



# **Faunistic Studies in South-East Asian and Pacific Island Odonata**

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## **Content**

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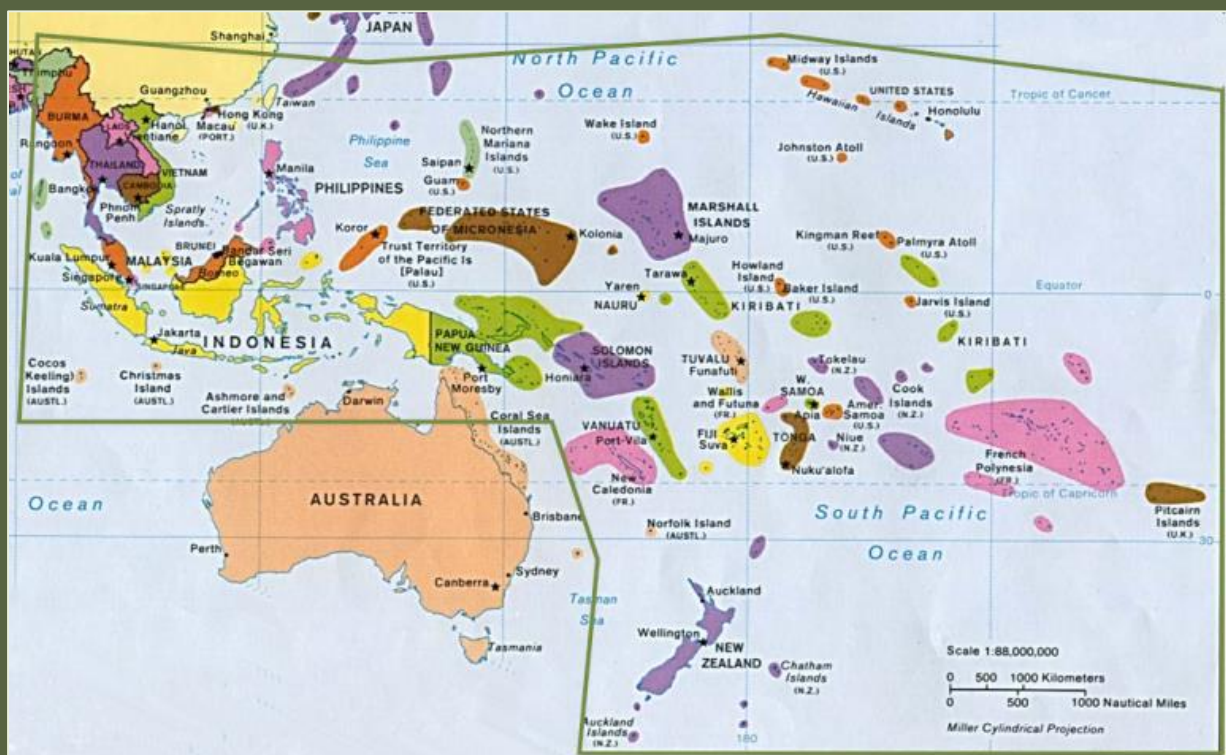
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## Odonata recorded from northeastern Papua New Guinea including the Bismarck Archipelago in May to July 1997

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### Abstract

64 (sub)species from 10 families of Odonata were recorded throughout five provinces of Papua New Guinea, including the Bismarck islands of New Britain and New Ireland, from mid-May to early July 1997. The field trip led to the description of two new damselfly species (Gassmann, 1999; Gassmann, 2011) and one possibly new damsel- and dragonfly taxon, respectively. For several taxa, considerable range expansions are provided. *Agriocnemis aderces* Lieftinck, *Hemicordulia hilbrandi* Lieftinck, *Nososticta callisphaena* (Lieftinck), *Nososticta plagioxantha* (Lieftinck) and *Tanymecosticta fissicollis* (Lieftinck) are recorded for Papua New Guinea for the first time. *Brachydiplax duivenbodei* (Brauer) is a new record for New Britain. *Agriocnemis femina* (Brauer), *Mortonagrion martini* Ris, *Nososticta africana* (Schmidt), *Rhyothemis resplendens* Selys, *Xiphagrion cyanomelas* Selys, *Brachydiplax duivenbodei* (Brauer) and possibly *Brachydiplax denticauda* (Brauer) are recorded from New Ireland for the first time.

**Key Words:** Odonata, Papua New Guinea, Madang Province, Morobe Province, Bismarck Archipelago, New Britain, New Ireland

### Introduction

Our knowledge of the odonate fauna of the island of New Guinea is largely based on the work of Dutch entomologist Maurits A. Lieftinck (1904-1985). Although he himself had visited only the Bird's Head Peninsula (Vogelkop) and some of the West Papuan islands (e.g. Misool) in what today is the Indonesian Province of West Papua (Geijskes, 1984), his contributions to New Guinea odonatology by describing numerous new species are essential. Lieftinck's work was almost exclusively descriptive. However, he



did provide a biogeographic synopsis of New Guinea Odonata where he distinguished between entogenetic and exogenetic odonate groups of New Guinea, thereby pointing to the mixed Oriental-Australian origin of the New Guinea odonate fauna (Lieftinck, 1949a). Another important early contributor to New Guinea Odonatology was Suisse Zoologist Ferdinand Ris (1867-1931). Subsequent taxonomic and faunistic accounts on New Guinea Odonata usually came from just a handful of people, and most of them are cited in the following text. Michalski (2012) recently provided an overview of odonatology in the Papuan region.

The author's work on New Guinea Odonata started in 1996 with a taxonomic revision of the Papuan platycnemidid genus *Idiocnemis* Selys, 1878 (Gassmann, 1999; 2000; Gassmann & Richards, 2008) and an odonatological field trip to Papua New Guinea (including the Bismarck Archipelago) in 1997. A complete species list from this field trip is presented here for the first time. These papers were followed by revisional work (Gassmann, 2011; Gassmann & Richards, *in prep.*) on New Guinean *Pseudagrion* species (Coenagrionidae).

The results of the author's second expedition to Papua New Guinea and the Bismarck Archipelago (Conservation International Nakanai Mountains Rapid Biodiversity Assessment in 2009) were published recently (Gassmann & Richards, 2011). A short history of Odonata collecting in New Britain can be found there as well.

A cladistic analysis of phylogenetic relationships within and around Papuan Calicnemiinae (Platycnemididae) was provided by the author later on (Gassmann, 2005), followed by a historical biogeographic analysis of that group, providing hypotheses on the origin of the Papuan platycnemidid fauna (Van Tol & Gassmann, 2007).

Recent work on New Guinea Odonata includes Opper (2005a,b) who provided sound analyses of habitat associations of Odonata in Papua New Guinea by monitoring species occurrences and species abundance in a lower montane rainforest habitat as well as comparisons between natural and modified forest (Opper, 2006). The Odonata have also become focal taxa in recent Rapid Biodiversity Assessments (Gassmann & Richards, 2011; Kalkman et al., 2011). Orr and Kalkman (2012) elaborate on the role of the Australian Monsoon tropics as a barrier for the exchange of dragonflies between New Guinea and Australia. Two manuals of dragon- and damselflies (Michalski, 2012) and damselflies (Kalkman & Orr, 2013) have been published recently.

From May 14<sup>th</sup> to July 6<sup>th</sup>, 1997, I undertook a 7-weeks-trip to Papua New Guinea to travel four provinces (National Capital District not counting here) to study and collect dragonflies (Anisoptera) and damselflies (Zygoptera) in their habitats, to collect them for morphological and molecular analyses and to obtain additional distributional data for biogeographical analyses. I travelled on my own, supported by local scientific contacts which I had established either before or during the trip. For a short itinerary see Table 1.



At that time, the field trip took place within the scope of my PhD research project on Southeast Asian and Papuan feather-legged damselflies, the Calicnemiinae (Platycnemididae). For that reason, the focus was laid on (adult) damselflies (Zygoptera). However, many dragonfly (Anisoptera) species were also collected on a rather opportunistic base.

So far, the faunistic results of the expedition had only been published for the Platycnemididae (Calicnemiinae) within the scope of a taxonomic revision of the New Guinean genus *Idiocnemis* Selys (Gassmann, 1999; 2000) and a phylogenetic and biogeographic analysis of the group (Gassmann, 2005; Van Tol & Gassmann, 2007).

The expedition and its evaluation was supported by a couple of organizations (see Acknowledgements). The International Dragonfly Fund (IDF) financially contributed to the evaluation of the field trip, i.e. the present paper and the description of a new species, *Pseudagrion lorenzi* (Gassmann, 2011).

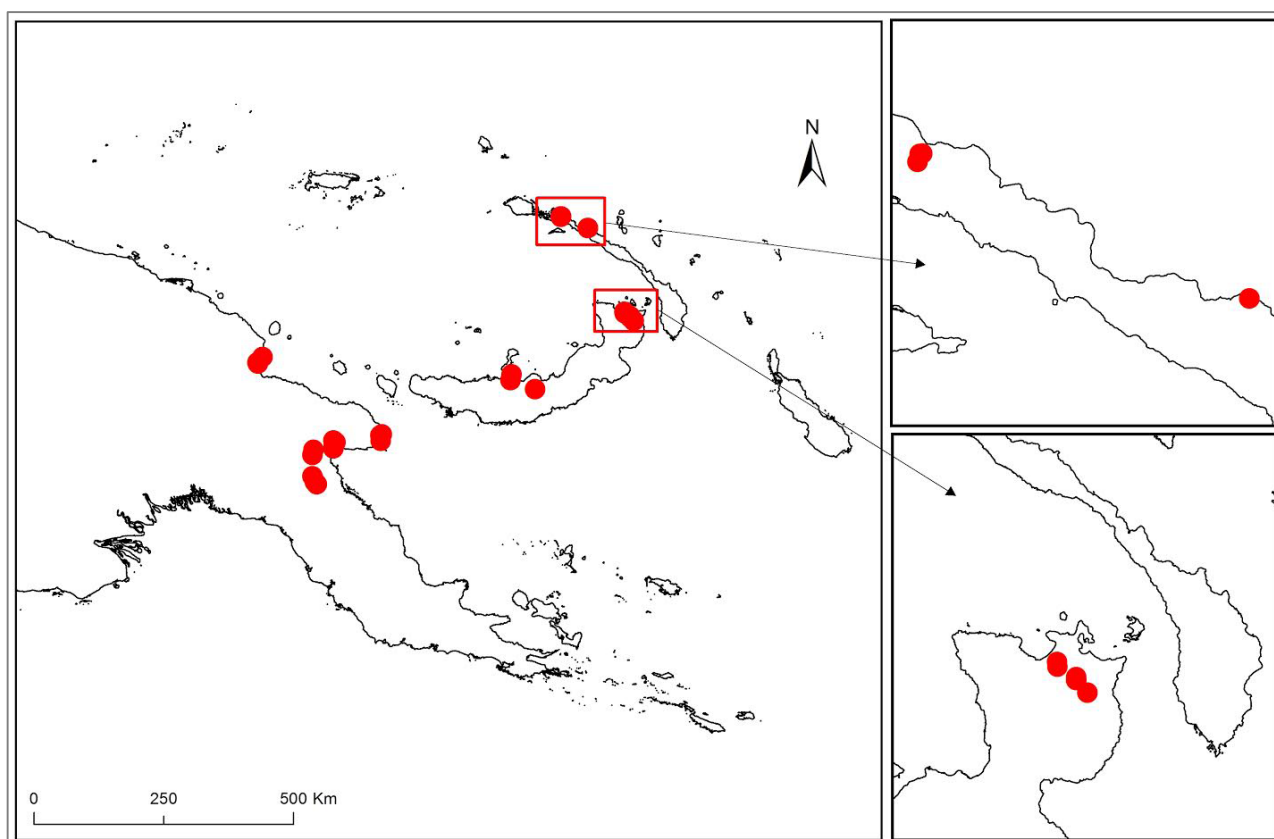


Figure 1. Map of Papua New Guinea with indication of sample localities

## Materials and methods

### *Sample localities*

Sample localities in four provinces of Papua New Guinea were searched and visited on a rather opportunistic base (Fig. 1, Table 2). The author either rented a car (alternatively a car plus a driver), or was supported by entomologist colleagues working in



the country who provided transport. Various aquatic habitats in the respective surroundings were explored. Travel between provinces and islands took place by plane, except for a boat trip from Lae to Finschhafen. For a summary of the itinerary, see Table 1.

A couple of additional specimens were collected for the author by Dr. Martin Wiemers, at that time working in PNG, in January 1997. They are included here.

### *Itinerary*

#### Morobe Province (Figures 2 – 7)

After arrival in Port Moresby (National Capital district), the trip was continued to Lae. The Botanical Gardens were the first sample locality. Based on the campus of the Uni-

**Table 1: Itinerary (summary)**

Date	Province	Place
May 16, 1997	National Capital District	Arrival at Port Moresby
May 17 – May 23, 1997	Morobe	Lae; mountains north to Lae
May 24 – May 31, 1997		Huon Peninsula, east coast, Finschhafen surroundings
June 1, 1997		Bulolo
June 2 – June 5, 1997		Wau surroundings, Little Wau Creek, Mt. Kaindi
June 6 – June 7, 1997		Lae (sorting out/preparation of specimens)
June 8, 1997		Sampling aquatic habitats near Gurakor, and between Wampit and Timini (Purinen River).
June 9, 1997		
June 10 – June 17, 1997	East New Britain	Rabaul; Keravat, Gazelle Peninsula
June 17 – June 21, 1997	West New Britain	Kimbe, Walindi, northern New Britain south to Willaumez and Hoskins peninsulas
June 22 – June 28, 1997	New Ireland	Kavieng; northern New Ireland
June 29, 1997	Morobe	Lae (specimen preparation)
June 30 – July 4, 1997	Madang	Madang; Ohu village surroundings; Kau Wildlife Area
July 5, 1997	Morobe	Lae: preparing departure
July 6, 1997	National Capital District	Port Moresby; departure





Figure 2. Creek near Mearambi River, Morobe Province. Habitat of *Diplacina ismene*, *Neurothemis ramburi papuensis*, *Orthetrum glaucum*, and *Pseudagrion silaceum*.





iversity of Technology (ca. 8 km out of Lae), several excursions into the mountainous surroundings north to Lae were undertaken during the first week of the trip. All localities were roughly situated between and around Gobari Plantation, Bumayong and Gobadik. Aquatic habitats were in proximity to villages. The second week of the trip was spent in the Finschhafen area at the eastern coast of the Huon Peninsula. The area was reached by boat. During the boat trip along the south coast, the author got an impressive view on the rugged interior of the Huon Peninsula. The fast flowing rivers, creeks and waterfalls near Scarlet Beach were visited first. Subsequently, the author explored aquatic habitats in the area around Heldsbach along the street which is leading upwards from Heldsbach further to Sattelberg. On June 1<sup>st</sup>, small creeks near Bulolo were sampled, and the trip was continued to Wau. Accomodated at the Wau Ecology Institute (WEI), I sampled habitats in the surroundings (e.g. Little Wau Creek) for odonates, and the slopes of Mt. Kaindi, situated northwest to Wau, were visited up to an elevation of 1590 m.

On June 8<sup>th</sup>, an excursion was undertaken from Lae along the road to Bulolo/Wau to aquatic habitats near Gurakor as well as those between Wampit and Timini (Purinen River).



**Figure 3. View on the rugged topography of the Huon Peninsula: south coast between Lae and Finschhafen.**





Figure 4: Waterfall near Scarlet Beach, Huon Peninsula, Morobe Province. In this area, *Drepanosticta conica*, *Nososticta astrolabica*, *Nososticta salomonis*, *Tanymecosticta fissicollis*, and *Metagrion montivagans* were recorded.





Figure 5. Purinen River, Morobe Province. Habitat of *Diplacodes haematodes*, *Huonia* spec. and *Neurobasis a. australis*.



Figure 6. View on the abandoned gold fields near Wau, Morobe Province.





Figure 7. Little Wau Creek, Morobe Province. Habitat of *Agriocnemis femina*, *Diplacina hippolyte*, *Huonia epinephila*, *Idiocnemis inaequidens*, *Metagrion kirbyi*, *Nannophlebia antiacantha*, *Neurothemis s. stigmatizans*, *Orthetrum glaucum*.



Madang Province (Fig. 8 – 11)

Partially accommodated at the Christensen Research Institute (CRI) ca. 20 km north to Madang (which were closed down at the end of 1997: Mervis, 1998), the author was able to undertake excursions into the surroundings. Near Ohu village west of Madang, two localities (ca. 2.3 km apart) at Siholum and Behir Creek were sampled. The community-operated Kau Wildlife Conservation Area, northwest to the CRI was visited for one day. Besides sampling a couple of aquatic habitats, the developing rainforest museum maintained by the local Didipa Clan was visited as well.



Figure 8. Siholum Creek near Ohu Village, Madang Province. Type locality of *Idiocnemis adelbertensis*, also habitat of *Agriocnemis femina*, *Nososticta chalybeostoma*, *Nososticta erythrura*, *Nososticta plagioxantha* *Nososticta nigrofasciata*, *Palaiargia humida* and *Pseudagrion civicum*.





Figure 9. Behir Creek near Ohu Community School. Habitat of *Agriocnemis femina*, *Neurobasis australis australis*, *Nososticta erythrura*, *Nososticta plagioxantha*, *Nososticta nigrofasciata*, *Pseudagrion civicum*, *Pseudagrion farinicolle*, *Pseudagrion silaceum*, *Rhinocypha tincta amanda*, *Neurothemis decora*, *Neurothemis ramburi papuensis*, *Orthetrum v. villosovittatum*.



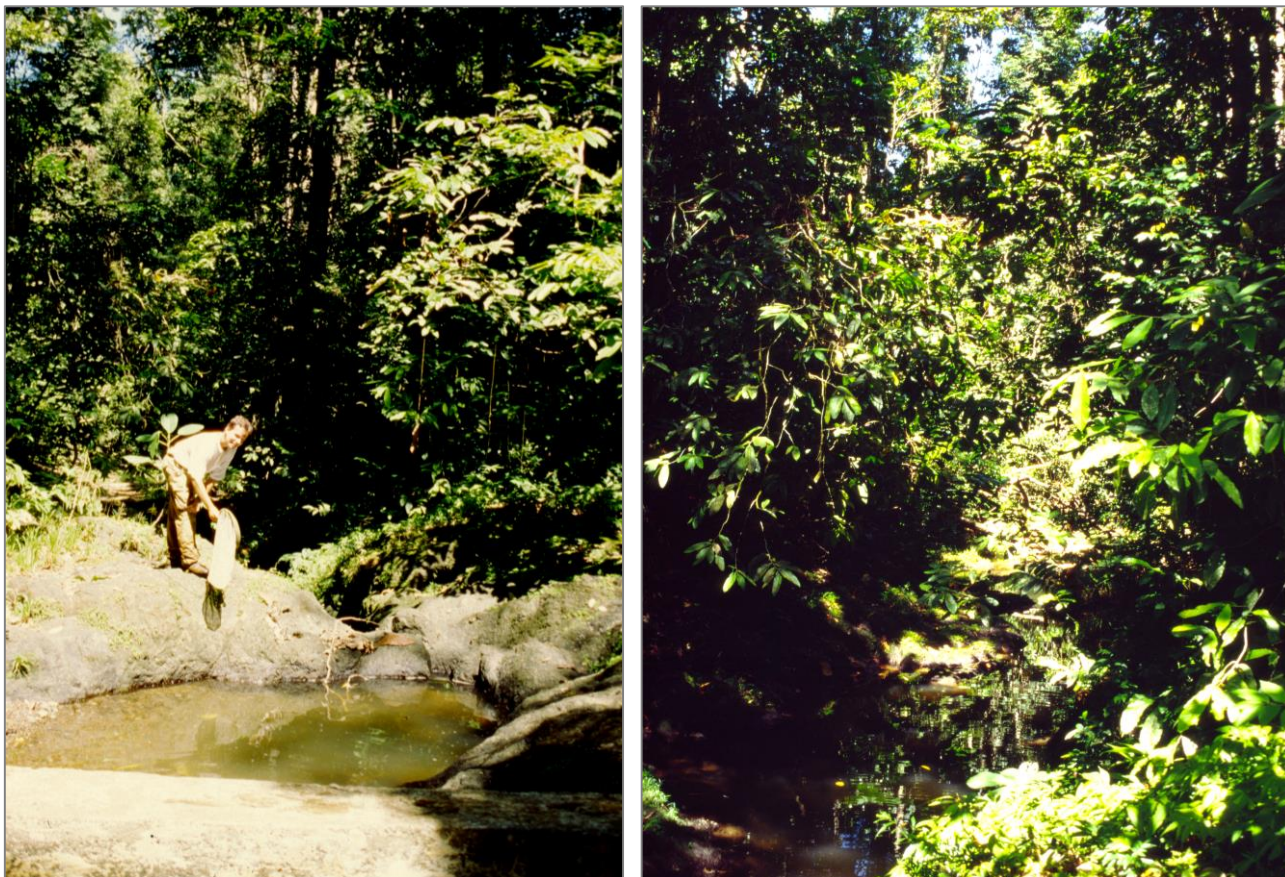


Figure 10 a,b. Kau Wildlife Area, habitat of *Metagrion* cf. *kirbyi*, *Nososticta chalybeostoma*, *Nososticta nigrofasciata*, *Pseudagrion civicum*, *Rhincocypha tincta amanda*, *Tanymecosticta fissicollis*, *Teinobasis scintillans*. Photo left: H. Wasel.



Figure 11. View on Kau Wildlife Area towards the Schrader Range.



### East New Britain Province (Fig. 12 – 15)

The Gazelle Peninsula of New Britain was visited three years after the major eruptions of 'Tavurvur' and 'Vulcan' volcanoes at the margin of Simpson Harbour. The scenery around the bay was dreary and disastrous. Ash was covering the whole area around the former provincial capital. The author stayed at a hotel which was close to Tavurvur volcano. The latter was regularly 'growling' and releasing signs of activity. All other Rabaul buildings were still destroyed, apparently collapsed by the weight of the volcanic mud.

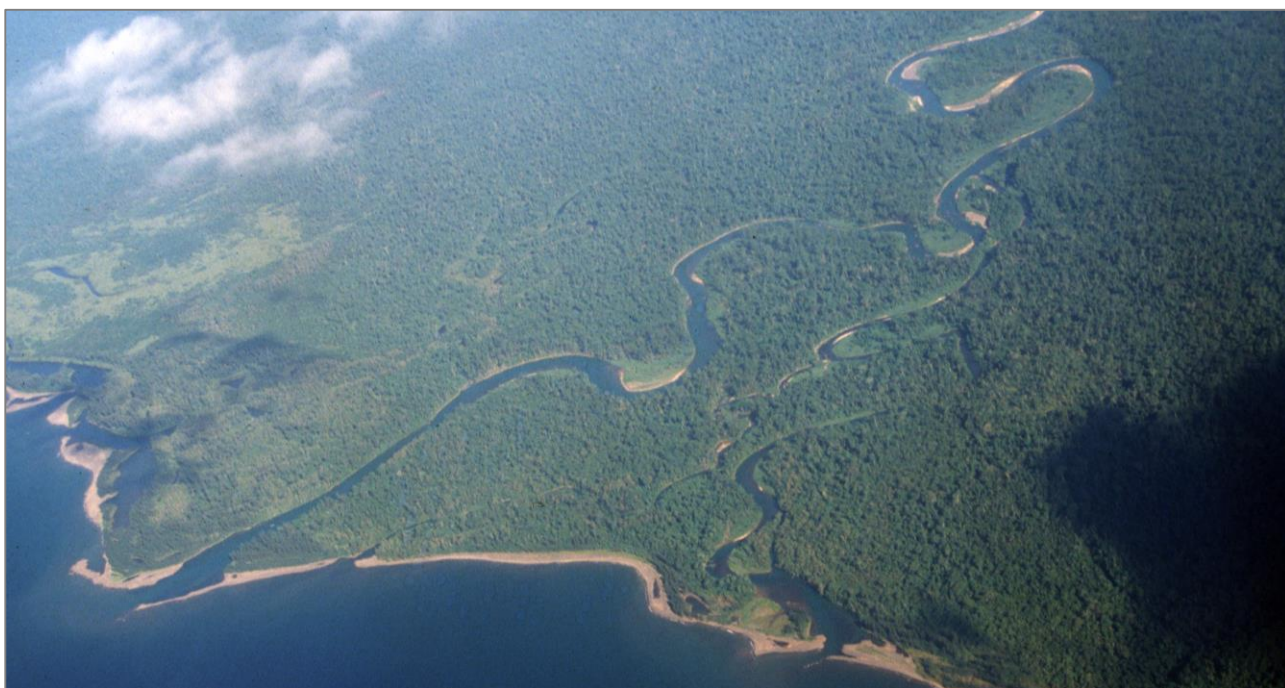


Figure 12. Aerial view on New Britain, north coast.



Figure 13. View on Simpson Harbour, East New Britain, with Mt. Tavurvur (left), in 1997, three years after the major eruption.





Figure 14. Rabaul: Destruction caused by the Tavurvur eruption in 1994. Photo taken three years later.



Figure 15. Creek in East New Britain Province. Here is where the author encountered the remarkable *Mortonagrion martini* for the first time. Also habitat of *Pseudagrion lorenzi*.



West New Britain Province (Fig. 16-17)

Based at Dami (southwest to Hoskins Airport), the author visited sample localities in the central northern part of New Britain, i.e. in the southeast of the Willaumez Peninsula (creek near Numundo Plantation, Tamari Creek) and south to Hoskins Peninsula (Malalimi Creek).



Figure 16. Creek near Numundo Plantation, West New Britain Province. The creek was leading into a clearing (state of 1997). The closed area of the creek still was the habitat of *Agriocnemis femina*, *Mortonagrion martini*, *Pseudagrion microcephalum*, *Pseudagrion lorenzi*, *Teinobasis rufithorax* and *Tetrathemis irregularis*.



Figure 17. Malalimi Creek, West New Britain Province. Habitat of *Nososticta africana*, *Nososticta commutata*, *Pseudagrion lorenzi*. In the middle the author.



### New Ireland Province (Fig. 18)

From Kavieng in the north of the island, excursions into the south were done by car along the Boluminski Highway at least up to the junction to the Lelet Plateau about halfway the length of the island. Further and first of all, the aquatic habitats along the connection road of west and east coast were sampled; usually they were rather dried up, the water quality was generally poor and with turbid water. Generally, there seemed to be rather little surface water at least in the northern part of the island, and climate was generally dry also due to the rising 1997 El Nino weather phenomenon. Along the west coast, a village was visited to establish contact with people.



**Figure 18.** New Irelands northern half is quite narrow. The coast may be viewed from many places.

**Table 2: Sample localities**

Province	Locality Code	Locality	Coordinates	Elevation	Sample time	Habitat
Morobe	[1]	Lae, Botanical Gardens	S 06°43'11.8" E 146°59'46.9" (approx.)	N/A	01.ii. & 17.v.1997	Artificial ponds
	[2]	Bualu and Gobari Creeks	N/A	N/A	21.v.1997	
	[3]	Creek at the way from Gobari to Bumayong	N/A	N/A	21.v.1997	
	[4]	Creeks/ponds nr. Gobari Plantation	N/A	N/A	18.v.1997	
	[5]	Small pond nr. Gobari Plantation	N/A	N/A	21.v.1997	
	[6]	Gobadik Creek	N/A	N/A	23.v.1997	
	[7]	Creek nr. Mearambi River	N/A	N/A	23.v.1997	
	[8]	Huon Peninsula, creek at Scarlet Beach	S 6°28'40.6" E 147°50'18.2"	N/A	30.v.1997	broad, partly deep rocky creek
	[9]	Huon Peninsula, broad creek nr. Butaweng River	N/A	N/A	25.v.1997	Broad creek
	[10]	Huon Peninsula, creeks between Heldsbach and Sattelberg mission	S 6°29'37" E 147°48'53"	N/A	28.v.1997	
	[11]	Huon Peninsula, creeks at road Finschhafen-Heldsbach south of exit to Sattelberg Mission	N/A	N/A	28.v.1997	
	[12]	Huon Peninsula, small creeks nr. Heldsbach	N/A	N/A	25. & 26.v. 1997	
	[13]	Huon Peninsula, small to broad creek with terraces	N/A	N/A	28.v.1997	
	[14]	Huon Peninsula, rocky creek with terraces and	N/A	N/A	30.v.1997	





Province	Locality Code	Locality	Coordinates	Elevation	Sample time	Habitat
		black-brown (lava?) stones				
	[15]	Stony creek at Gurakor, crossing Wau Road	N/A	N/A	08.vi.1997	
	[16]	Purinen River, between Gurakor and Lae	N/A	N/A	08.vi.1997	
	[17]	Purinen River, between Wampit and Timini	N/A	N/A	08.vi.1997	
	[18]	Small creek, Bulolo	N/A	N/A	26.i.1997 [leg. M. Wiemers]	
	[19]	Little Wau Creek	S 7°20'36.7" E 146°42'25.9"	ca. 1170 m	03.-05.vi.1997	Stony creek with sunny stretches
	[20]	Mount Kaindi, at way down to Wau Ecology Institute	N/A	ca. 1320 m	02.vi.1997	[in vegetation]
	[21]	Mount Kaindi, small stony creek crossing the way down to Wau Ecology Institute	N/A	ca. 1470 m	02.vi.1997	
	[22]	Mount Kaindi, at way down to Wau Ecology Institute	N/A	ca. 1590 m	02.vi.1997	
	[23]	Mount Kaindi, nr. Kaindi Village	N/A	ca. 1550 m	02.vi.1997	
Madang	[24]	Behir Creek, nr. Ohu Community School	S 05° 14' 59.7" E 145° 41' 24.4"	ca. 90 m,	02.vii.1997	Broad, partly stony creek
	[25]	Siholum Creek, nr. Ohu Village	S 05° 13' 59.7" E 145° 40' 44.4"	180 m	02.-3.vii.1997	Stony, partly rocky and sandy stream
	[26]	Kau Wildlife Area	N/A	N/A	03.vii.1997	Small streamlet in largely primary forest area

Province	Locality Code	Locality	Coordinates	Elevation	Sample time	Habitat
West New Britain	[27]	Creek nr. Numundo Plantation	S 5°32'10.7 E 150°03'55.4"	N/A	18.vi.1997	Medium-sized creek with sandy substrate, running out into a clearing (logged forest)
	[28]	Tamari Creek, nr. Walindi Plantation	N/A	N/A	19.vi.1997	
	[29]	Malalimi (?) Creek	S 5°41'37.8 E 150°29'36.5"	N/A	20.vi.1997	Broad shady creek with stony walls, sandy substrate with gravel areas, in forest
East New Britain	[30]	Small creek at Keravat road (several sampling localities)	Approx.: S 4°22'31.5" E 152°02'40.2" [only 12.vi.]	ca. 30-40 m; N/A	11.-13. & 15.vi.1997	Shady streamlet
	[31]	Broad creek at Keravat Road	N/A	N/A	11.vi.1997	
	[32]	Swamp nr. Gaulim	S 4°26'46.0" E 152°08'36.5"	N/A	13.vi.1997	Still water, almost entirely covered by aquatic plants
	[33]	Small creek nr. Vunakore	S 4°25'48.9" E 152°08'34.3"	N/A	13.vi.1997	
	[34]	Sikute River (tributary of Warangoi)	S 04° 30' 41.4" E 152° 12' 02.8"	ca. 130 m	11.vi.1997	
	[35]	Another tributary of Warangoi	N/A	N/A	11.vi.1997	
	[36]	Small creek at Northcoast Rd, nr. Cocoa and Coconut Research Institute	N/A	N/A	15.vi.1997	Small creek in plantation
New Ireland	[37]	Between Lagoon and Fissoa, 93 km south to Kavieng, at East Coast Highway	N/A	N/A	23.vi.1997	Stagnant creek in forest (not very clean)





Province	Locality Code	Locality	Coordinates	Elevation	Sample time	Habitat
	[38]	Connection road between West and East coast, 30 km south from Kavieng	S 2° 41' 51.2'' E 150° 56' 38.9''	up to 170 m	24.-26.vi.1997	Creek
	[39]	Creek at connection road West/East coast	S 2°42'31.7'' E 150°56'15.1''	ca. 20-50 m	25.-26.vi.1997	Small open creek, reddish and muddy underground

### *Specimen sampling and preservation*

Most specimens were caught by using a long-handled net (zygopterans also without a handle, or by hand), larval specimens by scooping a sieve in the water. Most specimens were treated with acetone for several hours up to one day, to preserve their colours. If a freezer was available, specimens were killed and stored there. Several adult zygopteran specimens were preserved in ethanol, as well as the larval specimens. With a few exceptions, specimens have been deposited in the collection of the Naturalis Biodiversity Center Leiden (RMNH).

### *Taxonomy*

Recent taxonomic changes at family level within the Zygoptera (Dijkstra et al., 2014), and at the generic level within the Argiolestidae (Kalkman & Theischinger, 2013), are adopted here.

### *Photography*

If not indicated otherwise, photographs were taken by the author and later scanned from the diapositives.

## **Results / Annotated species list**

64 (sub)species from 10 families of Odonata were sampled as adult specimens, among them are three families (26 taxa) of Anisoptera and seven families (38 taxa) of Zygoptera.

## **ANISOPTERA**

### **Corduliidae**

#### *Hemicordulia hilbrandi* Lieftinck, 1942 [22]

So far, this species had only been known from two male specimens from the type locality, Lake Paniai of the 'Wissel Lakes' group in West Papua, Indonesia (Lieftinck,

1942). The present male specimen from Mount Kaindi near Wau in Papua New Guinea was collected at an altitude of ca. 1590 m and represents a considerable extension of the known distribution range. Careful examination of the relevant characters (e. g. shape of the appendages, genital morphology, leg coloration, body and wing size) leaves no doubt to the author about the species' identity. First record for Papua New Guinea.

## Gomphidae

*Ictinogomphus australis lieftincki* (Schmidt, 1934) [4]

So far, *I. australis* is the only gomphid species known from New Guinea. Its distribution range reaches from Halmahera (Moluccas) to the Solomons, including Australia (Lieftinck, 1949).

## Libellulidae

*Agrionoptera insignis similis* Selys, 1879 [12], [38]

Three male specimens of this colourful species were collected during the trip. The specimen from Morobe Province (hindwing length: 32.0 mm) is distinctly larger than those from New Ireland (hwl: 27.5-28.5 mm) and lacks the cross-vein in the forewing triangle which is present in the latter.

?*Agrionoptera longitudinalis biserialis* Selys, 1879 [?]

A male specimen was identified from a blurry photograph taken in Morobe Province. The exact locality is not certain.

*Brachydiplax duivenbodei* (Brauer, 1866) [32], [39]

The single male from New Ireland is dark and lacks the bright blue pruinescence often encountered in this species. However, this could be due to an artifact caused by the treatment preceding the drying process. Based on the number of antenodals (7 in forewing, 6 in hindwing), the specimen is assigned to *B. duivenbodei* and clearly distinguished from *B. denticauda*. The two males from New Britain are distinctly bright bluish-pruinose. Found at a creek (New Ireland) as well as at a swamp-like still water (East New Britain). New record for New Britain and New Ireland.

?*Brachydiplax denticauda* (Brauer, 1867) [39]

With its creamy-white labrum and the comparatively high number of antenodal cells, the single female from New Ireland very probably represents *B. denticauda*. Potentially new record for New Ireland.





*Diplacina fulgens* Ris, 1898 [34]

One male of this beautiful and largely green-iridescent New Britain endemic was collected at Sikute River. Additional specimens from another recent survey in New Britain are available in the Leiden collection (Gassmann & Richards, 2011).

*Diplacina hippolyte* Lieftinck, 1933 [19] [20]

The three male specimens were found at stony Little Wau Creek in Morobe Province, at elevations of about 1200 m. A female was encountered at a higher locality of Mt. Kaindi (1320 m). From females of the quite similar *I. ismene*, the present specimen was distinguished mainly by its larger size and its colour pattern (Lieftinck, 1933). The female's yellow abdominal marking is broken up into a dorsal and ventral part, thus being not as complete as described by Lieftinck (1933).

*Diplacina ismene* Lieftinck, 1933 [4], [6], [7]

This species was found at three different localities in the mountains above Lae. During this trip, *D. ismene* was encountered at much lower elevations than *D. hippolyte* and *D. smaragdina*.



Figure 19. *Diplacina* spec. (probably *D. ismene*), Bulolo.

*Diplacina smaragdina* Selys, 1878 [15]

The male specimen from Morobe Province was found near Gurakor, an area from

which this species had been reported previously. The specimen is considered a *D. smaragdina* with regard to thoracic colour pattern and overall shape of the appendages. However, the shape of the male upper appendages, in lateral view, somewhat differs from Lieftinck's (1953) illustrations of that species and also shows similarity to *D. arsinoe* Lieftinck, 1953. Widespread species.

*Diplacodes haematodes* (Burmeister, 1839) [2], [3], [17]

The three males from Morobe Province were found at fast flowing streams. This species is distributed from Timor to New Caledonia and Australia (Theischinger & Hawking, 2006).

*Diplacodes trivialis* (Rambur, 1842) [39]

The single male from New Ireland was encountered at a rather muddy and dirty creek. The species had been known from the Bismarck Archipelago before (Gassmann & Richards, 2011); there is an older record from Fissoa, New Ireland (Lieftinck, 1949b). Distributed from the Seychelles across India and Japan up to Fiji and Australia (Theischinger & Hawking, 2006).

*Huonia epinephela* Förster, 1903 [4], [19] (Fig. 20)

Apparently quite widespread species that previously had been recorded from both West Papua (Indonesia) and from Papua New Guinea (Lieftinck, 1953; 1963). Found during the present trip in the mountains to the northwest of the Owen Stanley Range (Little Wau Creek) and at creeks and ponds above Lae, near Gobari Plantation (Huon Gulf area).



Figure 20. *Huonia epinephela*, ♂, Little Wau Creek.





*Huonia thalassophila* Förster, 1903 [4]

The present single male specimen is from Morobe Province. The species had been recorded previously from north- and southeastern New Guinea, from Astrolabe Bay to the Papuan Peninsula (Lieftinck, 1963). Just as *H. epinephela*, the present species was encountered in partially disturbed habitats.



Figure 21. *Huonia* spec., Purinen River, Morobe Province.

*Nannophlebia antiacantha* (Lieftinck, 1963) [19]

So far, this species had been recorded from the Star Mountains of West-Papua (Lieftinck, 1963; Kalkman, 2008), and from the Kratke Mountains along the Eastern Highlands Highway of Papua New Guinea (Lieftinck, 1963). The single male specimen from Little Wau Creek is the second record in what today is Morobe Province and extends the known distribution area of the species to the Southeast.

*Neurothemis decora* (Kaup in Brauer, 1866) [1, 24]

Male specimens were recorded from Lae Botanical Gardens (Morobe Province) and Behir Creek (Madang Province).

*Neurothemis ramburi papuensis* (Fabricius, 1775) [4] [7] [11] [24]

Mostly male specimens were recorded from Madang and Morobe Provinces.

*Neurothemis stigmatizans.stigmatizans* (Fabricius, 1775) [2] [12] [19] [32] [38]

Two teneral males and a homeochromatic female were collected at a swamp-like habitat near Gaulim/East New Britain.

*Orthetrum glaucum* (Brauer, 1865) [7], [19], [21], [22] (Fig. 22)

This widespread libellulid species, which occurs from India to New Guinea (Michalski, 2012), was found at comparatively high altitudes. The highest elevation at which it has been recorded during the trip (1590 m) might well mark the upper altitudinal limit of this species (cf. Orr, 2003). At Mount Kaindi, the species was found along the road leading down to Wau indicating that it is able to use 'poor' habitats (Orr, 2003). The mature males of *O. glaucum* are blue-pruinose, the females yellow-black. All specimens from Morobe Province.



Figure 22. *Orthetrum glaucum*, ♂, Mount Kaindi, Morobe Province.

*Orthetrum serapia* Watson, 1984 [2]

The two males are from a single locality in Morobe Province. The species is possibly distributed from the Philippines to the southwestern Pacific (Theischinger & Hawking, 2006). Recent new records include those from New Britain (Gassmann & Richards, 2011). Watson (1984), for the original description, had already examined specimens from 'Morobe District' which he considered 'apparently' conspecific with the Australian type specimens of the species.



*Orthetrum villosovittatum bismarckianum* (Ris, 1898) [28], [34]

Here found at medium-sized streams in both West and East New Britain Province. With regard to the species' populations from mainland New Guinea, the black tip of the abdomen provides the most conspicuous distinguishing character in the field.

*Orthetrum villosovittatum villosovittatum* (Brauer, 1868) [4], [23], [24] (Fig. 23)

Widespread from Maluku to the Solomons and Australia (Michalski, 2012), recorded here from localities in Morobe and Madang Province.



Figure 23. *Orthetrum villosovittatum*, ♂, Mount Kaindi, Morobe Province.

*Pantala flavescens* (Fabricius, 1798) [2], [5]

Nearly cosmopolitan species (Theischinger & Hawking, 2006). All present records are from Morobe Province.

*Rhyothemis resplendens* Selys, 1878 [39], [40]

This beautiful species with its blue reflecting wings was found fluttering in groups above two creeks of small to large size in New Ireland. Its distribution range is known to extend from the Moluccas in the west to the Bismarck Archipelago in the east (Theischinger & Hawking, 2006). Lieftinck (1949a) listed *R. resplendens* from

New Ireland. However, according to the author's knowledge, no locality or geographical record was given in Lieftinck's work or that of other authors that would confirm that statement. I therefore consider the present finding the first record of this species from New Ireland.

*Tetrathemis irregularis ?irregularis* Brauer, 1868 [27]

Gassmann & Richards (2011) recorded a *Tetrathemis* from New Britain as a presumed new (sub)species based on a male specimen preserved in alcohol as well as on a field photograph of the supposed female. The present specimen from West New Britain province belongs to the same taxon. All specimens are very close to the nominal subspecies *T. i. irregularis* known from the Philippines. A thorough analysis of variation within the *Tetrathemis irregularis* complex is required to clarify the taxonomic status of the present specimens.

*Trithemis festiva* (Rambur, 1842) [12]

This largely blue-pruinescent species is the only representative of the Old world genus *Trithemis* known from the Papuan region (Michalski, 2012). The present specimens are from Huon Peninsula. Based on the number of specimens he had seen in collections, Lieftinck (1942) considered *T. festiva* a rare species in New Guinea.

## ZYGOPTERA

### Argiolestidae

*Metagrion aurantiacum* (Ris, 1898) [33]

The two males are from a small creek near Vunakore, Gazelle Peninsula (New Britain).

*Wahnesia kirbyi* (Förster, 1900) [19]

Several males of this species, originally described from Huongulf area (type locality: Sattelberg), were found at Little Wau Creek at about 1170 m. According to Polhemus et al. (2004), the species is endemic to the Adelbert, Finisterre and Saruwaged Mountains. In the meantime, a further record came up from Eastern Highlands (Oppel, 2005).

*Wahnesia cf. kirbyi* (Förster, 1900) [26]

Thoracic markings of the present specimen from Kau Wildlife Area (Madang Province) are somewhat different from those of Little Wau Creek (Morobe Province). More importantly, it is lacking the bright marking on abdominal segments 8 to 10. The specimen is smaller than the Morobe specimens. Further study and additional specimens from the region are needed to assess the intraspecific variability of *W. kirbyi* and to clarify the taxonomic status of the present specimen.





*Metagrion montivagans* (Förster, 1900) [13]

One male specimen was collected in alcohol at a small to medium-sized stream flowing over rocky terraces at the eastern tip of the Huon Peninsula in Morobe Province. Like *W. kirbyi*, the species is considered endemic to the Adelbert, Finisterre and Saruwaged Mountains area of endemism (Polhemus et al., 2004).

**Calopterygidae***Neurobasis australis australis*, Selys, 1897 [2], [4], [16], [17], [24], [28] (Fig. 24)

This is the most widespread (sub)species of *Neurobasis* in New Guinea (Orr & Härmäläinen, 2007). During the present expedition, specimens were encountered in both Madang and Morobe Provinces, as well as in northern central New Britain (West New Britain Province). *N. a. australis* has been known from New Britain before. Interestingly, there is not yet any record from the Gazelle Peninsula. *N. kimminsi* Lieftinck, 1955, which is also known from the Papuan Peninsula, is apparently replacing *N. australis* in East New Britain; (Orr & Härmäläinen, 2007). Also during the 1997 trip, no representative of *N. australis* was encountered on the Gazelle Peninsula.



Figure 24. *Neurobasis australis* at Purinen River, Morobe Province.

## Chlorocyphidae

### *Rhinocypha tincta amanda* Lieftinck , 1938 [24], [26]

All specimens are from Madang Province. The subspecies is known from northern New Guinea, ranging from the Mamberano River Basin to the eastern tip of the Huon Peninsula (Lieftinck, 1938). Polhemus et al. (2008) recorded the subspecies from the northwestern part of central West-Papua.

### *Rhinocypha tincta dentiplaga* Lieftinck , 1938 [1], [2], [4], [10], [12], [14], [15], [18] (Fig. 25)

This subspecies had been previously known from the area around Astrolabe Bay (Madang Province), from the Finisterre Range as well as from the eastern tip (Sattelberg) and the southern coast (Hänishafen = Hanisch Harbour) of the Huon Peninsula in what today is Morobe Province (Lieftinck, 1938). The new records extend the known distribution area of this (sub)species into the Saruwaged Range. In Madang Province, the distribution range is extended into the Adelbert Range, i.e. slightly westwards (inwards) from Madang. The specimens from near Gurakor (between Bulolo and Lae) and from Bulolo so far represent the most southern records of *R. t. dentiplaga*. With regard to their specific rank and taxonomic status, it should be noted that *R. t. amanda* and *R. t. dentiplaga* were not found occurring syntopically during this trip.



Figure 25. *Rhinocypha tincta dentiplaga* near Gobari Plantation, Morobe Province.





*Rhinocypha tincta semitincta* Selys, 1869 [28] [34] (Fig. 26)

A male specimen was collected at Sikute River (Gazelle Peninsula) in New Britain. The few previous records from that region include Herbertshöhe (= Kokopo) on the Gazelle Peninsula and Mioko Island north to New Britain (Lieftinck, 1938).

The female specimen from West New Britain Province is very interesting. The dark bands on the wings are much more reduced compared to *semitincta* females from mainland New Guinea and point to *R. t. dentiplaga*. However, the bright abdominal markings are extremely reduced, just like in *R. t. semitincta* from Batjan Island, Moluccas (Lieftinck, 1938: Figure 5A). Compared to *R. liberata*, the opaque wing bands are more extensive and come close to the wing colour pattern of female *R. t. dentiplaga* (cf. Figure 3C in Lieftinck [1938]).

Lieftinck (1938), in his compilation of the group, had only four males and no female from New Britain available for study. Interestingly, he also describes the wing colour pattern of those specimens as close if not identical to that of *R. t. dentiplaga*.

The only two (sub)species of *Rhinocypha* currently known from New Britain are *R. liberata* Lieftinck and *R. liberata tincta semitincta* (Gassmann & Richards, 2011; Lieftinck, 1938). Further research on the variability of abdominal and wing colour patterns within the *Rhinocypha tincta* group is needed to establish the status of the present female specimen from Walindi, New Britain.



Figure 26 a,b. *Rhinocypha tincta semitincta* a) ♂, Sikute River, East New Britain; b) ♀, Tamari Creek, West New Britain.

### Coenagrionidae

#### *Agriocnemis aderces* Lieftinck, 1932 [1]

Four species of this genus of small damselflies are known from the Papuan region (Michalski, 2012). *Agriocnemis aderces* had only been known from the type locality, the Hollandia (= Jayapura) area in West-Papua. The present single male specimen was found at Lae Botanical Gardens and represents a considerable range extension. Probably, the species is widespread in (at least) northern New Guinea.



*Argiocnemis femina* (Brauer, 1868) [1], [18], [19], [24], [25], [27], [30], [32], [34], [35], [36], [37], [38]

This very small species is known to be widespread throughout South and Southeast Asia, and it was encountered in all five provinces visited by the author. Here, it is recorded from New Ireland for the first time.

*Argiocnemis rubescens* Lieftinck, 1932 [1]

This species occurs throughout an area reaching from India to northern Australia. (Lieftinck, 1932; Theischinger & Hawking, 2006). Collected at Lae Botanical Gardens.

*Mortonagrion martini* (Ris, 1900) [27], [28], [30], [31], [38], [39] (Fig. 27)

This in many respects remarkable species was found in New Britain and New Ireland, and from the latter island it is recorded here for the first time. It is quite abundant where found (*own obs.*).

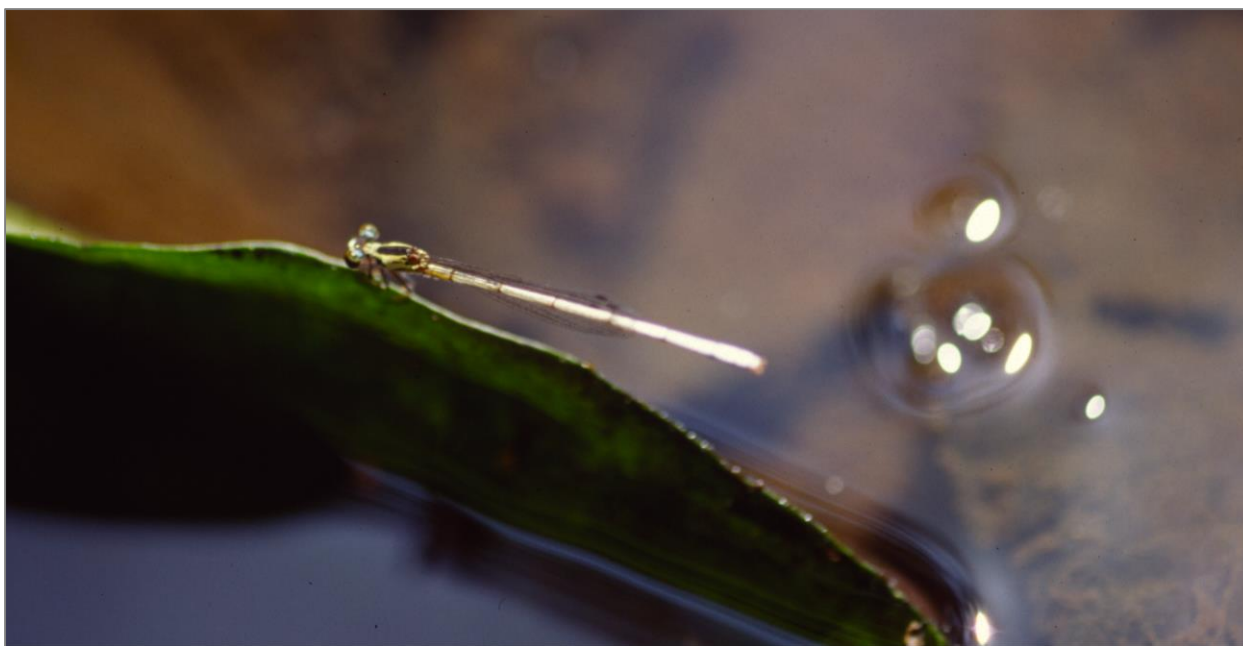


Figure 27. *Mortonagrion martini*, ♂, Gazelle Peninsula, East New Britain Province.

Although of small size, the males of this species are conspicuous due to their white pruinoscence, especially when exposed to sunlight. At closer look, the bright blue postocellar spots and the quite symmetrical shape of the quadrilateral cell (which is atypical for a coenagrionid) are interesting features. The females with their green-obscured coloration are rather cryptic. At least the males typically fly very low above the water surface (*own obs.*). There are previous records of this species from the Bismarck Archipelago: from New Britain (Ris, 1900; Gassmann & Richards, 2011), Umboi (Lieftinck, 1932) and Los Negros (Lieftinck, 1949b), from Woodlark Island (Polhemus et al., 2004) as well as from the Louisiade Archipelago (Sideia Island: Polhemus et al., 2004). Interestingly, it has not been found on mainland New Guinea so far.



From unknown reasons, this species was not included in Lieftinck's distributional list of Papuan Odonata (1949a).



Figure 28. The author doing fieldwork at a stagnant creek in New Ireland. At this site, the *Mortonagrion martini* population was heavily infested with a parasitoid Dipteran. Photo: Gerti Huber.

At a dirty-muddish creek in New Ireland (Fig. 28), several specimens were apparently infested with some kind of parasitoids, most probably midgies (ceratopogonids) which were attached to the thoracices of their hosts. An alternative explanation for this phenomenon would be phoresis. Dipterologist experts have been contacted for further studies.

*Palaiargia humida* Förster, 1903 [4], [10], [25]

The four female specimens were found at three different locations, one of which is on the eastern Huon Peninsula from where the species had been known previously. The second (north to Lae) and the third location (Siholum Creek, west to Madang) suggest that the species' distribution may not be restricted to the Huon Peninsula but extend further west into the Adelbert Range. The (lecto)type locality of this species is Sattelberg (Lieftinck, 1949a; Garrison et al., 2003).

*Pseudagrion civicum* Lieftinck, 1932 [2], [4], [24], [25], [26]

*P. civicum* was previously known from western, northern, northern central, and central New Guinea (Lieftinck 1932, 1949a; Polhemus, 2002). However, based on the present findings, its distribution range extends well into the east at least up to the western Huon Peninsula. Apparently widespread on mainland New Guinea.

*Pseudagrion farinicolle* Lieftinck, 1932 [24]

This species, characterized by the grey pruinescence on pro- and synthorax and a striking dark metallic-green upper surface of its abdomen, had previously been known from the Jayapura area and northwestern central New Guinea (Lieftinck, 1932; 1949) in West-Papua as well as from the Stephansort area (Astrolabe Bay) in Papua New Guinea. The present two male specimens are from Madang Province (nr. Ohu Community School).

*Pseudagrion lorenzi* Gassmann, 2011 [27], [29], [30], [31], [34], [35] (Fig. 29)

This yellow *Pseudagrion* from New Britain was new to science by the time of the field trip in 1997 and has been described by the author in 2011. Additional specimens from the 2009 Nakanai Mountains Rapid Biodiversity Assessment of Conservation International were included in the description (Gassmann, 2011; Gassmann & Richards, 2011).

Comparative remarks referring to *P. ustum* in the original description might have been potentially misleading and are therefore clarified here. *P. lorenzi* from New Britain is clearly distinct from *P. ustum* from the Moluccas. However, the male specimen which was reported by Ris from New Britain as *P. ustum* almost certainly belongs to *P. lorenzi*. Ris' specimen could not yet be examined by the author. The species may be considered a New Britain endemic.





The discovery of *P. lorenzi* fills a distributional gap between the 'yellow' *Pseudagrion* species from mainland New Guinea (e.g. *P. civicum*, *P. silaceum*) in the west and from the Solomons in the east (*P. incisurum*). Structurally, the new species is closest to *P. incisurum* (Gassmann, 2011).



Figure 29. *Pseudagrion lorenzi*, couple, West New Britain.

*Pseudagrion microcephalum* (Rambur, 1842) [1], [27?]

Widespread species in Southeast-Asia and the Indo-Australian region up to the Solomon Islands. The present record is from Lae Botanical Gardens. A teneral male collected in West New Britain Province is likely to be conspecific.

*Pseudagrion silaceum* Lieftinck, 1932 [1], [2], [7], [12], [18], [24], [36] (Fig. 30)



Figure 30. *Pseudagrion silaceum*, couple, Bulolo, Morobe Province.

Previously known from the northern New Guinea ranges eastwards up to the Bewani Mountains (Lieftinck, 1949), from central northwestern New Guinea (Mamberamo River valley: Lieftinck, 1932), and from southeastern New Guinea (Papuan

Peninsula). There is a record from Kokoda (Lieftinck, 1949) and from Gumini River, Alotau (Polhemus, 2004). The present new records fill the distributional gaps in north-eastern New Guinea, i.e. in Madang and Morobe Provinces.

Both *P. silaceum* and *P. civicum* are quite widespread in New Guinea. At two localities ([24], 22)), the species were found to occur syntopically.

#### *Teinobasis rufithorax* (Selys, 1877) [27], [30]

This distribution area of this widespread species reaches from the Moluccas via northern New Guinea, the Bismarck and Solomon archipelagos up to Australia (Lieftinck, 1949a). All my present records are from New Britain where it is the dominant Zygopteran (own obs.). At first sight, this species can be confused with *Idiocnemis kimminsi* in the field, also because they often share the same shady habitats (own obs.). However, *Teinobasis rufithorax* has green eyes instead of red-brown ones, and a closer look reveals the differences in the male appendages of the two species. According to Lieftinck (1949a), the species is also known from New Ireland. However, Lieftinck apparently referred to a record from Nusa Island (off the west coast of New Ireland), not to the main island itself (Lieftinck, 1949b) from where it has not yet been recorded.

#### *Teinobasis scintillans* Lieftinck, 1932 [26]

The single male collected at Kau Wildlife Area represents the most northeasterly record of this beautiful species. Previous records are from West-Papua (Lieftinck, 1932; 1949), from the Crater Mountain area and the Muller Range in Papua New Guinea (Kalkman et al., 2011; Opper, 2005). Although the present specimen was here found in a primary forest area, it appears that this species may be fairly tolerant to deforestation (Opper, 2005).

#### *Xiphiagrion cyanomelas* Selys, 1876 [39]

The two male specimens represent a new record of this species for New Ireland. Although Lieftinck (1949) lists *X. cyanomelas* for the New Ireland fauna in his distribution table, he apparently does not give any reference for that, neither in his 1949 paper, nor in a previous one. However, he does provide a reference for a record from Mioko Island ('Neu-Lauenburg' of the Duke of York island group between New Britain and New Ireland) which is quite close to New Ireland.

### Isostictidae

#### *Tanymecosticta filiformis* (Ris, 1898) [30]

This species was found at a shady streamlet in the Gazelle Peninsula of New Britain.





It had previously been known only from a single male specimen lacking its abdomen (Lieftinck, 1949). A redescription of the species is being prepared by the author.

*Tanymecosticta fissicollis* (Lieftinck, 1932) [8], [26]

The two records from Madang Province (Kau Wildlife Area) and Morobe Province (Huon Peninsula, Scarlet Beach) represent a significant range extension of this species which has otherwise been known only from northwest New Guinea (Hollandia [=Jayapur] and the Idenburg River Valley as well as, surprisingly, from Yamdena (Tanimbar Islands) in the Moluccas (Lieftinck, 1949). The present record suggests that this species, although not common (or at least not easily spotted by observers), might actually be widespread in and around New Guinea.

### Platycnemididae

*Idiocnemis adelbertensis* Gassmann, 1999 [25] (Fig. 31)

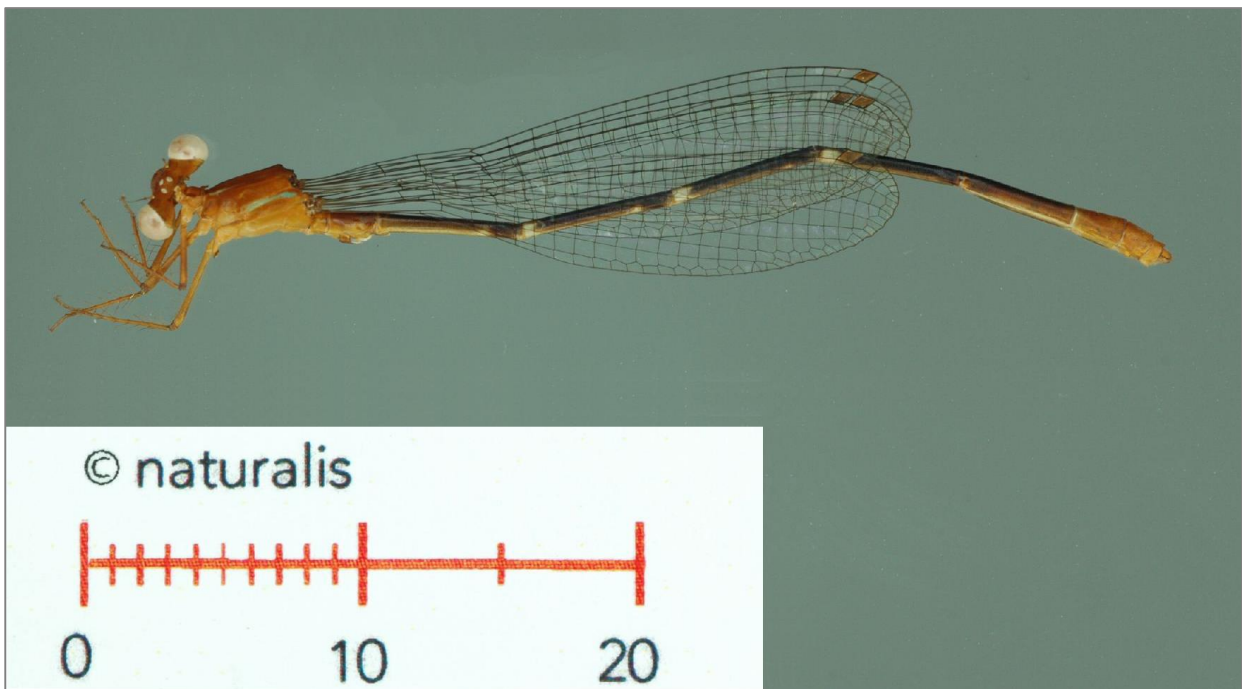


Figure 31. *Idiocnemis adelbertensis* Gassmann, Holotype ♂. © Naturalis Biodiversity Center. Photo K.-D.B. Dijkstra/R.A. Dow.

In 1997, I expected to find a new species around Hansa Bay since I had examined two unidentified specimens from this region in the Leiden collection that could not be assigned to any known *Idiocnemis* species. The specimens sampled here are from Siholum Creek, west of Madang. The distribution area of the species, in geological terms, appears to match the extension of the Adelbert Range terrane. The species was described by the author two years after the trip (Gassmann, 1999). A phylogenetic analysis of the monophyletic *Idiocnemis inornata* group suggests that *I. adelbertensis* is the sister species to a Northern New Guinea clade containing the east-

terly neighbouring species *I. huonensis* (Huon Peninsula) and *I. kimminsi* (New Britain) (Gassmann, 2005).

*Idiocnemis inaequidens* Lieftinck, 1932 [1], [2], [4], [7], [10], [15] [18], [19], [24], [25], [26]

A common species in northeastern and eastern New Guinea (Gassmann, 2000), it had been encountered at various altitudes in Morobe and Madang Provinces during the trip.

*Idiocnemis kimminsi* Lieftinck, 1958 [30], [33]

Near-endemic to New Britain and adjacent small islands, the species was found to be common but not abundant on the island. It was not found at the localities sampled in New Ireland. From that island, it has not yet been recorded, although it is known from the Duke of York group (Mioko Island) between New Britain and New Ireland (Gassmann, 1999; Lieftinck, 1958).

*Nososticta africana* (Schmidt, 1944) [27], [28], [29], [30], [34], [35], [37] (Fig. 32, 33)

This species was described by Schmidt (1944) as *Notoneura africana* from a male specimen in the Berlin collection. Schmidt apparently doubted the specimen's origin from Africa but decided to name it *africana* anyway. According to Pinhey (1962), the supposed type locality 'Massua' lies in the Solomons. The label 'Massawa, Eritrea, 29.12.1907' in the Berlin Museum [not seen by the author] is obviously wrong and had been 'completed' afterwards. Pinhey was assuming that it should be 'Massua, Solomon Islands' but didn't specify which island he was referring to. However, I have never actually found Massua in the Solomons. Recently, I came across a map of New Britain and found Massua at the south coast of that island, west of Jacquinet Bay. Since the type specimen is from the Berlin collection, it is actually more likely that the specimen originates from New Britain where, among others, Friedrich Dahl used to collect odonates at the end of the 19th century. So, I am inclined to assume that the male type specimen is from New Britain and that the species thus so far has not been recorded from the Solomons. During the Conservation International RAP of New Britain's Nakanai Mountains in 2009, *N. africana* was recorded as well.

The examination of specimens gathered from the author's two field trips to the Bismarck Archipelago in 1997 and 2009, has revealed further characters to distinguish *N. africana* from *N. salomonis* (Gassmann & Richards, *in prep.*). The latter species is considered widespread in northern and eastern New Guinea, New Britain and the Solomons (Lieftinck, 1949). Based on my findings, I doubt the occurrence of *N. salomonis* and *N. nigrofasciata* Lieftinck, 1932, in New Britain. It is possible that *N. salomonis* has been confused with the quite similar *N. africana* by researchers in the past.





The male specimen from New Ireland represents the first record of that species for New Ireland.



Figure 32. *Nososticta africana*, ♂, East New Britain.

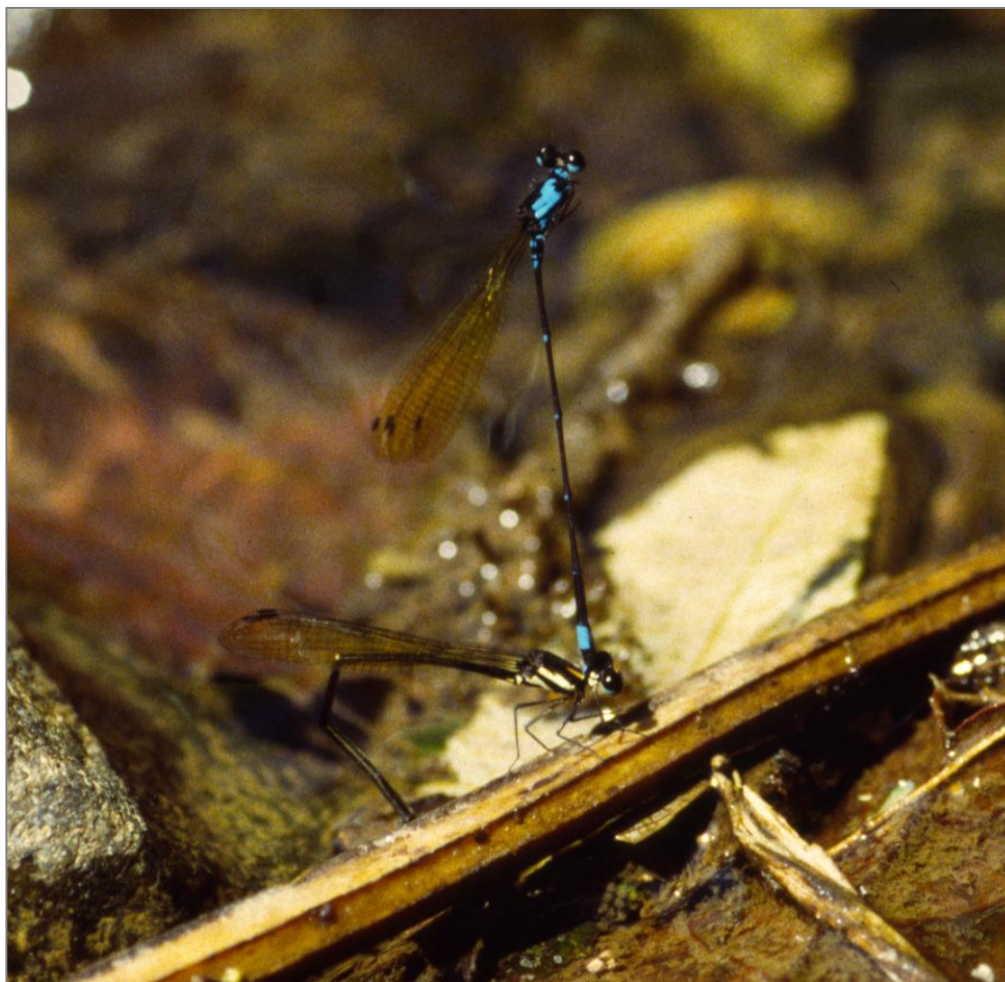


Figure 33. *Nososticta africana*, couple, ♀ ovipositing, East New Britain.

*Nososticta astrolabica* (Förster, 1898) [6], [8], [10], [13]

The six males are from localities in the Huon Peninsula (East coast, north to Finschhafen) and the southern foothills of the Saruwaged Range (Gobadik, north to Lae). The latter locality represents a considerable southern range extension with regard to the type locality (Astrolabe Bay) and the previous and present records from the east coast of the Huon Peninsula. These findings confirm that *N. astrolabica* may be considered endemic to the Adelbert, Finisterre and Saruwaged Mountain areas (Polhemus et al., 2004). The female of this species is still unknown.

*Nososticta callisphaena* (Lieftinck, 1937) [25]

The identification of the female specimen from Siholum Creek, Madang Province, is mainly based on the characteristic shape of the prothorax. The distribution of the species cannot longer be considered to be refined to the Northwest Papuan Coastal Lowlands Area of endemism (*sensu* Polhemus et al., 2004) in West Papua.

*Nososticta chalybeostoma* (Lieftinck, 1932) [25], [26]

The five males and two females from Madang Province mainly are from Siholum Creek near Ohu Village, west of Madang, and belong to the most eastern records of this species. Previously, it had been known from the Humboldt Bay area, the Cyclops and Torricelli Mountains as well as from one locality near Madang (Lieftinck, 1932; 1949).

*Nososticta commutata* (Lieftinck, 1938) [27], [29], [30], [34]

Previously known only from the Gazelle Peninsula of New Britain (Herbertshöhe = Kokopo; Ralum [between Rabaul and Kokopo]) and from Mioko island (Lieftinck, 1949b). The present collection from 1997 also includes three specimens from two localities in West New Britain Province (south to Willaumez and Hoskins Peninsulas, respectively). In the meantime, new records had become available also from the lower Nakanai Mountains and adjacent lowland areas at the south coast (Gassmann & Richards, 2011). Probably widespread in the lowlands and lower altitudes of the island.

*Nososticta erythrura erythrura* (Lieftinck, 1932) [24], [25] (Fig. 34)

The (sub)species had been known from Astrolabe Bay before. The present records are from near Ohu village, west of Madang. Other published records are from northern New Guinea, reaching westerly up to the Humboldt Bay area in West-Papua.





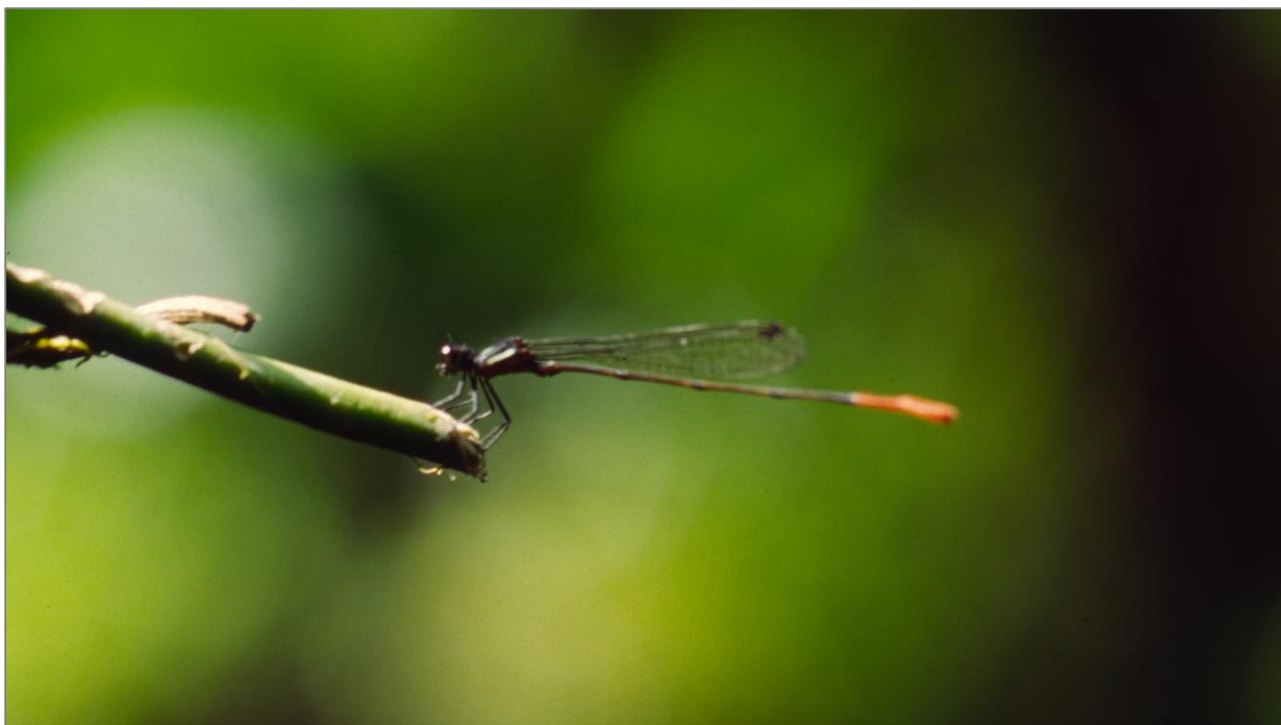


Figure 34. *Nososticta erythrura*, ♂, Siholum Creek, Madang Province.

*Nososticta ?melanoxantha* (Lieftinck, 1949) [4]

A single female specimen was collected near Gobari, Morobe Province. More specimens are needed to clarify the taxonomic status of the present specimen.

*Nososticta nigrofasciata* (Lieftinck, 1932) [2], [4], [6], [24], [25], [26]

This is a quite widespread species which has been known from the lower altitudes of (Central) North New Guinea in West-Papua as well as the Madang area in Papua New Guinea, from South (West) New Guinea and the Aru Islands, and from New Britain (Lieftinck, 1932; 1949). In New Britain, *N. nigrofasciata* had been recorded previously from just one locality: Tobera on the Gazelle Peninsula (Lieftinck, 1949b). I did not encounter this species during the two field trips in 1997 and 2009 to New Britain. The occurrence of this species on the island may be doubted, just as in the case of *N. salomonis* (Gassmann & Richards, 2011).

*Nososticta plagioxantha* (Lieftinck, 1932) [24], [25]

The two males from northern Madang Province represent the most eastern records of this species and the first from Papua New Guinea. Formerly, it was known only from the Jayapura area including the Cyclops Mountains (Lieftinck, 1932) and the northern central (Idenburg River basin: Lieftinck, 1949) and western central (Siewa and Logari River areas: Polhemus, 2000) parts of West-Papua, Indonesia. The species is probably confined to (but widespread in) northern New Guinea.

*Nososticta salomonis* (Lieftinck, 1938) [1], [8], [9], [10], [11], [12], [14], [18]

This is a species considered widespread in New Guinea, New Britain and the Solomons (Lieftinck, 1949a, 1949b). As stated in Gassmann & Richards (2011), and also for *N. nigrofasciata*, the occurrence of *N. salomonis* in New Britain is slightly suspect since no recent records from New Britain of this otherwise common species are known. The present records from mainland New Guinea extend the known distribution range of this species further into the northeast of the island.

*Nososticta* spec. [37]

The female blue-coloured specimen from New Ireland combines traits of *N. africana* and *N. commutata* and cannot be assigned to any of those species with certainty, possibly representing a new taxon. A careful revision of characters in the regional *Nososticta*, especially in the *N. africana/nigrofasciata/salomonis* complex, as well as the study of additional specimens from New Ireland, is needed.

**Platystictidae***Drepanosticta conica* (Martin, 1909) [8]

A single male specimen was collected at the Scarlet Beach area north to Finschhafen. Previous records of this species include the Astrolabe Range close to Port Moresby and the Milne Bay area (Lieftinck, 1938). The present record from the eastern tip of the Huon peninsula suggests that this species may be widespread in northeastern and eastern New Guinea.

**Larval specimens**

## Anisoptera spec. [25], [30]

The collection contains three anisopteran larval specimens, two in alcohol (Madang Province) and one exuvia (East New Britain).

**New taxa**

A couple of new taxa resulted from the 1997 trip. Two of them have been described in the meantime. The taxonomic status of the remaining critical specimen is subject to future study. The taxa concerned are listed below (see above for further information):

<i>Idiocnemis adelbertensis</i> Gassmann, 1999:	Adelbert Range, Madang Province
<i>Pseudagrion lorenzi</i> Gassmann, 2011:	New Britain
<i>Tetrathemis irregularis ?irregularis</i> spec.:	New Britain
<i>Nososticta</i> ?sp. nov.:	New Ireland





## New records

Several new records, along with some considerable range extensions, came up with the evaluation of the 1997 collections.

The known distribution area of *Pseudagrion silaceum* and *Tanymecosticta fissicollis* considerably extends into the east and now includes both Madang and Morobe Provinces. *Nososticta callisphaena* and *Teinobasis scintillans* are recorded from Madang Province for the first time, likewise *Agriocnemis aderces* and *Hemicordulia hilbrandi* for Morobe Province. *Brachydiplax duivenbodei* is a new species for New Britain (for further new New Britain records from the present collection see Gassmann & Richards [2011]). Seven species, *Agriocnemis femina*, *Brachydiplax duivenbodei*, *Mortonagrion martini*, *Nososticta africana*, *Rhyothemis resplendens*, *Xiphiagrion cyanomelas* and probably *Brachydiplax denticauda* are new records for New Ireland. Five species, *Agriocnemis aderces*, *Hemicordulia hilbrandi*, *Nososticta callisphaena*, *Nososticta plagiioxantha* and *Tanymecosticta fissicollis*, are recorded from Papua New Guinea for the first time.

The new records are summarized by the following table:

**Table 3: New records (province/island)**

Species	Madang Province	Morobe Province	New Britain	New Ireland	Papua New Guinea (state)
<i>Agriocnemis aderces</i>		x			x
<i>Agriocnemis femina</i>				x	
<i>Brachydiplax duivenbodei</i>			x	x	
<i>Brachydiplax denticauda</i>				(x)	
<i>Hemicordulia hilbrandi</i>		x			x
<i>Mortonagrion martini</i>				x	
<i>Nososticta africana</i>				x	
<i>Nososticta callisphaena</i>	x				x
<i>Nososticta plagiioxantha</i>					x
<i>Pseudagrion silaceum</i>	x	x			
<i>Rhyothemis resplendens</i>				x	
<i>Tanymecosticta fissicollis</i>	x	x			x
<i>Teinobasis scintillans</i>	x				
<i>Xiphiagrion cyanomelas</i>				x	

X = new record

## Discussion

The 1997 field trip resulted in considerable range extensions and new records of odonate species, even though the bulk of the new discoveries for the island of New Britain

had been published earlier based on another, more recent, expedition (Gassmann & Richards, 2011). The new distributional data and records for dragon- and damselflies recorded from the 1997 field trip, among them five new records for Papua New Guinea, and six to seven new records for New Ireland, demonstrate that although our knowledge on New Guinea Odonata diversity is progressing, distributional data of single species are still insufficiently known. It may be expected that increased research and collecting activities in the future will result, for instance, in more species from northern central and northern New Guinea having their known distribution ranges extended into the east (i.e. Papua New Guinea). This is because of biased collecting activities in the past. The respective West Papuan regions had, among others, been sampled by Mr. Stüber as well as during the Archbold Expeditions, and in comparison the northern New Guinea regions further to the east were sampled less systematically in the past.

Unfortunately, southern New Ireland could not be visited and studied during the present trip, but it may be considered a promising target for future research. The odonate fauna of the island is still poorly known, a fact that is demonstrated by several new records from that island from the 1997 trip. It appeared to the author that surface water is rare in New Ireland, but this may be different in the southern parts of the island. Beside that, the climate was very dry in New Ireland at the time of the trip, apparently due to the beginning of the 1997/1998 El Nino cycle. Certainly, the large and densely forested southern part of the island deserves further attention from odonatologists, as well as the remaining Bismarck islands, in particular the comparatively large islands New Hanover and Manus. Habitat associations and conservation aspects of some species are expected to be addressed in separate publications (Gassmann, *in prep.*).

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