenclature, but each species was provided with a diagnosis of a few Latin words following the genus name. In addition, in the accounts of a small number of species, including two dragonflies (*Libellula*), Linnaeus also gave a special name (the *Vulgo*) intended for everyday use. Species Number 757 (presently known as the male of *Calopteryx virgo*) was dubbed the **LOVISA** and species Number 758 (presently known as the female of *Calopteryx virgo*) the **ULRICA** (Fig. 2). This was obviously a dedication to the Princess and was the first dedication to an individual person in the animal names used by Linnaeus. It is worth noting that in selecting this beautiful demoiselle damselfly (Fig. 3) for his dedication, he chose what is surely the most gorgeously arrayed and charming insect to occur in northern Europe, which perhaps best embodies those qualities he admired in the princess.

In *Fauna svecica* Linnaeus only gave specific names (*Vulgo*) to 43 species of invertebrates, including 25 butterfly (*Papilio*) species and 14 moth (*Phalaena*) species. Some of these ‘*Vulgo*’ names were binomials, such as ‘*Papilio canicularis*’ (for the present *Gonepteryx rhamni*), ‘*Argus oculatus*’ (= *Plebejus argus*), ‘*Brassicaria vulgaris*’ (= *Pieris brassicae*), but most were single words, such as ‘*Alpicola*’ (= *Parnassius apollo*), ‘*Rex*’ (= *Argynnis aglaja*), ‘*Aurora*’ (= *Anthocharis cardamines*) and ‘*Cossus*’ (= *Cossus cossus*). Linnaeus later used ten of these 43 ‘*Vulgo*’ names, or part of the names as a species or genus group name in *Systema naturae* (1758). In 1746 Linnaeus was still developing his system of binomial nomenclature (which he himself had not invented, but was consolidating and regulating in its use). However, this process took place gradually and using the ‘*Vulgo*’ names (single or binomial) was just one step forward.

In *Fauna svecica* Linnaeus also presented the Swedish (Suecis) vernacular names for many vertebrate species, but among the insects and other invertebrates only some 50 species (mostly indoor pests or other species harmful to people and domestic animals) were provided with vernacular Swedish species names, and none were listed for butterflies,



Figure 1. Princess Luise Ulrike in 1744. Painting by Antoine Pesne.

757. LIBELLULA corpore cæruleo nitido; alis viridicæruleiscentibus: apice fuscis: margine immaculatis.
Raj. inf. p. 50. n. 10. Libella media, corpore cæruleo, alis fere totis ex cæruleo nigricantibus.
Vulgo Lovisa.
 Habitat ad Fluvios.
 DESCR. Magnitudo, figura, color, locus & omnia, ut in precedenti, sed alæ, quæ etiam puncto marginali carent, nigro-cæruleiscentes: apice pallide fuscæ. cauda unguiculata.
758. LIBELLULA corpore viridicæruleo; alis subfuscis: puncto marginali albo.
Raj. inf. 51. n. 12. Libella media, corpore viridi, alis fulvescentibus maculis parvis albis prope extremum angulum.
Vulgo Ulrica.
 Habitat ad Fluvios.
 DESCR. Mediæ est magnitudinis. Corpus viridi-fericeum, nitidum, minime cæruleum. Pedes nigri. Alæ subfuscæ puncto marginali albicante oblongo; Cauda inermis.
 Hæc precedentis femina. De Geer.
184. LIBELLULA. Os maxillosum. Antennæ breves. Cauda forcipata.
 1. Libellula magna alis planis. Fn. 764-771. Braven-mygg.
 2. Libellula media alis erectis. Fn. 756-759. Jungfrur.
 3. Libellula parva alis erectis. Fn. 760-763. Trollslända.
 Ordo 4.

Figure 2. Extracts from *Fauna svecica* (p. 228) by Linnaeus (1746) showing the ‘*Vulgo*’ names Lovisa and Ulrica (above) and from the 6th edition of *Systema naturae* (p. 62) by Linnaeus (1748) showing the Swedish vernacular names (below).

moths or dragonflies, hence the ‘Vulgo’ took their place.

Although Linnaeus did not use the Princess’ names in his final binomial name *Libellula virgo* (1758), his early admiration for her may also have influenced him in the selection of the species epithet *virgo*, descriptive of her state when she arrived in Sweden. At various times in his career Linnaeus was in close contact with Lovisa Ulrika, who from 1751–1771 was Queen consort. Occasionally Linnaeus even worked in the Drottningholm Palace. Lovisa Ulrika was sister to the polymath Frederick the Great of Prussia. She was said to have been her father’s favourite and had been well educated, so presumably she and Linnaeus enjoyed some intellectual companionship. As early as the 6th edition of *Systema Naturae* (1748) Linnaeus used the Swedish name ‘Jungfrur’ (virgins) for the ‘*Libellula*’ forms which he later recognised as a single species *L. virgo* (Fig. 2).



Figure 3. A male *Calopteryx virgo*, the species to which Linnaeus (1746) gave the names ‘Lovisa’ and ‘Ulrica’ after the Princess. Photographed by Sami Karjalainen in Loppi, Finland, on 11 July 2009.

In the second edition of *Systema Naturae*, Linnaeus (1740) had used the vernacular name ‘trollslända’ for his genus *Libellula* [in the 4th (1744) and 5th (1747) editions only the French name ‘La Demoiselle’ was given], but rather confusingly in the 6th edition ‘trollslända’ was used only for the zygopteran species, now included in *Coenagrion*, and strangely, for all Anisoptera used the name ‘Braren-mygg’. This name was later used by J.W. Zetterstedt (1828) as the Swedish vernacular name for Hemiptera. The Swedish name ‘Jungfrur’ was surely coined by Linnaeus himself, since it was not in common use in Sweden at the time (although today all *Calopteryx* species are called Jungfrusländor). In the revised edition of *Fauna svecica* (1761), the ‘Vulgo’ names Lovisa and Ulrica were no longer mentioned. However, they were not completely forgotten and an epithet dedicated to Lovisa Ulrika was to be reborn as a formal scientific name.

In his *Histoire abrégée des insectes qui se trouvent aux environs de Paris* (1762), Etienne-Louis Geoffroy listed and described 16 dragonfly species from the Paris region. In his descriptions of new species, Geoffroy did not use the new binomial nomenclature recently introduced by Linnaeus, although he knew the names and even used some of them when referring to Linnaean works. However he provided a French name, always feminine, for all 16 species listed. The first two species were ‘La louise’ and ‘L’ulrique’, which represent *Calopteryx splendens* male and *C. virgo* female. A reference to the Linnaean name *Libellula virgo* was correctly given in the account of L’ulrique. It is clear that Geoffroy had adopted these names from Linnaeus’ *Fauna svecica* (1746). In his book *Entomologia parisiensis* (1785) Antoine Francis Fourcroy provided formal Linnaean binomial names for the Parisian species which Geoffroy had described. Geoffroy’s ‘La louise’ became *Libellula ludovicea*, Ludovica being a Latin version of the name Louise. Fourcroy’s name was published five years after Moses Harris’ (1780) *Libellula splendens*, and therefore *Libellula ludovicea* Fourcroy, 1785 is a junior synonym of *Calopteryx splendens* (Harris, 1780). Later, an incorrectly emended spelling *ludoviciana* (based on Leach’s manuscript name) was used in the binomial name *Calepteryx* (sic) *ludoviciana* in a confusing way. *Calepteryx ludoviciana* Stephens, 1835 is a synonym of *C. virgo*, but *Calepteryx ludoviciana* ‘sensu Selys, 1840 and Rambur, 1842’ refers to *C. splendens*. For more details, see Hämäläinen (2008). In any case, Linnaeus’ original dedication to Lovisa Ulrika gave to the formal zoological nomenclature two available synonymic names. It should be noted however that although Linnaeus’ original dedication sprung from undoubted admiration for the beautiful and educated young princess, by the end of her life as Queen Dowager she had become deeply unpopular in Sweden. Fourcroy was no monarchist, having played a significant role in the French Revolution, so by formally introducing the name of this autocratic woman into zoological nomenclature he was merely following precedent and was scarcely aware he was honouring a Queen.

Since Linnaeus’ informal names (1746), and Fourcroy’s (1785) and Stephens’ (1835) nomenclatorily formal names were dedicated to Queen **Lovisa Ulrika** (1720–1782), several members of other Royal families in different countries have given their names to species of Odonata. The motives for dedicating zoological names to royal personages vary. Firstly, as in Linnaeus’ original informal dedication, names were sometimes bestowed from reasons of genuine admiration or fealty. In other cases the specimen was collected on an expedition on which a royal personage was present, or, in one case, the royal personage actually collected the type specimen. Some eponyms have been bestowed *in memorium*, following the death of a royal personage, or in one case possibly in sympathy following overthrow and exile. In some cases eponyms have been established from probable political motives, at times when naming a species after royalty could serve as a gesture of patriotic defiance. In several

cases names were obviously used because of a whimsical attraction to the name, which may have been seen to evoke the ethos of the country of origin. Such names tend to be historical with there being no possibility of a direct connection between the author and the individual commemorated. More recently royal names have been used with a view to raising awareness for nature conservation among their subjects, particularly in those countries which retain a deep reverence for royalty, chiefly in Asia. It goes without saying that this is effective only when the royal personages are themselves supportive of conservation, and their efforts deserve the global recognition afforded by an eponym. Being royal just makes them that much more conspicuous. Here we document known eponyms and attempt to understand and explain the motives which induced Odonata taxonomists to honour certain royal personages with formal Linnaean names.

Queen Victoria

Following Princess Lovisa Ulrika, the second European Royal to be honoured with a dragonfly eponym was Queen **Victoria** (1819–1901), Queen of the United Kingdom of Great Britain and Ireland and its dominions, now largely represented by the British Commonwealth. In 1876 she assumed the further title Empress of India. Although a constitutional monarch she symbolically represented more wealth and power for a longer period than almost any monarch before or since and her legacy left an indelible mark on European history. She was known as the ‘Grandmother of Europe’. When World War One broke out in 1914, two of the main belligerents, Kaiser Wilhelm II of Germany and King George V of Britain were first cousins, grandchildren of Victoria. In addition Tsar Nicholas II of Russia was a first cousin to King George on his mother’s side.

In 1869 Robert McLachlan named a large, handsome polythorid species from Bolivia as *Thore victoria* (presently *Polythore victoria*). He did not provide an etymology but wrote: “I possess one male of this magnificent species”. We are confident that it was named after the Queen. It is doubtful if any formal request was made to be permitted to use her name. Already monarchs were beginning to be viewed as public property, at least in the British Empire, and the thought of lèse majesté would probably not have arisen. Indeed Victoria was known to have basked in the love of her subjects, when it was offered, which was not always.

The next clear dedication to Queen Victoria was René Martin’s *Acanthaeschna victoria* (1901). The species epithet first appeared as a *nomen nudum* in Selys Longchamps (1883). It has been argued that the name of this species might be a toponym referring to the Australian State of Victoria. However, this is doubtful since Selys gave ‘Nouvelle Hollande’ (= Australia) and Martin ‘Queensland and New South Wales’ as the species’ provenance. Moreover there are no confirmed records of this species from Victoria. It is more likely that Selys named the species after the Queen of the *terra typica* rather than a locality itself.

There are also four epithets *victoria* and *victoriae*, which have been interpreted either as eponyms or toponyms. Friedrich Förster’s *Libellago rubida victoriae* (1914), presently *Chlorocypha victoriae* Förster, 1914 (Fig. 4), was based on material stated to come from ‘Entebbe, Victoria Nyanza [= Lake Victoria]. *Agriocnemis victoria* Fraser, 1928 was described from specimens from ‘N.W. shores of Lake Victoria, Uganda’. Similarly Eliot Pinhey’s *Acanthagyna victoriae* (1961) was described on basis of specimens from Uganda (Katera Forest and Entebbe, Zika Forest) on the northern shores of Lake Victoria and *Tetrathemis victoriae* (Pinhey, 1963) (originally *Archaeophlebia victoriae*) on specimens from Victoria Falls. As both the falls and the lake were named after Queen Victoria by the explorers David Livingstone and John Speke respectively, the question whether the species were named after the queen or the location bearing her name is immaterial. At least it is likely that F.C. Fraser had wanted to honour a queen rather than lake, given his predilection for naming odonates after famous people. Frank Louis Carle’s quite recent name *Austropetalia victoria* (1996) (Syn. of *Austropetalia tonyana* Theischinger, 1995) is a direct dedication to Queen Victoria. The author did not provide any etymology in the description, but has himself later confirmed that it was named after the Queen (Endersby & Fliedner 2015).



Figure 4. Male of *Chlorocypha victoriae*, a species with a name based on Queen Victoria. Photographed by Jens Kipping in Haut-Ogooue Province, Gabon, on 23 September 2013.

Princess Theresa of Bavaria

Edmond de Selys Longchamps also named a libellulid species *Anatya theresiae* (1900) in honour of Princess **Theresa** of Bavaria (Therese Charlotte Marianne Auguste von Bayern) (1850–1925). In this case the princess herself had collected the holotype (a female specimen) of this species in Colombia on 2 July 1898, during her expedition to South America. Princess Theresa was daughter of Luitpold, Prince Regent of Bavaria and the *de facto* ruler of Bavaria from 1886–1912. Theresa was a zoologist, botanist and ethnologist who made numerous scientific journeys, which she documented in several travel books. According to Selys' diary entries, he was in correspondence with her from around 1894. Besides dragonfly specimens for study, Selys received from the princess at least two of her travel books and her portrait (Fig. 5). On 9 July 1900 Selys sent his own photograph and a photo of his laboratory to her. Selys also asked for permission to name the new species after her. The dedication was published in mid-December 1900, a few days after Selys' death. Later *Anatya theresiae* has proven to be a synonym of *Anatya guttata* (Erichson, 1848).



Figure 5. Princess Theresa of Bavaria.

King Albert I, King Léopold III and Queen Astrid of the Belgians

In his paper on '*Pseudonévrotères, Odonates*' published in folio size in the series *Catalogues raisonnés de la faune entomologique du Congo Belge* in June 1934, the Belgian entomologist Henri Schouteden named two large new species in memory of **Albert I**, King of the Belgians, who was killed in a mountaineering accident in eastern Belgium on 17 February 1934. The species were named *Pseudomacromia Regis-Alberti* and *Ictinus Regis-Alberti*, presently known as *Zygonyx regisalberti* (Schouteden, 1934) and *Ictinogomphus regisalberti* (Schouteden, 1934). The latter species had the following etymology: *Je dédie cet Ictinus nouveau, si remarquable, à la mémoire de S.M. le Roi ALBERT, ami sincère du Musée du Congo, que la mort vient brutalement de nous enlever.* Albert I (1875–1934) reigned in 1909–1934.

On his death King Albert's son Prince Léopold (1901–1983) ascended the throne in 1934 as Léopold III, King of the Belgians. Léopold had already had dragonfly names dedicated to him, two years earlier than his father, while he was still Crown Prince. In 1932 F.C. Fraser named two New Guinean species after Prince **Léopold**: *Neurobasis leopoldi* (a synonym of *Neurobasis australis* Selys, 1897) and *Procordulia leopoldi*. Only a single male specimen was available of each species. The *Neurobasis* specimen was collected at 'Waideri River (New Guinea)' on 5 March 1929 and the *Procordulia* specimen at 'Angi Gita (New Guinea)' on 10 March 1929. Both localities were in the Arfak mountains on the Vogelkop (Bird's Head Peninsula). These specimens were among specimens collected during a voyage to the Netherlands East Indies from December 1928 to May 1929 arranged for Prince Léopold and his wife Princess Astrid. They were accompanied by Professor Victor van Straelen, the Director of the Royal Belgian Institute of Natural Sciences. The royal couple travelled incognito as 'Count and Countess De Réthy'. Their ship *Insulinde* embarked on 23 November 1928 and arrived in Java in mid December.

This expedition, which appears to have remained very poorly known (with the exception of its published scientific results among the researchers), visited over a dozen islands throughout the archipelago. On all islands visited small numbers of animals (mostly invertebrates) were collected, although in many cases their stay was only for a few days. The longest stopovers were in Java (December-January), New Guinea (March) and Sumatra (April-May). In New Guinea the party collected in the Arfak mountains and also visited the nearby Yapen and Aroe islands. It has been said that wherever the relaxed and enthusiastic young couple visited they captured the affection of everyone they met.

Fraser's (1932) Odonata paper was published in the voluminous series *Résultats scientifiques du voyage aux Indes Orientales Néerlandaises de LL. AA. RR. le Prince et la Princesse Léopold de Belgique*. The prince was an amateur entomologist, but the published entomological results of this expedition do not give any details of his personal participation of collecting individual insects during the expedition. King Léopold III reigned until 1951, when he abdicated in favour of his son Baudouin. He had married Princess **Astrid** of Sweden (Astrid Sofia Lovisa Thyra Bernadotte, born 1905) in 1926, two years before their grand expedition. Astrid was enthusiastically adopted by the Belgians who loved her for her beauty, charm and simplicity. She became Queen consort of the Belgians in 1934, but soon after died tragically in a car accident in Switzerland on 29 August 1935 at the age of 29 years. Her death was a great shock and she was deeply mourned both in Belgium and Sweden. In November of the same year Maurits Anne Lieftinck named a New Guinean dragonfly species *Procordulia astridae* (1935) in her memory, without however providing an etymology. The type specimens (a male and a female) came from the Cyclops mountains and were collected by Wilhelm Stüber in 1932 and 1935. In his description of *P. astridae* Lieftinck compared it with *P. leopoldi*. Thus both members of the royal couple, who had jointly explored jungles in New

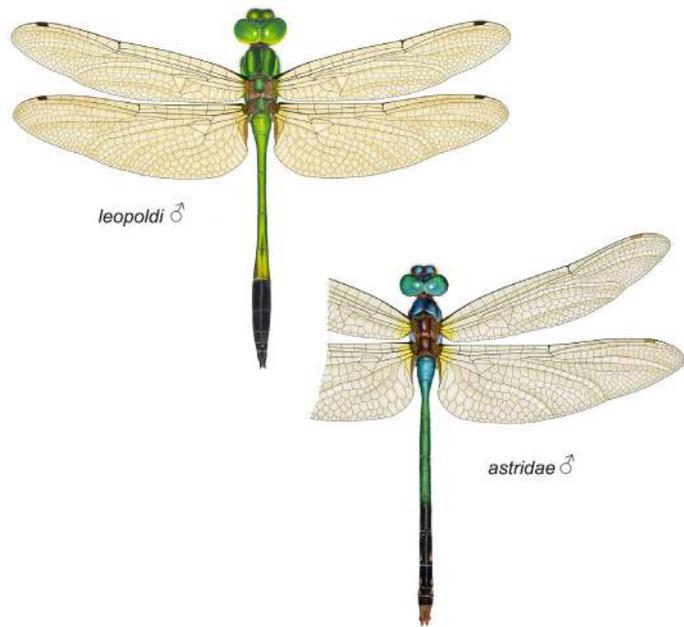


Figure 6. Prince Léopold and Princess Astrid and the dragonfly species honouring them, the New Guinea species *Procordulia leopoldi* and *P. astridae*. The royal couple was photographed in a jungle on the island of Aru in late March 1929 (Extract from a photo in Straelen 1933). Artwork by Albert Orr.

Guinea, are now immortalized in the names of these two New Guinean corduliid species of the same genus (Fig. 6).

Queen Juliana, Queen Beatrix and Princess Irene of the Netherlands

In May 1940 when the German troops invaded the Netherlands and Germany occupied the country within a few days, in Buitenzorg (Bogor) in Java M.A. Lieftinck was working for the sixth part of his *magnum opus* 'The dragonflies (Odonata) of New Guinea and neighbouring islands'. In this volume Lieftinck described 30 new species and subspecies. Among them were *Rhyothemis regia juliana* (Fig. 7), *Rhyothemis phyllis beatrix* and *Rhyothemis princeps irene* (Fig. 7; the subspecies epithets of these libellulids, with their beautifully patterned iridescent wings, were all

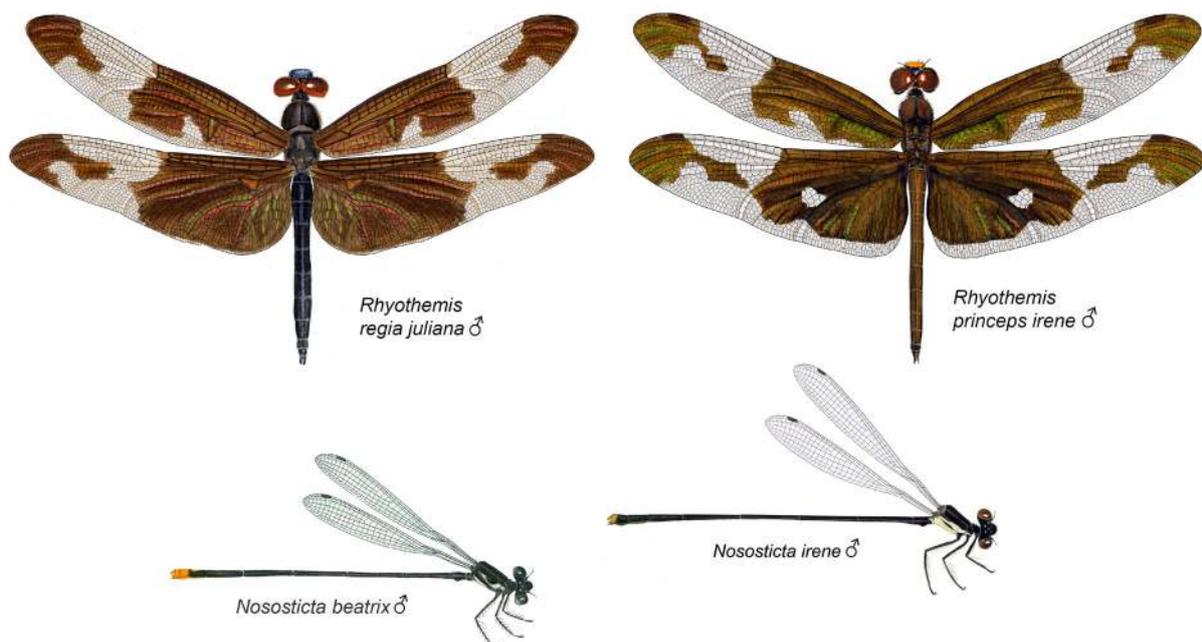


Figure 7. Four dragonfly taxa named by Lieftinck after the Dutch royalty: *Rhyothemis regia juliana*, *Rhyothemis princeps irene*, *Nososticta beatrix* and *Nososticta irene*. Artwork by Albert Orr.

clearly named after members of the Dutch royal family, although Lieftinck provided no etymologies. No doubt he selected these names in an emotional expression of patriotism at a time when all Dutch citizens living in the Netherlands East Indies felt particularly isolated and worried for the fate of their homeland. The Royal family had left the country and was living in exile in Britain from where the Queen broadcast regularly to the Dutch people. When the Japanese invaded the Dutch East Indies in the beginning of 1942 and the Dutch surrendered on 9 March 1942, Lieftinck's publication was already in press. Lieftinck was worried that the names celebrating Dutch royalty might be considered subversive, but when their publication in *Treubia* appeared in April 1942, they passed unnoticed by the occupying forces (Geijskes 1984).

Juliana Louise Emma Marie Wilhelmina (1909-2004) was Queen regnant of the Netherlands in 1948–1980. She had four daughters, the two oldest being Princess **Beatrix** Wilhelmina Armgard (b. 1938) and Princess **Irene** Emma Elisabeth (Irene van Lippe-Biesterfeld) (b. 1939). Beatrix inherited the throne from her mother and was Queen regnant of the Netherlands from 1980 to 2013.

In 1949 Lieftinck named two more New Guinean damselflies *Notoneura beatrix* (Fig. 7) and *Notoneura irene* (Fig. 7) after the princesses, again without giving an etymology. These are currently known as *Nososticta beatrix* (Lieftinck, 1949) and *Nososticta irene* (Lieftinck, 1949). The holotype of *N. beatrix* was collected in 1938 and that of *N. irene* in 1939, the respective birth years of the princesses. Perhaps this is a coincidence; Lieftinck left no explanation.

South American, Asian and Madagascar royalty

When studying the collections of the Königlichem Museum für Naturkunde, Berlin, Ferdinand Karsch chanced upon a male libellulid specimen labelled 'Brasilia, coll. Virnord (nro. 2423)'. He described it as a new species *Rhythemis braganza* (1890). Because the species belonged to an Old World genus, Karsch stated quite definitely that there is no reason to doubt the correctness of the given provenance of the specimen: Brazil. However, Karsch was wrong and it has since been shown the species is endemic to north-eastern Australia. Karsch did not provide any etymology, but the name undoubtedly refers to the Most Serene House of Braganza. The name was obviously a dedication to the Emperor **Dom Pedro II** of Brazil (1825–1891), who was a member of the Brazilian branch of the House of Braganza. Having reigned for 57 years as Emperor of Brazil, he lost his throne in a coup d'état on 15 November 1889 and with his family was forced into exile in Europe after just two days. The fate of the old Emperor drew much attention in Europe. Since these events took place just a few months before Karsch's paper was published in mid-March 1890, the Emperor's fate was a plausible reason for this dedication; perhaps an eponym given as an expression of condolence. As an editor of the *Berliner Entomologische Zeitschrift*, Karsch had the opportunity to make changes to his manuscript even at the last minute. Dom Pedro II was a great patron of arts and sciences, another probable reason for the dedication.

Philip Powell Calvert named a libellulid species from Mexico as *Trithemis Montezuma* (1899), which later proved to be a synonym of *Erythrodiplax umbrata* (Linnaeus, 1758). Although no etymology was given, the species epithet (the first letter being capitalised, as in other, older species names named after a person) refers to either of the Aztec emperors **Moctezuma** (Montezuma) I or Moctezuma (Montezuma) II who ruled in the 15th century and in the beginning of the 16th century. Calvert named several Central American odonate species after native Indian tribes living in the same areas where the species were found. The epithet *montezuma* is given in a similar vein, connecting the species to the indigenous culture of its *terra typica*, rather than honouring an individual person.

On his way back to Java from his one year home leave in Europe M.A. Lieftinck and his wife stopped in Ceylon for a week from 15 to 22 September 1938. During his stay he collected a number of dragonflies. Among them were four specimens of a gomphid which Lieftinck later (1940) named *Microgomphus wijaya*. In a footnote he stated: "Wijaya, the first Sinhalese king of Ceylon." **Prince Vijaya** (or Wijaya) reigned in 543–505BC. This is another name which evokes the *terra typica*, rather than a personal dedication.

F.C. Fraser named a damselfly *Caconeura theebawi* [presently *Prodasineura theebawi* (Fraser, 1922)] from two male specimens from King Island, Mergui, Lower Burma, collected by J.R. Elton-Bott. As usual Fraser did not provide any etymology, but undoubtedly the species epithet refers to **King Thibaw Min** (1859–1916), also known as Theebaw, who was the last king of Burma and reigned from 1878 to 1885. After losing his throne in the Third Anglo-Burmese war (1885) he lived in exile in India. Fraser also visited Japan in May and June 1934 and collected 28 species of dragonflies from several locations. From his material Fraser (1936) described three new species of Gomphidae. Two of them have proven valid species, but *Gomphus chichibui* has been synonymized with *Trigomphus interruptus* (Selys, 1854). Although Fraser did not provide an etymology it is known that this species was named after the Oxford educated **Prince Chichibu** [Chichibuno-Miya-Yasuhito-Shino] (1902-1953), the younger brother of Emperor Hirohito. Fraser was a deeply conservative man of typical establishment views. He openly admired rank and fame and often commemorated persons of note in the names of dragonflies. In this way he declared his esteem for the 2nd Earl of Lytton, Governor of Bengal, the poet and novelist Robert Louis

Stevenson, and George Mallory, the mountaineer who perished on Mt. Everest, some believe after reaching the summit, nearly thirty years before it was officially conquered by Sherpa Tenzing Norgay and Sir Edmund Hillary.

Five Madagascan Odonate species have been named after former sovereigns of Madagascar:

Phaon rasoherinae Fraser, 1949 (Fig. 8); *Zygonyx ranavalonae* Fraser, 1949; *Nesolestes ranavalona* Schmidt, 1951; *Gynacantha radama* Fraser, 1956 and *Nesolestes radama* Lieftinck, 1965. **Radama I** “the Great” (1793–1828) was the King of Madagascar from 1810–1828. After his death his widow **Ranavalona I** (1778-1861) took power and was Queen of Madagascar from 1828-1861. She was followed by her son Radama II (1829–?1863), whose reign lasted only less than two years and ended in a coup in May 1863 where he was presumably killed, although it was rumoured that he survived and lived to an old age as a common citizen. His wife **Rasoherina** (1814–1868) became Queen of Madagascar and she ruled from 1863–1868. Although Erich Schmidt’s dedication to Ranavalona was published in 1951, he had submitted the manuscript on Madagascar dragonflies, including this name, as early as 1944 to be published in *Deutsche Entomologische Zeitschrift*. The whole printed stock of this issue and its reprints were destroyed when Russian forces occupied Neubrandenburg in April 1945. Only some proofs and illustrations were held in safe keeping by Schmidt. Based on these, F.C. Fraser translated the German manuscript into English and arranged for its publication in a Madagascan journal (Schmidt 1951). No doubt Schmidt’s name honouring Ranavalona prompted Fraser to name one more species after her and in the same paper another species after Rasoherina. On the other hand the species epithet of Fraser’s *Gynacantha radama* originated from Selys’ manuscript name *radama* for the same species. Lieftinck’s dedication to Radama had a similar basis. None of these authors gave any etymologies for their names. We are confident that the epithet *radama* honoured Radama I, rather than Radama II as the former was much better known and influential. In all these cases it seems that the eponyms were bestowed because of the cultural associations of the royal personages to the *terra typica*.



Figure 8. Male of *Phaon rasoherinae*, a species named after a Madagascan Queen. Photographed by Callan Cohen in Masoala Peninsula, Madagascar, on 15 December 2013.

His Royal Highness the Gyalsey: Crown Prince of Bhutan

The newest Royal eponym was published in just March this year by Thinley Gyeltshen, Vincent Kalkman and Albert Orr to mark the first birthday on 5 February 2017 of the Crown Prince or Gyalsey of Bhutan. The etymology reads: The species is named in honour of His Royal Highness Crown Prince of Bhutan, The Gyalsey, Jigme Namgyel Wangchuck, on the occasion of his first birthday (Fig. 9).

This dedication is a token of fealty by the first author, a Bhutanese subject, and a mark of respect by the second and third authors in recognition of the high priority given to environmental and biodiversity conservation by the government of Bhutan with the encouragement of the King and Queen, the parents of the infant Gyalsey. The nature of Bhutanese personal names makes it more appropriate to use the Prince’s title, rather than his personal names. In this case permission to bestow this eponym, along with advice on the form it should take, was sought through diplomatic channels.

The event achieved considerable



Figure 9. The Gyalsey, Crown Prince of Bhutan, aged one year. Artwork by Albert Orr.

prominence in Bhutan, with the Prime Minister unveiling on the Prince's birthday, a giant framed print of a water colour depiction of the insect in life executed by Albert Orr [<http://www.naturalis.nl/nl/over-ons/nieuws/blogs/onderzoek/nieuwe-libel-vernoemd-naar-bhutaanse-drakenprins/>] with publication of the paper in *Zootaxa* following a few weeks later [<http://mapress.com/j/zt/article/view/zootaxa.4244.4.9>]. *Megalestes gyalsey* Gyltshen, Kalkman & Orr, 2017, or the Gyalsey emerald spreadwing is known from just one male specimen collected by the first and second authors at a mountain stream near Trongsa, at an altitude of 2450 m a.s.l. Trongsa is located virtually in the geographic centre of Bhutan in the foothills of the Himalayas.

The official and popular response to this eponym has been enthusiastic. It was widely reported in the Bhutanese media, with images of the art as well as a photograph of the Prime Minister unveiling the large print available at local news outlets. A report of the event also appears on the official website of the Bhutanese Ministry of Agriculture and Forests [<http://www.moaf.gov.bt/the-dragonfly-named-in-honour-of-the-gyalsey/>]. Beyond this official recognition however, the reaction of the people of Bhutan has been remarkable.

In April Vincent Kalkman returned from nine days in Bhutan and reports as follows “*Megalestes gyalsey is by now very well known in Bhutan. Every person we spoke to knew about it (I really do mean every person, even random people we met during walks or in monasteries). The minister of agriculture told me that especially the queen liked his birthday present.*” Such a response is of course deeply gratifying to the authors and will hopefully further interest in Odonata in the Kingdom, for which a Field Guide book is planned.

Why are there so few Royal eponyms among Odonata?

At present just ca 30 available odonate species names are royal eponyms (excluding those from Classical antiquity); seven of them are synonyms. This compares with some 2000 species and subspecies names dedicated to over 1300 commoners. These include colleagues, family, collectors and other assorted individuals who have in some way distinguished themselves in the authors' eyes. Of ca 8600 described species and subspecies, this is a very high proportion (23%) and since 1995 the proportion of eponyms among published names is even higher (41%) (Hämäläinen 2016). There are probably two reasons for this – firstly an eponym is either a noun in apposition or a noun in the genitive case meaning that its original spelling remains the same regardless of the gender of the genus to which it is assigned. It is thus a stable name, and especially attractive to the great majority of modern workers who have no Latin and less Greek. Also, taxonomy is becoming increasingly a social activity, with multiple authors common, rather than a single authority labouring away in solitude. There are also more Odonata collectors and taxonomists active at the present time than at any previous point in history. In the circumstances it is natural that there is a greater pool of persons deserving recognition. A recent phenomenon is to try to get funding for taxonomic research by bestowing an eponym in recognition of a significant financial contribution to special research projects. One might frown on this, but such ‘crowd-funding’ enabled the publication and local distribution of two field guides to New Guinea Odonata. One particularly generous contributor was Ludwig Quandt, principle cellist with the Berlin Philharmonic Orchestra who lists ‘dragonflies’ among his hobbies. In bestowing the name *Palaiargia quandti* Orr, Richards and Kalkman, 2014 the authors could be confident it would be appreciated.

Perhaps one of the reasons relatively few Odonata eponyms have been bestowed on royal personages stems from the obscurity of these insects in the public eye – during the 19th and early 20th centuries when the greatest number of charismatic birds, mammals and butterflies were being described, numerous royal eponyms were created in these groups. The last 25 years has seen an unprecedented level of taxonomic activity in less studied groups, but at the same time a diminishing interest in royalty, which many see as anachronistic. Surely the best known and longest reigning of present monarchs is Queen Elizabeth II of Great Britain and Northern Ireland. She is also the constitutional monarch of 15 other sovereign nations, including Canada, Australia, Papua New Guinea and New Zealand and thus her combined subjects include some 142 million people. In addition to this, as head of the British Commonwealth, she has a figurehead status in many other countries, with a total population of nearly two and a half billion people. For all her prominence we are not aware of a single species of animal named after her. She is patron of over 3000 organizations, including many learned societies such as the Royal Entomological Society and the Royal Zoological Society of New South Wales. However although she is an undoubted nature lover she has never singled out support for conservation as being more deserving than any of her other patronages.

In recent years eponyms tend to have been given to Royals only when they have exhibited special interest in biological research or conservation leadership. For example the late Prince Bernhard of the Netherlands, the foundation president of the WWF, had a species of New World monkey dedicated to him in 2002. Charles, Prince of Wales, has long been active in conservation initiatives and is president of WWF/UK. In recognition of this service an Ecuadorean tree frog was named after him in 2012. The Japanese Emperor Akihito is probably the second best known monarch in the world and a close second to Queen Elizabeth in the number of his subjects. However it is his status as an authority on marine ichthyology that has earned him membership of several learned societies in Japan and overseas. He has published in *Science* and *Nature*. His Majesty has two species of fish and

a genus of fish named in his honour, but unlike his uncle, no Odonata. The late Emperor Hirohito, or Emperor Showa as he is now known in Japan, was likewise a marine biologist and has had a species of gastropod and a coral named after him in 1973 and 2012 respectively. Also prominent is the Princess Maha Chakri Sirindhorn of Thailand, after whom 16 zoological and botanical taxa have been named. Her Royal Highness is a strong supporter of nature conservation and has several other serious academic interests, hence this level of attention is not surprising. However it is almost certainly the case that most dedications expressed genuine admiration for her by their authors and they have passed largely unnoticed by the Thai people, who almost universally love her fervently. Unfortunately to date no odonate has been named after the Princess, despite the relatively recent description of numerous new species from Thailand. Perhaps the time has come to remedy this situation.

Notes

1. – In addition to the names listed in this article, there is a small number of names published between 1773 and 1912 taken from Classical antiquity, including prominent historic figures such as Tullia Minor (ca 535-509 BC), the last Queen of Rome [*Neurothemis tullia* (Drury, 1773)], Gaius Julius Caesar (100–44 BC), dictator and Consul of the Roman Republic [*Anax parthenope julius* Brauer, 1865] and Cleopatra VII (69–30 BC), Queen of Egypt [*Erythrodiplax cleopatra* Ris, 1911]. None of these names however bear any connection to the author, to the *terra typica* of the species, or to its physical qualities. They are technically eponyms, but are used quite casually, the result of a Classical education and perhaps a lack of inspiration. In a similar vein Linnaeus, drew heavily on Classical literature and mythology, butterflies with red being named after Trojan heroes from Homer's Iliad, such as Priamus and Sarpedon, those without red being named after the Argives (Greeks) such as Agamemnon and Achilles. He also took the names of Greek Gods, such as Apollo.

2. – The term eponym, as used here, is a recent usage popularised by Bo Boelens in his series of books on zoological names named after people, such as Boelens & al. (2009, 2014). To be pedantic, the word used this way is incorrect according to most English dictionaries. When a species of dragonfly is named after a person it is the person who is the eponym as they have given their name to the dragonfly. However this distinction requires very convoluted language in discussing the topic in nomenclatorial terms. The philologically untidy expedient of using the word eponym to mean 'a taxon name based on the name or title of a specific individual' makes for much easier expression, with the neologisms 'eponymise' to create an eponym 'and eponymee' – one who receives an eponym (i.e. the eponym, in the original sense) also potentially available.

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On a probable new oviposition style in female *Antipodochlora braueri* (Odonata: Corduliidae)

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Abstract

Short investigations of known localities of *Antipodochlora braueri* (Selys, 1871) revealed a behaviour that is considered hitherto to be unrecorded for the species. Female *A. braueri* has usually been reported laying eggs in in-stream pools of water bodies. During the current study one adult was observed performing movements towards the water surface typical of ovipositing females and therefore considered as probable egg-laying behaviour. The utilised habitat was a small remnant pool completely isolated from other sections of the stream. Since the two sexes of *A. braueri* are morphologically very close, sex determination is preferably achieved in the hand. As the reported adult here was not caught and its sex confirmed the oviposition habitat choice remains to be validated by further observations.

Introduction

The genus *Antipodochlora* Fraser, 1939 is endemic to New Zealand (Rowe 1987). It was erected based on several archaic features (Fraser 1939) which are unique in both adults and naiads (Winstanley 1979b). Adult behaviour and ecology are also very specific for this species that typically lives in isolation and rarely competes with other dragonflies for food with the exception of *Austrolestes colenonis* (White, 1846) as described by Winstanley in Rowe (1987). *A. braueri* is an inhabitant of dense native bushes where it is considered a crepuscular species but according to Winstanley (1979a): "Occasional specimens may be seen flying during the day, but the tendency then is for them to move to higher levels of the canopy. They may also be more active in overcast conditions, or even in a light drizzle, when they may move out of the forest into more open situations." Due to its secretive life style the species was not well known to earlier New Zealand entomologists (like Hudson 1904), some of whom reported it as rare (Tillyard 1926). Almost nothing was known on the ecology of the species until Penniket (1966) included it in the key to the naiads of New Zealand Odonata with a description of the habitat and short behavioural notes. The females were reported as: "...to oviposit while flying over shallow pools where there was a current, the tip of the abdomen touching the water momentarily at intervals of from one to a few seconds." In a later modification of this key Rowe (1981) also gave the habitat of *A. braueri* pre-imaginal stages as thick vegetation, leaf trash, or stones in heavily shaded forest streams.

In a series of publications Winstanley (1979a, 1979b; 1980a, 1980b; 1982) presented his results of intensive investigations on the biology, ecology and distribution of *A. braueri*. He concluded that the species might actually be much more widely distributed than initially thought, but possibly overlooked because of their colour, which makes them hard to see in flight (Winstanley 1979b). Winstanley in Rowe (1987) stated that *A. braueri* inhabits scattered localities throughout the North Island from Kaeo to Eastbourne and Mt Egmont to Tokomaru Bay. Misidentified females of *Procordulia smithii* in the South Island and occasional records of flying adults lead to the conclusion that there may be isolated populations of *A. braueri* in northwest Nelson and the West Coast. However none of these observations were validated and for the moment *A. braueri* is known for sure only from the North Island (Winstanley 1979b, Winstanley in Rowe 1987, Marinov 2014).

Throughout the entire known range *A. braueri* has been exclusively found breeding in shady streams and rivers (Winstanley in Rowe, 1987). Data almost exclusively comes from native unmodified forests with one record only from a citrus orchard near Henderson (Winstanley 1979a), near the dense forest of the Waitakere Ranges. In these places the naiads are confined mainly to three types of habitats: 1) permanent rapid streams, 2) permanent slow rivers, and 3) rivers drying to pools (Winstanley 1980a). Ovipositing females fly in zig-zag course close to the water surface (Winstanley in Rowe, 1987). They tend to choose in-stream pools immediately above a riffle or still margins (Winstanley 1980a) where they deposit eggs in the tail of a quiet pool (Winstanley 1979a).

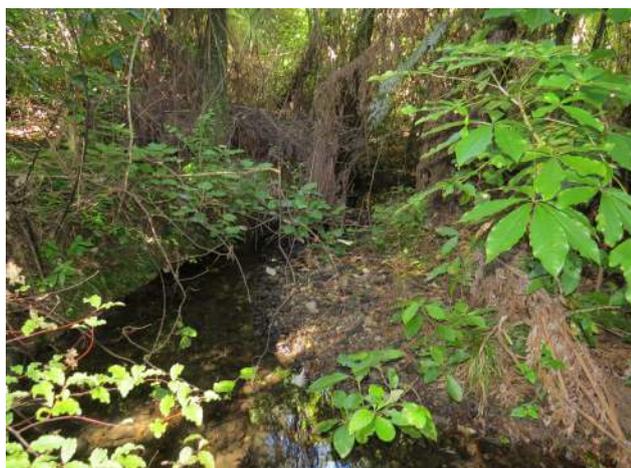
Recently we observed what we consider as an atypical oviposition attempt in *A. braueri*. Short explanations of the type of behaviour, the locality and its importance are provided below.

Material and Methods

In this short study two known localities for *A. braueri* were briefly investigated in February, 2017: -

1. Waiparere farm, Wairoa, Hawke's Bay region: 177.5237°E, 38.9322°S; 157 m a.s.l. The site was visited for a short time on the afternoon (approximately between 4pm-7pm) of 04 February 2017. Two creeks were investigated: i) Kokopu Creek dried up to small pool remnants with no surface flow (Fig. 1), and ii) Sandy Creek with a constant water flow (Fig. 2).
2. A stretch of Butterfly Creek along the tourist walkway in Eastbourne Domain and at the confluence to Gollans Stream: 174.8965°S, 41.3125°E; 50 m a.s.l. (Figs 3 & 4). The site was visited at the afternoon on 05 February 2017.

Adult *A. braueri* were caught with an entomological net and released at the site after determination of their sex. None were collected for further laboratory studies.



Figures 1-4. (1) Dried up section of Kokopu Stream bed; small pool remnant remained only, February 2017. (2) Sandy Creek with permanent water flow during the investigation. (3) Section of Butterfly Creek in Eastbourne Domain with good potential for oviposition site for *Antipodochlora braueri*. (4) Confluence of Butterfly Creek and Gollans Stream.

Results

Flying adult *A. braueri* were observed in both streams in locality 1. Only males were netted in the field. They were observed patrolling in-stream pools as low as 10 cm to more than 1.5 m above the water surface. The patrolling flight was observed during the whole period of investigation at that site. Individuals with low level flight were difficult to spot and follow on the wing, especially when observed from above with the dark water as a background in shaded forest. Not surprisingly males appeared much smaller and initially thought to be different species until caught and identified in hand (Fig. 5).

One individual was spotted at the beginning of the observation (locality 1, site i) flying low over the water surface and dipping its abdomen continuously on the water surface. Initially this behaviour took place in a completely isolated pool of the forested stream additionally shaded by fern leaves overhanging the site. It was so well covered by the bank vegetation that one had to kneel down in order to observe what were considered

as oviposition attempts. After 10-15 dippings the individual moved further up the stream valley and initiated another series of dippings in the same type of isolated in-stream pool (Fig. 6). Soon after it swiftly left the site. This individual was not caught and its sex was presumed to be female.

Locality 2 did not produce any sightings of the species although it was inspected at the same time of the day and similar weather conditions as the previous day when locality 1 was investigated.

Discussion

The literature suggests that females of *A. braueri* always oviposit in permanent water bodies (Winstanley 1979a, 1980a; Winstanley in Rowe 1987). Investigating the naiads of the species Winstanley (1980a) commented on the preferred habitat types and claimed they could be found in rivers drying to pools. However, these may have been stranded inside the pool remnants formed in a period of prolonged drought and neither Winstanley nor any other author has presented evidence for females ovipositing in isolated pools.

The adult reported here was followed uninterruptedly during its presence at locality 1 site i. As it was the first time for us to sight a possible ovipositing female we observed the whole process. The individual's ovipositing movements were typical for corduliid females described for New Zealand species in Armstrong (1958) i.e. flying unaccompanied by male, low over the water surface, and dipping intensively the tip of its abdomen into the water. Winstanley in Rowe (1987) reported male *A. braueri* touching the water surface with the tip of its abdomen during patrol flight. Corbet (1999: 19) claimed that the water-touching behaviour exhibited by both sexes may serve various purposes in addition to oviposition, such as cleaning of abdomen, cooling or drinking. However, in this type of behaviour the low-flying adults usually touch water surface for a short time and then leave, whereas the adult reported here continuously touched the water surface of the isolated pool, moved and performed another series of dipping movements in another part of the pool. The flight between the two sites was similar to that described by Winstanley in Rowe (1987) as a zig-zag course close to the water and therefore it is interpreted here as ovipositing attempts.

Because the sex of the individual was not confirmed in the hand this type of oviposition needs to be validated by future observations. Both sexes of *A. braueri* are morphologically very similar (Winstanley in Rowe 1987) and it is difficult to determine the sex of flying individuals by eye sight only. Marinov (2014) presented evidence for wing colour variation in both sexes with females existing in two strikingly different types: 1) near transparent wings with a dull brown spot at the distal end of the fore wing below the pterostigma, and 2) both wings deeply stained with the same brown colour. He also provided evidence that some males could have the same slightly infumed wing membrane, which makes distinguishing of the sexes in flight



Figure 5. Male *Antipodochlora braueri*.



Figure 6. In-stream pool considered as a potential ovipositing site for *Antipodochlora braueri*.

almost impossible unless there is good light and angle of observation. However, low light is the usual situation at *A. braueri* localities in densely forested areas. Observations were further obscured by the type of movement low over the surface water that in combination with the dull overall body colour provides an excellent protection for the species from potential predators. On one occasion the patrolling male was erroneously assumed to be another species as in the reduced light conditions at the site it looked unusually small, almost of the size of *Hemicordulia pacifica* Fraser, 1925, which is known to be the smallest member of the genus (Fraser 1927).

It is important to note that the current observation was within a site protected as a QEII National Trust Open Space Covenant and that the owners of the property maintain an excellent pest management network. As all other records on *A. braueri* in New Zealand come from native forested areas one can conclude that probably the species was continuously distributed across the whole of the North Island, but now known from scattered localities only (Winstanley in Rowe 1987). The report here of probable ovipositing female in isolated pool indicates the species may be utilising all types of in-stream habitats as long as they are within the protection of the native forest. However, in other investigations *A. braueri* was not confirmed from previously known localities. For example, during the summer of 2015-2016 the first author unsuccessfully searched for flying adults in locality 2 (Marinov, 2014 - Upper section of a tributary of Tara Creek crossing King Rd about 5 km W of Mangawhai Heads, Northland region, 174.5265°E, 36.0791°S; 25 m a.s.l.). The site is also covenanted under the QEII programme, but for yet unclear reasons no individuals were observed during the many hours spent looking for the species. Adult *A. braueri* were missing from locality 2 inspected during the current study although it has been found to be very suitable for the species in other studies (Hudson 1950; Penniket 1966; Winstanley 1979a, 1979b; Winstanley 1980a; Winstanley in Rowe 1987).

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Rediscovery of *R. tricolor* in Java after 59 years

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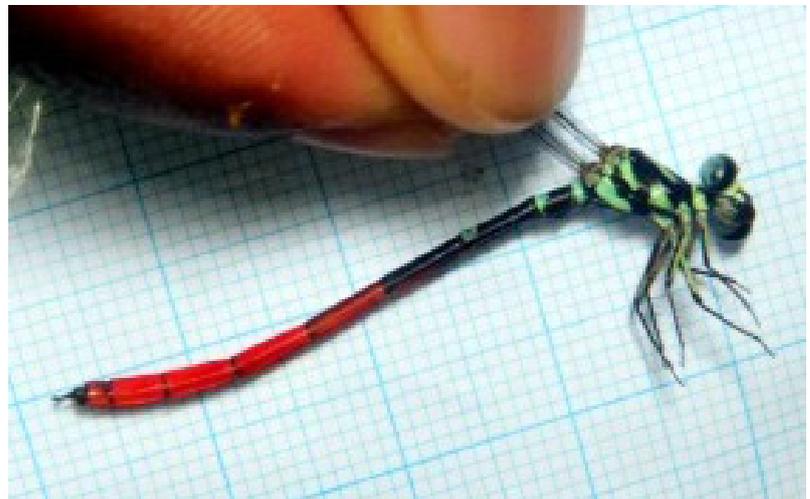
Introduction

Rhinagrion tricolor is a damselfly belonging to the family Megapodagrionidae that is endemic to Java. It was IUCN red-listed as Data Deficient by Dow (2009). The damselfly was first discovered in Java, Indonesia on 13 September, 1935 by M. Bartels at Cipandak. Other records were made in Java between 1935 and 1958 at Cipandak, Cidaun, Cipunage, Cidamar, Kalipucang, Sindangbarang and Ujung Kulon. *R. tricolor* was not recorded during the recent Java Odonata Survey conducted from 2010 to 2014 (Setiyono, 2014). Kalkman et al (2011) described *R. tricolor* as having abdominal segments 8-9 coloured a characteristic red color on the dorsum and sternum. The species occurs in dense primeval forest streams up to 300 m above sea-level. Males perch over the water on branches of fallen trees. Females oviposit in moss-covered logs and boulders in midstream (Lieftinck 1954).

Rediscovery

On 24 March, 2017 *R. tricolor* was recorded by a biology student of UIN, Sunan Kalijaga of the Nusa Kambangan Expedition Team, who was conducting a survey of the rare and endemic tree *Dipterocarpus littoralis*. The location was at a river located on Nusa Kambangan, Cilacap, central Java (S 07° 42.629' E108° 48.947'). Nusa Kambangan is a small island located at the western part of the southern coast. The island area is ca. 210 km² and its length from east to west is 36 km; its width varies between 3 km and 6 km (Partomihardjo et al., 2014).

All together *R. tricolor* was found at four locations at two different rivers at Nusa Kambangan. In total seven individuals were recorded over two days consisting of 5 males and 2 females.



Figures 1-2. *Rhinocypha tricolor*, Nusa Kambangan, Java, March 2017. (1) male. (2) female. Photo credit: Imam Syafii.

Site description

R. tricolor was found at a clear shallow, moderate flowing, rocky river, about 2-3 m width, in the middle of primary forest at an altitude of 57 m a.s.l. Lieftinck (1934) recorded *R. tricolor* at an altitude of 100-300 m a.s.l. The river was not disturbed by human activity and the distance to the nearest population was 3 km.

Discussion

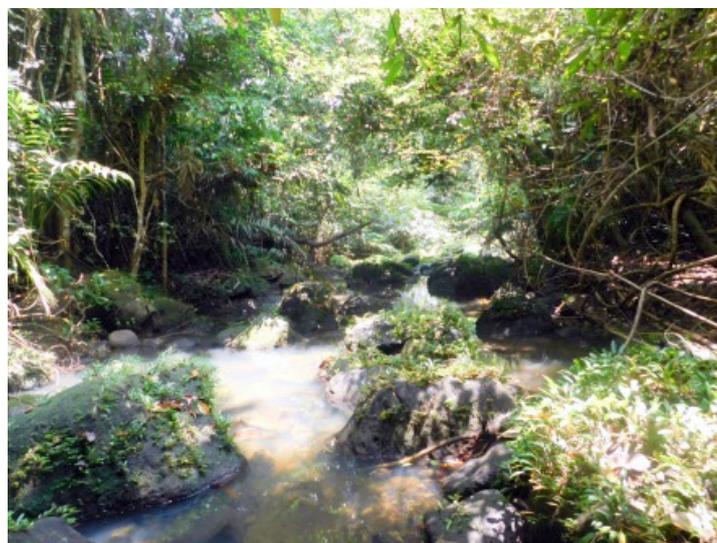
As noted by Kalkman et al (2011) a large part of the known range of *R. tricolor* has been deforested so that probably few populations remain. The rediscovery at Nusa Kambangan represents an important find in undisturbed primary forest. It is imperative that the area is preserved for the long term survival of *R. tricolor*.

Acknowledgments

We are grateful to Joko Setiyono (Capung Indonesia) who provided information about *R. tricolor* and confirmed the identification. We are also grateful to Fauna and Flora International - Indonesian Program (FFI-IP) and Global Trees Campaign (GTC) program who have supported Ekspedisi Nusa Kambangan. We also acknowledge the support of BKSDA Central Java and the Cilacap BKSDA resort that provided permission to conduct research in the area of Cagar Alam.

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Figures 3-5. Rediscovery site, Nusa Kambangan Island, Java, Indonesia, March 2017. Photo credit: Imam Syafii.

Student Research News
(Section for WDA sponsored students invited to share their research news)

Exploring Colombian Odonata

Cornelio Andrés Bota Sierra [corneliobota@gmail.com]

My name is Cornelio Andrés Bota Sierra; I am a Colombian biologist and a sponsored student member in WDA. I did my bachelor studies at the Universidad de Antioquia in Medellín-Colombia, where I began studying Colombia's Odonata diversity, making field surveys to build a reference collection for my country since 2007. Most of the collected specimens are deposited at Colección Entomológica de la Universidad de Antioquia (CEUA); 5,566 specimens are registered, representing 281 identified species and probably around 100 more still unidentified. This collection was the basis for the description of eight species new to science (Figures: 1a-c) (Bota-Sierra & Wolff 2013, Bota-Sierra 2014a, Bota-Sierra *et al.* 2015), along with the rediscovery of several rare species and new records for Colombia (Figures 2a-b) (Bota-Sierra *et al.* 2010, Bota-Sierra 2012, Bota-Sierra 2014b). These publications and research have been essential for the Dragonfly Red List assessment in the tropical Andes (Bota-Sierra *et al.* 2016). During the last few years the survey effort was directed to the western Andean branch (Cordillera Occidental), one of the unexplored and richer areas in Colombia where several rare species were found. Now I am working on a field guide of the dragonflies from the Tatamá National Park, a highly biodiverse area in Cordillera Occidental, home to many Andean endemic species, and a place famous for



Figure 1: Some of the recently described Colombian endemic species: a) *Mesamphiagrion gaudiimontanum* Bota-Sierra, 2013, a specialized species found only in peat bogs as the larvae live only in *Sphagnum* bogs; b) *Rhionaeschna caligo* Bota-Sierra, 2014, an endemic species from Páramos found only at the top of mountain ecosystems; c) a pair of *Oxyallagma colombianum* Bota-Sierra, 2014, in copula, a specialized species found only in high mountain lakes.

birding where also very beautiful dragonflies can be found (Figures 2c, 3a-e).

In addition, I am close to obtaining my Master's degree at the Instituto de Ecología, A.C. (INECOL A.C.) in Xalapa-Mexico under the supervision of Dr. Rodolfo Novelo. We are working on a project which evaluates the variability of the thermal tolerance of the community of dragonflies in Tatamá National Park by looking for intra- and interspecific variation in tolerance to temperature. This will give us insights into the ability of each species to adapt to changes in temperature or their dependence on a specific temperature range to perform normal activities. If a population has a low capability to adapt to temperature changes, it will be in a worrying situation since the ability of individuals to migrate to higher altitudes in tropical mountain forests is constrained by the small amount of space and the complex biological interactions among a very diverse community; so the lower the capability to adapt to temperature change, the higher the risk of extinction among tropical mountain populations under the actual climate change scenario.



Figure 2: a) pair of *Mesagrion leucorrhinum* Selys, 1886, in copula, the only endemic Colombian genus, recently rediscovered; b) ovipositing pair of *Protoneura paucinervis* Selys, 1886, recently recorded in Colombian Amazon (Photograph by Cintia Moreno); c) cloud forest at Tatamá National Park.

Acknowledgements

To all of you (WDA members) for supporting us students with our membership, to Nancy van der Poorten for the invitation to write this note, to Nancy van der Poorten and Juliana Sandoval for their critical reading, and to Cintia Moreno for her photograph of *P. paucinervis*.

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Figure 3: Some of the rare species in Tatamá National Park: a) *Philogenia* sp. nov., recently discovered; b) *Oreiallagma oreas* Ris, 1918, this Colombian bromeliad specialist was rediscovered a century after its first collection; c) *Gomphomacromia fallax* McLachlan, 1881, recently recorded for the first time in Colombia; d) *Epigomphus pechumani* Belle, 1970, recently rediscovered; e) *Cora aurea* Ris, 1918, the taxonomic placement of this beautiful species is an active topic of discussion.

Student Research News

Dragonflies and mosquitoes

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The Institute of Subtropical Biology of Misiones (Argentina) is located in the Neotropical region, where a high diversity of habitats is reflected in the large number of insect species that can be found. In these environments it is observed that mosquitoes and dragonflies share breeding sites. The main target of our study is to contribute biological and molecular information regarding Odonata as biological controllers of mosquitoes. To do so, we characterize the natural breeding grounds, evaluate the effective predation in controlled conditions and use molecular techniques to study predator/prey interactions.

We believe that the absence of success in biological control programs can be due, to a great extent, to the absence of knowledge on indigenous predators and their relationship to their prey. It is necessary to know, in depth, how Odonata interact with their prey in order to determine the scope of their application.

To study dragonflies as predators of mosquitoes is not new. Current programs for control of mosquitoes generally focus on the larval stage, since it is the most sensitive and restricted to the limits of the breeding grounds. With this study we expect to obtain major precision on the timing of establishing strategies for control of mosquitoes using native natural enemies who share their breeding place.



Figure 1. domestic mosquito (*Culex quinquefasciatus*) and libellulid larva predator.

Belitung Odonata Exploration Rediscovery of previously recorded Odonata of Belitung Island

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Odonata are good indicators for aquatic and terrestrial ecosystem (Heckman, 2006). Almost 6000 species are spread throughout the world and Indonesia has about 790 species, according to odonatologist from Indonesian Institute of Science (LIPI). Indonesia is the largest archipelago in the world, and contains so many small islands that have unique environments and diversity of life. One of the archipelago's provinces that has unique diversity is Belitung Island, formerly known as Billiton Island.

Belitung Island is located between three major Islands in Indonesia: Borneo, Sumatra and Java. It is one of the large Islands in the archipelago of Bangka Belitung Province with 12 districts, and one district outside of the major island (Selat Nasik District located on Mendanau Island). In Belitung itself, there is an Independent Nature Research Centre called RCBBO (Research Centre of Belitung Biodiversity Observer) which is an asset of Belitung Biodiversity Observer Foundation. RCBBO has tried to collect complete data on biodiversity, including the Odonata. Our first exploration was limited to areas of tourism, highways, and residential areas which have a source of freshwater used by local communities. Since the expanding of palm oil plantations in this island, the remaining forest area has been reduced. Also, some of the sources of freshwater in the deep forest are being polluted by tin mining activities by local communities. Even today the opening of land for plantations, mining, or oil palm continues to change the face of Belitung Island each year. In addition the government will carry out development programmes in the region until 2025, so some areas will likely experience a loss of aquatic ecosystems.

Ninety-two species of Odonata have been recorded from Belitung Island based on the historical literature. Other Odonata literature records are from the IUCN Red List and some odonatologist that mention the island of Belitung, such as *Brachygonia puella* Lieftinck, 1937 (Dow & Silvas, 2014), and *Risiphlebia dohrni* Krüger, 1902 (Kosterin, 2015). The Kuiper's Exploration of 1930 may be the first Odonata survey on this island. Since January 2015 we've been collecting data about Odonata richness on Belitung



Figures 1-4. (1) Map of Bilitung Island. (2) First Odonata survey at Batu Penyu village, Gantung District, East Belitung Resident. (3) Odonata Exploration activities in Air Kepang Swamp Forests at Membalong village (4) Odonata Exploration activities at Dam Lake, Air Seruk village, Sijuk District, Belitung Resident, Membalong District. Photo credits: J. F. Bilitoni.

Island and also on small islands nearby. At present, we've successfully collected 96 species of Odonata. The descriptions and photographs of each species will be presented in a book called "Kecapung" which will soon be published. Some of the Odonata species we found are at high risk. They live in swamp forest, lakes, ponds, rivers and small streams across the highway and located near the local communities. Considering the locations are very easily damaged by the activities of local communities or local government, some locations need protection to avoid extinction for some species. The three species that are facing high risk of habitat loss are *Podolestes* sp., *Mortonagrion appendiculatum* and *Nannophyopsis chalcosoma*.

In early January 2015 we found *Nannophyopsis chalcosoma* at a pond near Kaolin Lake located at Perawas village (Tanjungpandan District), Mempiu village (Badau District), and Air Malik village (Membalong District). At Perawas village, the population has been impacted by dam reconstruction on the ponds near Kaolin Lake carried out by the village government at the end of 2015, and also the summer dry season in 2015 was very long from early April until December of 2015 making the pond dry up. Now there are only two locations for this species – Mempiu village in Badau District and Air Malik village in Membalong District.

Mortonagrion appendiculatum habitat is being lost through destructive action by local communities when expanding their plantations, open fields made by the Palm Oil Company and also habitat loss by tin mining activities. According to the IUCN Red List, *M. appendiculatum* is of Data Deficient status and there are very little information about this species since 1937 (Dow, 2009). Since early 2015, we've found six habitats of *M. appendiculatum* in Badau and Sijuk District. Sijuk District may have the largest population of *M. appendiculatum*. The highest count was 23 individuals located at Air Seruk village (formerly known as Aer Seroe), compared with only four individuals at Cerucuk (formerly known as Tjeroetjoek) and Mempiu village. As with *Amphicnemis kuiperi* and *Amphicnemis billitonis*, *Mortonagrion appendiculatum* may be an endemic species of damselfly of Belitung Island.

In a different location, during a survey at Batu Penyu village, we found one pair of a *Podolestes* species. This species is an unknown *Podolestes* for us because it has a different shape of appendages and color pattern on the synthorax to *Podolestes orientalis*; also it looks smaller in size. This species lives in swamp forest with



Figures 5-8. (5) *Mortonagrion appendiculatum* Lieftinck, 1937. (6) *Nannophyopsis chalcosoma* Lieftinck, 1935. (7) *Risioephlebia dohrni* (Krüger, 1902). (8) Odonata Species Identification by citizen scientist at Batu Mentas Tarsier Sanctuary (back: Joly F. Bilitoni, front: Dingga Hafihar. Photo credits: A. Alfarisyi.

black water habitat. This habitat is located in the middle of the village. It is possible that the species is *Podolestes coomansi*, but we need further exploration and identification for that species in these isolated forests. Also at this location, we found some unique and rare species of butterflies in Belitung including *Lycaneopsis halandus*, *Bibasis oedipodia*, *Ionolyce helicon*, *Zeuxidia amethystus* and *Drupadia estella*.

Belitung Island Odonata Exploration will continue until the number of Odonata species on Belitung Island is complete. We would like to say thank you to Dr Rory A. Dow for his kindness in giving us his collection of Odonata papers which mention the Odonata species of Belitung Island. The total number of collected species in the field is 96 including the addition of 12 species from our survey, so the total number of species recorded on this island is now 103 (see table in Appendix 1 attached).

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Figures 9-11. (9) *Podolestes orientalis* Selys, 1862. (10) *Podolestes* sp. (11) *Lycaneopsis halandus*. Photo credits: A. Alfariysi.

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Appendix I

Checklist of the Odonata Species below based on Asahina (1977), Dow (2010), Dow (2011), Dow et al. (2007), Lieftinck (1935, 1937, 1939a, 1939b, 1940a, 1940b, 1942, 1948, 1950, 1954, 1960, 1965), Hämäläinen, Dow, & Stokvis (2015), Kosterin (2015), van Tol (1990) and Watson (1967). * indicated if the species are collected during the BBO exploration. ** indicated if the species are an endemic.

Family	Specis	Family	Species
1 Aeshnidae	<i>Anax guttatus</i>	53 Libellulidae cont.	<i>Pornothemis serata</i>
2	<i>Anax panybeus*</i>	54	<i>Risiophlebia dohrni</i>
3	<i>Gynacantha basiguttata</i>	55	<i>Rhyothemis obsolescens</i>
4	<i>Gynacantha bayadera</i>	56	<i>Rhyothemis phyllis</i>
5	<i>Gynacantha dohrni</i>	57	<i>Rhyothemis pygmaea</i>
6	<i>Gynacantha subinterrupta*</i>	58	<i>Rodothemis rufa</i>
7	<i>Gynacantha maclachlani</i>	59	<i>Tetrathemis flavescens</i>
8	<i>Heliaeschna idea</i>	60	<i>Tholymis tillagra</i>
9	<i>Heliaeschna crassa</i>	61	<i>Tramea transmarina</i>
10	<i>Tetracanthagyna plagiata</i>	62	<i>Tramea phaeoneura*</i>
11 Gomphidae	<i>Gomphidia machlachlani</i>	63	<i>Tramea virginia</i>
12	<i>Ictinogomphus acutus</i>	64	<i>Trithemis pallidinervis</i>
13	<i>Ictinogomphus decoratus</i>	65	<i>Tyriobapta torrida</i>
14	<i>Macrogomphus paralellogramma</i>	66	<i>Urothemis signata insignata</i>
15	<i>Macrogomphus quadratus</i>	67	<i>Zyxomma petiolatum</i>
16	<i>Macrogomphus decemlineatus</i>	68 Argiolestidae	<i>Podolestes orientalis</i>
17	<i>Megalogomphus icterops</i>	69	<i>Podolestes sp.*</i>
18 Macromiidae	<i>Epophthalmia vittigera vittigera</i>	70 Calopterygidae	<i>Vestallis amoena</i>
19	<i>Macromia cincta</i>	71 Chlorocyphidae	<i>Libellago aurantiaca</i>
20	<i>Macromia cydipe</i>	72	<i>Libellago hyalina</i>
21 Synthemistidae	<i>Idionyx yolanda</i>	73	<i>Rinochypa biforata</i>
22 Libellulidae	<i>Acisoma panorpoides</i>	74 Coenagrionidae	<i>Aciagrion hisopa</i>
23	<i>Aethriamanta brevipennis*</i>	75	<i>Agriocnemis minima</i>
24	<i>Aethriamanta gracillis</i>	76	<i>Amphicnemis kuipei**</i>
25	<i>Agrionoptera insignis</i>	77	<i>Amphicnemis biltonis**</i>
26	<i>Agrionoptera sexlineata</i>	78	<i>Archibasis melanocyana</i>
27	<i>Brachygonia oculata</i>	79	<i>Archibasis viola</i>
28	<i>Brachygonia puella</i>	80	<i>Archibasis tenella</i>
29	<i>Brachydiplax chalybea</i>	81	<i>Ceriagrion cerinorubellum</i>
30	<i>Bracythemis contaminata*</i>	82	<i>Ischnura senegalensis</i>
31	<i>Camacinia gigantea</i>	83	<i>Mortonagrion arthuri</i>
32	<i>Chalybeothemis fluviatilis</i>	84	<i>Mortonagrion falcatum</i>
33	<i>Crocothemis servillia</i>	85	<i>Mortonagrion aborense*</i>
34	<i>Diplacodes nebulosa*</i>	86	<i>Mortonagrion appendicaulatum**</i>
35	<i>Diplacodes trivialis</i>	87	<i>Pseudagrion coomansi</i>
36	<i>Hydrobasileus croceus</i>	88	<i>Pseudagrion microcephalum</i>
37	<i>Lathrecista axiatiaca*</i>	89	<i>Teinobasis ruficollis</i>
38	<i>Lyriothemis magificata</i>	90 Euphaeidae	<i>Dysphaea dimidiata</i>
39	<i>Macrodiplax cora*</i>	91 Lestidae	<i>Lestes praemorsus decipiens</i>
40	<i>Nannophya pygmaea</i>	92	<i>Lestes heterostylus</i>
41	<i>Nannophyopsis chalcosoma</i>	93	<i>Orolestes walacei</i>
42	<i>Neurothemis fluctans</i>	94	<i>Platylestes heterostylus</i>
43	<i>Nesoxenia lineata</i>	95 Platycnemididae	<i>Copera vitata</i>
44	<i>Onycothemis testacea*</i>	96	<i>Pseudocopera ciliata*</i>
45	<i>Orchithemis pruinans</i>	97	<i>Onychargia atrocyana</i>
46	<i>Orchithemis pulcherima</i>	98 Protoneuridae	<i>Elatoneura aurantiaca</i>
47	<i>Orthetrum crysis</i>	99	<i>Elatoneura coomansi</i>
48	<i>Orthetrum glaucum</i>	100	<i>Elatoneura longispina</i>
49	<i>Orthetrum luzonicum</i>	101	<i>Prodasinieura corallis</i>
50	<i>Orthetrum sabina</i>	102	<i>Prodasinieura interrupta</i>
51	<i>Pantala flavescens</i>	103	<i>Prodasinieura verticalis</i>
52	<i>Raphismia bispina</i>		

A tourist in Guangxi

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My wife was born in Beijing, but studied for her first degree in Guilin. So in the summer of 2012 she and some of her ex-college friends arranged for a reunion there. My mother was also accompanying us, so it was very much going to be a tourist visit rather than a dragonfly expedition. Nevertheless, I fully intended to see as much as I could.

I prepared by assembling photographs from the internet onto my laptop based on a species list supplied to me by Keith Wilson. This photo guide was far from complete; there were many species that I couldn't find photos for, although when I look today the situation has improved. I was also armed with Keith's *Field Guide to the Dragonflies of Hong Kong* (2nd edition, bilingual) and *Photo Atlas of the Usual China Dragonflies*. The latter is a Chinese-language publication which I wasn't highly impressed with (but it was very cheap).

The weather was bad when we arrived in Guilin from Beijing (where we had been staying with Haiwa's family), and had been for several days beforehand. The next day wasn't much better. Haiwa and my mother went for a tour round the city, but I was feeling unwell, so I limited myself to a short exploration of a park that I could see on the opposite bank of the river Li. I left my camera in the hotel for the same reason.

I didn't see very much in the way of dragonflies, the weather being what it was, but I did see a platycnemidid that I knew wasn't in my collection of photos. That evening Haiwa suggested looking in the *Photo Atlas of the Usual China Dragonflies* for it. "No, it's useless", I said, but did so anyway. Opening up the book a good photograph showed me exactly what I had seen – a male *Platycnemis foliaceae* – not previously recorded for Guangxi. At the suggestion of one of her college friends who still lived in the city, we next went to visit Maoershan (Cat Mountain) – the highest mountain in southern China, and the source of the river Li. The weather was improving, and the next two days proved to be hot and sunny. There was transport available from the village up to the top of the mountain itself, but I was told that foreigners were not allowed, since an American had been caught trying to smuggle out a rare plant. This was waived after a little negotiation, but by then I had learned there was no fresh water up there, so we decided just to explore the two valleys instead (two mountain rivers that merge at the entrance to the village to form the river Li). But I made sure to keep my net well out of sight, except when we were alone.

We saw plenty of dragonflies which were known to us, including *Archineura incarnata* (Fig. 1) – the world's largest calopterygid. It instantly became, and remains to this day, Haiwa's favourite. But the most intriguing species was a *Coeliccia* species – presumably *cyanomelas*, but with unusual markings (Fig. 2). Unfortunately I did not have time to get my net out before it flew off.

After that we returned to Guilin. The next day was spent mostly in one of the city parks, with plenty of common dragonflies to see. The day after, July 1st, was the day of the reunion. This involved a lunchtime gathering in the vicinity of the university – an area known as Yao Mountain. There was a



Figures 1-4. (1) *Archineura incarnata*, male (2) *Coeliccia cyanomelas*, male with unusual blue markings. (3) *Ceriagrion nipponicum*, male. (4) *Paracercion melanotum*, paired couple.

village nearby with a couple of streams and ponds, which we explored first in the morning, and found plenty of good dragonflies, some of which were new to me.

After lunch, the entire party went further out of town to the Flower river. It was a very hot day, and the place was full of dragonflies flying right up to sunset. Amongst them was a damselfly provisionally identified as *Ceriagrion nipponicum* (Fig. 3). If this is correct then it was a new species for Guangxi. Also present were several *Paracercion melanotum* (Fig. 4). Surprisingly, a first record for the genus in Guangxi. My final photo before we left for an evening meal was of a pair of gomphids (Fig. 5) that I have been unable to identify.

The next day Haiwa chartered a taxi to take us out into the countryside. The first stop was a village where a festival (or something like that) was going on. Fortunately there was a nice stream for me to explore, and I added further species to my life list. When I got back from my explorations, I was told that my mother had been interviewed on Chinese TV, Haiwa acting as translator.

The afternoon stop was at a lake that was divided by a giant arch carved in the rock. I had a good exploration, again seeing many good dragons including *Burmagomphus collaris* – another new species for Guangxi (Fig. 6).

The next day (July 3rd) was spent on a boat trip on the river Li, downstream from Guilin, mostly to see the scenery (Fig. 7). Inevitably gomphids landed on the boat, and I was able to get (rear end view) photos. One may have been *Burmagomphus collaris* again (unclear). The other is, I think, *Gomphidia kruegeri fukienensis* (Fig. 8). Keith Wilson had recorded the nominate subspecies further west in the province. Coming into the landing point, I spotted *Dysphaea basitincta* (wings firmly closed), perched on a boulder with the word (written in red in Chinese) “twenty” painted on it. I’ve no idea what the significance of that might be.

This was a standard tourist trip. From the landing everyone walks into the village to catch a bus, but before reaching the village, most people pose for photos whilst holding out a Chinese banknote – the scene behind across the river being depicted on the banknote. I was more interested in getting a photo of the gomphid high on the cliff on the landward side of the road, but didn’t manage very well.

The final day was another trip out with the same taxi driver from two days before. I had said I wanted to see mountain and forest streams, and he claimed to know a good area. The day started out really foggy, and we only saw one dragonfly at our first river stop. But after that the sun came out, and things greatly improved at our second and third stops. The latter was named Happy Valley, and I had a happy time finding species new to me.

After lunch we were driving along a winding valley road with a river clearly visible below. The driver asked me if I’d like to get down to the river, and so stopped at a bridge. As soon as Haiwa and I had descended to the river floor, something large with black and yellow wing markings flew past. “That’s it!” I yelled (I had told her that *Chlorogomphus papilio* would inhabit these mountains somewhere). I spent the next hour trying to get decent flight photos, but couldn’t manage better than the photo of a male reproduced here (Fig. 9). So I decided I would have to settle for netting it



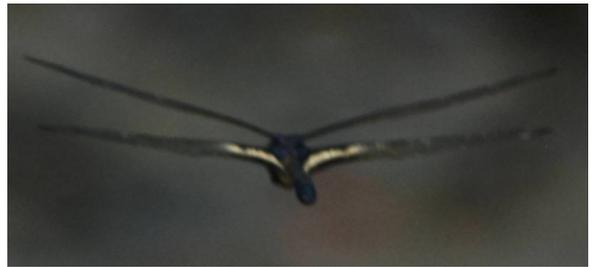
Figures 5-8. (5) Unidentified paired gomphid couple. (6) *Burmagomphus collaris*, male. (7) Guilin scenery. (8) *Gomphidia kruegeri fukienensis*, male.

and taking photos of it in the hand. But I had left my net in the taxi. Haiwa went back to fetch it (which I failed to use effectively), and I looked around to see what else there might be to photograph. *Orthetrum triangulare* was briefly present (but I had managed better photographs the day before). The big surprise however was a new species for Guangxi, in the shape of a female *Heliogomphus retroflexus* (Fig. 10).

Driving on a few kilometers up the road, it was time for a tourist stop. Haiwa and my mother got out of the taxi to explore the village. I wasn't in a hurry to follow them until they started yelling for me. Up amongst a cloud of *Panatala flavescens* was a female *Chlorogomphus papilio* (Fig. 11).

The final stop of the day (before heading straight for the airport) was another tourist stop, consisting of tourist shops above a couple of ponds by a big river. On the ponds was the delightful *Philosina buchi* (Fig. 12) and, confirmation, *Gomphidia kruegeri fukienensis* (Fig. 13).

Such a large number of new taxa from a week of visiting tourists sites (mostly) was most unexpected. I can recommend southern China as a place well worth visiting.



Figures 9-13. (9) *Chlorogomphus papilio*, male. (10) *Heliogomphus retroflexus* (11) *Chlorogomphus papilio* female in flight, with *Pantala flavescens*. (12) *Philosina buchi*, male. (13) *Gomphidia kruegeri fukienensis*, male.

Dragonfly fauna of high mountain habitats of the Dinaric Alps in Bosnia and Herzegovina (West Balkans, SE Europe) – the results of field surveys conducted in 2015 & 2016

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Introduction

Here we present the results of the first phase of dragonfly research focusing on high mountain areas of the Dinaric Alps in Bosnia and Herzegovina, particularly the most significant area, Mt Zelengora. In recent years, dragonfly knowledge in Bosnia and Herzegovina has advanced notably due to increased research intensity, although several regions are still poorly investigated. One of the most interesting is certainly the mountain region that covers the largest part of the country. High mountain habitats of Bosnia and Herzegovina are often isolated and difficult to access, which is the reason why the dragonfly fauna has remained poorly known.

The goal of this research is to better understand the distribution of species, habitats and the dragonfly communities present in these relict and threatened habitats.

Study area

The Dinaric Alps are located in the western Balkans, between the Pannonian Basin and the Adriatic Sea. This mountain range spreads from Slovenia to Albania, forming the largest continuous karst landscape in Europe and encompassing some of the most significant high mountain habitats of the Balkan region. The study area is located in the central part of the Dinaric Alps, on the territory of Bosnia and Herzegovina.

The main focus of the research was Mt Zelengora, while short field trips were also conducted on Mts Treskavica, Vranica and Čvrsnica. Mt Zelengora is located in the southeast region of the country at the boundary with Montenegro. The relief of this area is complex and diverse, with high mountain peaks (including the 2,386 m high Maglić peak, the highest in BiH), nine mountain lakes and deep canyons and the gorges of the Sutjeska and Hrčavka rivers. The biological and geological diversity of this area is imposing, with numerous plant and animal species as well as geological substrates and soil types.

The survey goals were mountain lakes, ponds and peat bog fragments in the high mountain zone (between 1,400 and 2,000 m a.s.l.). These habitats are known to support populations of several species having their main European distribution in the northern and central parts and reach their southern occurrence in Europe in this



Figure 1. Geographical position of the research area and the locations of surveyed mountains.

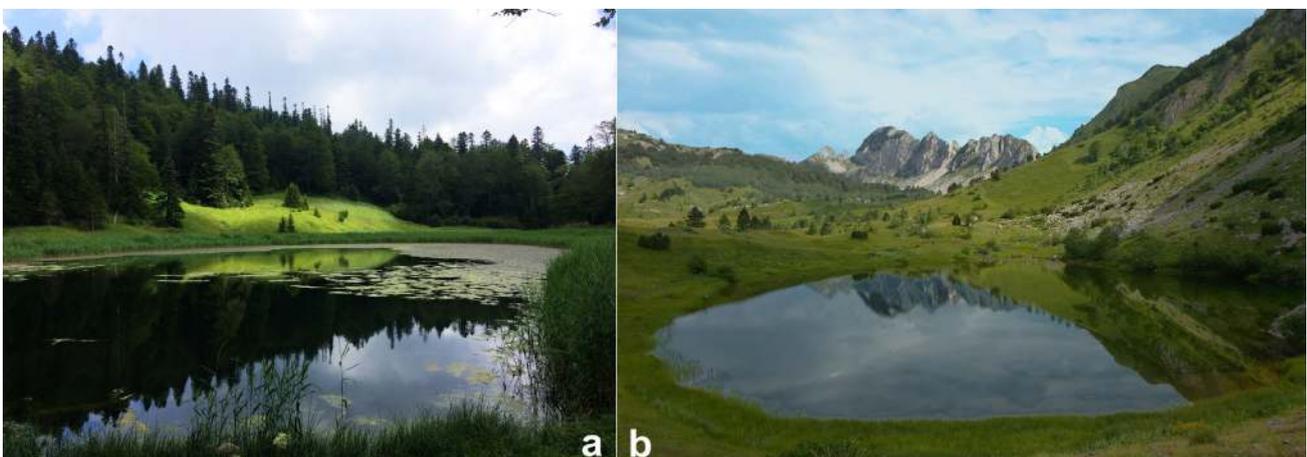


Figure 2. Crno jezero (a) and Gornje bare (b) lakes at Mt Zelengora.

area (e.g. *Coenagrion hastulatum*, *Aeshna juncea*, *Somatochlora metallica* and *Sympetrum flaveolum*).

Several field trips were conducted between the end of June 2015 and the end of July 2016. The survey in the Sutjeska National Park was implemented in collaboration with the Center for Environment that is working on the research and the protection of the freshwater habitats in the Park.

Results and Discussion

At Mt Zelengora and NP Sutjeska we recorded a total of 35 species, representing 55% of the dragonfly fauna of BiH. The highest number of species was recorded at the lakes of Orlovačko jezero (22 species), of Gornje Bare (20 spp.) and of Donje Bare (19 spp.). The dragonfly diversity at the investigated mountain lakes was positively correlated with the diversity of the vegetation and the water depth. The most numerous species at the lakes and ponds were *Cordulia aenea*, *Aeshna grandis*, *Enallagma cyathigerum* and *Libellula quadrimaculata*. Lakes at Mt Zelengora were also the habitats with the highest number of threatened and regionally endangered species. The most important species here were: *Coenagrion hastulatum*, *A. grandis*, *Aeshna juncea*, *Somatochlora metallica* and *Sympetrum flaveolum*. The mountain lakes of Mt Zelengora contain the only known populations of *C. hastulatum* and *S. metallica* in Bosnia and Herzegovina that are among only a few known in the west Balkan region, while for *A. grandis* and *A. juncea* these lakes are the most important localities within the country. During this research at Mt Zelengora several new populations of these species were found. New populations of *A. juncea* and *S. flaveolum* were discovered at several locations on Mts Čvrsnica, Treskavica and Vranica and *A. grandis* at Mt Treskavica. The high mountain area of this part of the Dinaric Alps probably hosts the largest populations of these species in the west Balkans.

Among 14 species found in the Sutjeska and Hrčavka River canyons, *Cordulegaster bidentata* was the most numerous. Adults were seen flying along streams and rivers, and above roads and forest paths, while larvae were present in many small streams in the area. The highest locality where we found *C. bidentata* was at 1,460 m a.s.l. In Sutjeska River canyon a single male of *Cordulegaster heros* was also found, more precisely it was caught in an ornithological net stretched above the Sutjeska River. It is the only record of the species for the area. Several species, such as *E. cyathigerum*, *A. grandis* and particularly *C. aenea*, that are dominant at mountain lakes were also found to be abundant in the canyons.

From a biogeographical point of view, the Dinaric Alps are one of the most important refugia in southeastern Europe that harbour disjunct relict populations of several central and northern dragonfly species. The range of these species in the Balkans is very small and fragmented. Their habitats are increasingly threatened due to climate warming and human activity, which can lead to local extinction of these species.

Although it is expected that these habitats could host populations of *Leucorrhinia dubia* or even *Somatochlora arctica*, both species were hitherto never found.

The results of this study are important for the threat status assessment of the species of high mountain habitats in BiH and the region and the work on the Red List of dragonflies of the country, which still does not exist. The collected data are also a valuable contribution to the Atlas of Dragonflies of Bosnia and Herzegovina that is in progress.

Further research is necessary and will be continued, including other mountain areas. One of the future goals would be a monitoring of several mountain lakes at Mt Zelengora in order to track the climate parameters, their change and influence on dragonfly populations.

Acknowledgements

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Figure 3. *Coenagrion hastulatum* at Donje Bare Lake (a) and *Somatochlora metallica* at Gornje Bare Lake (b).

Mediterranean Freshwater Key Biodiversity Areas: a new standard to highlight important sites for conservation of threatened dragonflies

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Abstract

This article presents sites identified as Freshwater Key Biodiversity Areas (KBAs) in the Mediterranean Hotspot which are important for threatened Odonata species. The article also introduces the recently launched IUCN Global Standard for the identification of KBAs and how it can be applied as a conservation tool for freshwater species.

Keywords: Odonata, Freshwater Key Biodiversity Area, Conservation, Mediterranean Basin Hotspot

The IUCN Centre for Mediterranean Cooperation, together with key experts and partners from the region, identified the freshwater KBAs for the Mediterranean basin (Darwall et al., 2014, Maíz-Tomé et al., *in press*). Odonata species, together with freshwater plants, molluscs and freshwater fishes, were used as a key group to identify the freshwater KBAs.

Freshwater KBAs are freshwater ecosystems that contribute significantly to the global persistence of freshwater biodiversity. The global standard for identification of KBAs was validated in 2016 by the International Union for Conservation of Nature (IUCN). The standard supports and harmonizes identification of important biodiversity sites. It also helps to identify sites that are neglected in existing approaches or policy making, e.g. small or temporary freshwater bodies that are important for the freshwater biodiversity. The IUCN KBA criteria (Table 1) are based on species' vulnerability and irreplaceability and their purpose is not to include every species or ecosystem within a KBA, but rather to locate and highlight sites that make significant contributions to the global persistence of biodiversity. This means that mainly species with a threatened category at the global level (i.e. Critically Endangered, Endangered or Vulnerable) according to IUCN Red List of Threatened Species will be considered but also those with a restricted range.

Table 1. Overview of the KBA Criteria. More details on each sub-criterion and thresholds are available from IUCN 2016.

KBA Criteria and sub-criteria
A. THREATENED BIODIVERSITY
A1. Threatened species
A2. Threatened ecosystem types
B. GEOGRAPHICALLY RESTRICTED BIODIVERSITY
B. Individual geographically restricted species
B2. Co-occurring geographically restricted species
B3. Geographically restricted assemblages
B4. Geographically restricted ecosystem types
C. ECOLOGICAL INTEGRITY
D. BIOLOGICAL PROCESSES
D1. Demographic aggregations
D3. Recruitment sources
E. IRREPLACEABILITY THROUGH QUANTITATIVE ANALYSIS

The identification of a site as a KBA is unrelated to its legal status, however, they can be invaluable for informing conservation planning and priority-setting. For example, KBAs can support the strategic expansion of protected-area networks toward achievement of the Aichi Biodiversity Targets (in particular Target 11 and 12), as established by the Convention on Biological Diversity (IUCN 2016).

Mediterranean freshwater KBAs and Odonata

Out of the 387 KBA for freshwater taxa identified in the Mediterranean region, 79 host Odonata species (Figure 1) which are all threatened with extinction according to IUCN Red List of Threatened Species (except for *Cordulegaster princeps*, listed as Near Threatened). Most of these sites important for dragonflies and damselflies are found in the eastern part of the Mediterranean or Morocco.

The Mediterranean hosts 165 Odonata species, of which 32 species are considered threatened with extinction and 10 of the latter are endemic to the area (Riservato et al., 2009). This is the case of the Critically Endangered Greek Red Damsel, *Pyrhosoma elisabethae*, which occurs in seven freshwater KBAs and of the Endangered Greek Goldenring (*Cordulegaster helladica*) which is present in ten freshwater KBAs. Additionally, the North African endemic Glittering Demoiselle (*Calopteryx exul*, listed as Endangered) is the Odonata species which occurs in more freshwater KBAs (20) and the Splendid Cruiser (*Macromia splendens*, Vulnerable) occurs in 15 freshwater KBAs of western Mediterranean. Table 2 at the end presents the Mediterranean freshwater KBAs where Odonata species are present.

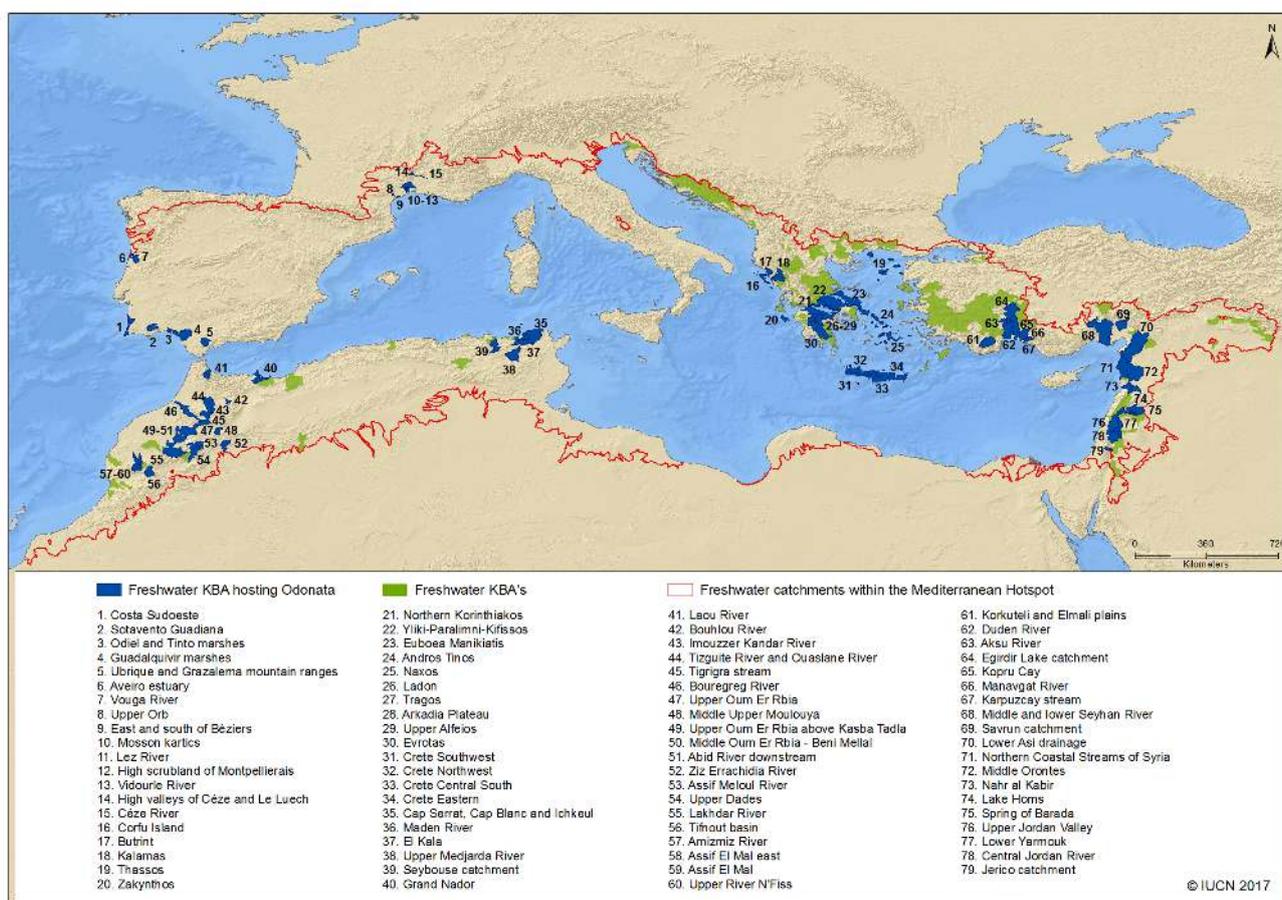


Figure 1. Mediterranean freshwater KBAs important for threatened Odonata species.

Main threats and conservation actions

In the Mediterranean region, Odonata are mainly threatened by increasing demand for drinking water, agricultural irrigation measures, hydrological alterations following construction of dams, over-abstraction of surface and ground waters, water pollution, land development, and invasive species (Boudot et al., 2009).

Out of the 79 freshwater KBAs hosting key Odonata species, 75.95% overlap with existing protected areas (based on an analysis done with Protected Planet material, UNEP-WCMC & IUCN, 2017). However, the effectiveness of protected areas for freshwater biodiversity is often questioned for many reasons including a lack of consideration of freshwater needs when designing and declaring protected areas, fewer resources devoted to freshwater conservation management than to other actions, and poor understanding of complex management problems beyond the limits of the protected area (Hermoso et al., 2016).

As a step further, currently four river basins (Litani river, Sebou river, Douro river and Vjosa river) in the

Mediterranean region, all of them encompassing freshwater KBAs, have been selected as they typify the range of threats for the region. These areas will act as pilot sites to act upon and to demonstrate tangible conservation actions which offer the potential for solutions that could be replicated regionally.

An increased attention to reducing the threats to freshwater in areas under protection, as well as designation and management of additional areas, are needed to safeguard freshwater flows, and support biodiversity conservation and the provision of freshwater ecosystem services (Harrison et al., 2016). The identification of KBAs targeting sites already known to be important for freshwater biodiversity can be a first step in this regard.

Table 2. Summary of freshwater KBAs important for Odonata species in the Mediterranean region. Mediterranean endemic species are highlighted with an asterisk (*).

Species	IUCN Red List Category	Freshwater KBA name	Country	No. in Fig. 1
<i>Boyeria cretensis*</i>	Endangered (EN)	Crete Central South	Greece	33
		Crete Eastern	Greece	34
		Crete Northwest	Greece	32
		Crete Southwest	Greece	31
<i>Brachythemis fuscopalliata</i>	Vulnerable (VU)	Aksu River	Turkey	63
		Duden River	Turkey	62
		Lower Asi drainage	Turkey, Syria	70
		Northern Coastal Streams of Syria	Syria	71
<i>Calopteryx exul*</i>	Endangered (EN)	Abid River downstream	Morocco	51
		Assif Meloul River	Morocco	53
		Bouhlou River	Morocco	42
		Bouregreg River	Morocco	46
		El Kala	Algeria, Tunisia	37
		Grand Nador	Morocco, Spain	40
		Imouzzer Kandar River	Morocco	43
		Lakhdar River	Morocco	55
		Laou River	Morocco	41
		Maden River	Tunisia	36
		Middle Oum Er Rbia - Benia Mellal	Morocco	50
		Middle Upper Moulouya	Morocco	48
		Seybouse catchment	Algeria	39
		Tigrigra stream	Morocco	45
		Tizguite River and Ouaslane River	Morocco	44
		Upper Dades	Morocco	54
		Upper Medjarda River	Algeria	38
Upper Oum Er Bbia above Kasba Tadla	Morocco	49		
Upper Oum Er Rbia	Morocco	47		
Ziz Errachidia River	Morocco	52		

Species	IUCN Red List Category	Freshwater KBA name	Country	No. in Fig. 1
<i>Calopteryx hyalina</i> *	Endangered (EN)	Lake Homs	Lebanon, Syria	74
		Middle Orontes	Syria	72
		Nahr al Kabir	Lebanon, Syria	73
		Spring of Barada	Lebanon, Syria	75
<i>Calopteryx syriaca</i> *	Endangered (EN)	Central Jordan River	Lebanon, Syria	78
		Jerico catchment	Palestine	79
		Lower Yarmouk	Jordan, Syria	77
		Upper Jordan Valley	Jordan, Lebanon, Syria	76
<i>Ceriagrion georgifreyi</i> *	Vulnerable (VU)	Corfu Island	Greece	16
		Thassos	Greece	19
		Zakynthos	Greece	20
<i>Coenagrion intermedium</i> *	Vulnerable (VU)	Crete Central South	Greece	33
		Crete Eastern	Greece	34
		Crete Northwest	Greece	32
		Crete Southwest	Greece	31
<i>Cordulegaster helladica</i> *	Endangered (EN)	Andros Tinos	Greece	24
		Arkadia Plateau	Greece	28
		Euboea Manikiatis	Greece	23
		Evrotas	Greece	30
		Ladon	Greece	26
		Naxos	Greece	25
		Northern Korinthiakos	Greece	21
		Tragos	Greece	27
		Upper Alfeios	Greece	29
		Yliki-Paralimni-Kifissos	Greece	22
<i>Cordulegaster princeps</i> *	Near Threatened (NT)	Abid River downstream	Morocco	51
		Amizmiz River	Morocco	57
		Assif El Mal	Morocco	59
		Assif El Mal east	Morocco	58
		Assif Meloul River	Morocco	53
		Bouhlou River	Morocco	42
		Imouzzer Kandar River	Morocco	43
		Lakhdar River	Morocco	55
		Middle Upper Moulouya	Morocco	48
		Tifnout Basin	Morocco	56
		Tigrigra stream	Morocco	45
		Upper Dades	Morocco	54
		Upper Oum Er Rbia	Morocco	47
Upper River N'Fiss	Morocco	60		

Species	IUCN Red List Category	Freshwater KBA name	Country	No. in Fig. 1
<i>Gomphus lucasii</i> *	Vulnerable (VU)	Cap Serrat, Cap Blanc and Ichkeul	Tunisia	35
		El Kala	Algeria, Tunisia	37
		Maden River	Tunisia	36
		Seybouse catchment	Algeria	39
		Upper Medjarda River	Algeria, Tunisia	38
<i>Macromia splendens</i>	Vulnerable (VU)	Aveiro estuary	Portugal	6
		Céze River	France	15
		Costa Sudoeste	Portugal	1
		East and south of Béziers	France	9
		Guadalquivir marshes	Spain	4
		High scrubland of Montpellierais	France	12
		High valleys of Céze and Le Luech	France	14
		Lez River	France	11
		Mosson karstics	France	10
		Odiel and Tinto marshes	Spain	3
		Sotavento Guadiana	Portugal	2
		Ubrique and Grazalema mountain ranges	Spain	5
		Upper Orb	France	8
		Vidourle River	France	13
Vouga River	Portugal	7		
<i>Onychogomphus assimilis</i>	Vulnerable (VU)	Aksu River	Turkey	63
		Duden River	Turkey	62
		Egirdir Lake catchment	Turkey	64
		Karpuzcay stream	Turkey	67
		Kopru Cay	Turkey	65
		Korkuteli and Elmali plains	Turkey	61
		Manavgat River	Turkey	66
Middle and lower Seyhan River	Turkey	68		
<i>Onychogomphus macrodon</i> *	Endangered (EN)	Central Jordan River	Lebanon, Syria	78
		Lower Asi drainage	Syria, Turkey	70
		Savrun catchment	Turkey	69

Species	IUCN Red List Category	Freshwater KBA name	Country	No. in Fig. 1
<i>Pyrrhosoma elisabethae</i> *	Critically Endangered (CR)	Arkadia Plateau	Greece	28
		Butrint	Albania	17
		Corfu Island	Greece	16
		Kalamas	Greece	18
		Ladon	Greece	26
		Tragos	Greece	27
		Upper Alfeois	Greece	29

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We would like to thank Dejan Kulijer and Boudjéma Samraoui for sharing their extensive knowledge on the occurrence of dragonflies of the Balkans and of North Africa respectively and for their contribution in the designation and evaluation of KBAs in the Mediterranean.

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My memories with Professor Philip Corbet: - Collaboration in disseminating odonatological knowledge

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Soon it will be ten years since Professor Philip Corbet passed away. During the past 30 years I have learned a lot of odonatological knowledge and way of thinking from him. I have also worked hard with him in disseminating odonatological knowledge and the spirit of conservation of dragonfly habitats. Below, I briefly look back on those memories.

In the early 1970s, when I started studying the ecology of some dragonfly species as a postgraduate student, Philip's book, *A Biology of Dragonflies* (1962, Witherby, London) was very helpful for me to develop a research plan based on the traits peculiar to dragonflies. Thus, the titles of several of my initial papers began with the words, "Life history and behavior of".

At an oral session of the XVI International Congress of Entomology held in Kyoto in August 1980, I made a presentation titled "Territoriality as a density-dependent mating strategy in *Cordulia*". After the presentation, Philip raised a question, in which he, in my memory, pointed out a direction for further development of my research after evaluating the value of my presentation.

Philip later participated in, and had discussion with several members at, the inaugural meeting of the Odonata Specialist Group of the IUCN in Kyoto, 1980, which had been prepared by Dr Syoziro Asahina for this opportunity and was chaired by Dr Norman Moore (cf. Figure 12.6. of Corbet's 1999 book: *Dragonflies: Behavior and Ecology of Odonata*, Cornell Univ. Press). As a listener at that meeting, I learned from them the necessity of conserving dragonflies and the importance of designing effective methods for their conservation.

After that, we started exchanging letters as well as reprints. On one occasion I noticed that the anonymous reviewer of a paper I submitted to *Odonatologica* must have been Philip because of the similarity in handwriting on my manuscript and the excellence of the comments. In addition, I cooperated with him for his plan to rewrite his 1962 book by providing detailed contents of odonatological information derived from papers written by some Japanese authors including me.

In November 1985, I got an opportunity to stay as a guest researcher in the laboratory of Dr Geoff Parker of Liverpool University, England, from where I traveled north and visited Dundee University to see Philip again (Fig. 1).

In Philip's laboratory, I explained the essence of my current research and got his comments and encouragement. After that, I heard stories about the topics of his research at the time. Meanwhile, he took out Rondeletius's book, "*Libri de piscibus marinis*" (1554, Bonhomme, Lyon), or another book citing it from the book shelving in which many rare books were stored. He showed me an illustration depicting a hammerhead shark and a zygopteran larva (which was later reproduced in Figure 12.1 of Corbet's 1999 book), both of which are similar to a T-shaped balance). He said to me: "The author of the book must have been unaware that the right one was a coenagrionid larva, don't you think it is interesting?"

The city of Dundee had just entered the Christmas season and Philip presented a gentle look like Santa Claus to my two young children in front of my wife and a tree with decorations.

In August 1993, the XII International Symposium of Odonatology which had been organized chiefly by Mr. Kiyoshi Inoue was held in Osaka, Japan. Philip was invited to the symposium and made the keynote lecture. He also chaired the plenary seminar, and gave a lecture titled "Wonders of dragonfly biology" in the international free meeting, "Nature is precious dragonflies are telling us", which was held for citizens as one of the related events of the symposium.

Prior to the symposium in Osaka, in January 1993, an air mail arrived from

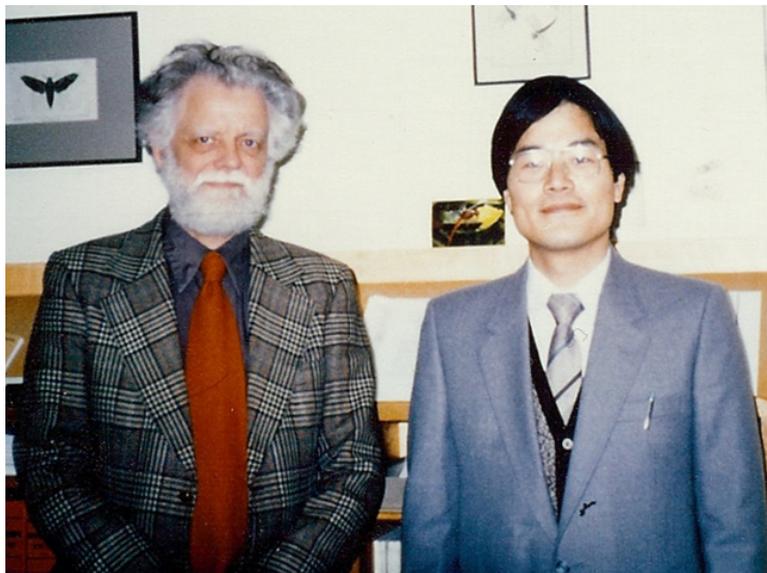


Figure 1. Philip and me, in his lab, University of Dundee, UK, November, 1985.

Philip. He wrote that he had a plan to visit Kushiro after the Osaka symposium, and asked if I could set an opportunity for him to give a lecture to the public there. I thought, "It's a big opportunity for us to call much more specialists for the speakers, so together with my friends I would like to hold an international symposium on dragonfly conservation here in Kushiro where I live."

On receiving Philip's agreement with my plan, I consulted with the local office of the Ministry of the Environment, and got a promise that they would cooperate fully with me because it would be meaningful as a related event of the COP5 to the Ramsar Convention, Kushiro, 1993. I organized the executive committee (it mainly comprised of several members of the Kushiro Insect Lovers' Society) and I selected seven panelists after consultation with Mr Inoue.

The International Symposium on the Conservation of Dragonflies and their Habitats (Kushiro) for which I was in charge of coordination and preparation) was held (Fig. 2) just after the Symposium in Osaka (cf. p. 578 of Corbet's book 1999).

In a meeting of the panelists on the day prior to the symposium, Philip proposed that a statement should be formulated and announced with the approval of all participants in the symposium, since all these members were going to express their views on dragonfly conservation. All the panelists agreed to his proposal. In the lunch time of the symposium, I circulated among the panelists the draft of the statement I had made by that time. The statement was improved by incorporating their opinions and the final draft crafted by Philip and Tony Watson. It was then titled as "**the Kushiro Appeal**" and read out by Philip with a request for the participants to support it, in concluding the symposium (NB. The Kushiro Appeal full text is cited in Table 12.9 of Corbet's 1999 book and provided in Table 1).

In the excursion to the Akan National Park the day after the symposium in Kushiro symposium I enjoyed a conversation with Philip sitting next to me on the mini bus. He told me it was the emergence of *Cordulegaster boltoni* he saw in his childhood that made him interested in dragonflies. Actually I also had been keeping a strong impression of a just emerged adult of *Anotogaster sieboldii* that my father kept in the house when I was six or so. We shared a smile over this coincidence.

The proceedings of the Kushiro symposium, edited by Philip, Sid Dunkle and me, were published in 1995 by the Japanese Society for the Preservation of Birds, Kushiro.

In July 1996, for the purpose of comparative study on the conservation of dragonfly habitats between Japan and the UK, I visited dragonfly reserves in England, Wales and Scotland, and received guidance and explanation from local conservation activists. In Scotland, I received from Philip and Bob and Betty Smith explanation on the



Figure 2. Closing address by Philip on behalf of the panelists of the International Symposium on the Conservation of Dragonflies and their Habitats, Kushiro, Japan, August 1993. From left: Hidenori Ubukata (coordinator), Drs Shigeo Eda, Bastiaan Kiauta, Philip Corbet, Eberhard Schmidt (behind Philip), Tony Watson, Sid Dunkle, and Mike Samways.



Figure 3. On Loch Maree, UK, where we confirmed the larvae of *Aeshna caerulea*, *A. juncea* etc, July 1996. From left: Bob Smith, Frieda Chaikovsky, Philip (wearing a mosquito net), Betty Smith, and me.

current status of Loch Maree as a habitat of dragonflies (Fig. 3).

In the last evening of my odonatological survey in Scotland, Philip and I were enjoying conversation together with Ms. Frieda Chaikovsky in her mansion while shaking scotch whisky glasses. Before ending this relaxed time Phillip consulted me on whether I could cooperate with him to publish a Japanese edition of his new dragonfly book to be published by the Cornell University Press within a few years.

I thought that it would be very difficult because the book would in an extreme case be as big as a volume reaching 1000 pages. So I could not easily accept it. Being brought round, however, by Phillip's serious look and enthusiasm, I finally answered him, "I will take it back to Japan and consult with colleagues and publishers as well."

After returning to Japan, I called for a few dozens of dragonfly researchers including amateurs to participate in the translation work, conducted a questionnaire survey to predict the rough number of the purchasers of the Japanese edition among people concerned with insects, and negotiated with several publishers to see if they were interested in the project. In 1997, the translation team consisting of 19 researchers and chapter sharing duties were almost solidified. In parallel with this I organized a group to promote collecting donations to supplement the publication funds so that it would become easier for the publisher to undertake the task.

As a result of those efforts, one publisher, Kaiyusha, expressed its intention to undertake the publication and then the project began to move. In 1998, Cornell University Press exchanged a contract with Kaiyusha, and then the translation work started all at once upon the publication of Corbet's original book in 1999.

In July 1999, WDA organized the International Congress of Odonatology and its first Symposium of Odonatology was held in Hamilton, New York (Fig. 4). At this venue, Corbet's original book, *Dragonflies: Behavior and Ecology of Odonata*, was exhibited and attracted the enthusiastic interest of the participants.

Philip praised the fact that the structure of the Japanese translation team was good and pledged with me that we would both try to recruit funds for the publication. Prior to the WDA General Meeting held during the symposium, I was asked by the WDA's Board of Trustees to assume a position as member of the board and was approved at the General Meeting. After that I worked on this Board with Philip and other members for six years.

A translation of almost all the chapters for the Japanese edition came in within one year after the start of the translation work. We established a supervisory board composed of four dragonfly ecologists including me for the translation (Fig. 5). I continued struggling to coordinate the whole project besides translating the preface and the first two chapters and to review several chapters. Dr Yoshitaka Tsubaki led the supervision of the whole of the book with collaboration of the rest of the supervisory board.

In the process of translation/supervision, many more errors than expected were discovered in the original book, which I compiled and then sent by



Figure 4. Philip, Ms Sarah Jewell and me during the field trip of the WDA 1st Symposium, 1999, Hamilton, New York, USA. Photo credit: Werner Piper.



Figure 5. The translation supervisor team of the Japanese edition of Corbet's 1999 book, Hiroshima, Japan, March 2000. From left: Ms Yoko Homma (publisher), Drs Kazunori Higashi, Hidenori Ubukata, Yoshitaka Tsubaki, and Tetsuyuki Uéda.

e-mails to Philip in addition to the usual inquiries from translators to the original author. Philip, of course, replied swiftly. The Japanese team contributed greatly to the augmentation of the list of corrigenda for the original book (cf. page iv of the 'Third printing with corrections' [2004] of Corbet's 1999 book), which was linked to the official website of WDA.

After that, also at the opportunities of the 2nd WDA International Symposium of Odonatology (Gällivare, Sweden, July 2001) and the 4th WDA International Symposium of Odonatology (Pontevedra, Spain, July 2005) I explained to Philip the stage of the progress of the project and received his words of encouragement and expectation for completion.

At the venue of the 5th WDA International Symposium of Odonatology (Swakopmund, Namibia, April 2007), in the opening ceremony I made an address as the President of WDA, on behalf of the translator team I presented to Phillip the Japanese version (2007) of his book (original, 1999) published a few weeks previously. Philip looked a little surprised and immediately he gave a full smile to me (Fig. 6).

Ten months later, Philip was called to heaven. The fact that I could present this Japanese edition of his book to him would be, I think, a comfort for his soul. I thank to Philip for giving me 30 years of fun memories between us and also to all the collaborators in this publishing project and in the Symposium at Kushiro.

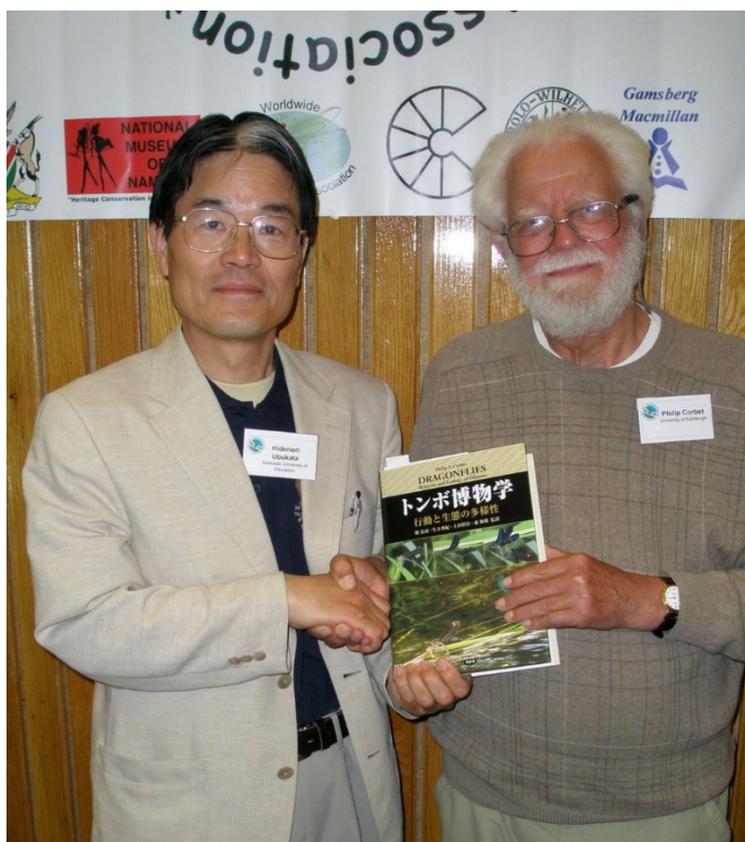


Figure 6. Philip and me with a volume of the just published Japanese Edition (2007) of Corbet's 1999 book at the WDA 5th Symposium, Namibia, April 2007.

Table 1. "The Kushiro Appeal"

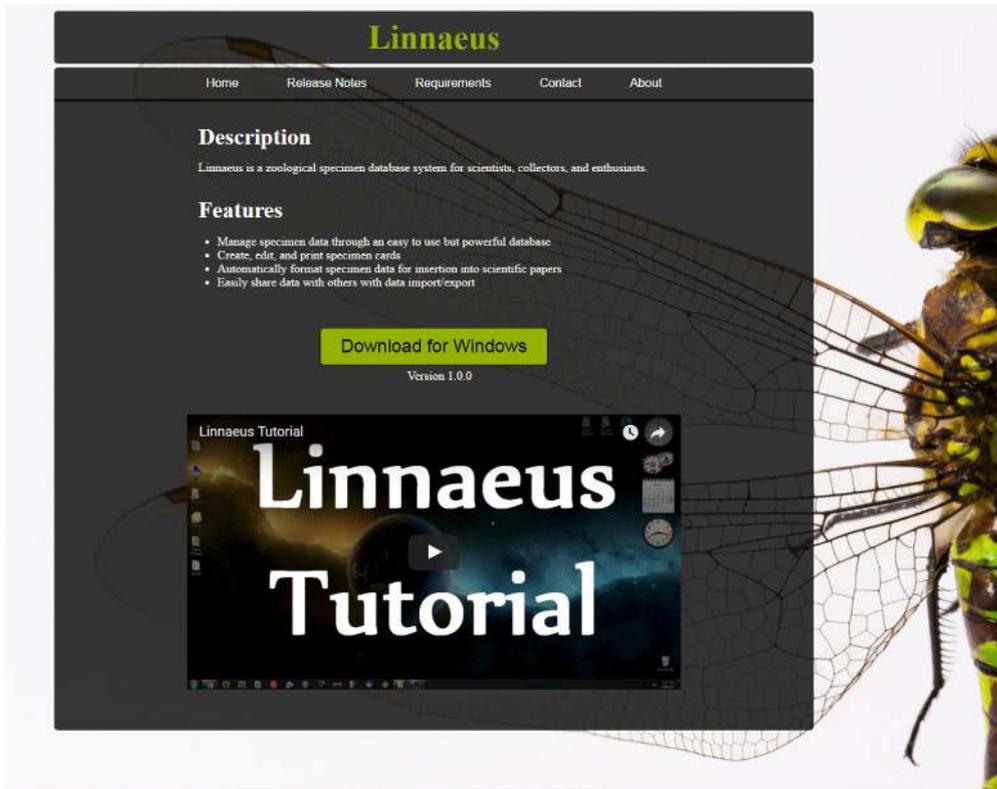
A statement supported unanimously by the panelists attending the International Symposium on the Conservation of Dragonflies and Their Habitats held at Kushiro, Japan, 13–15 August 1993.

1. Because humans depend, for practical as well as esthetic reasons, on diversity of habitats and their occupants, humans living today have an obligation to conserve such diversity for future generations.
2. Destruction of dragonfly habitats is increasing, almost entirely due to human impact, powered by growth of human numbers and economic activity; where habitat restoration is possible, it should reflect natural dynamics and preferably keep intact the integrity of natural systems.
3. In order to conserve dragonfly habitats, the following actions should be accorded high priority:
 - 3.1. conservation of aquatic and terrestrial habitats, and their surroundings, including preservation as parks and reserves;
 - 3.2. expansion of ecological research, including research on the impact of recreation on dragonfly habitats, as a basis for improved management of areas being conserved;
 - 3.3. ecological management of natural and restored habitats; and
 - 3.4. monitoring the successes, or failures, of conservation programs and, when necessary, modifying such programs.
4. The future success of dragonfly conservation depends on education, especially of nonspecialists and children.
5. Destruction of dragonfly habitats is a global problem; so wherever possible conservation strategies should be coordinated and reinforced both nationally and internationally.

LINNEAUS

A free dragonfly (Odonata) database system by Nikolaos Makaris

Linnaeus is available for free download at:
www.linnaeus.me



Linnaeus

Viewing record NEW of 39278

ID:		Family:		Country:		State:	
Genus:		Species:		County:		Elevation (m):	
Manuscript Name:	Original Name:	Photo:		Locality:			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Paratype:	Paratypes:	Holotype:					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Author:	Author Date:	Collection Date 1:		Collection Date 2:			
<input type="text"/>	yyyy	yyyy-mm-dd		yyyy-mm-dd			
Identified By:	Identified Date:	Partial Collection Date:		Timestamp:			
<input type="text"/>	yyyy	yyyy-mm-dd					
Current Collection:	Previous Collection:	Collector:		Coordinates Approximate:		<input type="checkbox"/>	
<input type="text"/>	<input type="text"/>	<input type="text"/>					
Males:	Females:	Lat °	Lat '	Lat "	Lat Direction:	Lat Decimal:	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Larvae:	Exuviae:	Lon °	Lon '	Lon "	Lon Direction:	Lon Decimal:	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
DNA sample taken:	Genital ligula extruded		Notes:				
<input type="checkbox"/>	<input type="checkbox"/>		<input type="text"/>				

Previous	Next	Add to Print Queue	Convert Coordinates
New	Edit	Submit	Delete
Search Database	Mass Edit	Special Characters	Options
Clear Print Queue	Data Manipulation Tool	Export	Import
Exit	User Guide	Open Files Folder	Open Database Folder

Cards: 0 Pages: 0

Linnaeus is a free database and card making program developed by Nikolaos Makaris in consultation with Odonatologists Rosser Garrison & Natalia von Ellenrieder. Rosser Garrison and Natalia von Ellenrieder have used a database and card making program using an in-house program run on Microsoft Visual FoxPro. As of this writing, Microsoft is no longer supporting this database program. The new database system, Linnaeus, allows you to:-

- Manage specimen data through an easy to use but powerful database
- Create, edit and print specimen cards in a 3 by 5-inch format (actual color for cards is white):

Cards: 4 Pages: 1	
<p><i>Porpax asperipes</i> (Socrates, 420) ♂</p> <p>det by: Socrates, 420</p> <p>United States: California: 2 miles north of the Santa Monica Pier on the shoreline 01 April 2016 54°23'39" N, 33°15'23" E; 30 m Collected by: Socrates</p> <p style="text-align: center;">ex Plato Collection Aristotle Collection</p>	<p><i>Porpax asperipes</i> (Socrates, 420) ♂</p> <p>det by: Socrates, 420</p> <p>United States: California: 2 miles north of the Santa Monica Pier on the shoreline 01 April 2016 54°23'39" N, 33°15'23" E; 30 m Collected by: Socrates</p> <p style="text-align: center;">ex Plato Collection Aristotle Collection</p>
<p><i>Porpax asperipes</i> (Socrates, 420) ♂</p> <p>det by: Socrates, 420</p> <p>United States: California: 2 miles north of the Santa Monica Pier on the shoreline 01 April 2016 54°23'39" N, 33°15'23" E; 30 m Collected by: Socrates</p> <p style="text-align: center;">ex Plato Collection Aristotle Collection</p>	<p><i>Porpax asperipes</i> (Socrates, 420) ♂</p> <p>det by: Socrates, 420</p> <p>United States: California: 2 miles north of the Santa Monica Pier on the shoreline 01 April 2016 54°23'39" N, 33°15'23" E; 30 m Collected by: Socrates</p> <p style="text-align: center;">ex Plato Collection Aristotle Collection</p>

- Automatically format specimen data for insertion into scientific papers using the DMT (Data Manipulation Tool)
- Easily share data with others with data import/export
- Automatically creates Microsoft Excel files of data that can be directly loaded into ArcMap or DiVa-Gis programs
- Allows for both latitude and longitude to be converted to degree, minutes, seconds or decimal degrees (both notations are stored in the database upon entering one)
- Includes a User Guide and online tutorial
- Type less with built in auto-complete (e.g., typing "ar" causes "Argia" to appear as a suggestion, similar to how a Google search works)

Once installed, the user enters identified specimens according to one of the classifications available. The program "remembers" species entries allowing for easy entry by typing only part of the genus or species name with the rest of the taxonomic (Family, etc.) automatically filled. There is also a mass edit command for changing any data or sets of data from one condition to another.

PLEASE NOTE: Linnaeus does not come with a ready installed database. Each individual user will need to construct their own database including taxonomic entries

New Book

Taschenlexikon der Libellen Europas: Alle Arten von den Azoren bis zum Ural im Porträt [Field Guide to the Dragonflies of Europe: All Species from the Azores to the Ural Portrayed]

**Authors: Hansruedi Wildermuth &
Andreas Martens**

824 pages, 600 colour photos, 6 b/w illustrations, 179 tables
Hardback: Mar 2017
ISBN-13: 9783494015583

Language: German

The Taschenlexikon der Libellen Europas contains brilliant and informative photos of dragonfly species both native to Europe and the sporadic invasive species, and portrays their biology in detail. In addition to the explanation of names, the current state of knowledge is summarized for each type in a compact form in this portable book. This pocket guide is aimed at experts that have been observing dragonflies for a longer time and wish to have more information on all species occurring in Europe and their way of life than is available in current identification guides.

Summary in German:

Wer einmal damit begonnen hat, diese schönen und geheimnisvollen Insekten zu beobachten, wird alsbald mehr über die Lebensweise dieser Tiergruppe wissen wollen. Genau dort setzt das „Taschenlexikon der Libellen Europas“ an! Beginnend mit brillanten und aussagefähigen Fotos, werden sowohl die in Europa heimischen als auch die sporadisch eingeschleppten Arten mit ihrer Biologie ausführlich porträtiert. Neben der Erklärung des Namens wird in diesem „taschentauglichen“ Buch das aktuelle Wissen zu jeder Art in kompakter Form zusammengefasst. Angesprochen werden mit diesem handlichen Taschenlexikon zum einen die „Kenner“, die sich schon länger mit Libellen beschäftigen und mehr Informationen über alle in Europa vorkommenden Arten und deren Lebensweise haben möchten, als in den derzeit erhältlichen Bestimmungsführern zu finden sind. Zum anderen sollen aber auch all diejenigen zu intensiveren Beobachtungen angeregt werden, die gerade damit beginnen, sich mit dieser faszinierenden Insektengruppe zu beschäftigen.

