

AGRION

NEWSLETTER OF THE WORLDWIDE DRAGONFLY ASSOCIATION

PATRON: Professor Edward O. Wilson FRS, FRSE

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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://worldddragonfly.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

The 2015 International Congress of Odonatology will be held at La Plata City, 60 km south of Buenos Aires, Argentina in association with the Universidad Nacional de La Plata, Museo de La Plata and Instituto de Limnología. The Congress venue is the 'Salon Cultural' of the Seguros Rivadavia Company (7th Avenue and 46th Street). The congress will be held between 15th and 20th November 2015. The post congress tour will be in Patagonia from November 22nd; in this tour we will visit Bariloche City (Rio Negro Province) and San Martin de los Andes City (Neuquen Province) visiting two beautiful National Parks: Lanin and Nahuel Huapi, hoping to find several of the patagonic endemics. For Congress enquiries contact Javier Muzón [icoargentina2015@gmail.com]. Enquiries for funding support should be addressed to Dr. Vincent Kalkman, Dorpsstraat 84, 2343BB Oegstgeest, The Netherlands. E-mail: [kalkman@naturalis.nnm.nl]. A website has been established for the Congress at: [http://ico2015-argentina.com.ar/congress/] and a Registration Form can be down loaded from: [http://ico2015-argentina.com.ar/registration/]. See also Congress message from Javier Muzón, p. 67.



The 8th Indian Symposium of Odonatology & Tropical Biodiversity was held in August 2014 (see report pp. 32-35) and many European country-based dragonfly societies held their annual meetings during the winter and spring of 2015. These included the Dutch Dragonfly Society (Nederlandse Vereniging voor Libellenstudie, NVL) which took place 22nd February, 2015 in Dominicanenklooster, Zwolle (see report p. 50); the Flemish Dragonfly Society (Libellenvereniging Vlaanderen vzw), which held its meeting jointly with Natuurpunt vzw at Mechelen, Belgium, 28th February 2015 (see report pp. 48-49); the Society of German Odonatologists (Gesellschaft deutschsprachiger Odonatologen e.V., GdO) whose meeting was held in Braunschweig, 21st March, 2015 (see report, pp. 36-37); the General Assembly of the French Society of Odonatologie (SFO), which was held, 14-15 March, 2015, in Ruynes en Margeride in the Cantal (Massif Central) (see report p. 47); and the First Symposium of Iberian Odonatology, which was held 1-3 May 2015 in Córdoba (Spain) (see report pp. 40-46).

Agrion Regional Representatives

Bert Orr has kindly agreed to act as Regional Representative, to help gather regional-based odonatological news and information of potential interest to WDA members from the Australasia region. Eight Agrion Regional Representatives have now been appointed, covering South America, Africa, Western Europe, North Asia, East Asia, Southeast Asia, South Asia and Australasia. We are hoping to appoint additional Regional Representatives to cover North America and Middle East. If any member would be interested in taking on the role for any of these two regions we would be very pleased to hear from you.

Cover photo: *Somatochlora sahlbergi* male taking shelter behind a one metre high palsa formation in windy weather. Photographed by Matti Hämäläinen in Nuorgam (Finnish Lapland) on 24 July 2009 (see *Somatochlora sahlbergi* article pages 22-31). Ed. The small village of Nuorgam is located on the northernmost point of Finland (70.09°N, 27°96'E) and since Finland is situated further north than any other EU country, Nuorgam is consequently the northernmost location in the European Union. The Nuorgam landscape is a fitting location for the world's most northerly occurring dragonfly (see Figure 13, page 30).

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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=14] or downloaded for completion and submission to WDA Secretary at [http://worlddragonfly.org/wp-content/uploads/2013/11/membership_application_form.pdf].

The WDA webmasters' email and address contacts are: Dr. Rhainer Guillermo Ferreira [rhainerguillermo@yahoo.com.br], R. Claudio Goelzer, 589. CEP 79823-352, Dourados, MS, Brasil and Dr. Christopher Hassall [c.hassall@leeds.ac.uk], School of Biology, University of Leeds, Woodhouse Lane, Leeds, LS2 3JT, UK.

Next issue of AGRION

For the next issue of *AGRION*, to be published at the beginning of January 2016, 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, preferably, or on a disk by post. Please do not include artwork with the text but provide a separate file or files in soft copy form, ideally in a compressed format (e.g. 'jpeg' or 'gif'), or as files on disk if sent by post.

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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The first collectors of *Somatochlora sahlbergi* – a story of an arduous expedition to Siberia in 1876

Matti Hämäläinen [matti.hamalainen@helsinki.fi]

Introduction

The Treeline Emerald, *Somatochlora sahlbergi* Trybom, 1889, has an extensive, transcontinental range in the arctic and subarctic regions of Eurasia as well as Alaska and North-West Canada. There are also isolated populations in the mountains of southern and eastern Siberia. For a recent review of its distribution and habitat preferences, see Schröter (2011) and Schröter & al. (2012).

As the northernmost dragonfly species in the world, *S. sahlbergi* enjoys a nearly mythical reputation among odonatologists. Yet for most, only the name of this enigmatic insect is well known. Only a tiny minority of odonatologists have been lucky enough to see this species in the field and on the wing. Many more dragonfly enthusiasts have tried their luck, but have returned home disappointed. Most of these ‘*sahlbergi* expeditions’, have headed to the species’ few known sites in northern Lapland, scattered across the far north of Fennoscandia, chiefly undertaken by those dragonfly devotees, wishing to see, photograph or collect as many European species as possible. Although most of them have the benefit of knowing the exact sites and flight periods in advance, the unforgiving and fickle weather conditions typical of Lapland, often prevent them from seeing any adult dragonflies at all. Moreover since *S. sahlbergi* flies only on sunny afternoons during a few weeks in July and early August, it is matter of sheer luck if suitable weather happens to coincide with the tight, advance-booked, travel schedules of today’s hasty travellers, even when they use helicopters to reach their destination.



Figure 1. *Somatochlora sahlbergi* male taking shelter behind a one metre high palsa formation in windy weather. Photographed by Matti Hämäläinen in Nuorgam (Finnish Lapland) on 24 July 2009.



Figure 2. *Somatochlora sahlbergi* female. Photographed by Matti Hämäläinen in Nuorgam (Finnish Lapland) on 23 July 2009 at the same spot as the male in Fig. 1. Both 23 and 24 July were sunny and windy days; there were more individuals of *S. sahlbergi* present at that site than mosquitos (see Karjalainen & Murtosaari 2015: 62–63). The low perching dragonflies were very docile and could even be touched.

Whatever inconveniences and troubles recent travellers may have experienced in their attempts to encounter *S. sahlbergi*, whether failed or successful, they are a far cry from those met by the participants of the original expedition to the Yenisei River in Siberia in 1876, where this corduliid species was first discovered and collected (among numerous other new insect species). The following account is based mainly on the personal experiences related by the Finnish entomologist John Sahlberg (1845–1920), the ‘eponymée’ of this species. Information is gleaned from the chapter ‘Journey to West Siberia in 1876’ (pp. 47–89) in a Finnish language book ‘*Travels in three continents*’ (Sahlberg & Saalas 1952). Sahlberg’s son Uunio Saalas (1882–1969) wrote the account of this Siberian trip based on Sahlberg’s long letters to his wife (of which 15 had survived) and on a series of brief travel reports in the Swedish language newspaper *Åbo Underrättelser*, which Sahlberg (1876) wrote on his expedition. Further information was gleaned from Saalas’ extensive bilingual biography of his father (Saalas 1960;

pp. 166–172 in Finnish, pp. 513–515 in German), from Sahlberg's brief note in *Berliner entomologische Zeitschrift* (Sahlberg 1877) and from the expedition report by Hjalmar Théel in Nordenskiöld & Théel (1877). For the publications of the entomological research results of his trip, see p. 26.

Nordenskiöld's expedition to Yenisei in 1876

In 1875 the renowned Arctic explorer and future discoverer of the Northeast Passage, Adolf Erik Nordenskiöld (1832–1901) made a successful voyage in the sloop 'Pröven' from Tromsø along the Arctic Sea coast, to Port Dickson at the mouth of the Yenisei River in Siberia. From there Nordenskiöld sent the ship back to Norway with some of the scientific participants, and himself continued with a smaller company of scientists in smaller vessels up the Yenisei to Yeniseysk town, finally returning home to Sweden overland. Encouraged with the results of this expedition Nordenskiöld decided to send two expeditions to Yenisei in 1876. According to his original plan (see Nordenskiöld & Théel 1877, pp. 3–7) the main expedition, lead by Nordenskiöld, would sail from Tromsø in late July on a sturdy cargo steamer, the 'Ymer' (a larger vessel than Pröven) to the mouth of the Yenisei and continue southwards to Dudinka (69° 24' N). The overland expedition, starting earlier, would travel to Yeniseysk, then descend the Yenisei River and meet with the nautical expedition members at latest by the end of August. The members of the overland expedition would then return to Europe in the steamer 'Ymer'.

Nordenskiöld originally selected two zoologists and two botanists to participate in the overland expedition. The leader was Dr Hjalmar Théel, a 27-year-old zoologist, who had participated in the 1875 expedition. The other participants were Dr Hampus Wilhelm Arnell (botanist and moss expert, aged 27), Filip Trybom (entomologist, aged 25) and Magnus Brenner (botanist and the interpreter of the expedition, aged 32). The first three were Swedes, posted in the Uppsala University. Brenner was a Finn and a headmaster from Helsinki. Only a few weeks before the start of the overland expedition, John Sahlberg, then aged 30, learned it was taking place and was eager to participate, even at his own expense if necessary. Sahlberg contacted Nordenskiöld and received a positive reply. Nordenskiöld promised to offer Sahlberg an expenses paid return trip on the steamer 'Ymer'. The four other participants were ready to accept Sahlberg's joining the party and it was agreed that Sahlberg should pay 1/5th of the expenses of the land and river journeys. Sahlberg made all necessary arrangements in a great hurry, raking up all money he could spare, amounting to 2,250 Finnish Marks (present value ca 9,200 Euro), a sum he expected to be sufficient, if nothing untoward occurred.

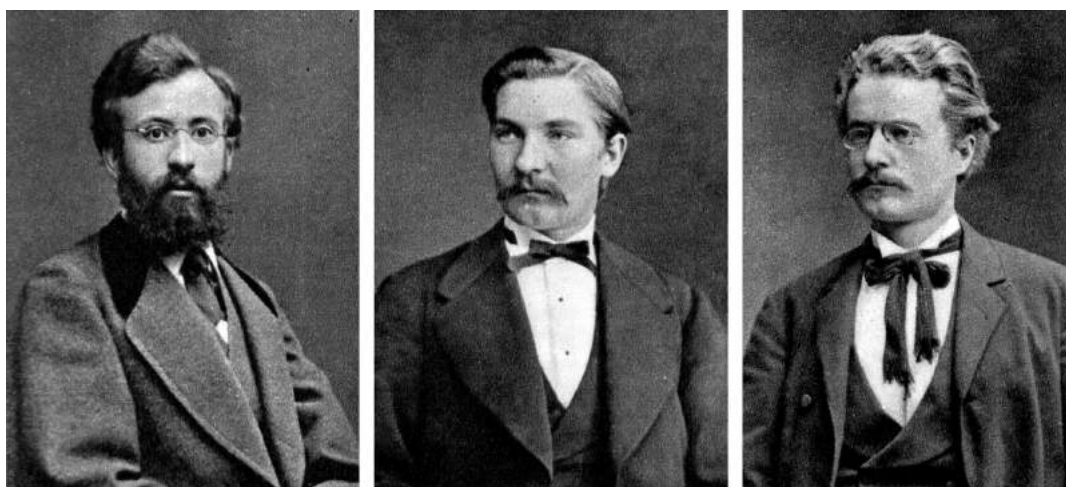


Figure 3.
Three
participants
of the 1876
Siberian
expedition:
John
Sahlberg
(left), Filip
Trybom
(middle)
and Hjalmar
Théel (right).

The long journey to Yenisei

At the start of May Sahlberg and Brenner took a train from Helsinki to Saint Petersburg. There they met the Swedes who had left Stockholm on 29th April. Sahlberg sought out an influential Finn, Major-General, Baron Knut Adold Ludvig Stjernvall, the director of Government Railways of Russia. Stjernvall gave Sahlberg a free first class train ticket to Nizhny Novgorod, the end of the eastern line at that time, and, just in case, a return ticket as well.

The five researchers left Saint Petersburg on 6th May. From Nizhny Novgorod they travelled on a ship along the River Volga and River Kama to Perm. Then they took two tarantasses with three or four horses, first to Yekaterinburg in the Ural mountains and then to the Tobol River. Sahlberg wrote: "It is difficult to imagine how uneven and bumpy this main road to Siberia is at this time of year ... the horses run flat out all time, with no attempt to avoid the potholes ... I have never before been so badly shaken in a horse ride ... As soon as we had left the ship, all conveniences of civilized life ceased". At the Tobol River they took a ship, first to its junction with the Irtysh River, which they navigated for some distance, then followed the Ob River to Tomsk. During the brief stops en route they were able to indulge in collecting along the shore. At the junction of the Irtysh and Ob rivers

the ship landed on the open shore at an isolated site for three days. During this period Sahlberg managed to make a good collection of beetles. After arriving at Tomsk, there began another long tarantass trip to Krasnoyarsk. The rainy weather had left the busy road in a miserable condition, but this did not slow their speed. Sahlberg wrote: "The vehicle hurried forward at such speed that it caused tremendous jolts such as one would think were caused by explosions ... the most important thing was to try to avoid one's head being smashed against the roof".

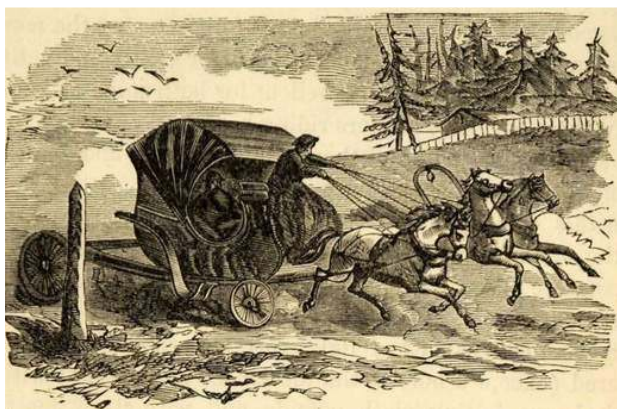


Figure 4. A tarantass in Siberia. A steel engraving from the year 1882.

the north, and in these surroundings the party collected further specimens. Around 25th June Sahlberg left the others for about a month and headed northwards on his own. He did this so that he might reduce his expenses by travelling on regular boats rather than sharing the costs of the hired private boats. (The Swedes and Brenner had no financial worries, all their expenses being covered by Baron Oscar Dickson, a wealthy Swedish magnate, who financed most of Nordenskiöld's expeditions). This diversion also allowed him more time to spend in the Arctic region, which held most interest for him.

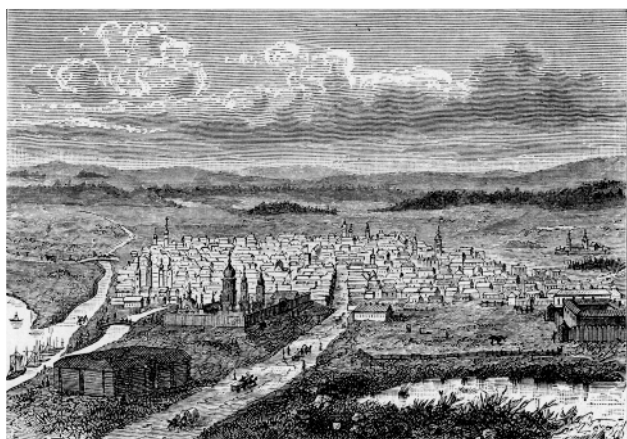


Figure 5. Yeniseysk town at 1870s. From Nordenskiöld (1880).

spirit. Some of the oarsmen were ready to sacrifice half their pay in exchange for the spirit. Early in the morning of 12th July Sahlberg arrived at Poloj (66° 50'N) and was left at the yurt of a poor Ostyak family, where all were away. He was advised to make himself at home and eat whatever he could find. The only food was a stack of sun dried fish, seething with black carrion beetles. "If you hit it with the back of an axe you could get a piece of this stone-hard mass of fish, and it was not too bad to eat when there was no other choice". After spending the whole day collecting and sleeping alone that night, the family returned and rowed him to the next destination.

In Chantaika and Dudinka

In Chantaika (68° 25'N), a rather lonely place, he got reasonable accommodation and he remained there for eight days from 15th to 22nd July. The river banks were well vegetated, but beyond the landscape opened into tundra with numerous small pools. In the first few days of his stay he enjoyed excellent sunny weather and saw and collected Arctic butterflies such as [*Boloria*] *freia*, [*Boloria*] *frigga*, [*Oeneis*] *norna* and [*Oeneis*] *bore* as well as *Anarta*

At Yenisei

After arriving in Krasnoyarsk (56° 01' N) late in the evening on 8th June, Sahlberg discovered that although carefully packed, all his glass bottles and tubes were broken. Insect pins had sprung out of boxes and were in great disorder. The party stayed in Krasnoyarsk about a week and managed some collecting in: "the most wonderful and enchanting environment I could have imagined; it was like being in Switzerland ... The mountain slopes had a luxuriant vegetation, and in the valleys you could see groves carpeted with the most beautiful flowers ... The insect fauna consisted partly of familiar Scandinavian species and partly of purely Siberian species; the fauna was richer than in any place I have previously collected". He collected mainly beetles and true bugs (Hemiptera), his speciality. On 16th June the trip resumed along the Yenisei River to Yeniseysk (58° 27' N), about 250 km to

Sahlberg was lucky to get on board a cargo vessel skippered by Captain David Ivanowitsch Schwanenberg and with the Finnish first mate Gustaf Adolf Nummelin, both of whom he had already met earlier on the route. They were exceedingly helpful, providing free (or cheap) passage and actively facilitating Sahlberg's field work during the brief stops. On 10th July Sahlberg left the ship at the junction of Kureyka River (66° 29'N), close to the Arctic Circle, and hired a succession of Ostyak (Khanty) men to ferry him in small boats from one village to the next. Sahlberg could speak only a few words of Russian, but with a small dictionary he managed to communicate with the oarsmen. He found the Ostyaks to be helpful and friendly people, but was worried by their great craving for alcohol (Sahlberg was a lifetime teetotaler). "Sometimes they give in to boozing so heavily that they drink themselves to death".

He had a small glass jar with a few fish preserved in



Figure 6. A large rowing boat on Angara River, a sidestream of Yenisei, south of Yeniseysk town. From Nordenskiöld (1880).

few kilometres away. The boatman had harnessed four dogs to the bow of the boat (a typical method there) to launch it. The launch was too rapid and the heavily loaded boat almost instantly filled with water and it was only with great difficulty the men had managed to prevent it sinking. Everything, including a pile of dried herbarium specimens, were soaking wet. Fortunately the insect collections were not badly damaged.



Figure 7. Dog-drawn boat in Yenisei in 1876. Drawing by Hjalmar Théel. From Nordenskiöld (1880).

at the mouth of the Yenisei on 15th August, and that they had tried to sail south, but as the ship had run aground several times south of Mesenkin ($71^{\circ} 27' N$) they had not been able to reach Dudinka as originally planned. Therefore, Nordenskiöld had decided to start the home voyage on 1st September, and he asked the party to return home by overland. This news was met with mixed feelings. They were pleased to know that Nordenskiöld had managed to reach the mouth of the Yenisei, but very unhappy that he could not meet them and provide passage home on the 'Ymer', although at one phase they had been only about 40 km away from the ship. Instead of a fairly comfortable three week sea voyage to Tromsø, they were now faced with a tedious two month return, retracing the same land route, in worsening weather conditions. Sahlberg had an added anxiety. His remaining funds were running short, since he had expected a free return passage. Nordenskiöld had left some cargo at Karepovsk ($71^{\circ} 25' N$) and Théel had to arrange for its transport and sale. The others headed southwards on a slow steamer, the 'Yenisei' on 7th September. There were no reserves of firewood in this ship for fuel nor was any stock available on the shore. Every few hours the ship had to stop and the crew and passengers went ashore chopping and gathering driftwood for fuel. Gradually a thin layer of snow covered the ground and the river started to freeze. It took nearly one month for the ship to reach Yeniseysk, where they arrived on 4th October. Since Nordenskiöld's 'official party' had still to remain there to wait for Théel's return, Sahlberg decided to head

moths. Here he also netted a *Somatochlora* female (see p. 27). Most of the time he was busy with collecting beetles and true bugs, but he also collected other insects and a selection of moss and other plants. From Chantaika, Sahlberg moved on to Dudinka ($69^{\circ} 24' N$) in the face of a strong contrary wind, arriving there on 24th July. At that time Dudinka consisted only of seven or eight ramshackle houses and a small wooden church. On 29th July, to his great joy, his four companions also arrived. In Yeniseysk they had bought a large boat ('Luna') and sailed down the river stopping here and there along the route to collect. In Dudinka, Sahlberg almost lost his collections. He had loaded his belongings onto a small boat and asked the boatmen to take the load to the 'Luna', which was anchored in a sheltered place a

Northwards to rendezvous with Nordenskiöld

On 8th August the party moved northwards to the section of Yenisei where there are numerous islands in the river. They first briefly visited Malo-Briochovskij Island ($70^{\circ} 30' N$) on 11–12th August and then stayed on Nikandrowskij Island ($70^{\circ} 20' N$) from 13–24th August awaiting Nordenskiöld's arrival. Their attempts to go further north failed. Since they had an impression that Nordenskiöld would fetch them from anywhere in that area they decided to retreat a little south to Tolstoinos (Tolstyy Nos; $70^{\circ} 10' N$), where they remained waiting for Nordenskiöld, making collections nearby. On 4th September a messenger arrived with a note from Nordenskiöld informing them that the 'Ymer' had already arrived

back home as soon as possible. The remaining party left later, on 22nd October. He badly missed his wife and his 9-month-old daughter of whom he had had no news since the start of the trip (only in Nizhny Novgorod or Moscow, just a few days before arriving home, did he receive one of the several letters his wife had sent to him at various poste restante addresses en route).

A destitute tatterdemalion on way home

On 5th October Sahlberg packed his things into a tarantass, worrying how he would manage to make the long and arduous return journey with his dwindling reserves of cash and rudimentary knowledge of Russian. Later he discovered this latter was not a serious problem, since the horse transport system was well organized in Russia and not many words were needed. "After arriving at the lodge you just need to say in a few words what you want, then the Russki replies 'haraschoo' and takes action at once. But if you start waiting for questions which you do not understand you become irresolute". He travelled as quickly as possible, slept only a few hours a night and often travelled at night. At Tomsk he managed to borrow 50 roubles from a Finnish teacher whom he had met in May. It was essential that he arrive at Kungur (near Perm) before the ship transport on Kama River stopped for the winter. He arrived to find, to his dismay, the last ship had departed three to four days earlier. This meant that he had to travel nearly 1,000 km further by tarantass than expected. However, during the summer he had developed resilience to all kind of difficulties. He soon composed himself, borrowed some money from a local Finn, and set off by road optimistic that at least in Kazan the river route would still be open. But again his hopes were dashed and he was obliged to travel by tarantass all the way to Nizhny Novgorod, from where he was able to take the train back home. After the arduous journey by horse-drawn tarantass it was a luxury to sit down in the first class carriage for which, most luckily had a free return ticket to Saint Petersburg. Sahlberg wrote that he was the only passenger in his carriage. Since his dirty clothes were in tatters he had to wrap himself in a large shawl, which was in a little better shape. Throughout the whole trip, at both ends of the carriage stood a waiter, expecting the passenger to order food and drink. But by now almost destitute he ordered nothing. In Moscow he managed to send a telegraph to his wife to say he would be back home next Tuesday. In both Helsinki and Stockholm relatives and friends of the Yenisei expedition members had long worried for their safety as they had received no news. In September, Nordenskiöld had sent a brief message that he had not met the party at the mouth of the Yenisei, nor had he any knowledge of their whereabouts. Only a month later in October were some of the participants able to telegraph family in Europe.

Finally, on 1st November Sahlberg reached home safely in Helsinki and joined his family after a separation of six months. With great relief he found that his collections had remained largely intact after the long, bone-shattering, epic journey by tarantass. Soon after his return he fell ill with a stomach ailment, but fortunately made a swift recovery. The Swedes made their return to Stockholm on 9th December; Brenner had arrived home in Helsinki a few days earlier.

On 3rd December 1876 his wife wrote to her friend: "John is pleased with his journey, but he would never wish to make a similar one. He met with many hardships, slept only in three nights during the last month and lived on beggar's rations; tea, bread and cabbage soup once a day".



Figure 8. Newly weds John and Mimmi Sahlberg make ready for their combined honeymoon/collecting trip to Kuusamo (in northern Finland) at the end of May 1873. In this studio portrait John Sahlberg is exceptionally well dressed. A woman wearing trousers at that time was a very unusual sight and attracted comment. Mimmi Sahlberg was interested in botany. Photograph from the photo archives of the Finnish Museum of Natural History, Helsinki.

In the final part of his series of travel reports published in *Åbo Underrättelser* Sahlberg (1876) wrote: "After leaving Helsinki I had over the period of a half year travelled a total of 17,600 km [the original figures are converted to kilometres], of these 3,200 km by railway, 6,950 km by ship along rivers, 1,600 km by various small craft (rowing, drifting on the current or drawn by dogs) and 5,900 km in horse-drawn vehicles". It was no picnic.

The dragonflies collected

In 1889 Trybom published a paper in Swedish on the Odonata collected during this expedition (Trybom 1889). In the paper he lists a total of 20 species and provides data of collecting localities and dates; all locations were along the Yenisei

River, from Yeniseysk (58° 21' N) to Dudinka (69° 25' N). The number of specimens is not specified for all species, but it seems obvious that the total number of the specimens collected may have been between 50 and 100. Most of the specimens were collected by Trybom himself. Only six specimens of four species were marked to be collected by Sahlberg, all of them during the time when he was travelling alone.

Trybom described four new species: '*Somatochlora sibirica*, n. sp.?', '*Somatochlora Sahlbergi* n. sp.', '*Somatochlora? theeli* n. sp.' and '*Agrion Hylas* n. sp.'. From these, two species are valid, namely *S. sahlbergi* and *Coenagrion hylas*.

The description of *Somatochlora sibirica* was based on a male and female specimens collected by Trybom himself at Inserovo (Lebjedovo; 62° 05' N) on 7th July. The author was somewhat dubious as to whether the species was really a new one, thus the question mark after 'n. sp.'. In the discussion he considers the possibility of it being the same as the Japanese *S. atrovirens* Selys, 1883, which species in turn is a synonym of *S. viridiaenea* (Uhler, 1858). Schmidt (1957) suggested that *S. sibirica* is a synonym of *S. graeseri* Selys, 1887, a species described from Amur.

Somatochlora sahlbergi was described from three male and one female specimens, all collected by Trybom. Two males and one female were collected at Plachino (68° 05' N) on 23rd July and one male at Dudinka (Dudinskoje; 69° 25' N) on 30th July.

Somatochlora? theeli was described from two female specimens. One was collected by Sahlberg in Chantaika (Chantajskoje; 68° 25' N) on 19th July and the other by Trybom in Patapovskoje (68° 55' N) on 25th July. The female specimen collected by Trybom was a rather old specimen, that by Sahlberg was badly damaged, either when captured or later. However, according to Trybom there was no doubt of them being conspecific. Trybom was not quite sure whether *theeli* should be placed in the genus *Somatochlora* or in a new genus, thus the question mark after the genus name. Later K.J. Valle studied the type specimens of *S. sahlbergi* and *S. theeli*, preserved at the Swedish Museum of Natural History in Stockholm (Valle 1930). Valle determined that the female specimen, identified by Trybom as *sahlbergi* was in fact a female of *S. alpestris* (Selys, 1840). On the other hand the two female specimens of *theeli* represented the female of *S. sahlbergi*. Consequently Valle (1930) placed *S. theeli* as a synonym of *S. sahlbergi*. The taxon *sahlbergi* had a page priority and the male sex of this taxon was known, unlike that of *theeli*. With this synonymy, Sahlberg also became a collector of the species named after him.

The description of *Agrion hylas* (presently *Coenagrion hylas*) was based on three male specimens collected by Trybom in Plachino (68° 05' N) on 23 July.

The other recorded species were (here the present names and genus combinations are used):- *Libellula quadrimaculata*, *Sympetrum flaveolum*, *Leucorrhinia dubia*, *L. rubicunda*, *Epitheca bimaculata*, *Somatochlora arctica*, *Cordulia aenea*, *Aeshna juncea*, *A. caerulea*, *A. grandis*, *Enallagma cyathigerum*, *Coenagrion johanssoni*, *C. hastulatum*, *C. lunulatum*, *C. armatum*, *Erythromma najas*. In spite of the taxonomic errors in the *Somatochlora* species in Trybom's paper the number of dragonfly species collected remained at 20.

Other insects collected

A large number of insects of different orders were collected by both Sahlberg and Trybom. Sahlberg was especially interested in Coleoptera and Hemiptera, but also collected other orders, such as Lepidoptera. The first publication on the entomological results of the expedition was a brief, 16-page paper by Trybom (1877) listing 51 butterfly species. Three new 'varieties' were named. Sahlberg (1878) published a paper on Hemiptera collected

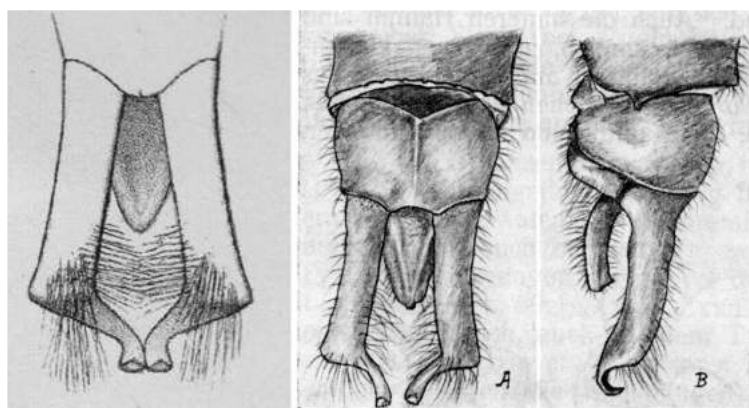


Figure 9. Anal appendages of male *S. sahlbergi*. Drawings from Trybom (1889) on left and from Valle (1930) on right.



Figure 10. *Coenagrion hylas* male. Photographed by Jean-Pierre Boudot in Tyrol, Austria on 30 July 1992.

during the expedition, also including the specimens collected by Trybom. In addition a number of specimens collected by other Finnish entomologists in Siberia in 1877 were included in this publication. Sahlberg's paper treated 186 species, of which 18 were new; one of them was named after Trybom. Two years later Sahlberg (1880) published a similar paper on Coleoptera, which however covered only 11 families. A total of 750 species were listed of which 78 were new. Two new species were named after Trybom and one new genus and new species was dedicated to Nordenskiöld.

I have not attempted to find other publications which might treat other insects collected on this expedition. It is also beyond the scope of this article to list other zoological and botanical publications resulting from the expedition. However, I should mention that in 1889–1890 S.O. Lindberg and H.W. Arnell published on the moss species discovered in Nordenskiöld's 1875 and 1876 expeditions. John Sahlberg had also collected a number of moss samples, and one new species *Jungermania sahlbergii* was named after him (Lindberg & Arnell 1889, p. 40).

Sahlberg's comments on his travel companions

After a few days' acquaintance with his Swedish travel companions, Sahlberg wrote to his wife on his first impressions. He wrote that "As far as I have been able to discern thus far, all of them – perhaps less so in the case of Arnell – are beginners in the field of science, but they are very enthusiastic in their various pursuits. Théel has manners and bearing very like [the Finnish professor of botany, Sextus Otto] Lindberg, when the latter is in calm mood. Trybom resembles a Finn, he is rather taciturn and prudent. Arnell is a decent man, after the fashion of [the Finnish moss expert Viktor Ferdinand] Brotherus. They have taken revolvers for self protection, but both Brenner and I consider it useless to carry a weapon". On the voyage on the Kama River Sahlberg wrote: "The Swedes want to live and eat well while we still have the opportunity; neither have I often been able to avoid participating in superb dinners with steaks, fried sturgeon, eggs and other delicacies". On the ship along the Tobol, Irtysh and Ob rivers, the Swedes and Brenner were in first class, but to save money Sahlberg travelled second class. Therefore Sahlberg could not spend much time with them. From Yeniseysk, Sahlberg wrote to his wife: "I think that Trybom may eventually become a very skillful collector, although he is still rather inexperienced and his knowledge of species is rather limited. I think that it has been quite useful for him to be in my company. Arnell is no doubt the one who will achieve most in this trip. I have often been impressed by his fund of knowledge and clear head. I feel some pity for Théel, who has many times regretted that he ever began this journey, having not wanted to participate from the first, as he has no special area of interest to which he could contribute knowledge. He just allowed Nordenskiöld persuade him to participate. It will be sad to part from these interesting travel mates, but it will be enjoyable to meet them again in Dudinka in mid-July. I think Nordenskiöld will appreciate that we will sometimes work in separate places". Obviously Sahlberg and the others got on well during the whole trip, or at least the story written by Uuno Saalas does not contain any really negative comments about his companions. Sahlberg's comment on Théel's research activity is somewhat misleading, since Théel observed and collected birds and mammals and he also took samples of fish, molluscs, crustaceans and other aquatic animals. In his travel report (Nordenskiöld & Théel 1877) Théel wrote that a total of 140–150 species of birds were observed during the trip. He also presented a list of 28 mammal species recorded.

Although Sahlberg joined this expedition by personal entreaty rather than invitation, his scientific contribution was remarkable in entomological terms, considerably greater than that of Trybom. In his travel report (cited above) Nordenskiöld listed Sahlberg as a member of the expedition, as did Arnell (1877). Therefore it is interesting to see that Trybom (1887) in his brief article '*The present condition of natural sciences in Sweden*' wrote of the Nordenskiöld expedition as follows: "Most of the insects which I collected in Siberia, 1876, were described by Professor John Sahlberg, in Helsingfors, who during the same year travelled in the land of exiles". This rather strange selection of words easily gives a wrong impression that Sahlberg would not have anything else to do with this Nordenskiöld expedition than to describe the insects collected by Trybom! Is there a somewhat chauvinistic tone in this statement, minimising the contribution of the Finnish gatecrasher, directed to a readership in America? On the other hand in Trybom's two entomological papers Sahlberg's role as a member of the expedition team is duly recognized.

Short biographies

John Sahlberg (6.6.1845 – 8.5.1920)

Johan (John) Reinhold Sahlberg was born in Helsinki as the second son of Reinhold Ferdinand Sahlberg, who was a Finnish entomologist, explorer, physician and later owner of a large rural estate, one of the largest in the country. Sahlberg enrolled at the University of Helsinki and in 1869 gained a Masters degree, majoring in zoology. In 1871 he defended his doctoral thesis, the subject of which was the Auchenorrhyncha fauna of Finland and Scandinavia. In the same year he was nominated as docent of zoology. In 1883 he became extraordinary professor of entomology at the University of Helsinki, from which chair he retired in 1918.

Sahlberg studied mainly Palaearctic Coleoptera and Hemiptera, but in his numerous publications and

scientific notes, he also wrote on Finnish species of several other insect groups, such as Lepidoptera, Hymenoptera, Trichoptera and Orthoptera. He described several hundred new insect species, mainly Coleoptera. He produced many voluminous publications enumerating different groups of Coleoptera and Hemiptera in Finland. He was an ardent and efficient field worker, who collected large quantities of insect specimens both in Finland and during his extensive foreign travels. In addition to the six month journey to Siberia in 1876, he travelled in East Karelia in 1869 and to the Kola Peninsula in 1870. Later he made a three-month-long journey to West Turkestan in 1896, accompanied by his 14-year-old son Unio Sahlberg (later Uunio Saalas). He also spent three winter periods (1895–1896, 1898–1899, 1903–1904) in Mediterranean countries, accompanied by his wife, Wilhelmina ('Mimmi') Sahlberg (née Werving), and other family members (they had five children of whom two died young). In these countries Sahlberg also assiduously collected insects. Altogether his foreign journeys amounted to three years.

Sahlberg was a modest, humble and friendly man. He did not consider any kind of work beneath him. He was pleased to eat whatever was available, a quality that helped him endure arduous field trips, especially in remote regions and in foreign countries. He was a strong walker and could easily cover tens of kilometres a day, even in old age. He was an advocate of temperance and he worked actively in Christian circles. Sahlberg did not accept Darwin's views on evolution and he wrote several articles (in Swedish) against them, such as 'The effect of Darwinism on morals' (1894).

Filip Trybom (24.12.1850 – 15.2.1913)

Arvid Filip Trybom was born in Fivelstad in East Gothland province in Sweden. His father was a warrant officer and hospital administrator. Trybom studied natural history at Uppsala University and gained his Masters degree in 1875 and the Licentiate of Philosophy degree in 1882. Besides participating in the Yenisei expedition in 1876, in 1877 he accompanied Herman Sandeberg on an expedition to the coast of the Kola Peninsula, where he mainly studied marine animals. From 1878 he worked in various offices in the Swedish fishery administration and in 1908 he became chief of the fishery department of the Board of Agriculture in Sweden. He published a handbook on fish conservation and fish breeding *Fiskevård och fiskodling* (1893). In connection with his fishery duties he visited several European countries and in 1885–1886 he visited the United States and Canada travelling throughout the continent from east to west. He received an honorary Doctor of Philosophy from the University of Uppsala in 1907.

Trybom published 25 entomological research papers, 17 of them (1893–1912) dealing with thrips (Thysanoptera). Besides the Swedish thrips fauna he identified and studied several collections made in Africa and described many new species and genera. In 1889 he married Ellen Schelin, but they had no children. Trybom was generally considered to be peaceable, considerate, prudent and jovial.

Johan Hjalmar Théel (14.6.1848 – 20.7.1937)

Hjalmar Théel (originally Tjäder) was born in Säter in Central Sweden. His father was captain Johan Jakob Tjäder and his mother Zephira Olivia Leijonflycht, a member of the Swedish nobility. Théel studied zoology at Uppsala University, was awarded a Doctor of Philosophy degree in 1872 and became docent of zoology in 1875. In 1889 he was appointed as an extraordinary professor of comparative anatomy at Uppsala University. In 1892 he became curator and professor of Invertebrate Zoology at the Swedish Museum of Natural History in Stockholm. After retiring from the museum in 1916 he continued work as Director of the Kristineberg Marine Zoological Station. Théel published mainly on sea cucumbers (Holothuridae) and on other marine invertebrates, such as sipunculid and polychaete worms. His major publication on holothurians is 'Report on the Scientific Results of the Exploring Voyage of HMS Challenger 1873–76', which appeared in two parts in 1881 and 1885. In this publication he described many new species, especially in the Order Elasipodida. An excellent artist, he personally prepared drawings for his publications. He participated in two (1875 and 1876) of the Nordenskiöld's expeditions to the mouth of the Yenisei River.

Adolf Erik Nordenskiöld (18.11.1832 – 12.8.1901)

Nils Adolf Erik Nordenskiöld was born in Helsinki into an old Finnish-Swedish noble family. His father was Nils Gustaf Nordenskiöld, a prominent mineralogist and traveller. Nordenskiöld studied mineralogy, mathematics, chemistry and physics at the University of Helsinki, gained a Masters degree in 1853 and defended his doctoral dissertation (on a mineralogical topic) in 1855. In the promotion ceremonies at the University of Helsinki in late May 1857 Nordenskiöld delivered a public speech, which was considered politically provocative by Count F.W. R. von Berg, Governor-General of the Grand Duchy of Finland. Nordenskiöld refused to send his apologies to von Berg, and rather than waiting for repercussions, he migrated to Sweden without delay. He soon settled into academic circles in Stockholm, and in 1858, aged 26, he was appointed as superintendent and professor of the mineralogy department at the Swedish Museum of Natural History in Stockholm, a position he held for the rest of his life.

Nordenskiöld became a citizen of Sweden in 1860, but his ties to Finland (where he could freely travel after von Berg's departure in 1861) remained close. In 1863 he married Anna Mannerheim, the daughter of Count Carl Gustaf Mannerheim, the well-known Finnish coleopterologist, and the aunt of Baron Carl Gustaf Emil Mannerheim, Marshal of Finland and the 6th president of Finland.

Nordenskiöld's first foreign expedition took place in 1853 when he accompanied his father to Tagilsk in the Ural mountains to study iron and copper mines. Nordenskiöld's Arctic explorations, together with Otto Thorell, began with two expeditions to Svalbard in 1858 and 1861. In 1864–1873 he led several independent expeditions to Svalbard. He also made two expeditions to Greenland (1870 and 1883). In 1875 and 1876 he studied the Kara Sea and the areas at the mouth of the Siberian Rivers Ob and Yenisei. These two journeys were preliminary steps in his ultimate goal to cross the whole Northeast Passage. This took place in 1878–1879. With his ship 'Vega' he managed to sail around the north coast of Asia returning home by way of the Bering Strait. On route the ship was icebound near the Bering peninsula for ten months, during which time the team conducted active research work. Nordenskiöld was the first to navigate the whole length of the Northeast Passage. The 'Vega' expedition made him a famous and widely celebrated explorer. He received the title of baron, membership of the Swedish Academy and numerous other tributes, both in Sweden and elsewhere.

Nordenskiöld's expeditions were not aimed to set records. Rather his intention was to perform detailed research work in geography, natural history, archaeology and ethnography. His expeditions were well planned, with ships carefully selected for their purpose and participating scientists chosen from a wide variety of fields of expertise. He also took care that the results were duly published. It was largely by his influence that Arctic exploration developed from adventure into scientific research. Nordenskiöld was also interested in zoology and botany. One of his earliest publications (1856) was on the molluscs of Finland.

Nordenskiöld was passionately interested in old maps, which he systematically collected and studied. His invaluable collection of 24,000 maps is kept at University of Helsinki. The collection is inscribed on Unesco's Memory of the World Register.

Concluding remarks

The first discovery of *Somatochlora sahlbergi* at Yenisei River was an unintended bonus to Nordenskiöld's attempt to find a navigable northern sea route from Europe to Asia. Although Nordenskiöld showed that it is possible to use this route, its commercial exploitation started only in 1935. After the collapse of the Soviet Union, only the route from Murmansk to Dudinka (one of the original collecting localities for *S. sahlbergi*!) has been regularly used, with the ports east of the mouth of the Yenisei now largely abandoned. However, one might expect that in future the Northeast Passage will be more widely used, especially as climate change makes this sea route more navigable. Unfortunately for *S. sahlbergi*,



Figure 11. Adold Erik Nordenskiöld.



Figure 12. An open subarctic habitat of *S. sahlbergi* in Nuorgam, Finnish Lapland. This type of landscape with palsa formations somewhat resembles the true frozen tundra habitat. Photo by Matti Hämäläinen (24 July 2009).



Figure 13. A sheltered habitat of *S. sahlbergi* in the Kevo canyon in Finnish Lapland. This small palsa mire pond is surrounded with arctic birch (*Betula pubescens czerepanovii*) forest sparsely mixed with boreal pine trees (*Pinus sylvestris*). Photo by Asmus Schröter (11 July 2010).

a species with unique ecological requirements inherited from the cold, dry and sunny pleistocenical Beringia, change of climate along the subarctic belt may threaten its survival.

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The 8TH Indian Symposium of Odonatology and Tropical Biodiversity

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The 8th Indian Symposium of Odonatology and Tropical Biodiversity was organized by the department of Zoology, Hislop College, Nagpur on 17th and 18th August 2014. Concomitantly, the First National Workshop on Odonatology was also undertaken. A photo exhibition-cum-competition on the title topic was also held. A one day field trip was arranged on the 19th to Linga Lake of Central India. The Inauguration programme was initiated by the anthem of RTM Nagpur University Nagpur, followed by lighting of a lamp.

Dr R.J. Andrew, the Convener of the symposium, spoke about various symposia and conferences on Odonatology held in different places in India, including the 18th International Symposium which was also organized by Hislop college in 2007.



Figures 1-12. Glimpses of the Symposium.

Dr Dipti Christian, the Principal of Hislop College, lauded the efforts taken by the Department of Zoology. She focused on conservation of biodiversity and voiced her concern about man being the greatest consumer of natural resources resulting in depletion of resources.

Dr Dilip Singh, Chief Conservator of Forest and Member Secretary Maharashtra State Biodiversity Board, Nagpur, spoke about the overexploitation of our natural resources, pollution, and industrialization which are posing great threats to natural ecosystems. He further added that odonates are a neglected group of arthropods, which have a definite role to play in maintaining ecology and biodiversity as a whole in a given ecosystem.

Dr Anoop Kumar, Commissioner and acting Vice-Chancellor, spoke about the toxicity in the environment and depletion of ozone layer and reduction in flora and fauna. He focused on university studies and novel trends of research to promote more awareness of biodiversity for the survival of the planet, and urged that the message of biodiversity and ecosystem conservation be spread through younger minds for the better future. He made a strong statement on rapacious human consumption and depletion of biodiversity. He justified the concept of simple living and quoted Gandhi: "the world has enough for everyone's need, but not enough for everyone's greed." He also stressed the importance of holistic development of students during college education and observed that the University should not be a degree vending organization, but a place to discover answers to the problems of the society. Prof. A. M. Khurad, ex-Head, PGD Zoology, RTM Nagpur University was also felicitated for being the perfect role-model teacher for his students.

Prof. D. B. Tembhare, was felicitated for his forty years research on odonatology and was conferred the title of "Father of Indian Odonatology" by the South Asian Council of Odonatology.

The First session started with the Keynote address *A geographic information system on Odonata of India* by Dr K.A. Subramanian followed by seven paper presentations on odonatology ranging from odonate biodiversity to effects of toxins on various systems/organs of dragonflies. The post-lunch session began with the plenary talk by Mr Prasenjeet Yadav *Photography: a tool in research and conservation*, followed by five presentations on odonatology. The evening session included the oral presentation of six papers on Indian biodiversity and poster presentations. A total of 10 odonate and 23 biodiversity posters were presented.

In the evening the South Asian Council of Odonatology, general body meeting was held in the conference hall. It was decided to continue with the same body of members and the next National Symposium would be held in the state of Kerala and to make the Workshop of Odonatology an integral part of the symposium.

Further oral presentations on odonatology were made on the second day, including a talk by Dr Suri babu on "Odonate assemblage at the mortuary of GMC, Jagdalpur". Post-lunch, the first hour was dedicated to interaction and question sessions by the participants followed by the Valedictory function. Prof. A.M. Khurad was the Chief Guest while Prof. D. B. Tembhare presided over the function. The following odonatologists were felicitated and conferred the "Fellow of the South Asian Council of Odonatology" for their continuous work on various aspects of odonatology over the past two or three decades: Dr B. Suribabu, Dr Manu Thomas, Dr G. K. Walia, Dr A. Reniprabha, Dr S. Muralidharan, Ms K.G. Emiliyamma, Dr Gaurav Sharma, Dr M.A. Subramanian and Dr R.J. Andrew. The top three winners of the poster and oral presentations and photo competition were awarded.

On 19th August around 55 participants embarked on a field study tour to Linga Lake, about 55 km west of Nagpur. Under the guidance of Dr Subramanian, Dr Sharma and Mr David Raju the participants were given field knowledge of the faunal diversity of central India.

The First National Workshop on Odonatology

The first ever Indian National Workshop on Odonatology was organized by Hislop College, in association with DragonflyIndia and India Biodiversity Portal, and held on 17-19 August 2014 at Hislop College, Nagpur, India. The workshop ran in parallel with the 8th Indian Symposium of Odonatology. The idea of the workshop was to provide a platform for researchers and amateurs working on odonates across India, to meet, interact and discuss their work. Dr K.A. Subramanian and Mr Pankaj Koparde coordinated the workshop. Thirty-five participants, representing ten states from all across the country participated in the workshop.

The workshop started on the evening of 16th August with an inspiring speech by Dr R.J. Andrew, who talked about how to do good science and how dragonflies can be used to study various aspects of physiology and behaviour. This was followed by a briefing on workshop schedule, activities and field trips by Pankaj Koparde.

On the morning of 17th August, the first field trip was arranged to Ambazari Lake in Nagpur city. The trip was led by Dr Ashish Tiple and Mr David Raju. Eleven species of odonates were sighted during the trip. The field trip was followed by tutorial lectures by Dr K. A. Subramanian on *Biology and taxonomy of Odonata* and by Mr Parag Ranganekar on *Odonata identification in the field*. Both these audio-visual lectures provided participants with basic knowledge on Odonata identification, which many of them found very useful.

The second field trip was arranged on 18th August morning at Futala Lake in Nagpur city. The trip was led by Dr Ashish Tiple, Parag Ranganekar and David Raju. Nineteen species of odonates were sighted during the

trip. The workshop session started with a talk by Dr Gaurav Sharma on *Odonates of Rajasthan*. This was followed by talks by Mr Vijay Barve, who talked on *Use of spatial data collection in science*, and Dr Thomas Vattakaven, who talked on *India Biodiversity Portal and its role in data acquisition*. Dr P. Jegan talked on how names of odonates in local language can be used in effective conservation.

On 19th August, the third field trip was arranged at Linga Lake in outskirts of Nagpur city. Sixteen species of odonates were sighted during the trip. The workshop session started with *Laboratory session on Odonata identification* lead by Parag Ranganekar. This session was followed by participant presentations wherein Mr Sridhar Halali presented his work on odonates of Goa and Mr Prosenjit Dawn presented on how to rear dragonfly larvae. The participants' talk session was followed by a tutorial lecture on *Odonata surveys* by Pankaj Koparde. The workshop session was ended with a talk by Dr Andrew, who summarized workshop activities.

The workshop sessions were mostly interactive and included classroom and laboratory teaching. Apart from the tutorial lectures, a lot of time of the workshop was spent on participants discussing their work and on creating a network of observers throughout India to fill in gaps in faunal data. Feedback on the workshop was invited and most of it was positive.



Figures 12-18. Glimpses of the workshop.



Ictinogomphus rapax
Common Clubtail [male]



Tholymis tillarga
Coral Tailed Cloud Wing [Male]



Paracercion calamorum
[Male]



Pseudagrion decorum
Three Lined Marsh Dart [Male]



Rhodischnura nursei
Pixie Dartlet [Male]



Pseudagrion hypermelas
[Male]



Rhodischnura nursei
Pixie Dartlet [Female]



Rhodischnura nursei
Pixie Dartlet [Mating pair]

Figures 19-24. Some of the species sighted during the field-trips.

34th GdO-Meeting in Braunschweig 2015 “25 years later”

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It was the Friday of the fourth weekend in March. Dragonfly specialists from all over Europe arrived in Braunschweig to make pilgrimage to the Haus der Wissenschaft (“House of Science”), where the organisers, Diana Goertzen, Dagmar Hilfert-Rüppell and Georg Rüppell, Carsten Schütte and Frank Suhling had arranged a friendly reception. It was easy to feel comfortable immediately, even after a long trip. More than 130 dragonfly specialists chatted with each other and enjoyed a warm soup and cold water, lemonade or just a beer. Needless to say, it was no easy task for the organisers to get all the participants to move to the lecture hall. The Friday evening topic “Expedition Libelle - die Suche nach den Hot Spots der Biodiversität” was represented by three talks. Viola Clausnitzer gave an impression of the “Kafa Biosphere Reserve” located in Ethiopia, its biodiversity and the last remaining populations of wild-growing *Coffea arabica*. Hmm – one could almost smell the coffee. With “The Big Five”, Jens Kipping illustrated the rediscovery of rare dragonflies in southern central Africa with beautiful pictures and a warm-hearted description of the people living there. Jewels are André Günther’s best friends, which he impressively illustrated in his talk about the Chlorocyphidae of Sulawesi. However, these talks weren’t the end of the day. Everyone was happy to see each other at the *Gesellschaft deutschsprachiger Odonatologen* e.V. (GdO) meeting again, to talk about ongoing and future projects, to show beautiful pictures or just to talk about life as such. Therefore, some people tested the night life of Braunschweig on a Friday evening and found a bar called “Eusebia”. They had the best German beer (which comes from northern Germany and not from Bavaria!) and very impressive plants there.

On Saturday, 21st March, the programme of the meeting started with three talks about the biodiversity in different European regions, followed by presentations about ecology, parasitism, morphology and biomechanics. Among others, four young scientists presented their talks including Philipp O. M. Steinhoff, the winner of this year’s “Lopi-Preis”, with his talk “MicroCT als Werkzeug in der Libellen-Taxonomie” (Steinhoff, P. O. M. & Uhl, G.). Nine posters on diverse topics were also presented at the meeting. Ariane Teske was the winner of the best poster presentation. Kamilla Koch, Joachim Falk, John Simaika & Frank Suhling, and Geert De Knijf & Tim Adriaens, got the awards for the second and third best poster presentations.

During the coffee breaks between the sessions, there was always enough time for discussions. Yet sometimes, if a discussion was too lively, one always had the option to sneak in on the second floor of the lecture hall. However, every now and again there was a short eye contact between those passionate scientists who didn’t make it on time and the audience on the first floor of the lecture hall during a talk.

The social evening on Saturday was celebrated in the “Altstadtrathaus” in the historic centre of Braunschweig. Most participants of the GdO meeting walked to this place through beautiful alleys in the rain. Some of us didn’t really know how to get there, but fortunately Braunschweig, populated with dragonfly specialists, provides the opportunity to meet one of those specialists at the next street corner. The “Odonatologen” were welcomed in a beautiful room under a wooden ceiling and treated to canapés and drinks, where everybody had a good time and talked to each other in a relaxed atmosphere.

Nonetheless, Braunschweig had to be explored for a second time on this Saturday evening. So, some dragonfly specialists found good spots to discuss future book or research projects, some wanted to simply drink a hot chocolate while others occupied a small bar just to talk about life. Those who had enough energy left after a long day with exciting talks and discussions discovered other popular places of Braunschweig.



Figure 1. Haus der Wissenschaft (House of Science). Photo credit: Christophe Brochard.



Figure 2. Frank Suhling giving welcoming speech. Photo credit: Georg Rüppell.



Figure 3. Participants of the GdO meeting. Photo credi: Georg Rüppell.

Regardless of how long or short the night was, almost all participants were in the lecture hall on time to listen to the morning talks about aerodynamic principles, the fluid dynamics of insect flight and the differences of the flight of dragonflies and damselflies, which weren't always easy to follow yet exciting. The following talks gave fascinating insights into projects on distribution, ecology, population and behaviour of damselflies and dragonflies, especially the talks about the "jet propulsion" of *Leucorrhinia*-larvae, the "AG Libellen Niedersachsen und Bremen" and the talk about the dragonflies of Dhofar (Oman).

Altogether 172 participants from eight European countries enjoyed the GdO



Figure 4. Lecture hall on Friday evening. Photo credi: Georg Rüppell.



Figure 5. Social evening. Photo credit: Christophe Brochard.



Figure 6. Social evening. Photo credit: Georg Rüppell.

meeting in 2015. All things considered, it really was a pleasant reunion of the GdO and Braunschweig. Compared to 1990, the main difference was to be found in the fashion style of the participants...

Figure 7. Audience of the GdO meeting in 1990. Photo credi: Georg Rüppell.



IJO Festschrift to Georg Rüppell

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The International Journal of Odonatology, volume 18(1) is the Festschrift in honour of Georg Rüppell's 75th birthday. It includes contributions by some of his "offspring" and colleagues. We authors are all very thankful to the editor Michael May for his tireless help and critical remarks. He managed to publish the issue just in time. On 1st May a copy of it was handed over to Georg after he returned from taking his dog for a walk; his home was occupied by several dragonfly friends who had arranged a surprise party! When unveiling the issue to him, Georg was totally amazed by the content and very moved by this tribute to his scientific work on dragonfly flight and behavior captured in slow motion.



Figure 1. Unveiling of the copy of the Festschrift. Left to right: Georg Rüppell, André Günther and Frank Suhling. Photo credit: Dagmar Hilfert-Rüppell.



Figure 2. Evening assembly at the garden pond. Photo credit: Ole Schütte Top row (left to right): Jan Rüppell, Georg Rüppell, André Günther, Andreas Martens, Frank Suhling, Carsten Schütte, Ida Suhling; 2nd row (right to left): Tanja & Lena Schütte, Adelheid Martens, Dagmar Hilfert-Rüppell; 3rd row (Skype insert) Jens Rolff.

Dragonfly slow motion films by Georg Rüppell & Dagmar Hilfert-Rüppell

Georg Rüppell [rueppell-film@t-online.de]

The films in the list are visible at Youtube. Explanations are given by English subtitles. The film of frogs catching prey has a humorous commentary, spoken from the frog's viewpoint.

Dragonfly fight: Large red damselfly (*Pyrrhosoma nymphula*)

Fighting behaviour of males and attacks on tandems are shown filmed at 600 f/s. Ramming, hitting with the legs and biting were filmed at a pond near Braunschweig, Germany. [www.youtube.com/watch?v=0Ws7AEMto8k]

Dragonfly flight: Small red-eye damselfly - heavy fighter

This film illustrates the outstanding manoeuvrability of *Erythromma viridulum*. Backward flight could be achieved fast or slowly by different phase relationships of fore and hind wings. Furthermore you can see dive-bombing of males in pairs, fights and very fast U-turns. [www.youtube.com/watch?v=_5HhXy3KD5k]

Prey catching of damselflies, banded demoiselle (*Calopteryx splendens*)

Demoiselles catch their prey, small flying insects, using their very spiny legs. In strong opposite light the movements of the legs are visible as well as the flight of prey. Competition for perches leads to wing spreading, ramming or attacks using legs. Towards the prey demoiselles show a very high beating frequency while flying back to the perch it decreases by gliding phases. [www.youtube.com/watch?v=20oDFPP7AUw]

Dragonfly behaviour: Flight & fight of southern hawker (*Aeshna cyanea*)

Aeshna males fight intensively at the reproductive site. They ram each other, fence by legs during circling flight and throw rivals into the water. No wonder that wings are damaged at the end of individual life. Flight manoeuvres such as flight on the spot, acceleration or turns are shown, too. [www.youtube.com/watch?v=gQSOv64Nqa8]

Dragonfly behaviour: Demoiselle sperm removal and egg fertilization

(Together with Dagmar Hilfert-Rüppell and Michael Gradias): The copulation of *Calopteryx haemorrhoidalis* is shown in real and animated footage (von Michael Gradias) as well as the fertilization of eggs. [www.youtube.com/watch?v=jSSRo7dgeJg]

Frog behaviour: Prey catching

(Together with Georg Seifert): We tried to publish something humorous, because frogs are funny behaving little creatures. So the frogs (*Rana esculenta*) speak the commentary themselves. Catching behaviour on *Coenagrion puella*, *Leucorrhinia pectoralis* and *Anax imperator* is shown, sometimes with success – as well that on earth-worms. [www.youtube.com/watch?v=dhWOm0VHEuE]

Bee-eater catching dragonfly

(Together with Dagmar Hilfert-Rüppell): The hide was extremely hot in southern France when waiting for hours to get the hunt of bee-eaters. Without viewing through the viewfinder we moved the camera parallel to the dragonfly (*Anax imperator*) and by luck the bee-eater caught it. [www.youtube.com/watch?v=pDoDT6qKx_8]

First Symposium of Iberian Odonatology Report

Florent Prunier [aeaelbosqueanimado.info@gmail.com]

*On May 1-3 2015, the first Symposium of Iberian Odonatology (SIO-2015) was held in Córdoba (Spain). More than 60 odonatologists gathered at the Botanical Garden of Córdoba from all over Spain, Portugal and also the UK, Germany and Belgium. The meeting was a huge success since up to 43 communications were presented, proposals for the near future were suggested at the assembly, weather was sunny and finally the scarce and overlooked *Onychogomphus costae* could be spotted during the field trip. Organization ran smoothly due to the collaboration of many entities and the dedication of the local team. The better reward has been of course the congratulations of the participants and that Portuguese folk are willing to organize SIO-2017.*

The starting point for this meeting can be traced to when members of ROLA – Andalusian dragonflies recording scheme – assisted at the third European Congress on Odonatology ECOO2014 at Montpellier (France). At this occasion, a second atlas of Andalusian dragonflies was presented, updating 25 years of observations since the last review. This new atlas can be downloaded from ROLA's website, along with an increasing number of papers dealing with Iberian dragonflies. The ROLA scheme is a group-project within a local NGO focused on environmental education and especially on citizen science and is based on collaboration of volunteers scattered in the territory (over a thousand 10 kilometre squares). Currently the database holds more than 16,000 records, 80% of them less than 20 years old. Back in Montpellier, plenty of contacts were made and, more than anything else, a very friendly atmosphere made the whole meeting very enjoyable. Of course, talks were very serious, and impressive studies were presented. But let's face the reality: it was so satisfying being there and sharing moments with new friends we thought: 'Well, why could we not organize something similar at home?' We then spoke with Adolfo Cordero from Spain and Sonía Ferreira from Portugal, and decided we should take it seriously and contact with other local groups to find out if this was



Figure 1. Logo of the Symposium and organiser Florent Prunier. Photo credit: Enrique Calzado.



Figure 2. Group photo of participants attending the first Simposio Ibérico de Odonatología. Photo credit: Florent Prunier.



Figure 3. Esther Soler presenting a talk on spatiotemporal dynamics of dragonfly communities in newly created habitats. Photo credit: Enrique Calzado.

feasible. We even decided the exact date, sticking with it 10 months later.

It is worth commenting on this background since the situation has changed considerably within a few years in the Iberian Peninsula. The first European Congress was organized in Porto (Portugal) in 2010. At that time, some Spaniards proposed to set up an Iberian group, but this never really turned into reality. Nevertheless, within those four years, many new naturalists have delved into dragonflies, especially thanks to KD Dijkstra's hugely successful European guide (hopefully translated for the sake of many), and experienced odonatologists generally took over the task of preparing local atlases. Another cornerstone happened when the fantastic book 'As Libélulas de Portugal', authored by Ernestino Maravalhas and Albano Soares, was published in 2013, being a reference book for its quality of illustrations. Apples were ripe, so to speak.

During the autumn of 2014, a round of discussions was carried out with the city council of Cordoba and later with Iberian groups featuring volunteer's schemes, such as the one set up in Catalonia (Oxygastra-ICHN) and in Valencia (Parotets). By Christmas, after some hesitation (it is a lot of extra work to prepare a conference), we decided to pull all our strength and just do it. This was indeed a late call for authors to present their communication. Within very few months everybody had to set the whole meeting. Curiously enough, the most difficult part of the event was to decide its name! Of course, we had to be quick to prepare the first announcement, but choose a good name to stick with. Less easy than it seems. You can look at the issue as somewhat trivial (yes it is, to some extent) and life is easier... but we were in the mood of being right about that name. It should be easily translated into English, so we thought about "Conference" and "Congress". The trouble with that is the acronym CIO belongs somewhat to slang in Portuguese and the result was... curious. Also "Congress" sounds very big, and we didn't know if we would be even 25 people! So at the end we decide on "Symposium", which is fine but barely used in Spanish. Hardly any but scientists and people studying ancient Greeks understand the meaning. Some naturalists do care about the explanation of scientific names... and it turns out "symposium" fits perfectly the purpose of the meeting, including the party at the local brewery (a new tendency in Spain). Over a few days, names came back and forth, but at the end the decision was made (SIO, at last! – moreover, an acronym with a glorious past), the logo prepared, a blog set up, many mails and the first newsletters sent. While this was slightly late, it has to be said that Spanish are good with short terms. The focus and objectives were clear and we profited from the guidance of Ten Simple Rules for Organizing a Scientific Meeting by Manuel Corpas et al¹ and much previous experience. The European Congress was also a huge inspiration.

So far, so good. The surprise came when many people got very interested, including some from abroad. It became clear that this was the right moment for the meeting and many people were in fact just waiting for the opportunity. At SIO-2015, up to 12 odonatological societies or groups were eager to collaborate: Oxygastra-ICHN (Cataluña), Parotets (Valencia), ANSE (Murcia), ROLA and Asociación Odonatológica de Andalucía (both based in Andalusia), Tagis (Portugal), Asociación española de Entomología (Spain), ECOEVO lab (Vigo, Galicia), Zaladrana grupo odonológico (La Rioja), and the web Observation.org (Dutch) and Biodiversidad Virtual (Spanish). So, it is hardly a surprise if more than 60 people gathered in Cordoba to know about dragonflies and their colleagues.

The Botanical Garden of Cordoba is a great place to organize such an event. After awarding ROLA

¹ Corpas M, Gehlenborg N, Janga SC, Bourne PE (2008). Ten Simple Rules for Organizing a Scientific Meeting. *PLoS Comput Biol* 4(6): e1000080. doi:10.1371/journal.pcbi.1000080.



Figure 4. Poster session. Photo credit: Ricardo Zaldivar.

in 2014 with an environmental prize dedicated to the late Brazilian environmentalist Chico Mendés, the City Council let us use the venue, free of charge, being mostly a meeting of volunteer schemes. Indeed we had some professional scientists, but unfortunately they are nowadays scarcer than most endangered species of dragonflies. The place is an oasis of peace within a usually quiet town, which turned out to be totally dedicated to the festival of “Las Cruces” during SIO. This meant a lot of noise and also because of the bank holidays, hotels were full. We sorted out this problem thanks to the University, which gave facilities in the “Colegios Mayores”. A bit of luck is always welcome. Back to the Garden, it is worth mentioning its location by the river Guadalquivir, where the first field trip was planned. It offers a superb venue with a nice collection of diverse plants, garden houses, and green lush vegetation providing shelter when the sun was too hot... The programme was so dense in fact we had hardly any time to enjoy it. By coincidence, the poster session was set beside an expedition by a local artist dedicated to natural history and designs of old wood logs and seeds. Science meeting art ... difficult to find a better match for our point of view.

As stated before, our first aim was for a friendly event, without forgetting the quality of the contents. As someone pointed out at the restaurant when SIO was finished, odonatologists are a nice bunch of people and we should care that it remains so. From the beginning, we were helped in this task by ‘Dragonfly’, four friends who performed live music for just one night in the main hall of the Botanical Garden. This was gorgeous, especially the final rumba, dedicated to odonates and their lovers. Later on, two plenary talks went straight to the subject. Adolfo Cordero, University of Vigo, showed a world overview of *Ischnura*, a well-known genus to people living in the northern hemisphere. It was striking to see its species diversity, global homogeneity and later weird things about life history of some species. Probably the most eccentric one is *Ischnura hastata*, the only described dragonfly able to sustain populations thanks to parthenogeny in Azores (which is part of our geographical coverage!). There were a lot of slides, from all over the globe, most of them taken by the speaker himself. Impressive. The second plenary talk was given by Antonio Torralba-Burrial, another Spanish classic odonatologist of recent years. The theme was the history of odonatology in the Iberian Peninsula, in which stands prominently the reverend Lónginos Navas in the early 20th century, among others such as Rambur and many more. As pointed out by one of the participants, not long ago (no more than few lustra), the only data available for some regions were Navas’ ones. As for the speaker’s pedigree, the importance of Pancho Ocharán (University of Oviedo) were duly highlighted. The talk ended on reflections about new technologies and public databases such as GBIF and others. Finally, Alberto Redondo from the University of Cordoba showed us his TV micro-documentary on *Calopteryx* mating strategies. Its purpose: producing a five minutes movie which summarizes a scientific paper on natural history. So, in summary, that first night was very diverse and interesting. Finally, we went to the Cruces and enjoyed a bit of Cordoba night’s life, tortillas and drinks, sitting outside the walls of its most famous monument, the Mezquita (Mosque-cathedral of Córdoba), standing since 784 CE.

The logo of SIO-2015 is an *Ischnura* (one of them!) landed on a map of the Peninsula. Of course, it could have been another more iconic species. But we really wanted the one species that every Iberian worker could recognize as typical of his local patch and also somewhat peculiar to the peninsula (we have no endemic

species). So it turns out to be *Ischnura graellsii*, this humble yet super-common damselfly that is difficult not to observe on any day of fieldwork. I think it casts perfectly the second intention of the Symposium which has been to integrate everybody with an interest in dragonflies. During the whole weekend, we scheduled 24 talks and a session with 19 posters, which is a dense programme, nearly too much in fact. I think this illustrates how vivid is odonatology at the moment in Spain and Portugal, which includes the Iberian Peninsula, but also a wealth of islands in Macaronesia and the Balearic archipelago. Of course those islands support populations of some *Ischnura* (but how could you say this has to be *graellsii*?).

Saturday was the big day with plenty of talks, a field trip, the poster session, coffee breaks to chat of future works and finally the congress's dinner at the restaurant. To summarize this is nearly as daunting as being part of it. To start with, if anything, maybe it is worth mentioning that the two "red cards" to remind the talk was running out of time were two gorgeous papier mache dragonflies (!). After the plenary session, which was open to the public and of wider scope, the next sessions followed a thread. The first session was dedicated to "Volunteers' networks" (recording schemes) currently in activity in the Peninsula, followed by a workshop to generate debate. This occupied most of Saturday's time. The second session was dedicated to "Advances in Odonatology", which spanned the rest of the weekend. The Saturday part of this session included two interesting talks to inspire future work: first an overview of the Atlas of Germany (Space) and the project of monitoring European dragonflies (Time). Further talks focused on more specific studies about Iberian and Macaronesian Odonata.

Back to Saturday morning. The whole SIO-2015 was designed as a meeting of on-going recording scheme advances, so that volunteers' networks had to be prominent in the symposium. The session covered an important part of the Iberian Peninsula. It was also very interesting to hear of projects in different states of advancement, from literally the beginning of a local scheme to the works undertaken by solid groups with years of experience. The result was diverse, hardly repetitive, and very informative. We had talks about Cataluña (Josep García), Valencia (Ezequiel Prieto), Murcia (Jorge Sánchez), Andalucía (Florent Prunier), La Rioja (Carlos Zaldívar) and Portugal (Patricia García-Pereira). The morning was already over, everybody fresh and marvelling at what was going on. The Celestino Mutis's room was very attractive, filled for the occasion by dragonfly pictures (thanks to Parotets and Enrique Calzado). Focus was on. Good participation. First goal achieved.

Just a few words about coffee breaks. Experienced congressists will tell you the important parts are actually the talks outside the rooms. In fact, people come mostly to congresses to speak together... and drink coffee. This, we saw clearly at the ECOO-2014 and we wanted to allow plenty of time for people to enjoy company. Moreover, in our NGO, when we organize events, the rule is the food has to be organic. So as pointed out by one participant, coffee breaks were a little paradise. Set outside, below a large tree, we had both sun, shadow and fresh air to breathe. Food included up to ten (!) kinds of bread, orange juice freshly squeezed by helpful volunteers, pâtés of all kind, chocolates, fruits, pastries and so on. Some organic coffee too! We love organic food and think it is best for environment and dragonflies.

After Saturday's morning session, we had a proper meal at the Zoological park and later on we split the group in two parts for a short visit to the Natural Monument of Sotos de la Albolafia, by the river Guadalquivir, within the city of Córdoba.

First field trip to Sotos de la Albolafia by David Chelmick

First field trip to Sotos de la Albolafia (by David Chelmick)

Cordoba is situated on the Rio Guadalquivir, the "Great River" of Southern Spain as the Moors described it. Downstream of the old Roman bridge the river splits into many branches interspersed with water meadows. The area is known as the Albolafia and was the location for our field trip on the Saturday afternoon. These branches of the river provide excellent habitat for one of Spain's most celebrated species and, of course, a Western Palearctic endemic: *Onychogomphus costae*. Due to the number of delegates we were split into two groups and, led by Rafa Tamajon (a local Cordobese), we left the Botanical Gardens and through a gate that took us to the southern end of the Albolafia. My experience of field trips such as this is that they are high on expectation but low on results. Certainly not the case here; no sooner had we passed under the road bridge and into the wetland than the first group had cameras pointing at a male *O. costae*. A female was seen moments later and all the photographers were able to come away amply rewarded. The trip gave us quality rather than quantity of species with a few *Ischnura graellsii* and *Platynemesis latipes* present on what was a fine hot day. Some of the stream banks with their stony substrate looked perfect for exuviae but our searches proved fruitless.

Back to the Botanical Garden, it was important to rehydrate (temperatures rose to higher than 35°C) and rest a little bit. In those conditions, everybody welcomed the second coffee break. This time, it matched with the poster session. 19 posters were presented at SIO-2015. Most of them were dealing with faunistics and distribution of dragonflies in nature reserves (Padul wetland), natural parks (Andújar NP; bogs of Navarra) or larger territories (municipality of Córdoba; provinces of Valladolid, Málaga, Galicia and Granada; Basque country;



Figure 5. Field trip to Sotos de la Albolafia along the Guadalquivir in the centre of Cordoba. Photo credit: José Manani.

Portugal). One was dedicated to the morphology of the larva of a *Calopteryx* species. The knowledge of the aquatic phase of dragonflies is certainly the subject to expand in a future SIO. A third group focused on surveys of rare species (*Lestes macrostigma* in Doñana; *Macromia splendens* in Cataluña; *Orthetrum albistylum* in Gipuzkoa) or small water bodies (an urban pool in Cordoba; ponds of Terceira Island in Azores). A poster was also dedicated to the already mentioned identification book of Portugal. Finally, it is worth mentioning two special works, which generated a large amount of work. It was our aim not just organizing a conference, but trying to make people work together and produce a collaborative work. The result has been two (!) posters. The first one is dealing with the 10 km squares distribution of three endangered anisopteran species – *Macromia splendens*, *Gomphus graslinii* and *Oxygastra curtisii* – in the whole of Iberia. Those three species belong to the European Habitats Directive, they are scattered in all Iberia, but mostly restricted to that region and neighbouring France, sharing very often a common habitat (larger and well preserved rivers which are becoming incredibly rare) and lots of recent data is available. We were successful at merging data of 19 authors and thoroughly reviewing the literature, producing at the end wonderful maps which can be compared with previous work (e.g. 2000's *Macromia* work of Adolfo



Figure 6. The enigmatic and rare *Onychogomphus costae* observed in the Sotos de la Albolafia. Photo credit: Geert De Knijf.

Cordero) to realize all the work done in past years. The second work was even more ambitious, focusing on updating species lists of every Spanish province and also Macaronesia. We let aside mainland Portugal, since Spain was enough to full dedication. The result has been the staggering compilation of 135,000 data records post- 1/1/2000. In fact, each province's main recorder sent the results so we didn't have to pool all this data in a single database. No doubt this is the next step. So in the poster, you can look at the current distribution on one hand of 79 Spanish species (mainland and Balearics) by province and on the other hand of 23 species occurring in Macaronesia by island. Quite an achievement! Only possible because of the collaboration of more than 50 co-authors. This indeed highlighted clearly the areas in which we urgently need more work such as the provinces of Toledo and Guadalajara, to cite the least studied ones in Spain. The posters can be downloaded from SIO-2015 webpage.

At 6:00 pm, it was time to come back to the conference room for the marathon of Saturday afternoon. We had still to hear about seven talks! The first part was dedicated to the workshop and further debates. A call to participate in a national bibliographical database (Juan Pedro Serrano), an explanation of the major on-line Spanish biodiversity database Biodiversidad Virtual (Pere Luque & Antonio Torralba), and a proposal to launch the future Iberian Atlas (Martíño Cabaña) followed and allowed people to express their feelings about how to work supra-territorially. Later a somewhat controversial idea was raised (Carlos Záldivar)

with a project of establishing Spanish common names for dragonflies. Despite everybody agreeing it would be good to have common names, it looks much more difficult to establish them and somewhat counter-productive from a scientific point of view. Use/folklore builds the language... I think now it is the time for insects to enter properly into society (one which is not prone to use binomial Linnaean names outside the circle of naturalists). So, lots of proposals, exciting projects and calls for people to collaborate. The most ambitious one being the formal expression of the need for an Iberian Atlas (with a 5-year calendar). Recently, a Spanish Atlas of water beetles was published, so it is time for Odonata to make their coming out. This was the end of the first session and we moved swiftly to the second session.

So, the Saturday's late afternoon was dedicated to "Advances in Odonatology". We heard about the project of Dragonfly Monitoring in Europe (Geert De Knijf) and the current advances and close publication of the Atlas of Germany (Klaus-Jürgen Conze). Those were our very special guests for the meeting (indeed Geert visited Spain and Portugal in the past and published on its dragonflies, so he was fully "Iberian" in our context). The meaning of those two talks right after the Recording Schemes' presentations in the morning was to show a frame of what is being done currently in neighbouring countries and inspire ourselves in that direction. Of course, most of the people are aware of what is an atlas and can imagine the basic outputs of a long term survey... but a large half continental database merger is a priority to know about. It altogether helped to realize that small scale studies contribute a great deal to bigger projects. We finished the conference with an ecological study focusing on Beta diversity and dragonfly colonization of newly created ponds in Cataluña, presented by Esther Soler, a young ecologist who appears to be also interested strongly in odonates and their ecology. At this point, we thought a long day was over, but 3 people jumped out of their box (Adolfo Cordero, Albano Soares and Pere Luque) and proposed the establishment of a Grupo Ibérico de Odonatología (GIO). It was late and we tired... but we listened to them. Another big proposal. Someone just said "This is the Proposal symposium!" It was time to move to the restaurant, a long walk was useful to move our long seated body and enjoy the night. Spanish cooks are famous, especially for the new cooking style of Adrián Feran. We were not precisely in a temple of modernity, instead we enjoyed the local specialties: salmorejo a kind of cold and refreshing tomato thick soup, bull's tail stew, and deep-fried eggplants (something like French fries) are Córdoba's absolute classics. You can imagine how Mediterranean people after a long day of listening were craving to exchange and talk at full length...

Sunday morning. SIO climax was reached the day before. We had to prolong it throughout the rest of the day. Outside the conference room, we set a stand with books, information and lovely crafts with Odonata designs. Two books were of particular interest: the Portugal one, well known to many and the recently edited "Libélulas y caballitos de agua de La Rioja" a small Spanish region. This is a large format book which represents 10 years of work, offering more than 500 high quality pictures of 49 species for an unbeatable price. It is worth mentioning the Botanical garden organizes every Sunday a 'Flower market', so here was the occasion for us to do environmental education and give information to the general public.

We started the symposium on time, with an audience growing steadily while the first talk on Macaronesia was presented by Florian Weihrauch, a well-known German entomologist who so often visits his beloved Spain that he hardly counts as a foreigner (the same applies to David Chelmick who talked a little later). It appeared knowledge is increasing at a high rate in Macaronesia and new species are being found. Florian was succeeded by Nelson Fonseca, speaking for the occasion in Portiñol, a kind of Spanglish, merging freely Portuguese and Spanish for the sake of non-English listeners. The talk itself concentrated on recent observations in the Algarve, a well-known tourism area, pretty rich for dragonflies (by European standards). It was striking to learn about recent records of rare species or about populations of hardly present species in the neighbouring Andalusia. Albano Soares followed and gave a talk on the situation of the 65 dragonfly species present in Portugal. The quantity of recent records of threatened species was indicative of high progress in knowledge and effort. The morning was very much focused geographically on the Atlantic Coast, the last talker before the coffee break being Martiño Cabaña who summarized five years of recording in Galicia. Very fruitful work and a curious place where species which are restricted to mountain ranges in the rest of the country live near to the coast. Galicia is extremely wet as you can imagine. It was then time to refresh ourselves, refill with plenty of incredibly tasty fresh organic orange juice and stuff the stomach with organic kiwis, carrots or local pâtés. We only had four talks to end with the oral session. First, one by Victor Salvador, a young odonatologist, attested to the presence of endangered species in Castilla y León, an immense region, mostly under-recorded for dragonflies. It was followed by David Chelmick who has to disclose in fifteen minutes 10 years of holidays' andalusian field work on *Macromia splendens*. David handled the challenge very well with his own - sometimes humorous - speech, and you could feel *Macromia* is his favourite insect. Later on, José Mañani presented a two-year survey carried out at an urban lagoon at University of Madrid, with other fellow friends and students. It is good to highlight how much our odonatological community is a mix of various generations and especially filled with young and enthusiastic naturalists, which surely will be the references of many future works. Shall this symposium inspire them in the long run? The final talk was again dealing with *Macromia splendens*. Pere Luque explained a trial of radio tracking of the beast, not an easy task. At the end his team was able to mark three specimens with 0.2 g tags. The orography of the locality

made it particularly difficult to survey. But the idea sparkled among the audience... not a few were thinking about being able to do the same back in their local patch.

So, our sessions were concluded successfully. Before leaving, we had time for a final speech to acknowledge everybody, especially the City Council of Córdoba and the Botanical Garden employees, the support of Junta de Andalucía, Almocafre, Biovalle and Ecotono, the different odonatological groups present at the symposium, every participant, the scientific committee (David Chelmick, Adolfo Cordero-Rivera, Antonio Torralba-Burrial and Sónia Ferreira), the local organizing committee (Florent Prunier, Javier Ripoll, Rafael Tamajón and Leónidas de los Reyes) and of course our wonderful team of volunteers (Enrique Calzado, Miguel Castaño, Irene de Gabriel Ruiz, Pedro García, Nuria Montes, Alicia Paredes, Diego Peinazo and Silvia Saldaña) and the musicians of “Dragonfly” (aka Niruta Beats). This was officially the end ... but we couldn’t separate that way. In fact we went for a short excursion at a good stream with a dozen participants, while some of us stayed to clean all the setting. By the evening, we met at a restaurant and spent such a nice time together we couldn’t avoid thinking Well, why could we not organize something similar somewhere else?

Second field trip to Arroyo Pedroches (by Klaus-Jürgen Conze)

On Sunday afternoon just after the official finish of the SIO in the Royal botanical garden a small group followed Rafael Tamajón on a short field excursion at the margin of Córdoba. Around fifteen people made a field trip to the valley of the “Arroyo de los Pedroches” which is situated just northeast of the urban settlement of Cordoba. For three hours Rafael led the group, from the beginning in a more rural and industrial surrounding at the city rim to a beautiful landscape more upstream. Thanks to Geert there is a list of all observed dragonflies, at least nine species: *Onychogomphus costae* and *O. uncatus*, *Orthetrum chrysostigma*, *Anax imperator*, *Crocothemis erythraea* and *Trithemis annulata* for the dragonflies and *Ischnura graellsii*, *Erythromma viridulum* and *Coenagrion scitulum* for the damselflies. Beside this, Rafael could also show the oviposition marks of *Lestes viridis* in a meadow bush at a small pond near the rivulet. After the long sessions of the congress it was a nice finale being outside with the dragonflies and knowing that there is a lot more to discover... thank you, Rafael.

To find out more on SIO-2015. Abstracts’ book (most in Spanish) and posters, <http://sio2015.blogspot.com.es/>. A special issue of Boletín ROLA will be edited as for the proceedings of the symposium.

David Chelmick’s report: <http://www.macromiascientific.com/iberia.html>



Figure 7. Field trip to the Arroyo Pedroches in the Andalusian Sierra near Cordoba. Photo credit: Geert De Knijf.

2015 General Assembly of the French Society of Odonatologie in Auvergne

Xavier Houard (SFO) [xavier.houard@insectes.org]
& Aurélie Soissons (GOA)

The General Assembly of the French Society of Odonatology - SFO - was held on 14th and 15th March 2015 in Ruynes en Margeride in the Cantal (Massif Central). Thirty French odonatologists met to share a highlight of the association. Greeted by a dynamic group of young odonatologists of the Auvergne region, participants came from all over France: Normandy, the Paris area, Burgundy, Limousin, Rhône-Alpes, Camargue, Languedoc, Pyrenees...

First on the programme was the balance of 2014 and new elections that saw confirmed the mandates of Cedric Vanappelghem as Chairman and Xavier Houard as Treasurer. Then, during a studios morning centred on the life of the association, participants voted unanimously for editing a book on the larvae and exuviae of French species by Christophe Brochard and participation of the SFO in the publication of a wonderfully illustrated posthumous book by Paul-André Robert. The discussions were extended around a “regional buffet” where everyone could taste the specialities brought by other participants. Then, taking advantage of good weather with some clouds, the afternoon was spent looking for *Cordulegaster* sp. larvae in small streams in the area, guided by the team of local odonatologists... Few *C. boltonii* were observed, but many *C. bidentata*. In the evening, everyone was back to continue to discuss activities around a “tartiflette” (homemade French specialty with potatoes and grilled cheese).

After a short night, the group reconvened for more naturalistic presentations. These talks included a study programme on the populations of *Coenagrion lunulatum* in the Auvergne Volcano Park, a presentation of a book by Paul André Robert, the first step assessment surveys on *Cordulegaster bidentata* in Auvergne and a report of the field trip (post congress tour) of the third European Congress on Odonatology (ECOO) held in 2014 in Montpellier, south of France.

The weekend ended in the early afternoon of Sunday, each participant filled with joy to begin a beautiful dragonflies season 2015 and a car full of Cantal cheese. Thank you again to our hosts the Group Odonata Auvergne (GOA) for their nice organization!



Photo credit: Marc Levasseur (SFO).

The Flemish Dragonfly Meeting 28 February 2015

Marc Tailly [marc.tailly@telenet.be]

The organization of dragonfly meetings by the Flemish Dragonfly Society (Libellenvereniging Vlaanderen vzw) has become a tradition over recent decades. Partly due to the closer cooperation between the Dragonfly Society and Natuurpunt vzw (the biggest Nature Protection NGO in Belgium) and the convenient use of their accommodation in the centrally situated city of Mechelen, during the last years, these meetings have become an annual event.

On the menu are talks about recent faunistic and ecological discoveries of Odonata in Belgium, a number of talks about the work at the University of Leuven laboratory where dragonflies are used in diverse Master's and Ph.D. studies, a quiz and a bookstand. A number of participants and speakers may also come from The Netherlands, Wallonia or nearby Northern France. The number of attendants generally is around 60.

A non-exhaustive summary of some of the talks from this year follows: -

Robby Stoks and his team (Lizanne Janssens, Marie van Dievel, Sara Debecker) presented part of their recent work: recent and on-going work on the integration of fundamental and applied ecology and evolution in the research team at the University of Leuven. A first topic focussed on stress ecology where they studied how combinations of stressors may reinforce each other and how stressors may show delayed effects, thereby sometimes bridging metamorphosis. For example, exposure to predation risk may increase the toxicity of contaminants and delayed effects of contaminants may shape interactions with predators. A second topic centres on the effects of climate change and evolution of species along latitudinal gradients. Both topics will be integrated as they show how latitudinal gradients can be used as a space-for-time substitution to inform how species will react to contaminants in a warming world.

Other talks were about the restoration of wetlands at least partly in favour of dragonflies in The Kraenepoel by Jan Versigghel, Jo Packet and Henk Wallays (with relatively few results) and the high Ardennes (Hautes Fagnes) by Dennis Parkinson, Philippe Goffart, Grégory Motte, David Kever and Oliver Schott (with great results). There was also a talk about the restoration of the Langdonken by Lon Lommaert, a non-odonatologist but very motivated for habitat restoration, in this case with great perspectives for Odonata.

As a limnologist, Henri Dumont, decades ago, often visited the Sahara and Sahel and published a lot on the dragonflies of these areas. With changing political situations a lot of destinations became too dangerous for travellers. He then moved to other zones of the world, but his love for the African desert stayed alive. Recently there was a "window of opportunity", as he called it, to visit Tibesti in Tsjaad and he organized an expedition to the oasis in that region. The results for Odonata were rather meagre, but at least some discoveries were made. The group came back with the last plane for the season and it may now again be a non-safe area for many years.

A short talk by Tim Adriaens and Geert De Knijf was about the possible ecological relevance of exotic dragonflies. Although up to 41 species of non-autochthonous species have already been found in Europe, only two species (*Ischnura senegalensis* and *Pseudagrion microcephalum*) have yet been recorded in Belgium, both on live plant material probably imported from Asia. A number of other species may well appear in the future. As for now, no animals were found in nature and the risk of spreading seems low, but climate change and import of plant material from more temperate zones like China and North America may well change the situation. Knowing the problems with alien species in general it is well worth the effort to keep an eye open and to be prepared to respond to new threats.

Christophe Brochard (NL) presented the context and the history of a book which has never been published: *Les larves des Libellules* by Paul-André Robert. Robert, well known by the somewhat older generation of contemporary dragonfly enthusiasts thanks to his 1958 book "Les Libellules" with editions in French and German, was a very keen artist, drawing and painting in great detail adults and larvae of his subjects, a number of which were printed in the named book. He had worked for 50 years on a larvae book, but it was never published. If there is enough interest, the book will now be brought out.

Although his work on Belgian dragonflies is restricted to his early years in odonatology, and his later odonatological work during most of his career treated other continents, Henri Dumont can be considered a kind of godfather for the recent dragonfly study in Belgium. For that reason he was offered an honorary membership of our society in a small ceremony.

For more on the Libellenvereniging Vlaanderen vzw, its activities and links to publications on dragonflies in Belgium, please visit www.odonata.be.

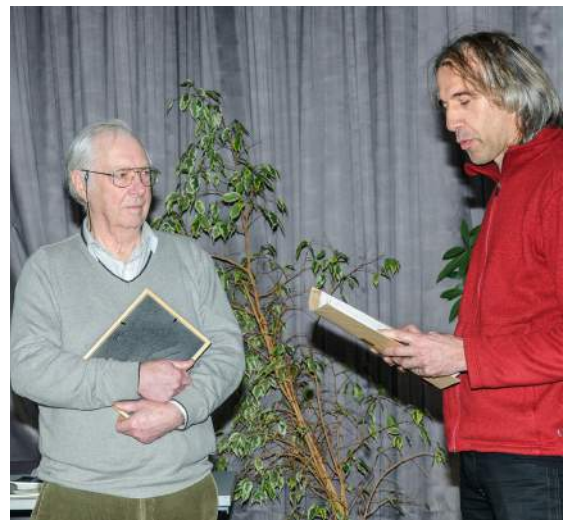


Figure 1 (top left). The start of the very much feared quiz. **Figure 2 (top right).** Robby Stoks. **Figure 3 (2nd row, left).** Bookstand; always a success. **Figure 4 (2nd row, right).** Geert De Knijf presenting Henri Dumont with honorary membership. **Figure 5 (3rd row).** Attendants in full concentration. **Figure 6 (4th row).** Group portrait.

NVL annual meeting 2015

Nick van Wouwen [redactie@brachytron.nl]

The 25th annual meeting and Study Day of the Dutch Dragonfly Society (Nederlandse Vereniging voor Libellenstudie, NVL) took place on 22nd February 2015 in the Dominicanenklooster, Zwolle. Membership is increasing, and the Facebook page of the Society, NVL Libellenstudie, is becoming popular as a forum for Dutch (and Flemish) odonata enthusiasts. The website is also flourishing. As a result, a record number of some 120 persons were present to hear a number of lectures and shorter presentations on many subjects pertaining to dragonflies and damselflies, and to participate in the annual 'Mystery Quiz'. Among other things, the new German Dragonfly Atlas was announced, and trends in the populations and distribution of dragonflies and damselflies in The Netherlands, and of individual species in The



Figure 1. Chairman Jaap Bouwman.



Figure 2. K.-J. Conze announces the new German Atlas.



Figure 3. Dutch dragonfly researchers are active everywhere...



Figure 4. Speakers in the spotlight (left to right Peter de Boer, Tim Termaat, Ewoud van der Ploeg, Lieven Thierry, Evert Ruiter, Vincent Kalkman, Weia Reinboud, quiz maker Es, Klaus-Jürgen Conze, quiz maker Faz).

Netherlands and Belgium, were reviewed. Due to the crowded programme, discussions had to be kept to a minimum, but this led to lively talking during the breaks between members of the public and speakers. All in all, it was quite a successful meeting. Afterwards, a group photograph was taken in commemoration of the 25th anniversary of the annual Study Day.



Figure 5. Chairman Jaap Bouwman.

New project starting in Rio Grande do Sul (Brazil)

Postdoctoral fellowship opportunity

**Samuel Renner [samuelrenner@hotmail.com]
PhD student, Univates Centro Universitário,
Museu de Ciências Naturais, Laboratório de Evolução e Ecologia**

We proudly announce a new research project funded by the Brazilian Government (CAPES/Science without borders action), involving people from Univates Centro Universitário (Brazil) and Halmstad University (Sweden). The project involves cooperative research covering Pampa Biome areas in the Rio Grande do Sul State (southern Brazil). The main goals include obtaining a better understanding of the effects of habitat fragmentation on the Odonata assemblages occurring on this poorly known biome as well as increasing our knowledge of the Odonata in this area, where, currently, only scattered data exists. This project is based at the Evolution and Ecology Laboratory of Univates and is under the coordination of Dr. Eduardo Périco (Univates) and Dr. Göran Sahlen (Halmstad).

We are currently recruiting one more international researcher to join this project by the means of a postdoctoral fellowship offered by the SWB which is implementable from 12 up to 24 months, and based at Univates (Univates / Lajeado / Rio Grande do Sul). We are hence looking for someone with experience of fragmentation issues, and, naturally interested in the ecology of the Odonata group from the Neotropics. For more information please contact: Dr. Eduardo Périco [perico@univates.br] or Dr. Göran Sahlen [goran.sahlen@hh.se].



Figure 1. Picture taken during the first field trip for the project.

Australasia Round-up

Compiled by A.G. Orr [agorr@bigpond.com]

New Zealand and the Pacific

Last December saw the publication in *Odonatologica* of an identification key to the adult Odonata of New Caledonia, Wallis and Fortuna by the late Daniel Grand and colleagues (Grand et al 2014). This represents a significant advance on the previous synopsis published by the late Allen Davies shortly before his death in March 2003 (Davies 2002). With its unique fauna of 58 species, including endemic argiolestids, isostictids and synthemistids, New Caledonia continues to attract attention from visitors and its fauna can be regarded as well studied, but until now identification still required consulting primary sources. This is no longer necessary. In New Zealand, Milen Marinov has just completed an analysis of the endemic genus *Xanthocnemis* and is also undertaking an updated list of NZ dragonflies which will be published by Auckland University Press as part of a popular illustrated book on NZ butterflies and dragonflies, with information on distribution within the country, where best to find particular species, conservation and how-to-attract these insects to the garden. Milen is also contributing a chapter on the biogeography of Pacific Odonata for a multi-authored book, *Dragonflies: Classification, Morphology and Conservation of Biodiversity* to be published by Nova Publishers www.novapublishers.com, probably next year.

Australia

Ian Baird has recently published detailed accounts of the larval burrow morphology and reproductive behaviour of *Petalura gigantea* (Baird, 2014a, b), as part of an ongoing study of *P. gigantea*, and to a lesser extent *P. litorea*. Upcoming publications focus on population dynamics and conservation of *P. gigantea*, and he is interested in possible use of population genetics to better understand dispersal ecology, metapopulation dynamics, and biogeography of the species. Ian Endersby and Heinrich Fliedner have recently finished their book on the etymology of Australian Odonata and expect its publication soon. This significant work includes all genus group and species group names including synonyms and homonyms, over 500 taxa in total. It also has short biographies of each of the taxon authors and photographs accompanying each biography. Ian Endersby has also compiled a database of species distribution records which will be used via SIS to evaluate Australian odonates at risk. Gunther Theischinger and Ian Endersby have together produced a well-illustrated guide to the identification of larvae of all Australian Odonata (Theischinger and Endersby, 2014). Because of gaps in our knowledge, only about 60% of zygopteran and 78% of anisopteran larvae can confidently be placed to species, but this publication highlights exactly where the deficiencies lie.

New Guinea and the Solomon Islands

In terms of biodiversity New Guinea and its surrounding islands remain one of the richest and least-explored areas on Earth. The region is attracting a growing number of workers. Stephen Richards in particular is making herculean efforts in Papua New Guinea to redress this situation, collecting large numbers of specimens, including many new taxa, as well as amassing a collection of high quality photographs of Odonata in life that is of inestimable value. Material collected representing new taxa is being described mainly by Gunther Theischinger and Stephen Richards and also by Albert Orr and Stephen Richards. Among the most significant recent publications are Theischinger and Richards (2015), in which 10 new species group taxa of *Nososticta* are described, and Richards and Theischinger (2015), which documents the odonate fauna of the Hindenburg Wall region. Other recent collections by Vincent Kalkman in Papua New Guinea and Indonesian New Guinea and Tibor Kovács from Batanta have yielded new taxa (and distribution records) which are presently being described by various combinations of the above workers. Martins Kalnins has recently collected in the Vogelkop, describing one new *Argiolestes* species. Dirk Gassmann recently published records from collections in north-east Papua New Guinea and the Bismark Archipelago (Gassmann 2015). Günther Fleck is continuing work on larvae collected in Papua New Guinea in 2004. Albert Orr and Vincent Kalkman have completed a field-guide to the Anisoptera of New Guinea and surrounding Islands. This is a companion to their previous field guide to the Damselflies of New Guinea (Kalkman and Orr, 2013) and follows a similar bilingual format with photographs by Stephen Richards and Sandra Lamberts and diagnostic artwork by Albert Orr. Unlike the previous guide, this volume aims to be as complete as possible given present knowledge. It is presently being translated and will be published later in the year.

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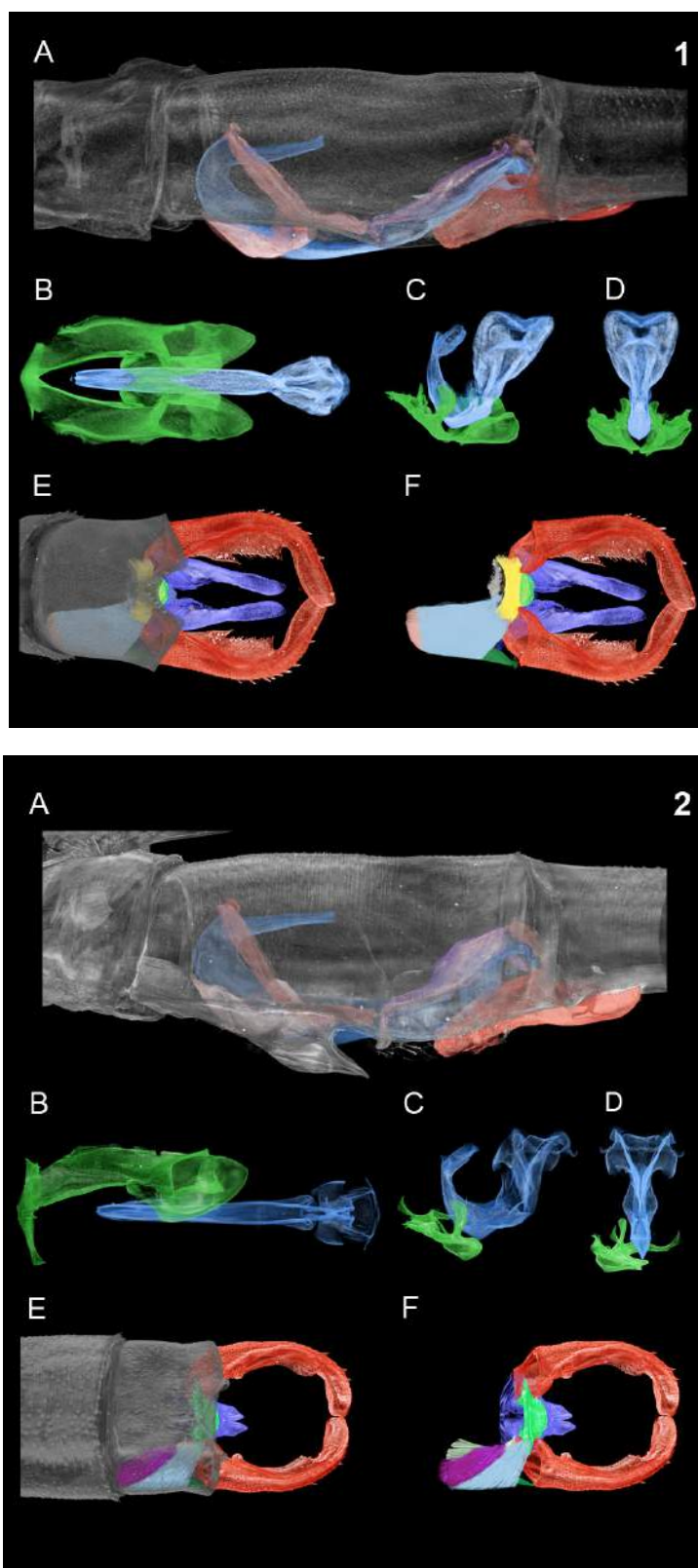
MicroCT-investigation of the caudal appendages and the secondary copulatory apparatus of selected damselflies

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The damselflies and dragonflies possess a unique pattern of mating behaviour, which is reflected by an exceptional morphology of their copulatory organs. The caudal appendages and parts of the secondary copulatory apparatus of males are widely used in taxonomy. However, the working mechanism of those organs remains incompletely resolved. The mating behaviour, the morphology of the caudal appendages, as well as the tandem-formation process have been discussed by several authors (e.g. Corbet 1999; Córdoba-Aguilar 2003; Dreyer 1978; Jurzitza 1974; Loibl 1958; Pfau 1971, 2002). Nonetheless, the examination of structures, involved in tandem-formation and sperm transfer, in the active state, is very difficult. To elucidate their functional morphology, the exact position of those structures and their interactions is essential and can be achieved only by the use of non-destructive methods.

In our study we examined the morphology of the mating-related structures of *Lestes sponsa* (Hansemann 1823), *Lestes viridis* (Vander Linden 1825) and *Pyrrhosoma nymphula* (Sulzer 1776) (Willkommen et al. in prep) using non-destructive micro-computed tomography. The advantage of such a method is that the structures can be examined in their natural position in both, the inactive and active states during copulation without touching or manipulating them. Thus, we were able to precisely show the interaction of male and female structures.

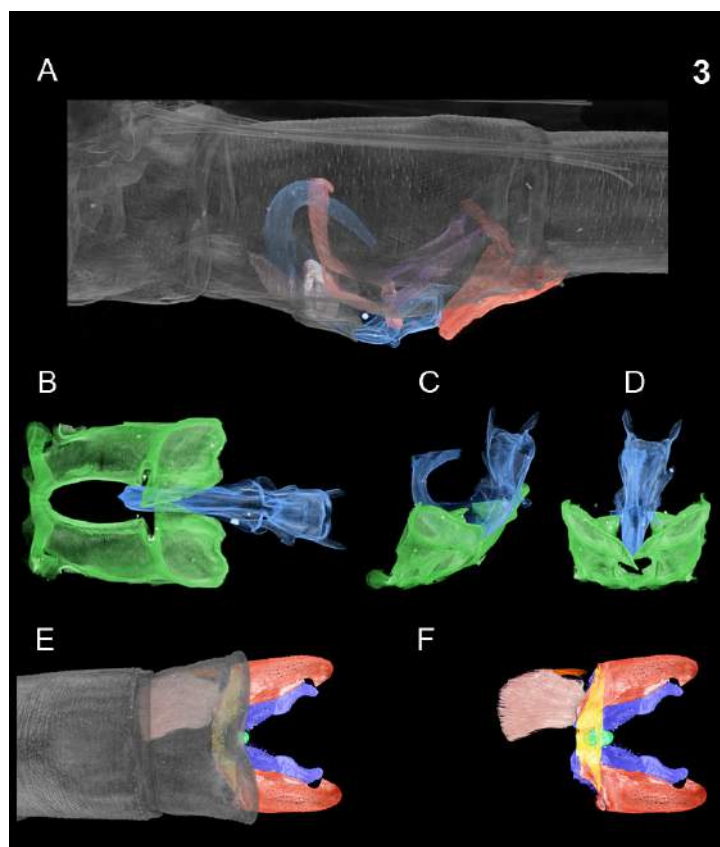
Figures 1-3. Secondary copulatory apparatus and caudal appendages of the male of 1. *Lestes sponsa*, 2. *Lestes viridis* and 3. *Pyrrhosoma nymphula* in the relaxed or non-copulatory state. **A.** Secondary copulatory apparatus (hamuli not shown in Fig. 1A). Ligula in blue, lateral view, anterior direction is to the left. **B-D:** Ligula and hamuli. Ligula in blue, hamuli in green. **B.** Ventral view. **C.** Latero-caudal view. **D.** Caudal view. **E-F.** Caudal appendages of the male, dorsal view. Cerci in red, paraprocts in blue. **F.** Cuticula of the abdominal segments removed.



Both lestids have a plesiomorphic muscle equipment of the claspers (cp. Pfau 2002) with a set of muscles, opening and closing the claspers, on the cerci and paraprocts, respectively. In *P. nymphula* the paraproct is equipped only with an opener muscle. In all three damselfly species examined here, the cerci are used to clasp the female. This condition is most likely the primordial state of clasping in Odonata. In contrast, the males of *Ischnura elegans* (Vander Linden 1820) clasp the females with their paraprocts and remain in this position over a long period of time. In this species the clasping represents an energy-efficient process. As an adaptation to the long clasping period, an effective interplay between structures, their material composition and corresponding muscles might be suggested (Willkommen et al. in press).

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Odonata of Sakaerat Environmental Research Station, Nakhon Ratchasima, Thailand

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Abstract: This paper presents records of Odonata collected in June 2014 in Sakaerat Environmental Research Station, Nakhon Ratchasima Province, Thailand. A total of 33 species were recorded, including one very rare species *Coeliccia nigrescens* and one *Oligoaeschna* species potentially new to science. Nine species are considered new records to the province of Nakhon Ratchasima.

Key words: Odonata, dragonflies, damselflies, Sakaerat, Nakhon Ratchasima, Thailand, new species

Introduction

In South-East Asia, Thailand is one of the countries best documented for Odonata. Two odonatologists, Syoziro Asahina and Matti Hämäläinen, were influential in publishing on the Odonata diversity of Thailand during the 1980s and 1990s. Asahina published a series of familywise papers of Thai Odonata in 1982-1990, which were reprinted in a book form (Asahina 1993). Among the many publications by Hämäläinen, the Atlas of the Dragonflies of Thailand (Hämäläinen & Pinratana 1999) was to become the cornerstone for current Thai odonatologists. Day et al. (2012) provided a summary of other recent provincial records which contributes to the knowledge of dragonfly distribution in Thailand. In recent times, Odonata research has been advanced by a new generation of workers through the use of social media, blogs and websites (Day et al. 2012). Even though the Odonata fauna of Thailand is well known, many areas within this large country lack species records, and species new to science are still being discovered (Sasamoto 2015).

Sakaerat Environmental Research Station (SERS) was established in 1967 as a forest reserve for scientific purposes and is administered by Thailand Institute of Scientific and Technological Research. In 1977, it was made a biosphere reserve under the UNESCO 'Man and Biosphere Programme'. Since its inception, SERS has hosted local and foreign researchers in many ecological studies. Aside from supporting scientific research, it currently serves several functions such as reforestation programmes, science camps for school groups, conference and meeting facilities, and small-scale eco-tourism (Sakaerat Environmental Research Station 2015).

SERS is located in Wang Nam Khiao district, Nakhon Ratchasima province, northeast Thailand in the Korat Plateau, about four hours drive from Bangkok. It has a total area of about 80 km² with altitude ranging from 250m to 760m asl. The research station headquarters and vicinity is at about 300m to 400m asl. The site is neighbouring to Taplan National Park and Phuluang National Forest Reserve (Fig. 4). The climate is tropical with mild dry winters and hot humid summers. Average maximum temperature is 35°C while average low is 16°C. The wet season occurs from May to mid-October, with rainfall peaks in May and September. The driest part of the wet season is in June to July. The average annual rainfall is 1200mm (Sakaerat Environmental Research Station 2015). Dominant forest types in SERS are dry evergreen, dry dipterocarp, and mixed deciduous forest (Trisurat 2009). The other vegetation is a matrix of reforested land, grassland and bamboo.

Wildlife diversity is rich in SERS. Around 230 bird species, 80 species of mammals, 90 species of reptiles and 26 species of amphibians have been recorded. In terms of invertebrates about 150 species of butterflies and 140 ant species are known to occur, as well as about 20 earthworm species (Sakaerat Environmental Research Station 2015). Odonata has never been researched systematically in SERS although Hämäläinen (in litt.) collected 13 species from Wang Nam Khiao district in June 1984 during a two hours stop-over at a stream close to the office of Kasetsart University field station. Therefore this paper can be considered the first proper record of Odonata from SERS.

Materials and methods

Adult Odonata were collected using handheld nets on five days from 23-27 June 2014. The main collecting locations were: within the headquarter grounds, a man-made retention pond (known to staff as Sheila's pond), Jong Oang dry waterfall stream, and Khao Sunt forest dry stream which was accessed from the nearby Sakaerat Silvicultural Research Station. Essentially three different habitats were explored: trails and man-made retention pond near the headquarters were amidst a highly disturbed forest (Fig. 5); Jong Oang waterfall stream was

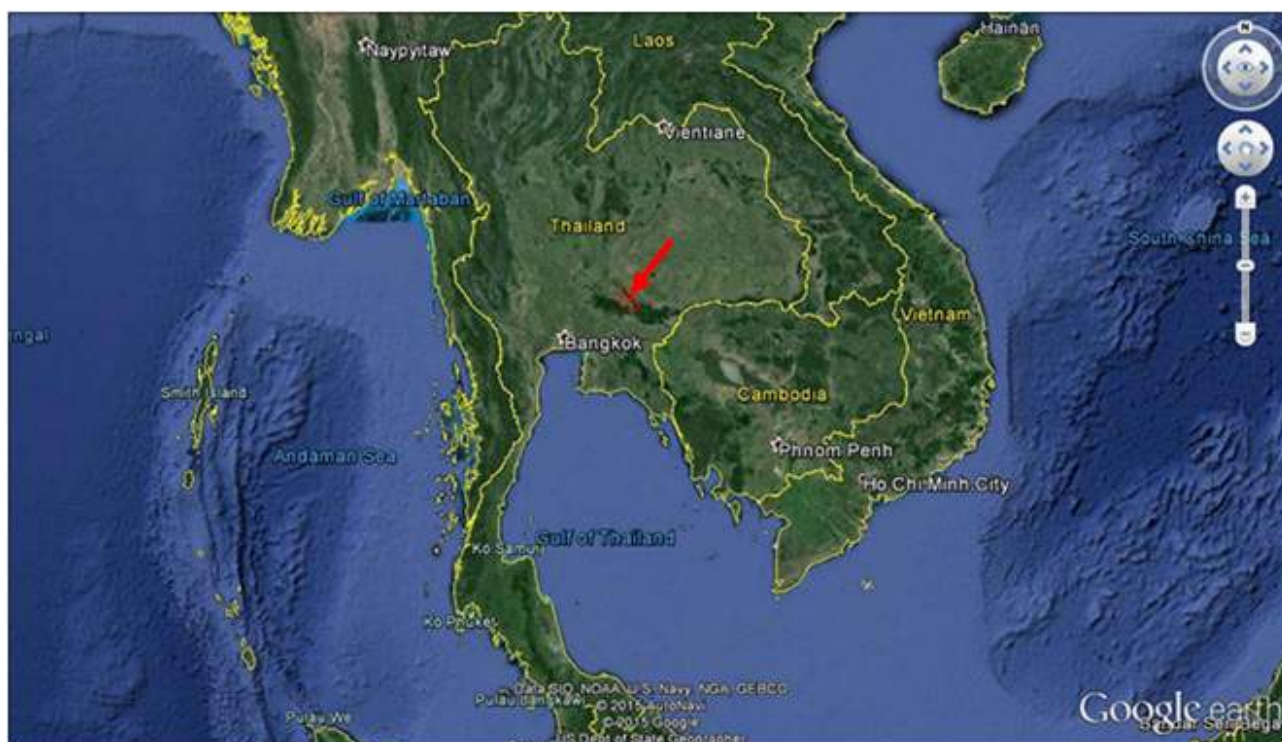


Figure 1. Google Earth map showing location of SERS (in red) in Thailand.



Figure 2. Google Earth map showing area of SERS. Outer yellow boundary is the transition zone, inner yellow boundary is the buffer zone and red boundary is the core area

in regrown secondary forest (Fig. 5); and Khao Sunt was a primary forest habitat (Fig. 9). The month of June receives the least rainfall during the wet season, hence all the streams were dry except for water pools among boulders and in certain stream sections (Fig. 9). Collections were made at altitude ranging from 370m asl at the headquarters to 600m asl at Khao Sunt forest. The sampling sites are shown in Fig. 4.

Specimens were preserved by treatment with acetone. The specimens are currently held in the working collection of the first author and will eventually be deposited in the Lee Kong Chian Natural History Museum at National University of Singapore.

		Species	Location	Research Station HQ	Sheila's pond	Jong Oang dry waterfall stream	Khao Sunt forest dry stream	Total specimens collected
Zygoptera	Coenagrionidae	<i>Ceriatagrion chaoi</i> Schmidt, 1964 #			+	+		4♂ 1♀
		<i>Ceriatagrion indochinense</i> Asahina, 1967 #			+			1♂
		<i>Pseudagrion australasiae</i> Selys, 1876			+			1♂
	Chlorocyphidae	<i>Helicypha bifurcata</i> (Selys, 1859)				+		2♂
	Calopterygidae	<i>Vestalis gracilis</i> (Rambur, 1842)				+		1♀
	Platycnemididae	<i>Coeliccia kazukoae</i> Asahina, 1984					+	5♂
		<i>Coeliccia nigrescens</i> Laidlaw, 1931					+	8♂ 1♀
		<i>Copera vittata</i> (Selys, 1863)					+	1♂
		<i>Onychargia atrociana</i> Selys, 1865			+			1♂ 1♀
	Platystictidae	<i>Protosticta khaosoidaoensis</i> Asahina, 1984 #					+	8♂
Anisoptera	Aeshnidae	<i>Anax guttatus</i> (Burmeister, 1839) #			+			1♂
		<i>Gynacantha</i> species					+	*
		<i>Oligoaeschna</i> sp. nov? #					+	1♂
	Macromiidae	<i>Macromia</i> cf. <i>pinratani</i> Asahina, 1983 #					+	1♂
	Libellulidae	<i>Acisoma panorpoides</i> Rambur, 1842 #			+			1♂
		<i>Brachydiplax farinosa</i> Krüger, 1902		+	+			1♂ 1♀
		<i>Camacinia gigantea</i> (Brauer, 1867)			+			1♂
		<i>Cratilla lineata</i> (Brauer, 1878)				+		2♂
		<i>Diplacodes trivialis</i> (Rambur, 1842)					+	*
		<i>Hydrobasileus croceus</i> (Brauer, 1867)			+			1♂
		<i>Indothemis carnatica</i> (Fabricius, 1798) #			+			1♂ 1♀
		<i>Lathrecista asiatica</i> (Fabricius, 1798)				+		1♂
		<i>Neurothemis fulvia</i> (Drury, 1773)			+	+		2♂
		<i>Neurothemis intermedia</i> (Rambur, 1842)		+		+		3♀
		<i>Orthetrum chrysis</i> (Selys, 1891)				+	+	2♂
		<i>Orthetrum glaucum</i> (Brauer, 1865)				+		*
		<i>Orthetrum luzonicum</i> (Brauer, 1868) #			+			1♂
		<i>Orthetrum triangulare</i> (Selys, 1878)					+	2♂
		<i>Pantala flavescens</i> (Fabricius, 1798)					+	1♀
		<i>Rhyothemis plutonia</i> Selys, 1883			+			1♀
		<i>Rhyothemis triangularis</i> Kirby, 1889			+			1♂
		<i>Tetrathemis platyptera</i> Selys, 1878			+	+	+	4♂
		<i>Tramea transmarina</i> Brauer, 1867			+			1♂

Legend: # denotes new provincial record; * denotes species not collected but confidently identified by sight; + denotes location where specimens were collected.

Results

A total of 33 species (30 collected and three identified by sight) from eight families were recorded. All specimens were collected by the first author. The result is presented in Table 1. Nine species are new provincial records for Nakhon Ratchasima. One species is potentially new to science.

Discussion

This result represents the first proper record of Odonata from SERS, Thailand. The majority of the 33 species recorded are common and expected to occur in this part of Thailand. This is especially so for most of the species which are typically found in a lentic habitat within a rural landscape. However three species from Khao Sunt forest are notable, viz. *Coeliccia nigrescens* is a very rare species, and poorly known from very few specimens and localities. (Hämäläinen in. litt; Dow 2009). The *Macromia* specimen is most allied to *Macromia pinratana* as illustrated in Muraki (2014). However there is some difference in the length of the epiproct relative to the cerci (Kosterin in. litt.), thus it is tentatively identified as *Macromia* cf. *pinratana* until a comprehensive review of this genus is undertaken. The most interesting specimen is a potentially new *Oligoaeschna* species (Wen-Chi in. litt.). However due to time constraint, the first author has yet to investigate this further at time of writing. It is also noted that the *Diplacodes trivialis* and *Pantala flavescens* recorded at Khao Sunt forest was not from inside the forest but at the open silviculture field by the forest entrance (Fig. 8).

Nine species are new provincial records for Nakhon Ratchasima (Table 1.). This is based on published records from nearby Khao Yai National Park (Hämäläinen 1998, 2000), an updated list from Day et al. (2012), and the unpublished record from Wang Nam Khiao district (Hämäläinen in. litt.).

This first survey in SERS shows the potential for the site to harbour a diverse Odonata fauna, particularly since it was conducted during a dry period when the streams were not flowing. Therefore more species are expected to be discovered during the wetter months. Of special interest is the primary forest of Khao Sunt. It is a large mountainous area with valleys and small streams under closed canopy. This forest extends northwards into Phuluang National Forest Reserve. Future expeditions should concentrate on this area and it is the intention of the first author to return at the earliest opportunity.

Acknowledgements

The first author would like to thank National Research Council Thailand for granting research permit (No. 0002/209) and Wei Song Hwang for a supporting letter in the application process. Matti Hämäläinen helped to improve the manuscript, and together with Oleg Kosterin, Wen-Chi Yeh and Noppadon Makbun, were most generous in species identification and sharing information. Thank you also to Taksin Artchawakom and his staff for being a wonderful host at SERS. And also to Ming Kai Tan and Huiqing Yeo for including the first author in the survey team.

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Travels with *Macromia*

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Introduction

Macromia splendens is endemic to southern France and Iberia; it is a species of rivers and streams with deep pools that will accommodate the larvae over their two year lifecycle. The emergence period is very much dependent upon quiet weather conditions allowing the adult to emerge; but there are often storms and high river flows which inevitably delay emergence. How do the larvae cope with this, bearing in mind that the adult insect would be fully developed inside the larval case and the insect unable to feed?

In May this year I visited the Rio Hozgarganta in southern Spain to carry on with my studies of this species. The Hozgarganta has a number of small tributaries on which *M. splendens* breeds and on 21st May I searched for larvae around the base of the small cliff (Fig. 1) and was successful. I am writing a species review for the British Dragonfly Society and decided to breed out the larva.

I placed the larva into a small pot and took it back to my hotel room in nearby Los Angeles (the one in Spain). I filled my temporary breeding tank with detritus collected from the river and Evian water and added the larva. I constructed a muslin based containment system around the tank. Figs. 2 & 3 show the original system.

I observed the larva in the tank. It was making no attempt to cover itself with sand/mud as it would when feeding; it was quite motionless. At 23:43 the larvae had moved about 600 mm above the surface of the water and looked ready to emerge. Foolishly, I fell asleep and woke at 1:30 am. I went to the system assuming emergence would have taken place; but the larva was nowhere to be seen. I searched the room to no avail; clearly my containment system was far from perfect and the insect had escaped. I returned to my bed in the conviction that the local gecko (lizard) had consumed my prize. At 7:30 am I awoke and was immediately aware of an insect halfway down the net curtains of the window. To my complete surprise and delight, it was the larva.

Bearing in mind that the insect had been out of the water almost eight hours and had travelled at least 4 m, it was very lively and sensitive to any movement. At 8:17 am the larva started to move down the net curtain in what appeared to be an attempt to escape the now bright sunlight. I moved the tank to the bottom of the curtain. At 8:40 am the larva fell to the ground and I placed it back into the tank.

No sooner had it re-entered the water than it was out again (Fig. 7). At 8:44 am it rose approximately 150 mm from the water and again looked ready for emergence twitching its head and abdomen in readiness; however by 10:23 am the

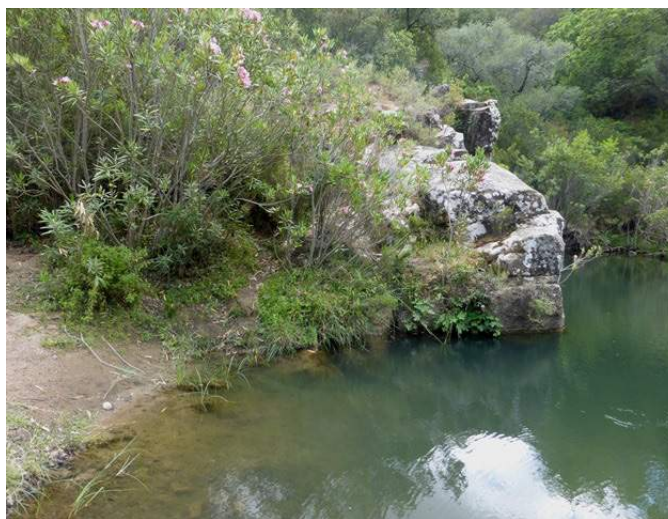


Figure 1. Rock cliff on river Hozgarganta. The larva was collected from the base of this cliff.



Figure 2. The tank and muslin containment system in construction. Clothes pegs were used to secure the muslin.



Figure 3. The completed containment which proved to be less than adequate.



Figure 4. *M. splendens* larva on the net curtains of the hotel room at 7:30 am.



Figure 5. The distance from the failed containment tank (dismantled) and the window.



Figure 6. The larva returned to the water after a night on the net curtains.



Figure 7. The second attempt at emergence which again failed.



Figure 8. The larva back in the tank for the second time and making no attempt at concealment.



Figure 9. Emergence tank mark 2. Television abandoned and vertical support provided by a used beer can.



Figure 10. Emergence tank 2 completed with clothes pegs.



Figure 11. Making the churro; a bread mix injected directly into hot fat.



Figure 12. The newly constructed tank (mark 3). This time with no possibility of escape.



Figure 13. The larva installed at Aguadulce not making any attempt to conceal but covered in sand/ mud following the disturbance of the journey.



Figure 14. The larva packaged for travel.

larva turned round and headed back into the water where it remained. At this point I decided that the original emergence tank needed to be made more secure and constructed version 2 (Figs. 9 & 10). This tank allowed for no escape although this proved to be unnecessary as the insect stubbornly decided to remain motionless in the tank.

On Sunday 24th May I had to change venues and after an interesting Spanish breakfast of the Churro (Fig. 11), I removed the beer can, covered the tank with the muslin and travelled the 200+ km to Aguadulce

near Almeria. On arrival at my daughter's flat I constructed emergence tank mark 3 and quickly placed the larva into the now very turbid water (Figs. 12 & 13).

The larva was quite unaffected by the journey but hardly moved and certainly made no attempt to clean itself of the detritus that had accumulated on its body. The larva remained unmoved in this condition for a further three days. The ambient temperature went from 20 °C to 31 °C. Sufficient to tempt emergence? Clearly not, as the insect remained unmoved. On the 28th May I had to return to the UK, so early that morning I packed the larva into a small container surrounded by wet muslin (no free water) (Fig. 14) and placed in my hold luggage. I arrived back in UK in the early afternoon and unpacked the larva; it was again quite unaffected by the travelling and I quickly installed it into my emergence tank at home (Fig. 15).

I left the larva overnight with no heating. In the morning the ambient temperature was around 10.0 °C and the larva was quite comatose. At first, I thought it had died but this was not the case and so, in an attempt to improve the situation, I introduced a heater (Fig. 15). It was now Friday 29th May: some seven days after the initial attempt at emergence. At 15:00 hours the temperature had risen to 23.0 °C and the larva was now looking, once more, ready to emerge. At 17:45 the larva left the water and was resting about 150 mm above the surface (Fig. 16). I was supposed to be taking my wife out to dinner; a plan that was immediately modified by this new chain of events. By 19:00 it had reached the top of the emergence cage and by 19:23 the first hanging stage of emergence had been achieved. By 19:55 the adult was completely out of the exuvia and was hanging (Fig. 17). By 22:09 the wings were fully expanded (Fig. 18). At this point I removed the heating and left the insect overnight. At 5:00 am the next morning the ambient temperature was 10.6 °C. The adult insect had not moved.

At around 10:00 am the ambient temperature had risen to 13.0 °C. I moved the adult onto a Rhododendron bush. The adult was still very slow and fell off the twig a number of times before becoming secure. Eventually when the ambient temperature had risen to 15.0 °C, the adult flew (Fig. 19).

Postscript

The adult insect's vulnerability in the early morning must be one of its major limiting factors to its spread. In southern Spain where this insect is fairly common, early morning temperatures in excess of 20 °C at this time of year are common giving ample opportunity for the emerging insect to fly to safety. Further north in southern France such temperatures only occur later in the year where the flight season is June until August.



Figure 19. The adult insect on a Rhododendron.



Figure 15 (right). The home emergence trap with camera and heating.



Figure 16. The larva resting after leaving the water at 17:45



Figure 17. The adult hanging from the exuvia at 19:55.

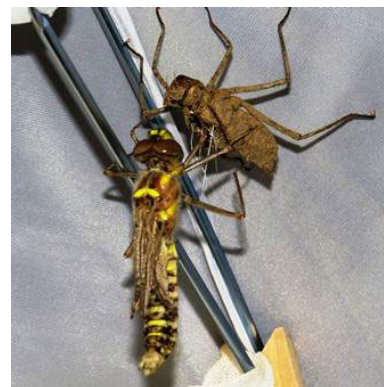


Figure 18. The fully expanded male insect at 22:30.

How to determine the sex of the exuvia

The adult insect was a male. This has enabled me to examine the exuvia in detail for structural differences that may be present between male and female. Corduliidae and Macromiidae females do not have significant ovipositors and, therefore, the terminal abdominal segments do not show any difference between males and females. The males, on the other hand have secondary genitalia that are quite prominent. Does this show in the larvae/exuviae? Fig. 20 shows that the male has two small processes on the second and third segments. These are absent on the female (Fig. 21). Examined using a binocular microscope the details are much clearer:

The male processes hardly project and are, therefore, hard to see from the side. However these processes are clear in the ventral view (Fig. 22). These processes are not present on the females (Fig. 23). Are these distinctions present in the literature? The original description of the larvae was produced by Grasse (1930). His description of the second and third segments includes the following: Le deuxieme....Pres du bord posterieur du sternite on voit tout petit tubercule median – The second near the posterior border of the sternum there is a small median tubercule. Le troisieme...Sur son sternum il y a un tubercule identique a celui signale sur le segment precedent. The third...On its sternum there is a tubercule identical to that reported in the previous segment. Clearly Grasse described the exuviae from a male insect but made no mention of their absence in the female.

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Figure 20. Male insect (ventral view) – as bred out by DGC on 29th May.



Figure 21. Female (ventral view) as collected by DGC in Spain.



Figure 22. Male – details of processes on ventral view of abdominal segments 2 & 3.



Figure 23. Female – processes absent.

A checklist of the dragonflies from the North-Western of Isiboro-Sécure Indian Country and National Park, Bolivia

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The Isiboro-Secure Indian Country and National Park is located in central-western Bolivia, in the departments of Beni and Cochabamba (Figure 1). The Park includes about 12,363 km² of Yunga rainforest in the Bolivian Amazon, and apart from the presence of the Yuracare and Chimane tribes, most of its area is free from human activities. With the exception of the extreme southern part of the park, which is accessible by land, most of its area is almost inaccessible. The main rivers are the Isiboro and Secure, that drain to the Mamoré river, part of the Amazon basin.

The senior author stayed in an extreme tourist operation in the north-west of the park from July to October 2011, conducting extensive sampling in at a limited number of sites. The odonate fauna in this region is unknown, and few entomological studies have been conducted; it can only be mentioned the ecological index of Nabor *et al.* (2007), carried out in the south of the park, in which a list of aquatic insects is presented, but it included Odonata only at family level. Additionally, and due to its importance as vectors of the tropical disease Leishmaniasis, a few studies on sand flies have been conducted, but the sampling was focused on the peridomestic fauna of villages in the south of the park (*e.g.* Bustamante *et al.*, 2012 & García *et al.*, 2007).

Apart from the contributions listed above, this is the first entomological field work and insect checklist for the park.

The sampling was conducted in small permanent streams that drain into the Pluma River (the main tributary of the upper Secure River), small ponds, and open areas of the forest. From July to August dragonflies were scarce, and only *Heterina sanguinea* Selys and a very few specimens of *Argia* Rambur, pseudostigmatids and libellulids were observed. In September, many dragonflies appeared, but were restricted to one stream (unnamed stream 2) and one ephemeral pond.

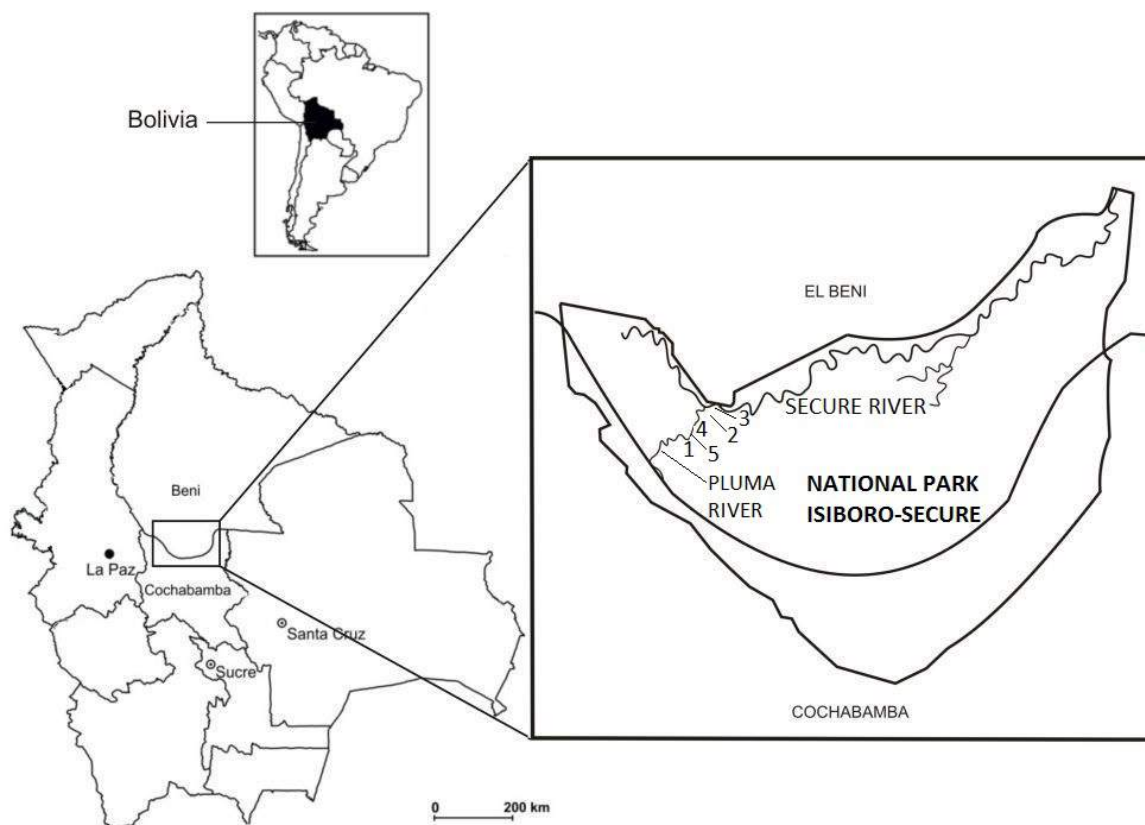


Figure 1. Map showing location of Isiboro-Secure Indian Country and National Park.

Sampling sites: -

1. Bolivia, El Beni state, National Park and Indian land Isiboro-Sécure, unnamed stream, by the side of Pluma Lodge camp, tributary of Pluma river, 16°05'04.6" S 66°16'26.95", 8-10/2011, P. Pessacq leg.
2. Same as above but, unnamed stream, tributary of Pluma river, in the road from Coruya settlement to Pluma Lodge camp, 16°02'49.74" S 66°15'10.84", 8-10/2011, P. Pessacq leg.
3. Same as above but, unnamed stream, tributary of Pluma river, in the road from Coruya settlement to Pluma Lodge camp, 16°02'37.37" S 66°14'35.10", 8-10/2011, P. Pessacq leg.
4. Same as above but, temporary pond in the road from Coruya settlement to Pluma Lodge camp, 16°02'56.50" S 66°15'13.16", 8-10/2011, P. Pessacq leg.
5. Same as above but, Pluma Lodge camp, 16°04'59.71" S 66°16'31.48", 8-10/2011, P. Pessacq leg.
6. Same as above but, Asunta village, 15°49'58.88" S 66°25'38.37", 10/2011, F. Morales leg.

SPECIES LIST

Numbers in brackets indicate sampling sites.

CALOPTERYGIDAE

Hetarina sanguinea Selys (1, 3)

Mnesarete devillei (Selys) (2)

MEGAPODAGRIONIDAE

Heteragrion sp. (2)

Note: the studied specimens are probably co-specific with those identified as *Heteragrion inca* by N. von Ellenrieder and R. W. Garrison (pers.com.).

COENAGRIONIDAE

Acanthagrion aepolum Tennessen (1)

Acanthagrion apicale Selys (4)

Acanthagrion vidua (Selys) (1, 4)

Argia yungensis Garrison & von Ellenrieder (2)

Argia sp. 1 (2)

Argia sp. 2 (2)

Argia sp. 3 (2)

Argia sp. 4 (2)

Argia sp. 5 (2)

PROTONEURIDAE

Protoneura woytkowskii Cowley (2)

Note: This species is currently known from Bolivia, Brazil, Ecuador and Perú (Cowley, 1940; Pessacq et al., 2012). The specimens studied possess a long apical lobe on the third segment of the genital ligula, while in the original description (Gloyd, 1939) a short lobe is illustrated. In material from Ecuador provided by N. von Ellenrieder, both forms, with a short and a long apical lobe are present. Dr. N. von Ellenrieder is currently revising the genus *Protoneura*, and based on material on her collection, a new species could be proposed in the future (von Ellenrieder pers. com.). But for now we consider the specimens to belong to *P. woytkowskii*.

Epipleoneura venezuelensis Rácanis (2)

Note: As stated in Pessacq (2014), this is the first record for the species in Bolivia; it was previously recorded from Northern Venezuela, central Brazil and northern Argentina (Pessacq, 2014).

Drepanoneura loutoni von Ellenrieder & Garrison (2)

Note: This is the first record for the species in Bolivia; the species was previously recorded from Ecuador to Peru (von Ellenrieder & Garrison, 2008). Two of the males possess a mainly black mesothorax, without the yellow color along ventral margin of humeral suture and metepisternum as originally described (von Ellenrieder & Garrison, 2008). These specimens also have a longer lateral lobe of genital ligula.

AESHNIDAE

Gynacantha membranalis Karsch (4, 6)

Gynacantha sp. (4)

Note: male probably belonging to a new species. Following the key by Williamson (1923) the male falls into couplet 12, showing intermediate characters between *Gynacantha convergens* Förster and *G. laticeps* Williamson. However, the cerci are different from both species.

Triacanthagyna septima (Selys in Sagra) (5)

Triacanthagyna caribbea Williamson (5)

GOMPHIDAE

Archaeogomphus nanus Needham (1)

Note: This is the first record for the species in Bolivia; the species was previously recorded in Brasil, Guayana Francesa, Suriname and Venezuela (Heckman, 2008).

LIBELLULIDAE

Anatya guttata (Erichson) (2, 5)

Erythrodiplax fusca (Rambur) (5)

Erythrodiplax unimaculata (De Geer) (5)

Macrothemis flavescens (Kirby) (5, 2)

Orthemis cultriformis Calvert (4, 5)

Orthemis discolor (Burmeister) (4, 5)

Orthemis paulsoni von Ellenrieder (4)

Note: This is the first record for the species in Bolivia; the species was previously recorded in SE Perú and Ecuador (von Ellenrieder, 2012).

Perithemis icteroptera (Selys in Sagra) (4)

Note: This is the first record for the species in Bolivia; the species was previously recorded in Brazil, Uruguay and Argentina (von Ellenrieder & Muzón, 1999; von Ellenrieder et al. 2009).

Perithemis mooma Kirby (4)

Perithemis thais Kirby (4)

Perithemis sp. 1 (4)

Perithemis sp. 2 (4)

Uracis fastigata (Burmeister) (4)

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Unveiling South America ICO 2015

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2015 is a great year for Odonatology in South America. For the first time the International Congress of Odonatology will be held in the region (<http://ico2015-argentina.com.ar/>), Argentina being the host country (15th to 20th of November). Many colleagues and students from Mexico, Colombia, Venezuela, Peru, Brazil, Chile, and Argentina have already registered, positioning the Neotropics on the arena with conferences and a symposium on Neotropical Biodiversity.

Furthermore, ICO 2015 has been chosen as the perfect scenario for discussing and putting into practice a new odonatological society which will foster the connection and interaction between Latin American Odonatologists and all the colleagues interested in Neotropical diversity.

Odonata from the Lower Delta of the Paraná River, Argentina

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Argentina, one of the biggest countries in South America, is characterized by complex regions and landscapes, which include a great variety of freshwater ecosystems. The odonatological knowledge of this complexity is far from complete. Considering the great extent of the country, few regions have been properly covered, as for example northern Patagonia, Iberá wetlands and Yungas forest (Muzón *et al.*, 2008, 2014; von Ellenrieder & Garrison, 2007; von Ellenrieder, 2009).

The first Argentine area surveyed for odonates was the Lower Delta of the Paraná River (DP) (Ris, 1904; Navás, 1920, 1927), a large wetland area of between Buenos Aires and Entre Ríos provinces, close to Buenos Aires city (Figure 1). This area has a typical delta landscape including plenty of riverine and pond habitats and is encompassed by two main rivers (Paraná de las Palmas and Paraná Guazú). It belongs to the Delta and Paraná Islands eco-region, which is represented by a narrow corridor of riparian forests following the Paraná River from the northern limit of Corrientes Province to DP. Delta and Paraná Islands eco-region is biogeographically more related to the northern eco-regions i.e. humid Chaco and Paranaense Forest rather than southern Pampas grasslands.

At the end of the 19th century and the first half of the 20th, the human population increased in DP to occupy large areas dedicated mainly to timber production and tourism. From the second half of the 20th century to now, land use has changed to low intensity tourism leaving large areas unexploited.

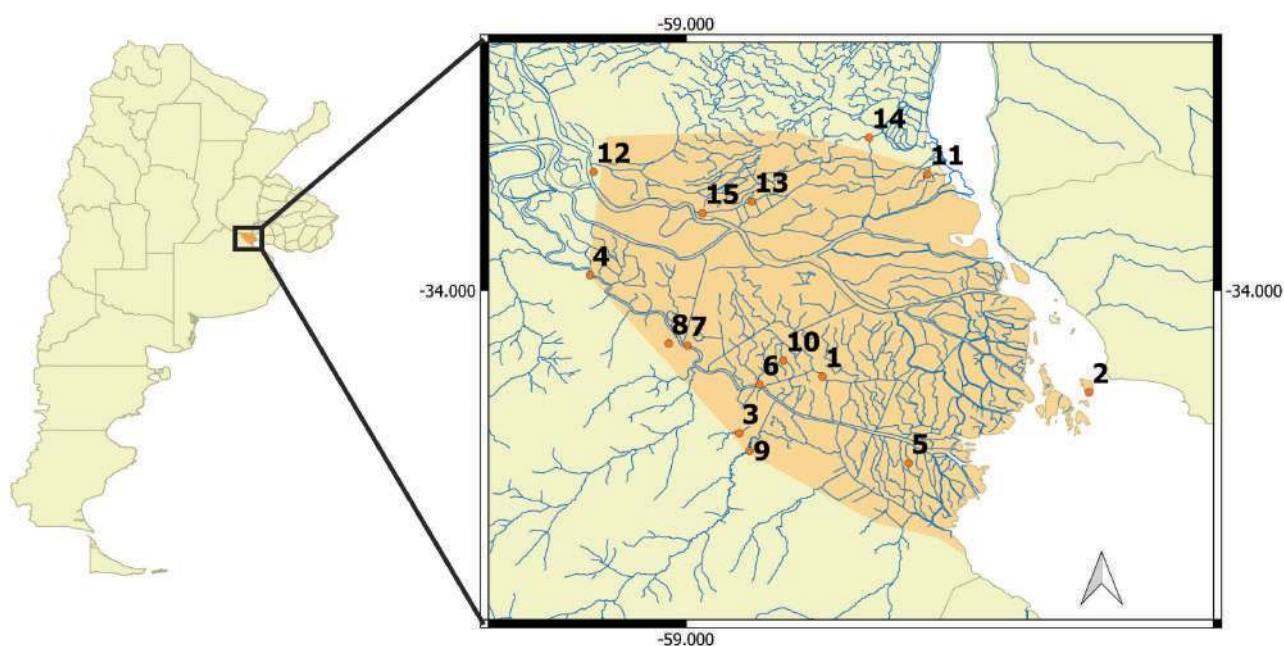


Figure 1: Map of the Lower Delta of the Paraná river showing recently surveyed localities (see Table 3 for details).

Table 1 (right). Inventory of odonates from Lower Delta of the Paraná river.

¹ Navás (1920; 1927; 1929; 1930; 1932). ² Includes Belle (1972, 1992), Pessacq (2007) and new records (NR)..

³ Seen only. ⁴ Recorded from Corrientes province by Muzón & von Ellenrieder (1998) and von Ellenrieder & Muzón (2008). ⁵ Recorded only from Misiones province by Muzón & von Ellenrieder (1998) and von Ellenrieder & Muzón (2008). ⁶ Recorded from Misiones and Corrientes provinces by Muzón & von Ellenrieder (1998) and von Ellenrieder & Muzón (2008). ⁷ Belle (1992) stated that all the specimens cited by Navás under *A. dentata* Selys probably belongs to *A. distinguenda* (Campion).

Family	Species	Source of record		
		Ris (1904)	L. Navás ¹	XXI century ²
Coenagrionidae	<i>Acanthagrion lancea</i> Selys	X	-	X
	<i>Andinagrion saliceti</i> (Ris)	X	-	-
	<i>Argentagrion ambiguum</i> (Ris)	X	-	X
	<i>Cyanallagma bonariense</i> (Ris)	X (as <i>Acanthagrion interruptum</i>)	-	X
	<i>Homeoura chelifera</i> (Selys)	X	-	X
	<i>Ischnura capreolus</i> (Hagen)	-	-	NR
	<i>Ischnura fluviatilis</i> Selys	X	X (1929)	X
	<i>Oxyagrion terminale</i> Selys	X	X (1929)	X
	<i>Telebasis willinki</i> Fraser	-	-	NR
Lestidae	<i>Lestes spatula</i> Fraser	-	-	NR
	<i>Lestes undulatus</i> Say	-	-	NR
Protoneuridae	<i>Peristicta forceps</i> Hagen in Selys	-	-	X
Aeshnidae	<i>Rhionaeschna bonariensis</i> (Rambur)	X (as <i>Aeshna</i>)	X (1927a)	X
	<i>Rhionaeschna confusa</i> (Rambur)	-	-	NR
	<i>Rhionaeschna planaltica</i> (Calvert)	-	-	NR
	<i>Staurophlebia bosqui</i> Navás	-	X (1927b)	X
	<i>Triacanthagyna nympha</i> (Navás)	-	-	NR
Gomphidae	<i>Aphylla distinguenda</i> (Campion)	X (as <i>Aphylla dentata</i>)	X (1927b; 1930 as <i>Gomphoides dentata</i>) ⁷	X
	<i>Phyllocycla argentina</i> (Hagen in Selys)	X	X (1927a as <i>Gomphoides</i>)	X
	<i>Phyllocycla vesta</i> Belle	-	-	NR
Libellulidae	<i>Progomphus</i> sp.	-	-	NR
	<i>Diastatops</i> sp. ³	-	-	NR
	<i>Erythemis attala</i> (Selys in Sagra)	-	-	NR
	<i>Erythemis plebeja</i> (Burmeister)	-	-	NR
	<i>Erythemis vesiculosa</i> (Fabricius)	-	X (1927a as <i>Lepthemis</i>)	X
	<i>Erythrodiplax corallina</i> (Brauer)	X (as <i>E. plebeia</i>)	X (1927a)	-
	<i>Erythrodiplax media</i> Borror	-	-	NR
	<i>Erythrodiplax melanorubra</i> Borror	X (as <i>E. fusca</i>)	X (1927a; 1929; 1932 as <i>E. fusca</i>)	X
	<i>Erythrodiplax nigricans</i> (Rambur)	X (as <i>E. choloropleura</i>)	X (1927a; 1929)	X
	<i>Erythrodiplax</i> cf <i>pallida</i> Needham	-	-	NR
	<i>Miathyria marcella</i> (Selys in Sagra)	X	-	X
	<i>Micrathyria eximia</i> Kirby ⁴	-	X (1932)	-
	<i>Micrathyria hypodidyma</i> Calvert	X (as <i>M. didyma</i>)	X (1932 as <i>M. didyma</i>)	X
	<i>Micrathyria unguata</i> Förster	-	-	NR
	<i>Nephepeltia flavifrons</i> (Karsch)	-	-	NR
	<i>Oligoclada laetitia</i> Ris	-	-	NR
	<i>Orthemis ambinigra</i> Calvert	-	-	NR
	<i>Orthemis cultriformis</i> Calvert ⁵	X	-	-
	<i>Orthemis nodiplaga</i> Karsch,	X	X (1927a)	X
	<i>Perithemis icteroptera</i> (Selys in Sagra)	-	X (1927a, b)	X
	<i>Perithemis mooma</i> Kirby	X (as <i>P. domitia</i>)	X (1927a as <i>P. domitia</i> var. <i>cloe</i>), (1932 as <i>P. domitia</i>)	X
	<i>Tauriphila argo</i> (Hagen) ⁶	-	X (1930)	-
	<i>Tauriphila risi</i> Martin	X	X (1927a)	X

Taxa recorded in DP (Delta and Paraná Islands eco-region)		Also recorded in Pampas eco-region	Also recorded in humid Chaco, Paranaense forest or in northern areas
Coenagrionidae	<i>Acanthagrion lancea</i>	X	X
	<i>Andinagrion saliceti</i>	X	-
	<i>Argentagrion ambiguum</i>	X	X
	<i>Cyanallagma bonariense</i>	X	X
	<i>Homeoura chelifera</i>	X	X
	<i>Ischnura capreolus</i>	X	X
	<i>Ischnura fluviatilis</i>	X	X
	<i>Oxyagrion terminale</i>	X	X
	<i>Telebasis willinki</i>	-	X
Lestidae	<i>Lestes spatula</i>	X	X
	<i>Lestes undulatus</i>	X	X
Protoneuridae	<i>Peristicta forceps</i>	-	X
	<i>Aeshnidae</i>	X	X
	<i>Rhionaeschna confusa</i>	X	X
	<i>Rhionaeschna planaltica</i>	-	X
	<i>Staurophlebia bosqui</i> ¹	-	-
	<i>Triacanthagyna nympa</i>	-	X
Gomphidae	<i>Aphylla distinguenda</i>	-	X
	<i>Phyllocycla argentina</i>	X	X
	<i>Phyllocycla vesta</i>	X	-
	<i>Progomphus</i> sp.	-	X
Libellulidae	<i>Diastatops</i> sp.	-	X
	<i>Erythemis attala</i>	X	X
	<i>Erythemis plebeja</i>	-	X
	<i>Erythemis vesiculosa</i>	-	X
	<i>Erythrodiplax corallina</i>	X	X
	<i>Erythrodiplax media</i>	-	X
	<i>Erythrodiplax melanorubra</i>	X	X
	<i>Erythrodiplax nigricans</i>	X	X
	<i>Erythrodiplax cf pallida</i>	X	X
	<i>Miathyria marcella</i>	X	X
	<i>Micrathyria hypodidyma</i>	X	X
	<i>Micrathyria unguolata</i>	X	X
	<i>Nephepeltia flavifrons</i>	-	X
	<i>Oligoclada laetitia</i>	-	X
	<i>Orthemis ambinigra</i>	-	X
	<i>Orthemis cultriformis</i>	-	X
	<i>Orthemis nodiplaga</i>	X	X
	<i>Perithemis icteroptera</i>	X	X
	<i>Pertithemis mooma</i>	X	X
	<i>Tauriphila risi</i>	X	X
Total species by eco-regions		26 (63%)	38 (92%)
Total species in both eco-regions		21 (51%)	

	Locality	Coordinates
1	Buenos Aires, San Fernando, Delta del Paraná, Camping Cielo	34° 09' 37.00" S - 58° 44' 45.00" W
2	Buenos Aires, Isla Martín García	34° 11' 22.93" S - 58° 15' 00.14" W
3	Buenos Aires, Arroyo Pescado sobre RN 9	34° 15' 56.56" S - 58° 54' 02.38" W
4	Buenos Aires, Lima, Club de Pesca	33° 58' 18.68" S - 59° 10' 44.41" W
5	Buenos Aires, Tigre, arroyo Antequera	34° 19' 16.50" S - 58° 35' 07.76" W
6	Buenos Aires, Otamendi, Estación Experimental INTA - Delta	34° 10' 30.92" S - 58° 51' 47.35" W
7	Buenos Aires, Isla Talavera	34° 06' 09.00" S - 58° 59' 51.00" W
8	Buenos Aires, Zárate	34° 05' 55.71" S - 59° 01' 56.25" W
9	Buenos Aires, Arroyo s/n, RN 9, km 64	34° 17' 54.06" S - 58° 52' 54.96" W
10	Buenos Aires, Campana, Delta del Paraná, entre Otamendi y Partido de San Fernando (e/ 2da y 3ra balsas)	34° 07' 51.00" S - 58° 49' 08.00" W
11	Buenos Aires, Delta del Paraná, arroyo El Brasileño, Quinta Arco Iris	33° 47' 02.68" S - 58° 33' 01.87" W
12	Entre Ríos, Ibicuy, Camping Islas Malvinas	33° 46' 47.45" S - 59° 10' 19.58" W
13	Entre Ríos, Ibicucito	33° 50' 06.31" S - 58° 52' 38.27" W
14	Entre Ríos, Villa Paranacito	33° 42' 57.96" S - 58° 39' 33.14" W
15	Entre Ríos, Arroyo Ibicucito y RN 12 (traza vieja)	33° 51' 22.90" S - 58° 58' 09.37" W

Table 3. List of recently surveyed localities.

One of the first papers on Argentine odonates was written by Friedrich Ris in 1904, in which a total of 18 species were recorded for DP (Table 1), two of these were new to science, *Oxyagrion saliceti* (= *Andinagrion saliceti*) and *Acanthagrion ambiguum* (= *Argentagrion ambiguum*). Later, the Jesuitical priest Longino Navás published a series of records on Argentine odonates (1927; 1929; 1930; 1932), which include five new records for DP and the description of *Staurophlebia bosqui* (Navás, 1927).

Navás (1920) described *Persiticta lizeria*, from Buenos Aires province without further information on locality, nevertheless, taking into account that most localities from Buenos Aires province, cited in Navás papers, correspond to DP or towns close to the delta front, it is likely that the type specimens of this species were collected near DP. According to Pessacq (2007) the taxonomic status of *P. lizeria* is doubtful due to the incomplete original description and the unavailability of its holotype. On the other hand, Pessacq (2007) recorded *P. forceps* for DP.

During the past 20 years several field trips to DP has increased the species inventory for this area to 43 (Figure 1, Table 1); the Libellulidae family with most new records. The biogeographical relationship of DP with Humid Chaco and Paranaense Forest is validated with these additions. In fact, except for six species, *Andinagrion saliceti*, *Cyanallagma bonariense*, *Staurophlebia bosqui*, *Phyllocycla vesta*, *Erythrodiplax corallina* and *Erythrodiplax cf pallida*, the remaining 37 (90%) species have also been recorded from Paranaense Forest (Table 2). Out of 25 genera recorded from DP (36%) *Telebasis*, *Persiticta*, *Staurophlebia*, *Triacanthagyna*, *Aphylla*, *Progomphus*, *Diastatops*, *Nephepeltia*, and *Oligoclada* have not been recorded from the Pampas.

There are several species that have not been recorded since Ris and Navás' papers, some probably due to chance (e.g., *Phyllocycla argentina*, *Erythrodiplax corallina*, and *Orthemis cultriformis*) or misidentifications (e.g. *Tauriphila argo*). *Andinagrion saliceti*, is a rare species known from very few records mainly from the Pampas eco-region; it was originally described by Ris from San Isidro, an area closely related to DP, but it has not been collected or seen in DP since Ris' description.

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Table 2 (left). Species recorded in DP and its presence in eco-regions.

¹ Recorded only in Delta and Paraná Islands eco-region

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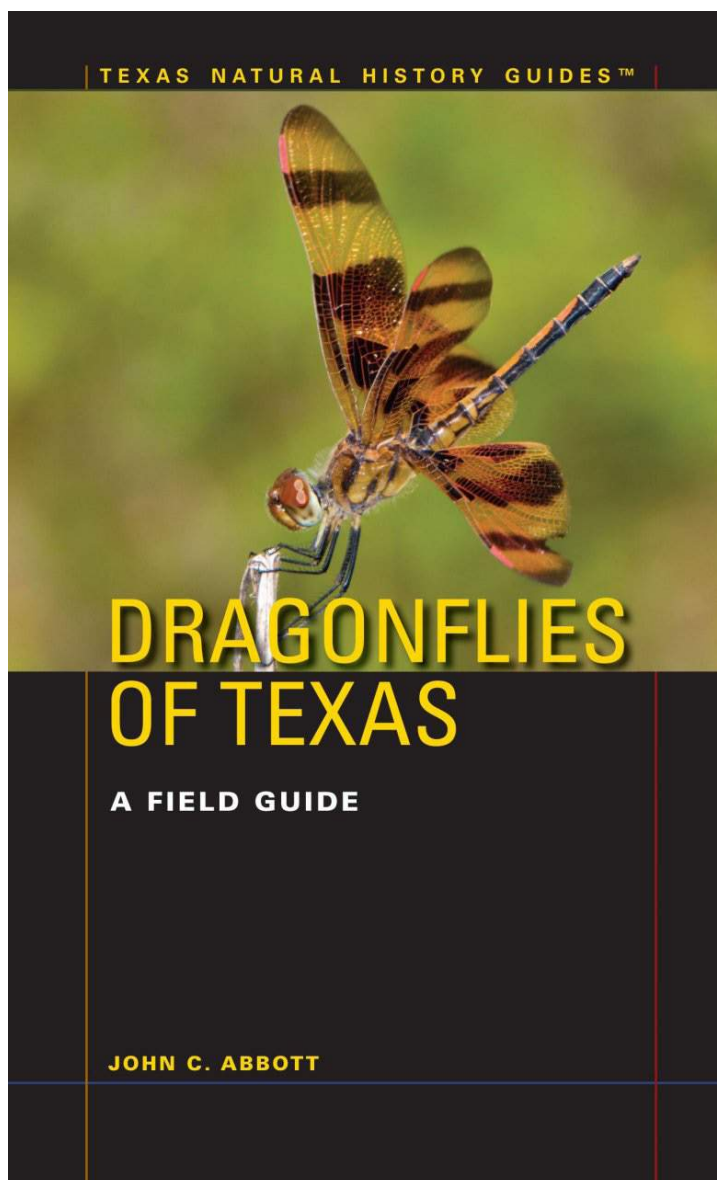
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