Worldwide Dragonfly Association

AGRION

THE NEWSLETTER OF THE WORLDWIDE DRAGONFLY ASSOCIATION

PATRON: Professor Edward O. Wilson FRS

Volume 9, Number 2 July 2005

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ISSN 1476-2552

EDITORIAL

What a great response! Thank you to those of you who sent articles for inclusion in the Asian Number of AGRION; and thank you to all those who wrote telling me you had enjoyed the number – I enjoyed putting it together.

I am looking forward to seeing a goodly number of readers at the Spanish Symposium later this month.

PLEASE NOTE THAT MY E-MAIL ADDRESS IS NOW: JSilsby1@btinternet.com

THE 'BIG BOOK' PROJECT - Richard Rowe

In 1962, 1980 and again in 1999 Philip Corbet produced synoptic reviews of dragonfly biology. These reviews had an enormous influence on, and were of tremendous value for, our discipline. Most dragonfly biologists probably cut their scientific teeth on one or more of Philip's reviews. Largely as a consequence of the momentum generated following Phil's efforts, such a work is now probably forever beyond the capacity of a single author.

Beginning in 2003 a small core of dragonfly workers has assembled with the goal of producing a 'Big Book' to continue this cycle of synoptic reviews, synthesising current knowledge. The planned outcome is tentatively titled 'Corbet's dragonflies' (like Imms' 'Insects' and other scientific sequences that have adopted the founding author's name). Our plans are to produce the volume(s) some time between 2015 and 2020. The core production group was gathered on the basis of a complementary range of interests and geographical range. At the moment Phil is mentoring us and plans to continue doing this into the future.

The core group comprises:

Richard Rowe	(co-ordinator)
Adolfo Cordero	(adult stage)
Stanislaw Gorb	(biomechanics and ultrastructure)
Andreas Martens	(habitat selection and oviposition)
Göran Sahlén	(egg stage)
Mike Siva-Jothy	(mating systems)
Frank Suhling	(larval stage)

We are now beginning to gather, index and sort primary sources. We shall also be seeking advice from Odonatologists worldwide. The core group would very much appreciate the assistance of the whole dragonfly community in this project. In the first instance it would be very helpful if you could keep the appropriate area coordinator up to date with your studies by providing reprints (annotated where you think this would be helpful). Further, and more urgent and focussed, requests will be made to individuals and the community as the project develops.

THE DRAGONFILES PROJECT - Richard Rowe

At the Beechworth WDA symposium John Trueman and I raised the possibility of providing web-based databasing of core information on the world odonate fauna, we argued that this project was potentially useful, of feasible size and would give Odonata a boost as various groups speak loudly about being "first on the web", and we might do it. This note introduces one of the components of the programme – the ***DRAGONFILES*** database. The purpose of this database is to provide a reliable and up-to-date, machine-searchable directory to information on dragonflies.

Information contained:

taxonomic information with authorities ... the labels are the key to the scientific literature
synonymies with authorities ... the other labels
locations of descriptions and keys ... allows for the establishment of identity
indicative information on ecology with authorities
geographical distribution with authorities

conservation status with authorities
DNA sequence genbank accession numbers
links to photographs, further information etc
full bibliography, with provision for links to any electronic versions of documents

This is intended to be a directory to, not a repository of, information. The information within *Dragonfiles* will be to guide researchers.

Dragonfiles will complement another parallel project that seeks to provide interactive keys to the known fauna.

Dragonfiles is being built to operate through community involvement. The system will comprise three parallel databases. The first is open to registered contributors to enter and to modify data. The second is the review database where contributors' contributions are scanned by the editor (or editorial panel) and any problem points are cleared up or documented for status. At this point citations of authorities will be checked. The third component is the public access database that can be searched and queried by anyone. Data will move from entry database to review database to public database via a sneaker network to limit the possibilities of catastrophic mix-ups.

The only way the database will be populated with information in a reasonable time is through community involvement, both entering data and checking veracity of entered data. Such highly parallel multi-authored methods work elsewhere: they should work here.

Current status: at a late alpha stage of development.

A front end is largely completed.

Security methods are being added to the front end – both for contributors and for data.

The trial front end is now being populated with real data to test for breakdowns (until now we have been using generalised dummy data, real data will add new pitfalls).

Next step: beta-testing.

Access will be given to selected volunteers to enter more information while system performance is monitored.

Entry breakdowns will be fixed.

A query front end will be produced to provide for a range of 'ordinary' queries using fill-the-box web forms.

Links will be provided to allow full SQL querying of the database.

Once this is satisfactorily sorted out the system will be up and running. If traffic is high then the public access database should be mirrored in Europe or North America, for robustness this is probably a good idea anyway.

The system is being implemented in PHP code using a mySQL database. Both of which provide standard and portable platforms. The coding is being done by Rhondda Jones (originally my Head of Department, and until her retirement our University's Deputy Vice-Chancellor) and the system will, in the first instance, be hosted on a server at James Cook University while we bang the bugs out. We are designing the system for easy transfer to XML coding consistent with the taxonomic databases standards being developed in conjunction with GBIF.

Timetable: we expect alpha testing to be completed by Christmas 2004 and beta testing will occur through to mid 2005. We anticipate full implementation and release in time for the 2005 WDA conference (Pontevedra, July 26 to 30 July). My guess is we will have about 500 species entered at this stage, which is a start. From then on it will be up to the community to enter and check data. Once significant parts of the fauna are entered and 'stable' it will be necessary to work systematically through the less fashionable and more difficult corners so we can generate near completeness.

THE IMPOSSIBILITY of a 4-SIDED TRIANGLE. Jill Silsby

It was several years since I had discovered a new site for the primitive libellulid, *Tetrathemis polleni* (African Primitive) within the grounds of Kruger Park Lodge in HazyView, Mpumalanga, South Africa. Visiting the place again in February this year I was anxious to ascertain that (a) the typically scruffy little pond had remained a scruffy little pond and (b) that *T. polleni* was still breeding in it – both anxieties were satisfactorily laid to rest! Two females were busily ovipositing into the undersides of a couple reeds leaning over the water and a single male was flitting busily over the pond. There is a large tree with its roots partly in the water and I spotted another male perched near the tip of an overhanging branch. An examination of one of the reeds showed hundreds of tiny dried up eggs and a dozen or so fresh ones. Clearly the inmates of the former had already hatched and dropped into the water below, soon to be followed by the prolarvae of today's batch. Hopefully their future is ensured.

Even though there had been several changes in management, my original exhortations regarding the comparative rarity of the very pretty little dragonfly and the need to keep its breeding site exactly as it was, had been handed down to successive managers. Mark, the present incumbent, was particularly interested and anxious to learn how to separate the black apical patches on the wings of *polleni* from the black markings of the much more common *Palpopleura lucia lucia* (African Black Widow) which was also present at the little pond. (Both species are illustrated in my *Dragonflies of the World,* on pages 160 and 175.) I was assured that the Polleni Pond would still be as scruffy as ever if and when I returned after another gap of five or six years and Mark wanted to be told exactly how this could be achieved.

I went on to describe one of the primitive characters of the subfamily Tetrathemistinae: the discoidal cell in the forewing (the so-called 'triangle') being four-sided. Mark and my mathematician son Jonathan, who was also with me in Hazy View, clearly thought me a complete idiot; how could a four-sided shape possibly be called a triangle? I explained how one of the three veins making up the discoidal cell doesn't run straight but kinks, thus

making an extra angle and giving the cell four sides. It was no use: maths was really the only exact science, as Jonathan had always known! Mark was more polite!

Amazingly there is a second member of the subfamily breeding in the Polleni Pond. The less uncommon but very secretive and inconspicuous little *Notiothemis jonesi* (Jones's Primitive) is present in a dark, overgrown, corner of the pond. This species will remain stationary on a dark floating leaf or piece of sodden wood and, unless its presence is suspected, can easily be overlooked. A prominent white patch on the seventh abdominal segment attracts an observer's attention and, with difficulty, the black and green cryptic pattern of the rest of the abdomen can be picked out. A picture of *N. jonesii* can also be found in *Dragonflies of the World.*

WAITING for the WET in NORTHERN AUSTRALIA – Jan Taylor

At last we were able to get away on our long planned trip to see the Kimberley and Kakadu. We chose to go in September/October to avoid the bulk of grey nomads (retired people doing their round Australia caravanning trip) although we knew it would be hot. We saw a few stragglers on our way to Port Hedland, but most caravans had already gone south. After a few nights at the Bird Observatory at Broome we headed for Windjana Gorge. This is a magic place where the Lennard River cuts through the fossiliferous Devonian Reef of the Napier Range. The river was just pools, waiting for the first rains (placid compared to our last visit when it became a raging torrent during the passage of a cyclone – but that is another story). The pools were, as usual, surrounded by lazy fresh-water crocodiles, and three Brolgas strutted near the entrance to the gorge. The track passes through a narrow band of paperbark and eucalyptus forest with near vertical limestone walls towering on either side of the gorge. Great Bowerbirds were busy making their presence known and we passed a colony of fruit bats hanging and smelling like rotting garbage bags flapping in the breeze. Any grassy area had many smallish red dragonflies settling on the grass stems, twigs or on the ground.

I was keen to see Red Arrows (*Rhodothemis lieftincki)* because I have never identified this species, despite examining any smallish red dragonfly whenever I am in northern Australia. They all appeared to be the abundant *Diplacodes haematodes*, although they did seem a little different *****. Higher up the gorge there were patches where, instead of the red dragonflies there were many Painted Grasshawks (*Neurothemis stigmatizans)* settling on the grasses. It is strange that the two species did not seem to intermingle – there were either lots of *Neurothemis*, or lots of the red species.

Our next stop along the Gibb River Road was Bell Gorge in the Lennard Range. It was a hot stony walk down to the first stream and then down a gully to a spectacular river pool and waterfall. We decided to walk further down to the pool below for our swim. No crocodiles to be seen, but there was a large water goanna. While sitting on the rocks, we could hear bats in a deep rock-shelter to the side of the waterfall, I went in to have a look and was amazed at what I found: instead of bats, I found the roof of the shelter festooned with large dragonflies and I estimated there were well over 100. Near ones were disturbed by my movement and flew back and forth seeking new places to settle, often slipping off the rock several times before finding a new perch. They were sandy-coloured matching the rock and they had the large eyes typical of many crepuscular species: Cave Duskhawkers (*Gynacantha nourlangie)*.

On the way back to the car we stopped at a small stream pool where there was an attractive damselfly with a dark patch on its wings. It settled on rocks and reeds and was quite easy to photograph. It was hard to identify – I had assumed the dark patch on its wing would be a give away, but made assumptions on its behaviour that

it was not a *Nososticta* because, in my experience, these are very wary and tend to hover in shady places if you disturb them. However, it proved to be *Nososticta* after all: the Spot-winged Threadtail (*N. kalumburu*), a Kimberley endemic

*** Back in Perth I checked my photos – I had taken several of the smaller red dragonflies, which had been abundant everywhere and which I had assumed were *Diplacodes haematodes*. To make certain, I compared them with photos and details kindly supplied by Deniss Reeves and sadly concluded that they were definitely not *Rhodothemis lieftincki*.**

Spot-winged Threadtail, *Nososticta kalumburu*.

Next we went on to Mornington Station which is a wilderness reserve owned by Australian Wildlife Conservancy. We found a few more Cave Duskhawkers in rocky caves by the Fitzroy River and Gold-fronted Riverdamsels (*Pseudagrion aureofrons*) but a small creek running by the campsite proved the best hunting ground. The creek was in a gully with overhanging trees and pandanus palms. We heard crocodiles and fruit bats at night. Black-headed Skimmers (*Crocothemis nigrifrons*) patrolled pools together with the occasional Common Glider (*Trapezostigma loewii*) and I saw many larger red dragonflies in areas where there were reeds: these I assumed were Rosy Skimmers (*Orthetrum migratum)*. They were mature and strongly pruinosed. Small red dragonflies were everywhere – mostly Scarlet Perchers. Some of the ubiquitous Blue Skimmers (*Orthetrum caledonicum)* were also there.

There were a number of damselflies too, especially numerous were black Malachite Threadtails (*Nososticta liveringa)* which were usually seen hovering almost invisibly in the shady areas. Wet muddy areas had tiny Pygmy Wisps (*Agriocnemis pygmaea)*. I was surprised to learn that the shining white Silver Wisp (*A. argentea)* has not been found in the Kimberley, although common in the adjoining Pilbara and NT. Blue Riverdamsel (*Pseudagrion microcephalum)* and Flame-headed Riverdamsel (*Pseudagrion ignifer)* were also present. While at Mornington I promised to put together a CD of Kimberley Odonata from my photos.

Next we went on to Manning Gorge. There is a large pool by the camping ground and a hot walk over rocky hills leads to higher pools. Crossing the first creek at the end of the big pool I saw a number of Spot-winged Threadtails and some very small Pilbara Billabongfly (*Austroagrion pindrina)*. Then I saw some other small red dragonflies – they were Pygmy Perchers (*Nannodiplax rubra)* and were not much bigger than the Pilbara Billabongfly: I was able to photograph the two together for comparison.

Emma Gorge at El Questro had some lovely Gliders circling over the upper pool by the waterfall and many Grasshawks on the way up there. Lake Kununurra was a marvellous expanse of water with emergent vegetation: just right for many species, particularly Graphic Flutterers (*Rhyothemis graphiptera)*.

Going on into the Northern Territory opened up a whole new world of dragonflies, many of which do not get into Western Australia. The first new species to encounter was the only member of the genus *Lestes* found in Australia. It was the Dusky Spreadwing (*L. concinnus)*. It was amongst some grasses bordering the creek at Timber Creek. The same area had Twisters (*Tholymis tillarga)*, flying fast and erratically over the lawns at dusk. Litchfield Nat'l Park was fascinating for its Magnetic Termite Mounds, looking like gravestones in an abandoned graveyard. A little further down the road we came to a swamp renowned for its birdlife. There were some birds, but the dragonflies were superb. Near the water's edge were many Pygmy Perchers, and Chalky Perchers (*Diplacodes trivialis)* amongst others. There were so many that lizards were having a feast, sometimes rushing into the water

after their quarry. There were some large red damselflies with a greenish thorax. These proved to be Redtails (*Ceriagrion aeruginosum)* – very different from the small delicate species I was familiar with in the UK. Finally I found a lovely little black dragonfly with dark wing tips, it was the Charcoal-winged Percher (*Diplacodes nebulosa)*.

Charcoal-winged Percher, *Diplacodes nebulosa*

Edith Falls near Katherine had a number of Rosy Skimmers, *Orthetrum migratum* with their typical red colour, and I had my first sighting of the Iridescent Flutterer, *Rhyothemis braganza*. It was drifting high over the river with no chance of a photograph.

Fogg Dam had an amazing expanse of reeds and water lilies, but had warnings not to get too close because of crocodiles. Graphic Flutterers were everywhere and I photographed a twiggy bush with one settled on each twig. Small powdery blue dragonflies flew amongst the reeds – they were Palemouths (*Brachydiplax denticauda)*. Common Gliders drifted around the bird observation hut, and I could see an Australian Tiger (*Ictinogomphus australis)* perched in a typical manner on a reed way out in the lake.

Yellow Waters at Kakadu brought some close encounters with crocodiles – no swimming there! More Palemouths were busy in the reeds and a Top End Hawk (*Austrocordulia territoria)* constantly flew back and forth beside a boardwalk. The river trip brought some sightings of Emperors, probably Green Emperors (*Anax gibbosulus)*: they flew high and well out of reach of even a telephoto lens. I had better luck with what I presume was a female Red Swampdragon (*Agrionoptera insignis)* on a branch of the Alligator River. It remained settled near the ground in an area of rainforest and did not budge, even when a party of tourists went by.

Reluctantly we set off on the return journey. We first stopped at Gunlom, a wonderful rock pool with a waterfall in Kakadu National Park that is renowned as the site for romantic scenes in the film Crocodile Dundee. It was very hot there, in fact Territorians had been saying it was hot for the last few days – getting up to a humid 43°C in the day and maybe as low as 33°C by 6 am. There was also very little shade, I had not appreciated that Eucalyptus trees are deciduous in the far north. We lay in the water to keep cool. One of the pools had an Iridescent Flutterer constantly flying and settling over it:perfect for a photograph and a great way to end our trip to Kakadu.

(Note: Photographs of many of the above mentioned species can be found in the web version on our WDA webpage. Ed.)

Observations on Seasonality in Coastal Afrotropical Dragonflies

Viola Clausnitzer

Some observations on seasonality of tropical dragonflies along coastal habitats in **Kenya** and **Tanzania** are given. Since this was not the primary aim of the studies no quantitative data is available and facts regarding the life history of some species are speculative.

Sites visited

The Arabuko-Sokoke Forest (03°11'- 03°29'S; 39°48'- 40°00'E) at Kenya's north coast lies in the 900-1100 mm per year rainfall zone, but experiences a very variable rainfall. Studies on dragonflies were conducted during April, May and December 2000, March and April 2001 and September 2002. Species of the Arabuko-Sokoke Forest and their breeding habitat as well as their behaviour in the dry season are listed in Table 1.

The Buda Forest (04°26'S; 39°24'E) in southern Kenya, has a patch of moist swamp forest and experIences 1300-1400 mm rainfall per year. The swamp forest areas are dominated by the palms *Raphia farinifera* and *Elaeis guineensis.* Another seasonal swamp forest visited was the Rufiji Delta's Ngumburuni Forest in Tanzania (07°52'S; E39°03'E), which is a groundwater forest with seasonal swampy areas.

Seasonal streams of coastal dry forests were visited in the Kichi (08°14'S; 38°39'E), Kiwengoma (08°18'S; 38°57'E) and Nyamwete (08°19'S; E39°02'E) forests in the Rufiji District, Tanzania. These are semi-evergreen or evergreen forests with only one rainy season that usually lasts from February to May, thus the dry period can exceed eight months. Rainfall is unpredictable and can be very low in some years.

Five different seasonal habitat types were differentiated: forest pools, open pools, streams, swamp forest and phytothelmata. The adaptations to these habitats are either siccatation in the forest during the dry season or one-way migratory flights. Some species cope with the seasonal habitats while, at the same time, individuals of these species are reproductively active throughout the year at non-seasonal habitats in the same region.

1) Seasonal streams. In coastal habitats, seasonal streams are less common than seasonal pools and swamp. Such seasonal streams occur in an otherwise dry forest matrix in the Kichi and Kiwengoma Hills, Rufiji District, Tanzania. During the rainy season these streams are fast flowing with a sandy, partly rocky streambed, but dry quickly with the end of the rains. The streams are usually dry for up to 8 months or more. Despite this they are colonised by otherwise non-seasonal dragonflies. For instance, males and females of the widespread *Phaon iridipennis* were found in large numbers along the dry streambeds during a survey in February 2003, after the streams had already been dry for 9 months. The males settled along the dry streambed, awaiting the onset of the rains. Along permanently wet streams in the Rufiji Delta, individuals of this species were found to reproduce throughout the year. The observations on *P. iridipennis* suggest a facultative seasonality, an adult life span of one year or more, and a very rapid development from egg to adult. Migration of individuals from permanent water bodies to seasonal streams seemed unlikely based on distance, topography and observations. Nevertheless this deserves further studies, e.g. a one-year mark-recapture study along the seasonal streams. Another species found along the dry streams in the dry season was *Trithemis aconita*, while more species, e.g. Gomphids, are expected to be adapted to the seasonality of the streams as well, siccatating during the dry season in the forest areas, returning to the streams during the rains and having a fast larval development.

2) Seasonal pools in glades. Many dragonfly species that reproduce in the more open and sunny pools of the Arabuko-Sokoke Forest migrate to these during the rainy season from either permanent or already water filled seasonal pools. This "migratory flight" is one-way towards new reproduction habitats. Often these species follow the rains in migration swarms which have been observed for *Anax ephippiger, Rhyothemis semihyalina, Pantala flavescens* & *Tramea limbata*. The migration of *R. semihyalina* was for example observed during the night of 20 May 2000 near Watamu Beach. Other species siccatate in the forest during the dry season, e.g. *Lestes uncifer*, *L. tridens, Hemistigma albipunctum* & *Tholymis tillarga*. These species make a seasonal refuge flight and can be observed in the forest during the dry season, although their inconspicuous behaviour and non-breeding coloration makes them difficult to detect. Oviposition into moist soil, before the pools fill with water, was only observed for *Anax ephippiger*. Most of the species at open seasonal pools are common and widespread in tropical Africa.

3) Seasonal pools within the forest. The seasonal pools within the forest are often very small and entirely shaded by the forest canopy. Species diversity is much lower than at the open pools. Common are *Gynacantha* species and *Tetrathemis polleni*. Females of these species start oviposition before the onset of the rains and before the pools fill with water. Females of *Gynacantha* oviposit into moist soil, while females of *Tetrathemis polleni* place their eggs on sticks overhanging the pools. Because of the ephemeral nature of the pools larvae of both *Gynacantha* and *Tetrathemis* species probably have rapid periods of development.

4) Seasonal swamp forest. This habitat is similar in some respect to the seasonal pools, why species of *Gynacantha* and *Tetrathemis polleni* are found here as well. Additionally *Teinobasis alluaudi* and *Thermochoria jeanneli* are typical inhabitants of swamp forests. *Teinobasis alluaudi* oviposits in the moist soil before the swamp fills up

with water and the same behaviour is assumed by *Thermochoria jeanneli* as well. Of the latter territorial males were only found at the beginning of the rainy season. Adults of neither species are found at the reproduction site once these are filled with water.

5) Phytotelmata. Phytotelmata are small bodies of water found in or upon plants, usually treeholes. In coastal East Africa *Coryphagrion grandis* and *Hadrothemis scabrifrons* reproduce in such tree holes throughout the year, if water is permanently available, e.g. in forests of the East Usambara Mts. In seasonal habitats adults spend the dry season in the forest and start reproduction when the rains start or water filled phytotelmata are provided artificially. In the Arabuko-Sokoke Forest the treeholes were observed to have been dry throughout 2003, although adults of both species were still found in the forest. There is no possibility of immigration from other forests, so the adult life of both species can be assumed to be at least one year and both species are facultative seasonal.

ODONATA OF THE ARABUKO-SOKOKE FOREST	Ph	Fp	Op	Siccatate	Migrate
ZYGOPTERA (DAMSELFLIES)					
LESTIDAE					
Lestes tridens McLachlan, 1895			x	x	
Lestes uncifer Karsch, 1899			x	X	
PSEUDOSTIGMATIDAE					
Coryphagrion grandis Morton, 1924	x			x	
COENAGRIONIDAE					
Azuragrion nigridorsum (Selys, 1876)			x		?
Ceriagrion glabrum (Burmeister, 1839)		X	x	x	
Ceriagrion suave Ris, 1921			x	X	
Ischnura senegalensis (Rambur, 1842)			x		?
ANISOPTERA (DRAGONFLIES)					
AESHNIDAE					
Anax ephippiger (Burmeister, 1809)			x		X
Anax imperator Leach, 1815			x		X
Anax speratus Hagen, 1867		X	?		X
Anax tristis Hagen, 1867			x		X
Gynacantha usambarica Sjöstedt, 1909		X		x	
Gynacantha villosa Grünberg, 1902		X		x	
LIBELLULIDAE					
Brachythemis leucosticta (Burmeister, 1839)			x		X
Crocothemis erythraea (Brullé, 1832)			x	?	X
Diplacodes lefebvrii (Rambur, 1842)			x		X
Hadrothemis scabrifrons Ris, 1910	x			x	
Hemistigma albipunctum (Rambur, 1842)			x	?	X
Orthetrum stemmale (Burmeister, 1839)			?	?	
Orthetrum trinacria (Selys, 1841)			x		X
Palpopleura lucia (Drury, 1773)			x		X
Palpopleura portia (Drury, 1773)			x		X
Pantala flavescens (Fabricius, 1798)			x	x	X
Philonomon luminans (Karsch, 1893)			x		X
Rhyothemis semihyalina (Desjardins, 1832)			x		X
Tetrathemis polleni (Selys, 1877)		X		x	
Tholymis tillarga (Fabricius, 1798)		?	x	x	
Tramea basilaris (Beauvois, 1817)			x		X
Tramea limbata (Desjardins, 1832)			x		X
Trithemis annulata Beauvois, 1807)			X		X
Urothemis assignata (Selys, 1872)			X		X
Urothemis edwardsii (Selys, 1849)			X		X

Table 1: Dragonflies of the Arabuko-Sokoke Forest, Kenya and their reproduction sites: **ph**: phytotelmata**, fp**: forest pools (e.g. at nature trail), **op**: open pools (e.g. sand quarry) and whether the adults **siccatate** close to the seasonal reproduction sites or perpetually **migrate** to find suitable habitats

A SOPHISTICATED FEEDING BEHAVIOUR IN *AESHNA CYANEA*

Henrik Svengren henriksvengren@hotmail.com

On a sunny and tranquil autumn afternoon, October 2nd, in the nature reserve ”Hyltenäs kulle” in south western Sweden, I and a friend got a unique glimpse of the predatory life of *Aeshna cyanea*. While strolling along a path near the shoreline of lake Örby, a large female specimen crashed on a flat rock next to us. At that time of year, we imagined that this might be the last moments of the sturdy dragonfly, but instead it was the very last moments of the wasp caught in her jaws. As we lay down on her dinner table to watch, she started her meal by turning the wasp with its ventral side down, facing the same direction as the dragonfly. The wasp tried to reach her with its mandibles but was disabled in this position. The thorax of the wasp was then severed from the gaster, which was held in her maxillary palps. She turned the gaster 90º, with the petiole hole pointing left, and flipped the left side of the gaster upwards. In this position the left mandible easily entered the soft hole and she started to cut along the side of the gaster towards the sting. It was a very straight and accurate cut. Next step was to rotate the gaster with the sting facing backwards, and the dorsal side up. Fixed in position, she now opened the dorsal side of the gaster like a door on hinges, and the intestine was exposed. A dragonfly’s dinner served on a (dorsal) plate. She began to feed from the front, and after about a minute nearly all was finished, apart from the rearmost part of the intestine. She started to twist and twirl the remains while peeling off everything except the poison glands, the ducts and the sting. The clean and empty shell of the gaster fell to the ground, and left in her maxilla were the two poison glands attached to the stinger via the two ducts, perfectly intact. She gently turned them around and around while licking them completely clean, and left them neatly beside the empty gaster. That’s good table manners! The meal lasted about 4 minutes. As we were sitting there, amazed by her refined and accurate dissection of the wasp, she took off and circulated in the canopy of a *Pinus silvestris* where some other wasps flew around. Judging by how devotedly and thoroughly she finished the edible intestine, wasps seem to be delicious food for dragonflies!

Henrik Svengren is a chemical engineer affiliated to Halmstad University, Sweden. ***Goran Sahlen***

NEWS FROM MEMBERS

Milen Marinov sent me a copy of his Biodiversity Calendar. It has lovely photos of odonates taken by Matjaz Bedjanic, Burkhard Grebe, Sami Karjalainen, Hans-Ulrich Kohler and Dave Smallshire. I was particularly pleased to find a picture of *Lestes macrostigma* as it’s a species I have never seen.

Gordon & Valerie Pritchard had a holiday in Mexico during March.

Richard Rowe wrote from Townsville in Queensland: “It is steamy hot here but the rains have yet to come. The long, chronic drought has played havoc with the dragonfly population.” He adds he has no data: “ well, who would begin collecting data in anticipation of a long, chronic, drought? I arrived here at the end of a seven-year drought that broke a couple of months after I got here: the place was alive and the frogs appeared etc. etc. We have now had a long period of miserly rains since the early 90s. Yes we've had events (incl. 750+mm in 24h) and we've had a couple of weak wet seasons, but last year *Orthetrum caledonicum* didn't turn up on our campus creeks or on the puddles on the roadside; *Pantala* only showed as isolated individuals etc., etc.”

Michael Samways writes: “My book on Insect Diversity Conservation (2005) (Cambridge UP) has just come out. It was a long haul.”

Jan Taylor sends us more news from Australia. He had a holiday at Kaladu up in the north of the continent that appears to have been odonatologically perfect! See his contribution above.

Graham Vick wrote telling me the news of Mary’s death on 30th March this year and I know how saddened those of you who knew Graham and Mary will be. Graham wrote: “She had survived 7 years 6 months since first diagnosis and the outlook had been poor at that time. She did so much over the last years and fully enjoyed herself with her many interests."

WELCOME to NEW MEMBERS

Belgium	
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France	
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Changes of Address

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Review

A Fieldguide to the DAMSELFLIES of South Africa – Warwick & Michèle Tarboton. 2005. ISBN 0620-33878-4. Privately published by the authors. Orders & enquiries via e-mail: wtarbotn@iafrica.com.

This is a companion volume to the authors' 2002 work on dragonflies and is equally welcome. It covers all 67 species of South African damselflies, has 65 distribution maps, 312 colour illustrations and 97 line drawings. It is reviewed by K-D Dijkstra in the PHAON pages below but here I'd like to mention two features that were not incorporated into the dragonfly volume and which are, to my mind, of particular note. First, I like the life-size illustrations added to the pages of each individual; and secondly I'm sure odonatists in the field will appreciate the 150mm rule on the back cover.

It is interesting to find a couple of Kennedy's 1920 names officially replacing the better known one, *Enallagma.* On the subject of vernacular names the debate will undoubtedly continue but, among damselflies, there are fewer contentious examples. *Jill Silsby*

Postscripts

1. BIRTH ANNOUNCEMENT – Mike May

Aeshna Sierra Ware Huff. As her odonatological godfather, I'm proud to announce the birth, on 26 March, of a daughter, Aeshna, to Jessica Ware and Jeremy Huff. Aeshna, at home in Highland Park, New Jersey is doing just fine – in fact she's been coming in to the lab on a pretty regular basis (her baby carrier fits nicely on an opened bottom desk drawer) and I hope to have her swinging a net by the time she's a year old. Mom and Dad are hanging in there and seem pretty happy about the situation when they're not nodding off. As some of you know, Jessica is my graduate student, working on the systematics of Libelluloidea. Jeremy is on the staff at the American Museum of Natural History and works on spiders and other dragonfly food. I hope you'll all join me in celebrating Aeshna's emergence and look forward to recruiting her as the youngest WDA member on record.

2. SMILE – Jill Silsby

I was giving an illustrated talk to a group of Surrey Wildlife members and arrived at a picture of a pair of Common Darters (*Sympetrum striolatum*) in tandem. The male had his appendages firmly fixed to the area behind his mate's eyes and he was flinging her vigorously up and down to release her clutch of eggs. After explaining what was happening I added that I would hate to be a female darter and moved onto the next slide. A man in the audience rose to his feet to inform me that not all female darters were treated in this fashion: I replied "Oh yes?" and wondered what on earth he was about to say. "No" he said, "my wife is a female darter" and, after quite a pause, he continued: **"My surname is Darter**!!"

The WDA is about to celebrate its eighth birthday. It has its roots in Slovenia but its branches spread all over the world.
Our membership is now 275 and we have members in 35 countries.

Phaon (Pinhey's Heritage African Odonata Network) – July 2005

Wings in the whirlpool: in search of dragonflies in the heart of the Congo Basin

Klaas-Douwe B. Dijkstra, Gortestraat 11, NL-2311 MS Leiden, The Netherlands (dijkstra@nnm.nl)

Called an "evolutionary whirlpool" by Jonathan Kingdon, the Congo Basin is one of the most interesting parts of Africa for Odonata. From west to east it connects the continent's main rainforests with its main highlands, to the north and south it gently grades through a mosaic of forest, woodland and savannah towards the dry lands of the Sahara and Kalahari. With its forests, rivers and swamps, the basin itself is an endless succession of prime odonate habitat. Africa's wet heart is the centre of diversity of several genera, especially in Libellulidae, including poorly known ones like *Aethiothemis*, *Lokia*, *Porpax* and the aptly named *Congothemis*. We largely owe our knowledge of the Congolese fauna to the efforts of Belgian collectors who assembled their material in the 1930s to 1960s. Almost no research took place in the last three decades of the 20th century, while earlier efforts were concentrated in a handful of peripheral regions (e.g. Katanga, Parc National de la Garamba). The knowledge of most of the lower basin ('cuvette') is therefore negligible. No wonder that an invitation to join Conservation International's biodiversity assessment of the Lokutu area, on the Congo River about 250 km downstream from Kisangani, turned a long cherished dream into excited sleepless nights. On 27 October 2004 seven biologists, including myself, took a small aeroplane from Kinshasa (Democratic Republic of Congo) across the basin to our destination. Tracing a perfect straight line across the completely flat land below us, we flew over 800 km of infinite forest, interrupted only occasionally by a snaking river or an isolated hamlet.

Because no prior research of Odonata has been undertaken in the Lokutu region, or even anywhere near it, any result would be surprising. The total of 86 species found was high, especially considering only 27% were widespread Afrotropical species. By comparison, the well studied Bwindi Impenetrable and Semliki National Parks, both in Uganda on the DRC border, have 65 and 91 species respectively, of which 31% and 48% are widespread species. The Lokutu area thus has a richer fauna of localised, generally forest-associated, odonates. Ubiquitous well-dispersing species, like *Crocothemis* and red *Trithemis* species were totally lacking, even in disturbed habitats. Equally notable was the paucity of some characteristic Congo Basin species. The only sign of the endemic libellulid diversity were single specimens of *Congothemis trithemoides* and *Hadrothemis vrijdaghi*. The observed poverty of certain Congolian specialities is probably explained by the selection of habitats encountered. The flight back over the basin revealed numerous other habitat types that are likely to hold these species, such as forested and open swamps, seasonally flooded forest, oxbows and medium-sized rivers. These all have stagnant or slow-flowing water, while the wealth of encountered species lay in Zygoptera and Gomphidae that principally inhabit faster flowing water. Indeed the diversity of running-water forest species (29 species; i.e. 35%) lay above that of Semliki (23; 25%) and Bwindi (23; 35%).

Logically, many of my records constituted range extensions: for instance *Pseudagrion simplicilaminatum* and *Phyllogomphus coloratus* were not known east of Congo-Brazzaville. *Chlorocypha pyriformosa* was not even known east of Nigeria, but the discovered populations were somewhat aberrant. *Ceriagrion ignitum* was so far only known from the Ghanaian type series and its rediscovery in an anthropogenic habitat 2700 km to the east came as a surprise: numerous egg-laying pairs were found on sheltered ponds covered by *Salvinia*, but the first specimens were caught at a disused swimming pool! Three discoveries appeared to be new to science. Finding very distinctive new species of the conspicuous but small genera *Platycypha* and *Mesocnemis* was remarkable. A third probable novelty, in the difficult genus *Elattoneura*, is also numerous in the Belgian collections.

At Lokutu the Congo River is over 3 km broad, fragmented by numerous forested islands. Because adults emerge at night and are rarely seen afterwards, river species like gomphids are seldom collected. Daytime reveals little of interest along the shores, but at dusk the middle course (as far as 1 km from the bank) comes alive with large uncatchable anisopterans that swiftly skim the surface. Perhaps this is the main time and place of reproductive activity. A couple hours spent scouring the banks in the morning revealed many interesting exuviae and a few emerging adults. I then realized I should take a canoe and flashlight out around midnight. Within an hour I found emerging *Neurogomphus* and *Phyllogomphus*, probably becoming the first to witness this in the field. At least seven gomphid species in seven different (sub)genera reproduced in the river: *Gomphidia bredoi*, *Ictinogomphus regisalberti*, *Lestinogomphus* sp., *Neurogomphus* (*Mastigogomphus*) cf. *chapini*, *N.* (*Neurogomphus*) cf. *uelensis*, *Paragomphus acuminatus* and *Phyllogomphus coloratus*. This odonate diversity in one of Earth's largest rivers was one of the survey's most interesting results. Unfortunately I did not think of a midnight boat trip until the last evening, but I intend to make moonlight riverside paddling a priority in the future!

"A Fieldguide to the Damselflies of South Africa" by Warwick & Michèle Tarboton (2005)

This 95-page full-colour fieldguide (ISBN 0-620-33878-4) is the sequel to the anisopteran book produced by the same authors in 2002. "Tarboton 2", dedicated to B.I. Balinsky, is another splendid achievement! The new book has the same format, but the quality of the images is even better and many of the small imperfections of the first guide have been avoided, making this one even better. Each species has about a full page and is illustrated with several enlarged dorsal and lateral scans of fresh specimens. All species have a distribution map, a brief description and usually a natural photograph of a male. It is a delight to see the vivid colours of all the species, especially of the nation's endemic synlestids! Simple pictorial keys direct the user to the right pages. The general introduction is kept to an absolute minimum, but the choice of vernacular English and Afrikaans names is addressed. The authors were previously criticized for introducing alternatives to names previously used in South Africa. They argue that names evolve and their objective has been to remain close to scientific names in coining vernaculars. I recommend some of the more imaginative alternatives and will certainly adopt Riverjack for *Mesocnemis singularis*. Cherry-eye Sprite for the widespread *Pseudagrion sublacteum* is also very apt and attractive. More than a third of the zygopterans covered is endemic to South Africa, while the majority of the anisopterans are widespread Afrotropical species. That makes the new guide slightly less applicable elsewhere in the continent than the first book. Still I recommend this unequalled book to anyone with any interest in Africa's odonates. Order both guides directly from the authors (wtarbotn@iafrica.com). We must hope that Warwick and Michèle will now work towards an updated edition incorporating both suborders! ***K-D Dijkstra***

232 year old puzzle finally solved: *Palpopleura lucia* and *P. portia* are distinct species!

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Libellula lucia and *L. portia* were the first true odonates to be described from tropical Africa, 232 years ago. The two, among the most familiar and often photographed dragonflies in the continent, have long been treated as forms of a single species, *Palpopleura lucia*. In a recent study Mitchell & Samways (2005) compared the DNA of several specimens of both and two additional *Palpopleura* species, all from the same locality. This showed unequivocally that *lucia* and *portia* are distinct, but closely related, species. It is worth adding that, besides well-known differences in size and wing coloration (*lucia* is larger and darker, see O'Neill & Paulson 2001), the two differ in pruinosity pattern and penis morphology. The latter was already illustrated 111 years ago by Karsch (1894, *marginata* is a synonym of *lucia*)! Mature males of *portia* have the mesepisterna pruinose but the abdomen black-tipped (S9-10 not pruinose), while in *lucia* the mesepisterna remain mat black but the abdomen becomes entirely pruinose. Pinhey (1982) mentioned intermediates between *lucia* and *portia* from Cameroon, the Central African Republic, the Congos and Gabon. These were probably dark *portia* from warm and wet regions, with blacker wings with a less apparent *portia*-pattern. There is no type material of the two taxa, but they are illustrated well by Drury (1773). His *portia* illustration clearly shows a male as known by that name, but the depicted *lucia* is female. To my knowledge, this sex cannot yet be safely identified. Still, the identity of the two species is commonly accepted. This brings me to a small criticism of the Mitchell & Samways paper: The wing figure of "*lucia*" shows a male *portia*, that of "*portia*" a female of either form. Despite this the paper elegantly demonstrates how new molecular techniques can solve old problems.

Drury, D., 1773. Illustrations of natural history; wherein are exhibited upwards of two hundred and forty figures of exotic insects, according to their different genera, being engraved and coloured from nature, with the greatest accuracy, and under the authors own inspection, on fifty copper-plates; with a particular description of each insect... to which is added a translation into French, 2. White, London.

Karsch, F., 1894. Libellen von der deutschen Forschungs-Station Yaúnde im Hinterlande von Kamerun, gesammelt von Herrn G. Zenker. Berliner entomologische Zeitschrift 39 (1): 11-16.

Mitchell, A. & M.J. Samways, 2005. The morphological 'forms' of *Palpopleura lucia* (Drury) are separate species as evidenced by DNA sequencing (Anisoptera: Libellulidae). Odonatologica 34 (2): 173-178.

O'Neill, G. & D.R. Paulson, 2001. An annotated list of Odonata collected in Ghana in 1997, a checklist of Ghana Odonata, and comments on West African odonate biodiversity and biogeography. Odonatologica 30 (1): 67-86.

Pinhey, E. 1982. Odonata collected in Ethiopia III. Anisoptera. Problemi attuali di scienza e di cultura (III) 252: 1-56.

Lake Malawi's Dancing Jewel: Elliot Pinhey's letters to its discoverer John Wilson

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Chlorocyphidae, especially the common Dancing Jewel (*Platycypha caligata*) of tropical E. Africa, are known for their bright coloration and showy displays. To quote Elliot C.G. Pinhey (1965): "The female rests on a twig in seemingly bored contemplation while the male performs a little aerial dance, backwards and forwards in the arc of a circle, orientated towards the female and dangling the white surfaces of the tibiae below his head like a beard. If competition is keen, however, such formalities are generally omitted and he merely pounces on her without any prelude". In August 1981, Pinhey presented a paper at the international symposium of odonatology in Chur, Switzerland, titled "*Platycypha caligata* (Selys) and a new lacustrine morph (Odonata: Chlorocyphidae)" (see photo-

graph in Dijkstra et al. 2003). The presentation formed the outcome of his investigation of *Platycypha* specimens collected on the shore of Lake Malawi, and an intensive correspondence with their collector, John G. M. Wilson.

In January 2002, I met both the collector and the collected, which shed a new light on Lake Malawi's *Platycypha*. Quotes from Pinhey's letters to Wilson in 1980, that the latter has kindly allowed me to reproduce, neatly summarise Pinhey's interpretation of the Malawi specimens. He first mentioned them in a letter dated 2 April: "The species of particular interest, and for which this letter is written is a new *Platycypha*. […] Do see if you can find more, including the female, a duller looking girl. [...]. *Platycypha* like fast running streams, often in shade, settling on branches or on rocks. […] I have long suspected there *must* [emphasis by Pinhey] be a new species of *Platycypha* or *Chlorocypha* in Malawi." Twenty days later, following a reply with ecological details from Wilson, he continued: "The ecology of that *Platycypha* is most intriguing, inhabiting rocks on lake shore. […] I must find time to write up this new species. […] I will hope to name it after its discoverer! If you could possibly pickle a mature male in 75% alcohol immediately on capture it would help in the description." Pinhey elaborated on 6 June: "A lake breeder is quite remarkable […]. Your colour photos will help in checking colours of the male." On 30 June he apologized: "I am sorry I put you to so much trouble over the reproduction of living colours of your new *Platycypha* and, particularly, in the great misfortune of losing your close-up lens. I am sorry if this resulted from my persuasion. [...] When I suggested alcohol I had no idea this universal fluid would be so hard to obtain in its preservative form."

After receiving the photographs and alcohol material Pinhey altered his opinion, as evidenced by a letter dated 3 July: "The colour slides are excellent but [have not] solved the problem in the expected manner! There were three original male *Platycypha* […] Two showed peculiar markings on abdominal segments 4-5 which seemed distinctive but the third was different, rather nearer *caligata*. That is why I asked for a pickled example (or photos) in order to clarify the markings and to see if there was any overall colour difference. The colour photos show the male to be the same colour as mature *caligata* and […] proves that there is really no definite pattern difference from that species. I am still working on other characters, but I am sorry to say they appear to be *caligata* after all, and at most there may be differences developed from a change in ecological conditions. The unusual habits in themselves will be worth describing apart from any morphological characters there may be. I am sorry to disappoint you (and myself)." Six days later he expanded: "I should have expected staining […] However, I am developing a possible distinction for the lake populations. Out of 150 male *caligata* examined from many parts of Africa your nine lake males are invariably smaller than all the rest, except for another male (singleton) which R. C. Wood sent me in August 1961 from the lake shore at Cape Maclear! This seems significant. Moreover their tibial expansions are less than average for other populations. […] Thus, there does seem reason to believe that at least the ecology has resulted in *some* [emphasis by Pinhey] difference, particularly in diminishing size. […] I will […] continue on a paper outlining the supposition that *Platycypha caligata* has adapted to both riverine and lacustrine environments, unlike other known African species of the family. This in itself is of much interest. It is unlikely, I suppose, that any freshwater fish show similar tendencies to modify under such changes?" The final question directed at Wilson, a fisheries biologist, is remarkable considering Lake Malawi's fame for its profusion of endemic species of specialized cichlid fish. On 10 December Pinhey concluded: "In August next year I will read my paper on your lacustrine *Platycypha* to the World's Odonata gathering in Switzerland. Your name will be uppermost in the script." In the proceedings resulting from the paper read, Pinhey (1982) described the Lake Malawi specimens as a form of *Platycypha caligata*. The Lake Malawi examples are constantly smaller than specimens from throughout the species's range, but differences in coloration were dismissed by Pinhey (1982), who stated: "The [initial] three males seemed at first to have unusual but rather consistent markings […] Further examination […] showed that these markings were only post-mortem discoloration changes."

During a visit to a rocky islet 2 km off the lake coast on 1 January 2002, I encountered numerous *Platycypha* specimens. The first impression was of a much smaller and darker insect than typical *caligata*. Some males had the basal segments darkened, a condition not occurring in *caligata*, while others had the typical all-blue abdomen. Mature males were found perched near the waterline, whereas females and teneral males were abundant among the bushes that crowned the isle. It appeared that S1-5 become extensively melanised with age, which is not seen in typical riverine *P. caligata*. Presumably the resulting difference in markings initially lead Pinhey to conclude this was a new species, but he only received additional material and photographs of young specimens. He thus decided the differences were caused by staining, describing the lacustrine *Platycypha* as a mere form. From the research history illustrated by Pinhey's quotes and his emphasis on colour patterns therein, it may be deduced that he would have regarded the Lake Malawi specimens as a good species if he had known the nature of their coloration. At the Chala crater lake on the Kenya-Tanzania border, *P. caligata* is similarly small, but does not darken with age (V. Clausnitzer pers. comm.). Molecular studies may prove that Lake Malawi is home to an endemic species of *Platycypha*, and not just dwarfed specimens of *P. caligata* as seen at Lake Chala.

Dijkstra, K.-D.B., A. Martens & M.J. Parr, 2003. Proceedings of the 1st PHAON Meeting on African Odonata, Gällivare, 26 July 2001, Foreword, African Odonatology:past, present and future.Cimbebasia 18: 161-166.

Pinhey, E., 1965. Development of the study of Odonata (Dragonflies) in Central Africa. Proceedings of the Central African Scientific and Medical Congress, Lusaka, Northern Rhodesia, 26-30 August, 1963. Pergamon Press, Oxford 321-331.

Pinhey, E., 1982. *Platycypha caligata* (Selys) and a new lacustrine morph (Odonata: Chlorocyphidae). Advances in Odonatology 1: 213-225

ECHO

DEADLINE: ***Contribution for the next issue of Echo should be sent to Vincent Kalkman (Kalkman@naturalis.nl) before 1 November 2005***.

The number of pictures present on the Asian Dragonfly internet site (www.asia-dragonfly.net) has steadily increased in the last few months. So far more than 60 persons have contributed and at the moment (1 June 2005) 1000 pictures of 282 species are available. Most of the pictures are from common and widespread species but the site contains also numerous photos of rarer and more interesting species. Some examples of pictures especially worth taking a look at are:

- *Archineura*: both species of this genus of large calopterigids are depicted. *A. incarnata* is specially remarkable due to its reddish wing-base.
- *Chlorogomphus*: Most species of the genus *Chlorogomphus* combine a large size with a spectacular wing pattern. In total 9 pictures of 4 species are present, among which is a picture of a flying *Chlorogomphus nakamurai*.
- *Philoganga*: *Philoganga* is a small genus of rather weird damselflies. Two species are present on the internet site and are worth taking a look at.
- *Cyclogomphus gynostylus*: The side contains pictures of no less than 29 gomphids species many of which are poorly known. An example of such a species is the picture of a fresh female *Cyclogomphus gynostylus.*
- *Rhinagrion philippinum*: Sadly not many pictures have been published of the many endemics present in the Philippines. Luckily a few are now present on Asian-Dragonfly. One of the most interesting is a picture of *Rhinagrion philippinum*.
- *Tetracanthagyna plagiata*: during their trip to the National Park of Endau-Rompin Keith Wilson and Eric Gibert were able to take a good picture of a female *Tetracanthagyna plagiata*, the dragonfly boasting the largest wingspan of all:

Recently the site has been used by birdwatchers living in SE Asia to identify the pictures they had previously taken: hopefully it will get some of these local birdwatchers more actively involved in dragonflies.

Haruki Karube: Ten years ago I started working on the dragonfly fauna of Southeast Asia concentrating on the fauna of **Vietnam**. The first results of the fieldwork in Vietnam have been published in the last years. These papers include an update on the aeshnids present in Vietnam. Twenty-one species of this family have so far been found in Vietnam. Six of these were recorded as new for the Vietnamese fauna in my recent papers, among these is one species new to science. Also included in these papers are the descriptions of the first female some *Planaeschna* species and the redescription of *P. tamdaoensis* Asahina. At the moment I am working on papers on Gomphidae and Cordulegastridae which will hopefully be published this year. I spent a long time on a revision of Chlorogomphine-group and hope it will be finished next year. This revision will include about 20 new species and will deal with a large number of taxonomic problems in this group.'

Last year I had a serious allergy after been bitten by 'Bull Ants' during fieldwork in Australia. After that, I also had a food allergy and so it is difficult to do any collecting at the moment. I am recovering from this and hope soon to do fieldwork in Southeast Asia again.

I spent a long time on a revision of Chlorogomphine-group and hope it will be finished next year. This revision will include about 20 new species and will deal with a large number of taxonomic problems in the group.

Naoto Yokoi: Since 1994 I started investigating the dragonflies present in the mountainous regions of **Laos**. As a result, 195 species are presently known from Laos among which are four Amphipterygidae, 15 Platycnemididae, 10 Calopterygidae, 34 Gomphidiae, 21 Corduliidae. Besides these I have specimens of 30 or more species not yet published from Laos.

I visited Bolovens plateau, Sekong and Attapu, southern Laos to collect dragonflies in April this year. Dragonflies were relatively scarce due to the strong dry season. However some new and interesting species were found (*Coeliccia montana*?, *Aristocypha* sp., with orange wing!, *Macromia* cf *moorei*, *Hemicordulia* sp. nov.? etc.). Recently the building of dams has strongly increased in Laos resulting in large scale damage to the natural environment. So for some areas the next few years will be the last opportunity to study the dragonfly-fauna.

Emergence study in Hong Kong wetlands *Graham Reels* (gtreels@asiaecol.com.hk)

As part of my ecological consultancy work in **Hong Kong**, I am monitoring dragonfly populations at some 27 ponds. About half of these ponds were formerly commercial fishponds, which are now being "ecologically enhanced" in mitigation for wetland loss caused by construction of a new railway line, while others are newly-created wetlands, which have been constructed for the same purpose.

The primary function of these wetlands is to provide suitable habitat for waterfowl, and none (regrettably) have been specifically designed for dragonflies. However, the habitat requirements of these faunal groups do overlap to some extent, and many individual ponds have proven to be very good for dragonflies, with more than 20 species recorded as adults.

In order to gain a clearer understanding of the value of these wetlands for dragonflies, I have been studying emergence by regularly patrolling the pond edges and collecting and identifying the exuviae. This approach is, however, only able to provide qualitative data, and there is insufficient funding to conduct such surveys more than twice per month in each pond. This is unfortunate, since there is tremendous scope to generate much useful information on the colonization of wetlands by lentic dragonflies in Hong Kong, and their seasonality and voltinism.

In February of 2004, in order to overcome the limitations of my funded survey work, I initiated a voluntary study of dragonfly emergence from two former fishponds and two newly-created ponds, using a combination of emergence screens and traps. After tagging some 50 anisopteran exuviae, of various species, to determine their persistence in the field, I concluded that I needed to check these apparatus two times per week in order to be confident that I was not losing a significant amount of data. I have also been intensively studying another constructed pond, about half a hectare in size, by collecting all exuviae present on the vegetation two times per week. This pond has yielded information which has been genuinely surprising to me – most notably, the sequential emergence of larger odonates over the period February to July (*Anax guttatus* and *A. parthenope*, followed by *Ictinogomphus pertinax*, followed by *Epophthalmia elegans*, followed by *Sinictinogomphus clavatus*) – an emergence pattern which, at this stage, seems peculiar to this pond.

Since the beginning of 2005 I have expanded this study to several more ponds. I hope to get emergence data over a period of several years in these ponds, but already find it hard to free up enough spare time. The good news is that my employers are starting to take an interest, and will hopefully permit me to use normal working hours to pursue the study in the future. I am still hampered by the fact that I am not affiliated to a university or research institution, but if I can use this forum to gain advice and information from others who have conducted similar studies, this will be of great help to me. I am unsure if anyone has undertaken such studies in tropical Asia (I have not found any references in the literature, but maybe I haven't looked hard enough), but would be delighted to hear from anyone who has.

Endau-Rompin 20-24 July '04 *Keith DP Wilson* (wilsonkd@ntlworld.com) & *Eric Gibert* (egibert@samarts.com)

In October 2003 Eric Gibert, who started the Asia-Dragonfly.net website two years ago, asked me if I would be interested in helping produce a booklet on the dragonflies of Endau-Rompin National Park, Johor Bahru, **Malaysia**. Eric reminded me that Endau-Rompin was host to the largest Anisopteran in the world, namely *Tetracanthagyna plagiata* Waterhouse, but we both needed no encouragement to visit this huge, relatively pristine, lowland rainforest. The invitation came from Vincent K.K. Chow of the Malaysian Nature Society and Scientific Consultant to the Johor National Park Corporation. Vincent has already initiated odonate studies at Endau-Rompin. Eventually, after a couple of cancelled visits, we found a period in summer 2004 when Eric and I could both make the trip to the Park. On the 20th July 2004 we met up with Vincent and Mohamid Basir B. Mohamed Sali, Director of the Johor National Park Corporation, at the Johor Parks Head Office in Johor Bahru. After fruitful discussions, we were soon whisked off to Endau-Rompin, which is a four-hour, part four-wheel drive, journey from Johor Bahru. During our short five-day visit we received superb hospitality from the Johor National Park Corporation and the Malaysian Nature Society for which we are both extremely grateful.

Endau-Rompin National Park is located on the Johor-Pahang border and covers an area of some 48,905 hectares (800 sq. km). It is the second largest national park in peninsular Malaysia after Taman Negara and comprised of lowland forest with several prominent sandstone plateaus rising up to ca 700 m altitude. It is the headwater catchment for several rivers including the Endau, Selai, and Jasin rivers. The wet season officially begins on 15th October and lasts for three months with the Park closed during November and December.

Our visit coincided with perhaps the driest period of the year and should have been relatively dry, but it rained most of the five days we were in the Park. Endau-Rompin is after all a tropical rainforest and as such it experiences rainfall throughout the year. Despite the all year round rainfall it was self evident that many dragonflies adopt a seasonal lifestyle. We encountered no adult corduliids such as *Macromia* or *Idionyx* and very few aeshnids and gomphids. Only small numbers of dragonflies were observed feeding at dawn and dusk indicating

the main adult flying period for many dragonflies such as the corduliids and aeshnids probably occurs during the October to January wet season. We nevertheless encountered 49 species of Odonata and witnessed some interesting dragonfly behaviour on the days when we enjoyed long periods of sunshine.

The behaviour of interest involved *Rhinagrion mima* Karsch which is a stout, strikingly coloured member of the Megapodagrionidae. Males are black with a bold pattern of pale bluish green spots on the thorax and basal abdomen and bright orange-red dorsum to abdominal segments 7-10. Males involved in territorial disputes, located at favoured, sunlight spots beside sizable flowing streams, angled the tips of their orange-red abdomens upward and flew side by side for long periods, often slowly rising up towards the adjacent forest canopy. The flights terminated when one of the males would fly rapidly to take up a prominent position at a favoured sunlight spot, with the losing male taking up a position several metres away in a less favoured position. The disputes were often quickly resumed and in one case continued for over twenty minutes. One female was observed ovipositing into mossy vegetation, which was growing on a vertical bank, located some 1.5 metres above the stream surface, adjacent to a clump of screwpine (*Panadanus* sp.) with an extensive aquatic root system.

Another member of the Megapodagrionidae, *Podolestes orientalis* Selys was found in a teneral condition adjacent to a well-shaded, leaf-filled marshy pool, close to a small forest stream.

After three days fieldwork we had seen no sign of the charismatic *Tetracanthagyna plagiata*. At 21° latitude in China *Tetragynacantha waterhousei* McLachlan, 1898 exhibits a seasonal lifestyle. It emerges at the onset of the rainy season in late April, and is not found on the wing in late summer. We figured if *Tetracanthagyna plagiata* has a similar emergence pattern then we might not encounter any on the wing at Endau-Rompin during the July dry season. On our last fieldwork day we climbed up to one of the sandy plateaus in the hope of finding marshy ground but found no permanently wet areas. We did, however, find three species of pitcher plant. Soon after returning to the lowland streams we encountered a female *Tetracanthagyna plagiata* settled on tall vegetation about four metres from the ground. Somewhat awestruck by its size and magnificent colouration we managed to take a few photos before it flew further up into the canopy and settled well beyond our reach. This species is one of the few examples where the female has wings with more extensive colouration than their male counterparts; a feature shared with *Chlorogomphus papilio* Ris, 1927 which, coincidently, has a wingspan almost as large as *plagiata*.

Tetracanthagyna plagiata has a wingspan of ca 162-163 mm, hindwing of 80-84 mm and a body length of 95-100 mm. According to the literature, it is an insect usually observed in fading light at sunset but our female was observed flying in well-shaded forest during late morning during a period of bright sunshine.

On returning to our accommodation we were treated to another exceptional sighting. We both observed at close quarters a large, ca 1 m length, sandy-white squirrel crashing through the canopy and leaping from tree branch to tree branch across our path. On researching this sighting it is apparent that we may well have observed a cream-coloured giant squirrel (*Ratufa affinis* Raffles, 1821). This squirrel has only previously been recorded from Singapore, where it is considered critically endangered and is listed on CITES appendix 2. Vincent Chow also reports that he has observed a giant white squirrel in Endau-Rompin.

Both Eric and I are resolved to return to Endau-Rompin during the wet season in the near future. It will be fascinating to contrast the activity and numbers of odonate adults observed in the dry season with future observations during the wet season.

The list of the 81 spp recorded during the first and second trip to Endau-Rompin is provided below in Table 1.

ZYGOPTERA	**ANISOPTERA**
Amphipterygidae	**Gomphidae**
Devadatta argyoides (Selys, 1859)	*Ictinogomphus decoratus* (Selys, 1854)
Calopterygidae	*Megalogomphus sumatranus* (Kruegar, 1899)
Neurobasis longipes Hagen, 1887	**Aeshnidae**
Vestalis amethystina Lieftinck, 1965	*Indaeschna grubaueri* (Förster, 1904)
Vestalis amoena Selys, 1853	*Gynacantha dohrni* Krüger, 1899
Euphaeidae	*Tetracanthagyna plagiata* (Waterhouse, 1877)
Dysphaea dimidiata Selys, 1853	**Corduliidae**
Euphaea impar Selys, 1859	*Epophthalmia vittigera vittigera* (Rambur, 1842)
Euphaea ochracea Selys, 1859	**Libellulidae**
Rhinocyphidae	*Acisoma panorpoides* Rambur, 1842
Libellago lineata lineata (Burmeister, 1839)	*Agrionoptera insignis* (Rambur, 1842)
Rhinocypha biforata Selys, 1859	*Agrionoptera sexlineata* Selys, 1879
Rhinocypha fenestrella Rambur, 1842	*Brachydiplax chalybea chalybea* Brauer, 1868
Rhinocypha perforata (Percheron, 1835)	*Brachythemis contaminata* (Fabricius, 1793)
Sundacypha petiolata (Selys, 1859)	*Cratilla metallica* (Brauer, 1878)

Megapodagrionidae
Podolestes orientalis Selys, 1862
Rhinagrion mima (Karsch, 1891)
Rhinagrion macrocephalum (Selys, 1862)
Lestidae
Orolestes wallacei (Kirby, 1889)
Platylestes praemorsus (Hagen in Selys, 1862)
Coenagrionidae
Agriocnemis femina (Brauer, 1868)
Agriocnemis pygmaea (Rambur, 1842)
Agriocnemis cf *naia* Fraser, 1923
Archibasis melanocyana (Selys, 1877)
Archibasis rebeccae Kemp, 1989
Argiocnemis rubescens Selys, 1877
Teinobasis kirbyi Laidlaw, 1902
Ceriagrion cerinorubellum (Brauer, 1865)
Ischnura senegalensis (Rambur, 1842)
Mortonagrion aborense (Laidlaw, 1914)
Pseudagrion microcephalum (Rambur, 1842)
Pseudagrion williamsoni Fraser, 1922
Platycnemididae
Coeliccia albicauda (Förster in Laidlaw, 1907)
Coeliccia didyma (Selys, 1863)
Coeliccia octogesima (Selys, 1863)
Copera ciliata (Selys, 1863)
Copera vittata (Selys, 1863)
Indocnemis orang (Förster in Laidlaw, 1907)
Platystictidae
Drepanosticta quadrata (Selys, 1860)
Protosticta foersteri Laidlaw, 1907
Protoneuridae
Elattoneura analis (Selys, 1860)
Prodasineura autumnalis (Fraser, 1922)
Prodasineura laidlawi (Förster in Laidlaw, 1907)
Prodasineura notostigma (Selys, 1860)

Crocothemis servilia (Drury, 1773)
Diplacodes nebulosa (Fabricius, 1793)
Diplacodes trivialis (Rambur, 1842)
Hydrobasileus croceus (Brauer, 1867)
Lathrecista asiatica (Fabricius, 1798)
Lyriothemis biappendiculata (Selys, 1878)
Nannophya pygmaea Rambur, 1842
Neurothemis fluctuans (Fabricius, 1793)
Epophthalmia vittigera vittigera (Rambur, 1842)
Orchithemis pulcherrima Brauer, 1878
Orthetrum chrysis (Selys, 1891)
Orthetrum glaucum (Brauer, 1865)
Orthetrum sabina (Drury, 1770)
Orthetrum testaceum (Burmeister, 1839)
Potamarcha congener (Rambur, 1842)
Pantala flavescens (Fabricius, 1798)
Rhodothemis rufa (Rambur, 1842)
Rhyothemis obsolescens Kirby, 1889
Rhyothemis phyllis (Sulzer, 1776)
Rhyothemis triangularis Kirby, 1889
Tholymis tillarga (Fabricius, 1798)
Tramea transmarina Brauer, 1867
Trithemis aurora (Burmeister, 1839)
Trithemis festiva (Rambur, 1842)
Trithemis pallidinervis (Kirby, 1889)
Tyriobapta torrida Kirby, 1889
Zygonyx ida Hagen, 1867
Zygonyx iris malayana (Laidlaw, 1902)
Zyxomma petiolatum Rambur, 1842

Table 1. List of odonates recorded from Endau-Rompin during visits on 20-24 July 2004 and in January 2005.