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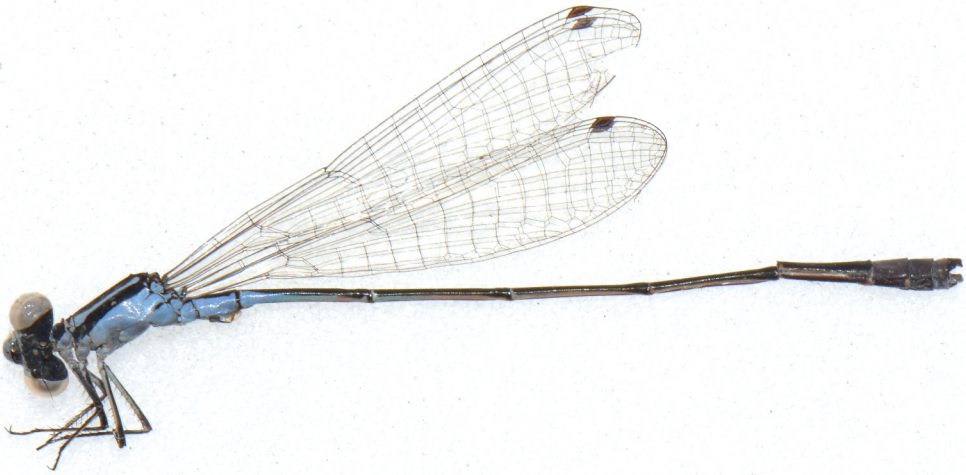

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**Survey of Odonata from Timor Island, with description of the female of *Anax georgius* (Odonata: Aeshnidae)**

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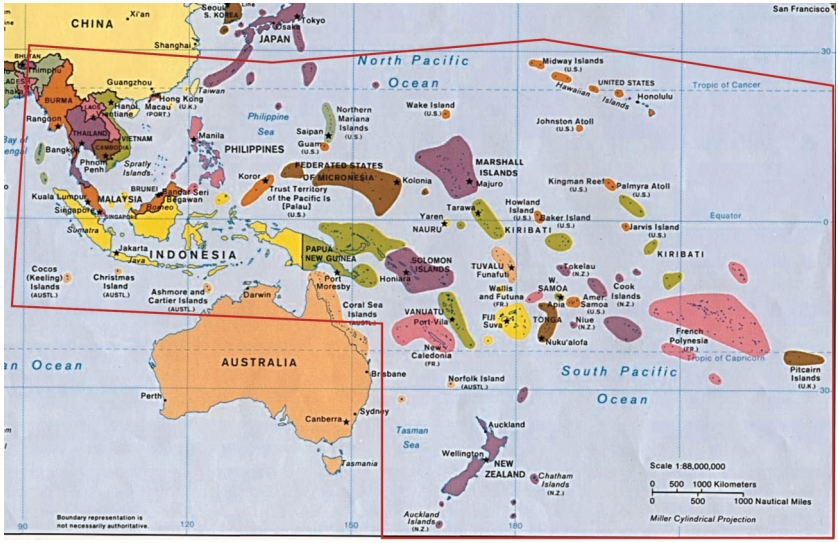



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# Survey of Odonata from Timor Island, with description of the female of *Anax georgius* (Odonata: Aeshnidae)

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## Abstract

The survey is based on specimens held at Museums in Australia, Belgium and Germany. Altogether 487 specimens of 31 species from Timor were examined. These include: a recent collection from Timor-Leste of 148 specimens (25 species) at the Australian Museum Sydney, an historic collection from West Timor consisting of 338 specimens (20 species) of the ex-collection Eugène Le Moult, stored at the Institut Royal des Sciences Naturelles de Belgique in Brussels, and a single specimen from West Timor of the Coll. Ris stored at the Senckenberg Naturmuseum Frankfurt, Germany. The following nine species are reported from Timor for the first time: *Agriocnemis pygmaea*, *Austroallagma sagittiferum*, *Ischnura heterosticta*, *Xiphiagrion cyanomelas*, *Crocothemis servilia*, *Neurothemis ramburii*, *Orthetrum pruinosum* cf. *schneideri*, *Potamarcha congener* and *Zyxomma obtusum*. The female of *Anax georgius* is described and illustrated. An illustrated key to the *Anax* species of the Lesser Sunda Islands is given and specimens from the Lesser Sunda Islands formerly identified as *Anax gibbosulus* are considered to be *Anax panybeus*. Some characters of the *Orthetrum pruinosum* taxa group of species, *Tramea stenoloba* and female *Zyxomma obtusum* are discussed. Figures of the male appendages and genital ligulae of *Austroallagma sagittiferum*, *Aciagrion fragile* and *Xiphiagrion cyanomelas* are provided, as well as figures of the male secondary genitalia, appendages and the penis of *Trithemis lilacina* and the male appendages of *Epophthalmia vittigera*. A preliminary checklist for Timor including 36 species is given.

**Key words:** dragonflies; damselflies; Lesser Sunda Islands; Eugène Le Moult; *Aciagrion fragile*; *Anax gibbosulus*; *Anax panybeus*; *Epophthalmia vittigera*; *Zyxomma multinervorum*; *Zyxomma obtusum*; *Orthetrum pruinosum*

## Introduction

The island of Timor is the largest (about 30460 km$^2$) and one of the easternmost of the Lesser Sunda Islands. It belongs to the southern part of the Wallacea region with the Australian mainland about 450 km southeast of Timor. Politically it is divided into the Indonesian West Timor (Timor Barat) and the eastern Democratic Republic of Timor-Leste.

The Odonata fauna is rather poorly known. Lieftinck (1936) was the first to list odonates known from Timor, recording 21 species. Lieftinck (1953) listed 25 species for Timor which still is a small number compared with the neighboring islands of Sumba and Flores from which respectively, 70 and 42 species are recorded. Veiga (1970) listed 28 species (based on literature) occurring in Timor-Leste and Polhemus & Helgen (2004) 25 species (Trainor 2010 cited this as 35 species by mistake). Generally most of the Odonata species known from Timor are Southeast Asian representatives, but some originate from Australia and reaching their north-western distribution boundary in the eastern Lesser Sunda Islands.

Three species are apparently endemic to Timor: *Indolestes lafaeci* Seehausen, 2017, *Nosoticta impercepta* Seehausen & Theischinger, 2017 and *Pseudagrion schmidtianum* Lieftinck, 1936. But Polhemus & Hagen (2004) claimed that *Pseudagrion schmidtianum* might be just a local variant of *Pseudagrion microcephalum* (Rambur, 1842).

*Rhinocypha pagenstecheri timorana* Lieftinck, 1936, *Pseudagrion pilidorsum deflexum* Lieftinck, 1936 and *Anax georgius* Selys, 1872 were described from Timorese material but their range is not restricted to Timor (Lieftinck 1953, Asahina 1990a, Polhemus & Helgen 2004).

## Material and methods

Altogether 487 specimens of 31 species from Timor were examined. These include: a recent collection from Timor-Leste of 148 specimens (25 species) at the Australian Museum Sydney, an historic collection from West Timor consisting of 338 specimens (20 species) of the ex-collection Eugène Le Moult (1882-1967), stored at the Institut Royal des Sciences Naturelles de Belgique in Brussels, and a single specimen from West Timor of the Coll. Ris stored at the Senckenberg Naturmuseum Frankfurt, Germany.

For further comparisons specimens of *Aciagrion fragile* (Tillyard, 1906), *Anax* spec. Leach, 1815, *Epophthalmia vittigera* (Rambur, 1842), *Orthetrum pruinosum* (Burmeister, 1839), *Zyxomma obtusum* Albarda, 1881 and *Zyxomma multinervorum* Carpenter, 1897 from different localities and held in several collections were studied.

Collections used:

AG – Private collection of André Günther, Germany

AMS – Australian Museum Sydney, Australia

ANIC – Australian National Insect Collection, Canberra, Australia

NMB – Naturhistorisches Museum Basel, Switzerland

IRSNB – Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium

OLML – Oberösterreichisches Landesmuseum, Biologiezentrum Linz, Austria

SMF – Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany

UMB – Überseemuseum Bremen, Germany

ZSM – Zoological State Collection Munich, Germany

Abbreviations used:

Fw = forewing; Hw = hindwing; Pt = pterostigma; Cu-a = cubito-anal cross vein; Ab = abdomen; S1, 2, 3 etc. = abdomen segment 1, 2, 3 etc.

Terminology used for wing venation follows Watson & O'Farrell (1991).

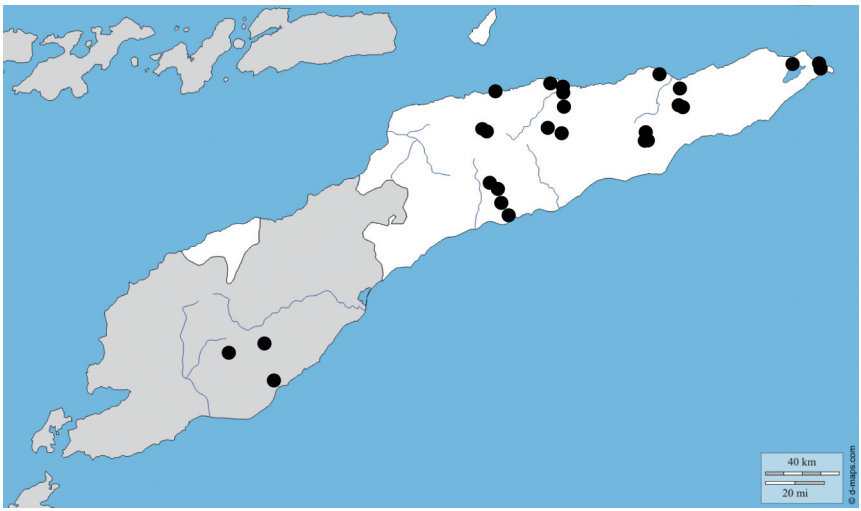


**Fig. 1. Map of Timor Island with collecting sites. http://d-maps.com/m/asia/timor/timor13.gif.**

**List of collecting sites and dates** (Fig. 1)

1. Kolbano, South Central Timor Regency, West Timor, Indonesia, 10.02° S, 124.53° E, iv-v.1929, ex- coll. Le Moult, IRSNB.
2. Soe, South Central Timor Regency, West Timor, Indonesia, 9.86° S, 124.28° E, (a) vi.1929, ex- coll. Le Moult, IRSNB; (b) 1929, SMF.
3. Niki-Niki, South Central Timor Regency, West Timor, Indonesia, 9.82° S, 124.47° E, (a) 1929, ex- coll. Le Moult, IRSNB; (b) 29-vi-1911, C.B. Haniel leg., Coll. Ris, SMF.
4. Fatukama, Municipality Dili, Timor-Leste, 8.52789° S, 125.63264° E, 15 m a.s.l., 22-v-2012, AMS.
5. Kablaki Hotel, Same, Municipality Manufahi, Timor-Leste, 8.999969° S, 125.648072° E, 490 m a.s.l., 25-v-2012, AMS.
6. Tutuala, communication tower, Municipality Lautém, Timor-Leste, 8.39903° S, 127.28394° E, 320 m a.s.l., 26-v-2012, AMS.
7. Belana, Municipality Manufahi, Timor-Leste, 9.16711° S, 125.71578° E, 20 m a.s.l., 26-v-2012, AMS.

8. Hatoudo, Municipality Ainaro, Timor-Leste, 8.98189° S, 125.62414° E, 735 m a.s.l., 27-v-2012, AMS.
9. Valu Sere Resort, opposite Jaco Island, Municipality Lautém, Timor-Leste, 8.40931° S, 127.29875° E, 5 m a.s.l., (a) 27-v-2012, AMS; (b) 28-v-2012, AMS.
10. 1 km N Daisna, Municipality Manufahi, Timor-Leste, 9.0644° S, 125.68233° E, 190 m a.s.l., 27-v-2012, AMS.
11. Kakaru, 1.7 km E Poros, Municipality Lautém, Timor-Leste, 8.4189° S, 127.12636° E, 330 m a.s.l., 27-v-2012, AMS.
12. Loi Huno, Municipality Viqueque, Timor-Leste, 8.78478° S, 126.3756° E, 260 m a.s.l., 29-v-2012, AMS.
13. Ossu, Municipality Viqueque, Timor-Leste, 8.74267° S, 126.38486° E, 660 m a.s.l., 29-v-2012, AMS.
14. Loi Huno, Municipality Viqueque, Timor-Leste, 8.77836° S, 126.37978° E, 280 m a.s.l., (a) 30-v-2012, AMS; (b) 31-v-2012, AMS.
15. 1.5 km N Lahae, Dili-Same Rd, Municipality Aileu, Timor-Leste, 8.78056° S, 125.59214° E, 1020 m a.s.l., 1-vi-2012, AMS.
16. Manufonihun river, 3.5 km S Aileu, Municipality Aileu, Timor-Leste, 8.7517° S, 125.56936° E, 920 m a.s.l., 1-vi-2012, AMS.
17. Spring, 3.8 km WNW Manatuto, Municipality Manatuto, Timor-Leste, 8.50847° S, 125.98292° E, 130 m a.s.l., (a) 2-vi-2012, AMS; (b) 5-vi-2012, AMS.
18. 4 km S of Laga, Municipality Baucau, Timor-Leste, 8.52028° S, 126.56086° E, 215 m a.s.l., (a) 2-vi-2012, AMS; (b) 5-vi-2012, AMS.
19. River x-ing, 12.6 km S Manatuto, Municipality Manatuto, Timor-Leste, 8.63047° S, 125.98936° E, 230 m a.s.l., (a) 3-vi-2012, AMS; (b) 4-vi-2012, AMS.
20. Gully 0.5 km NE Laclubar, Municipality Manatuto, Timor-Leste, 8.74647° S, 125.91497° E, 1030 m a.s.l., 3-vi-2012, AMS.
21. Quelicai, base of Mt. Matebian, Municipality Baucau, Timor-Leste, 8.60744° S, 126.56978° E, 880 m a.s.l., 3-vi-2012, AMS.
22. 1.8 km NW Quelicai, Municipality Baucau, Timor-Leste, 8.59358° S, 126.56403° E, 605 m a.s.l., 4-vi-2012, AMS.
23. 6.9 km E Laclubar, Municipality Manatuto, Timor-Leste, 8.74425° S, 125.97461° E, 1180 m a.s.l., 4-vi-2012, AMS.
24. Limestone boulders, 5.7 km S Manatuto, Municipality Manatuto, Timor-Leste, 8.56914° S, 125.99789° E, 100 m a.s.l., 4-vi-2012, AMS.
25. Gully nr. Ilimanu, Municipality Manatuto, Timor-Leste, 8.49383° S, 125.95481° E, 160 m a.s.l., 5-vi-2012, AMS.
26. Beach house near Baucau, Municipality Baucau, Timor-Leste, 8.4428° S, 126.46906° E, 10 m a.s.l., 5-vi-2012, AMS.

## List of collected species

CHLOROCYPHIDAE

*Rhinocypha pagenstecheri timorana* Lieftinck, 1936

(8) 1 ♂; (13) 3 ♂♂ 1 ♀; (14b) 1 ♂; (15) 1 ♀; (17b) 1 ♀.

LESTIDAE

*Indolestes lafaeci* Seehausen, 2017

(2a) 9 ♂♂ 3 ♀♀. Holotype male and paratypes.

PLATYCNEMIDIDAE

*Nososticta impercepta* Seehausen & Theischinger, 2017

(1) [lacking a date] 1 ♀; (2b) 1♂; (17b) 2 ♂♂. All are paratypes.

COENAGRIONIDAE

*Agriocnemis femina* (Brauer, 1868)

(1) [lacking a date] 1 ♀; (2a) 16 ♂♂ 7 ♀♀; (19b) 1 ♂.

*Agriocnemis pygmaea* (Rambur, 1842)

(9b) 3 ♂♂ 1 ♀; (22) 1 ♀.

*Austroallagma sagittiferum* (Lieftinck, 1949)

(1) [lacking a date] 1 ♂; (3b) 1 ♂.

*Ischnura heterosticta* (Burmeister, 1839)

(1) [lacking a date] 1 ♂; (6) 2 ♂♂ 1 ♀.

*Ischnura senegalensis* (Rambur, 1842)

(11) 1 ♂; (12) 1 ♀; (17a) 1 ♂ 1 ♀; (22) 2 ♀♀.

*Pseudagrion microcephalum* (Rambur, 1842)

(11) 1 ♂.

*Pseudagrion pilidorsum deflexum* Lieftinck, 1936

(1) [lacking a date] 2 ♂♂; (2a) 18 ♂♂ 9 ♀♀; (5) 2 ♂♂; (17b) 3 ♂♂; (20) 1 ♂.

*Xiphiagrion cyanomelas* Selys, 1876

(19b) 1 ♂.

AESHNIDAE

*Anax georgius* Selys, 1872

(1) [lacking a date] 1 ♀; (22) 1 ♂.

*Anax guttatus* (Burmeister, 1839)

(6) 1 ♂.

LIBELLULIDAE

*Camacinia gigantea* (Brauer, 1867)

(17b) 1 ♂.

*Crocothemis servilia* (Drury, 1773)

(1) 3 ♂♂ 5 ♀♀; (3a) 3 ♂♂ 2 ♀♀; (11) 5 ♂♂ 2 ♀♀; (17a) 1 ♂; (19b) 1 ♂.

*Diplacodes haematodes* (Burmeister, 1839)

(1) 1 ♂; (2a) 3 ♂♂ 1 ♀.

*Diplacodes trivialis* (Rambur, 1842)

(1) 1 ♂; (2a) 16 ♂♂ 6 ♀♀; (3a) 1 ♂ 2 ♀♀; (4) 2 ♂♂ 1 ♀; (7) 3 ♂♂ 5 ♀♀; (9a) 1 ♂; (11) 1 ♂ 2 ♀♀; (12) 2 ♀♀; (13) 1 ♂ 1 ♀; (14a) 2 ♀♀; (14b) 1 ♂; (16) 1 ♀; (17a) 2 ♂♂ 2 ♀♀; (18a) 1 ♀; (18b) 1 ♀; (21) 6 ♂♂ 2 ♀♀; (22) 2 ♂♂ 1 ♀; (23) 1 ♀; (26) 2 ♂♂ 1 ♀.

*Neurothemis ramburii* (Brauer, 1866)

(12) 3 ♂♂; (19a) 1 ♂; (19b) 1 ♀; (25) 1 ♂.

*Orthetrum caledonicum* (Brauer, 1865)

(2a) 1 ♀; (3a) 1 ♂.

*Orthetrum glaucum* (Brauer, 1865)

(2a) 5 ♂♂ 3 ♀♀; (15) 1 ♂.

*Orthetrum pruinosum* cf. *schneideri* Förster, 1903

(1) 1 ♀; (2a) 3 ♂♂.

*Orthetrum sabina* (Drury, 1773)

(1) 1 ♂ 2 ♀♀; (2a) 8 ♂♂ 8 ♀♀; (3a) 1 ♂; (11) 4 ♂♂ 2 ♀♀; (13) 1 ♂; (16) 2 ♂♂; (17a) 2 ♀♀; (19b) 1 ♂ 1 ♀; (25) 5 ♂♂ 3 ♀♀.

*Orthetrum testaceum* (Burmeister, 1839)

(1) 6 ♂♂ 7 ♀♀; (2a) 69 ♂♂ 18 ♀♀; (3a) 7 ♂♂ 2 ♀♀; (14b) 1 ♂; (17a) 1 ♂; (21) 1 ♂ 2 ♀♀; (22) 1 ♂.

*Pantala flavescens* (Fabricius, 1798)

(12) 1 ♀; (14b) 1 ♀; (22) 1 ♂ 1 ♀; (24) 2 ♂♂; (26) 5 ♂♂ 1 ♀.

*Potamarcha congener* (Rambur, 1842)

(17b) 2 ♂♂.

*Tramea stenoloba* (Watson, 1962)

(1) 2 ♀♀; (17b) 1 ♂.

*Tramea* spec. Hagen, 1861

(3a) 1 ♀ (last abdominal segments are missing).

Trithemis aurora (Burmeister, 1839)

(1) 4 ♂♂ 2 ♀♀; (3a) 1 ♂ 1 ♀; (10) 1 ♀.

*Trithemis festiva* (Rambur, 1842)

(1) 1 ♂ 4 ♀♀; (2a) 53 ♂♂ 6 ♀♀; (3a) 6 ♂♂; (10) 1 ♂; (12) 2 ♀♀; (17b) 2 ♂♂; (20) 1 ♀.

*Trithemis lilacina* Förster, 1899

(3a) 1 ♂; (17b) 2 ♂♂.

*Zyxomma obtusum* Albarda, 1881

(5) 1 ♀.

## Discussion

The occurrence in Timor of most species examined was previously reported by Lieftinck (1936, 1953). The following nine species are recorded from Timor for the first time: *Agriocnemis pygmaea*, *Austroallagma sagittiferum*, *Ischnura heterosticta*, *Xiphiagrion cyanomelas*, *Crocothemis servilia*, *Neurothemis ramburii*, *Orthetrum pruinosum* cf. *schneideri*, *Potamarcha congener* and *Zyxomma obtusum*. The occurrence of almost all of these species in Timor is not surprising since all are found on surrounding islands and some also on the Australian mainland.

Males of *Rhinocypha pagenstecheri timorana* (Fig. 2) have S9-10 black instead of only S10 as in the nominate subspecies (Lieftinck 1936). The yellowish colour of the abdomen of almost all specimens in the collection of the AMS indicates immaturity, only one female appears to be mature (Fig. 3). The overall sizes of these specimens are not distinctly smaller than that of the nominate subspecies.

**Fig. 2. *Rhinocypha pagenstecheri timorana* male, collected at Ossu, Timor-Leste (loc. 13; AMS). Photo: Malte Seehausen.**

**Fig. 3. *Rhinocypha pagenstecheri timorana* female, collected near Manatuto, Timor-Leste (loc. 17b; AMS). Photo: Malte Seehausen.**

*Agriocnemis pygmaea* is reported from Timor for the first time. But this widespread species is well known from several Sunda Islands and Australia (Lieftinck 1953, Theischinger & Hawking 2006). Whereas *Ischnura heterosticta* was not recorded from the Sunda Islands before and its discovery at Timor is a significant range extension. To date this species was known from Australia, Aru Island, New Guinea, Palau Island and eastwards towards Tonga (Ris 1913c, Paulson & Buden 2003, Theischinger & Hawking 2006, Marinov 2013, Kalkman & Orr 2013). All males (Fig. 4) as well as the androchromotype female (Fig. 5) have a reduced blue pattern at the antehumeral suture, a form described as *Ischnura torresiana* Tillyard, 1913. However, Watson (1976) showed that *Ischnura torresiana* is a junior synonym of *Ischnura heterosticta*.

**Fig. 4. *Ischnura heterosticta* male, collected at Kolbano, West Timor (loc. 1; IRSNB). Photo: Malte Seehausen.**

**Fig. 5. *Ischnura heterosticta* female, collected east of Tutuala, Timor-Leste (loc. 6; AMS). Photo: Malte Seehausen.**

*Pseudagrion pilidorsum deflexum* (Fig. 6) was described from Timor by Lieftinck (1936). It differs from the other subspecies (ssp. *pilidorsum* (Brauer, 1868) from the Philippines, ssp. *obscurum* Lieftinck (1936) from Nias Island, ssp. *declaratum* Lieftinck (1936) from Lombok, Sumbawa, Flores and Sumba) in details of the male anal appendages.

**Fig. 6: *Pseudagrion pilidorsum deflexum* male, collected at Same, Timor-Leste (loc. 5; AMS). Photo: Malte Seehausen.**

Lieftinck (1949) described *Aciagrion sagittiferum* from two males collected at Jamdena Island, the largest of the Tanimbar Islands east of Timor. Further material from Sumba was recorded by Lieftinck (1953); in this publication he transferred them to the new monospecific genus *Austroallagma* Lieftinck, 1953. Lieftinck (1953) claimed the absence of a well-developed internal fold in the genital ligula of *Austroallagma sagittiferum* but it is distinct in both males from Timor (Figs 7, 10a-b). However, perhaps he just overlooked it and the shape of the male genital ligulae as well as the appendages and the overall habitus of the Timorese specimens correspond with Lieftinck (1949, 1953). Timor lies in between both known ranges (Tanimbar Islands & Sumba) of *Austroallagma sagittiferum* and with the discovery of Timorese material their distributions are linked.

**Fig. 7. *Austroallagma sagittiferum* male, collected at Kolbano, West Timor (loc. 1; IRSNB). Photo: Malte Seehausen.**

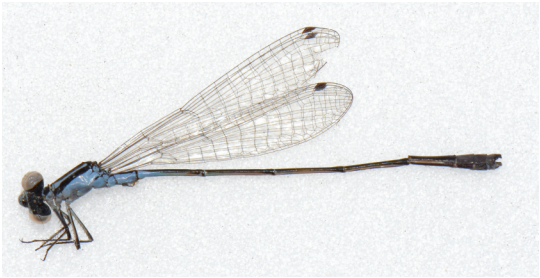

**Fig. 8. *Xiphiagrion cyanomelas* male, collected south of Manatuto, Timor-Leste (loc. 19b; AMS). Photo: Malte Seehausen.**

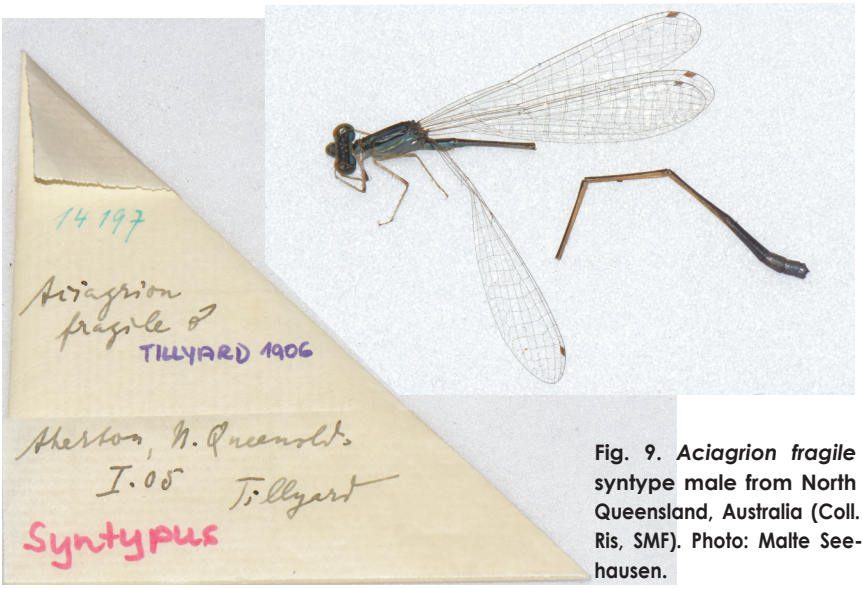


**Fig. 9. *Aciagrion fragile* syntype male from North Queensland, Australia (Coll. Ris, SMF). Photo: Malte Seehausen.**

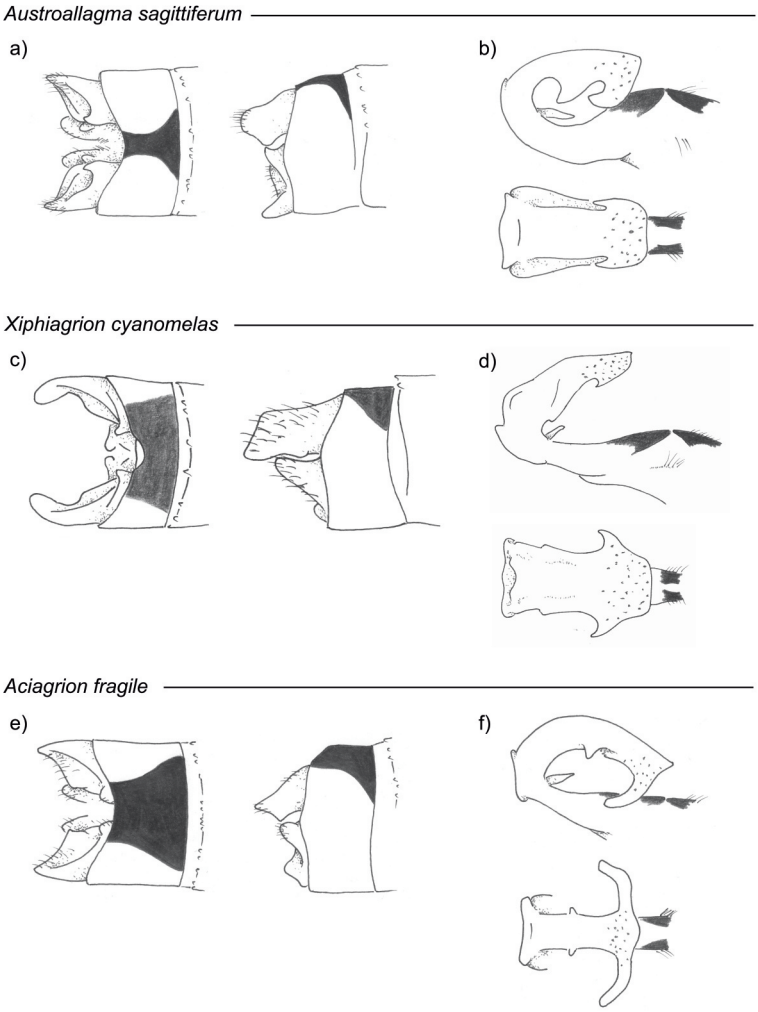


**Fig. 10. *Austroallagma sagittiferum* from West Timor, *Xiphiagrion cyanomelas* from Timor-Leste and *Aciagrion fragile* from North Queensland, Australia (syntype; deposited at Coll. Ris, SMF). Male appendages lateral and dorsal, genital ligulae lateral and ventral. Illustrations: Malte Seehausen.**

The genus *Xiphiagrion* Selys, 1876 is also considered to be monospecific and comes close to the genus *Aciagrion*. The most distinctive character to separate both genera appears to be the presence of postoccular spots in *Aciagrion* while they are absent in *Xiphiagrion*. *Xiphiagrion cyanomelas* was described from a pair from Maluku and it occurs from Sumatra to Borneo, Sulawesi, Palawan (Philippines) and the Maluku

Islands to New Guinea (Lieftinck 1949). From the southern Sunda Islands it is known from Java, Flores, Sumba and Wetar (Lieftinck 1953). Ris (1913c) and Lieftinck (1929, 1936, 1949) discussed the variability in the presence and the extent of the blue antehumeral stripe and also noted slight differences in the male appendages. The male from Timor-Leste (Fig. 8) has complete antehumeral stripes and agrees exactly with *Skiallagma braueri* Förster, 1906 figured and synonymized by Garrison (2012). The male genital ligula and appendages (Figs 10c-d) correspond with those of the syntype of *Skiallagma braueri*, as well as with the figures given by Lieftinck (1929) for specimens from Java. The cerci appear less bifid than they are illustrated for specimens from Borneo and the eastern range (cf. Ris 1913c, Lieftinck 1949, Garrison 2012). However, I studied the syntype male of *Xiphiagrion cyanomelas* at the Coll. Selys (IRSNB) and found the appendages only slightly bifid.

Lieftinck (1953) recorded the Australasian *Aciagrion fragile* (Tillyard, 1906) from Sumba, west of Timor. Thus I studied this species as well and examined a syntype male of *Aciagrion fragile* from North Queensland, Australia (Fig. 9; held in the Coll. Ris, SMF, No. 14197) as well as a male from west Sumba held at the NMB and compared them


**Fig. 11. *Anax georgius* holotype male from Timor (Coll. Selys, IRSNB). Photo: Malte Seehausen.**

**Fig. 12. *Anax georgius* holotype male from Timor. Painting by Severin (Ae3b, IRSNB).**

with *Austroallagma sagittiferum* and *Xiphiagrion cyanomelas*. I confirm the occurrence of *Aciagrion fragile* on Sumba Island and consider that Timor is very likely also within the range of this species and might well be recorded there in the future. The male appendages and genital ligulae of these three species are distinctly different (Figs 10a-f) and clearly separate them.

*Anax georgius* was described by Selys (1872) and for a long time it was uncertain whether the type male (Figs 11 & 12) originates from Natal (South Africa) or Timor. Since Watson & Theischinger (1987) found *Anax georgius* in Northwestern Australia and Asahina (1990a) recorded a male from Timor it was proven to be an Australasian species. The female has hitherto remained unknown (Theischinger & Endersby 2009) and is described in the following section. Lieftinck (1942) provided a descriptive key including all *Anax* species occurring on the Lesser Sunda Islands except for *Anax georgius*. The separation of *Anax gibbosulus* Rambur, 1842 and *Anax panybeus* Hagen, 1867 appears to have been especially difficult and some characters given by Lieftinck (1942) are misleading. Even Lieftinck was not always sure about the identity of some specimens from Sumatra, Borneo, Java and Bali, which were listed as *Anax*

*gibbosulus* ssp. by Lieftinck (1942) but subsequently he considered them to be *Anax panybeus* ssp. (Lieftinck 1953). For comparisons I studied several specimens of *Anax* and found, that there is more variation in size than Lieftinck (1942) stated. My studies reveal that specimens from the Sunda Islands and Maluku formerly identified as *Anax gibbosulus* correspond better with *Anax panybeus*. Thus I generated a preliminary key to the regional *Anax* species with remarks on characters (see section following the description of the female *Anax georgius*).

*Crocothemis servilia* as well as *Potamarcha congener* are well known and widespread species in Southeast Asia and *Potamarcha congener* also occurs in Australia (Theischinger & Hawking 2006). Lieftinck (1953) listed the occurrence of both species for all the larger islands of the Lesser Sunda Islands except Timor. So the recent records are the first for Timor but are not surprising.

The Timorese males of *Neurothemis ramburii* have wing coloration with slightly irregular hind margins (Fig. 13) as found by Seehausen & Dow (2016) in some specimens from the Philippine Islands of Marinduque and Luzon, as well as from Bali (cf. Seehausen & Dow 2016, page 14, fig. 15f). The reason for the development of this conspicuous variation remains unknown. The specimens from Timor were collected in May and June, those from Bali in August and from Marinduque in January and February, all at altitudes from 160-300 m, suggesting season and altitude are unimportant. The isochrome female from Timor (Fig. 14) has a wing coloration to around the midway between the nodus and the Pt, resembling fig. 21d of Seehausen & Dow (2016, page 20).

**Fig. 13. *Neurothemis ramburii* male, collected south of Manatuto, Timor-Leste (loc. 19a; AMS). Photo: Malte Seehausen.**

**Fig. 14. *Neurothemis ramburii* female, collected south of Manatuto, Timor-Leste (loc. 19a; AMS). Photo: Malte Seehausen.**

There are five recognised subspecies of *Orthetrum pruinosum* (Burmeister, 1839). Beside the nominate subspecies these are *O. p. neglectum* (Rambur, 1842), *O. p. clelia* (Selys, 1878), *O. p. schneideri* (Förster, 1903) and *O. p. migratum* Lieftinck, 1951. The Australian *O. p. migratum* is now considered a separate species (Hawking 2009); it has no pruinescence on the abdomen, a lighter Pt as well as reddish veins on the basal and costal area of the wings (Lieftinck 1951). Ris (1909b) considered *O. p. schneideri* to be a junior synonym of *O. p. clelia* but subsequently Ris (1927) listed ssp. *schneideri* for Sumatra. However, according to Ris (1909b) the main differences between the subspecies of *O. pruinosum* are the colour of the face (pale in the nominate subspecies and ssp. *neglectum*, dark in ssp. *clelia*), the colour and extent of the wing base pattern (yellow-brown and not reaching Cu-a in the nominate subspecies, golden-brown and reaching to or beyond Cu-a in ssp. *neglectum*, dark brownish-black and reaching to or beyond Cu-a in ssp. *clelia*) as well as the colour of S10 and the appendages (red in the nominate subspecies and ssp. *neglectum*, blackish in ssp. *clelia*). The Timorese males of *O. pruinosum* (Fig. 15) have S1-3 of the abdomen with bluish pruinescence, S10 black as well as a dark brown wing base reaching beyond Cu-a in the hindwing. Ris (1909b) and Lieftinck (1953) recorded the occurrence of the nominate subspecies from Sumatra and Java to Sumbawa Island and Flores (no records are mentioned for Sumba Island). Thus it is strange that the Timorese specimens do not correspond with the nominate subspecies of *O. pruinosum*. The ssp. *clelia* was described from Sulawesi and is known to occur in the Philippines, Taiwan and the North Maluku Island of Batjan as well (Ris 1909b, Asahina 1977, Sharma 2010, Michalski 2012). Sharma (2010) stated that the ssp. *schneideri*, known from the Peninsular Malaysia, Sumatra and Borneo, is considered to be likely a junior synonym of ssp. *clelia*. I studied three males of ssp. *schneideri* from Sumatra and Borneo as well as 28 males of ssp. *clelia* from Sulawesi and the Philippines held at the Coll. Ris (SMF), and found the main difference to be in the bluish pruinescence on S3 in ssp.

**Fig. 15. *Orthetrum pruinosum* cf. *schneideri* male, collected at Soe, West Timor (loc. 2a; IRSNB). Photo: Malte Seehausen.**

*schneideri* whereas it is lacking in ssp. *clelia*. This was also described for the type male of ssp. *schneideri* by Förster (1903). Because the Timorese *O. pruinosum* have bluish pruinescence on S3, they are assigned to ssp. *schneideri*. Timor is far away from the main range of ssp. *schneideri*, and even if this subspecies will turn out to be a junior synonym of ssp. *clelia* it appears to be a rather odd distribution pattern. However, I consider that further studies are needed to check the variants and the classification of the *O. pruinosum* taxa group of species. For instance Yong et al. (2014) revealed distinct genetic lineages between ssp. *schneideri* from Peninsula Malaysia and Borneo and ssp. *neglectum* from Japan and China.

**Fig. 16. *Tramea stenoloba* male, collected near Manatuto, Timor-Leste (loc. 17b; AMS). Photo: Malte Seehausen.**

Since the establishment of *Tramea stenoloba* (Watson, 1962), the former record of *Tramea limbata* (Desjardins, 1832) from Timor by Ris (1913b) and listed by Lieftinck (1936) as *Tramea limbata eurybia* (Selys, 1878) may be regarded as referring to this species. The male (Fig. 16) and both females from Timor correspond in almost all characters with those of *Tramea stenoloba* given by Watson (1967). The male hamulus is long and narrow, about 2.2 mm long. The female vulvar scale reaching to beyond S9 (but not as long as in *Tramea rosenbergi* Brauer, 1866) and is divergent to posterior, the whole face is pale yellow-ochre except for a black lower edge of the labrum and a black basal bar on the dorsal frons. However some characters of Timorese specimens do not full agree with Watson's (1962, 1967) description. These include black stripes along the metapleural suture, interpleural suture, meso-katepisternum and fossae on the synthorax resembling those of *Tramea loewii* (Brauer, 1866) as illustrated by Theischinger & Hawking (2006). Also the colour patch on the hind wing of Timorese specimens reaches only to the base of the triangle as

it is illustrated for *Tramea loewii* by Theischinger & Hawking (2006) whereas Watson (1967) illustrated it as reaching at least the middle of the triangle in *Tramea stenoloba*. However, I have seen further specimens of *Tramea stenoloba* from Australia and Indonesia with coloration of the hindwing reaching only to the base of the triangles, thus it is simply more variable than it was originally illustrated. *Tramea loewii* differs from *Tramea stenoloba* by a shorter genital hamulus of the male and a shorter vulvar scale not reaching the end of S9 in the female (Lieftinck 1942, Theischinger & Hawking 2006). One female held at IRSNB lacking the last segments of the abdomen is probably also *Tramea stenoloba*, but is listed as unidentified here.

**Fig. 17. *Trithemis lilacina* male, collected at Niki-Niki, West Timor (loc. 3a; IRSNB). Photo: Malte Seehausen.**

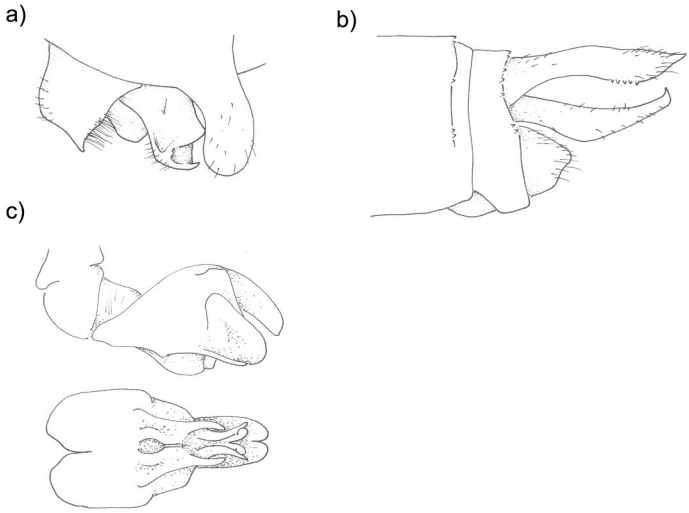


**Fig. 18. *Trithemis lilacina* from Timor. Male secondary genitalia lateral, appendages lateral, last segments of the penis lateral and ventral. Illustrations: Malte Seehausen.**

*Trithemis lilacina* is apparently endemic to the Lesser Sunda Islands (Lieftinck 1936). The three males from Timor appear to be immature post-tenerals with the abdomen yellowish rather than red-violet. Only S10 of the abdomen is black (Fig. 17) instead of S9-10 as described by Förster (1899) and Ris (1912) for material from the islands of Sumbawa, Sumba, Lombok, Flores and Pantar. The secondary genitalia of the Timorese males correspond with the illustration of Ris (1912) and the superior appendages bear 5-6 teeth. The secondary genitalia of *Trithemis festiva* are similar, but the terminal segments of the penes of both species are distinctly different (Figs 18a-c; cf. Pinhey 1970, page 114, fig. 44).


**Fig. 19. *Zyxomma obtusum* female, collected at Same, Timor-Leste (loc. 5; AMS). Photo: Australian Museum.**

Ris (1913a) stated that the differences between *Zyxomma obtusum* and *Zyxomma multinervorum* Carpenter, 1897 are slight, especially in the females. *Zyxomma obtusum* ranges from Singapore to the Sunda Islands, the Philippines and Japan (Ris 1913a, Ris 1927, Lieftinck 1953, Okudaira et al. 2001, Ngoi et al. 2011) whereas *Zyxomma multinervorum* occurs at Seram Island, Aru Island, New Guinea and northern Queensland in Australia (Ris 1913a, Theischinger & Hawking 2006, Orr & Kalkman 2015). Records of *Zyxomma obtusum* from the Lesser Sunda Islands are available from Bali, Lombok, Flores and Sumba (Lieftinck 1953). Thus the female from Timor-Leste (Fig. 19) was collected within the known range of *Zyxomma obtusum*, but identification needs to be based on morphological characters. Therefore I compared six females of *Zyxomma obtusum* from Sumatra (Indonesia), Simalur Island (Indonesia), North Sulawesi (Indonesia) and Mindoro Island (Philippines) held at the Coll. Ris (SMF) and two females of *Zyxomma multinervorum* from Seram Island (Indonesia; held at Coll. Ris, SMF and Coll. Selys, IRSNB) and one from Aru Island (Indonesia; held at the Coll. Ris, SMF). Ris

(1913a) gives the following characters to separate both species: *Zyxomma multinervorum* has the hindwings slightly more slender, a parallel margin of the more slender abdomen with S4 more constricted while *Zyxomma obtusum* has slightly broader hindwings, the slightly broader abdomen spindle shaped and S4 less constricted. However, these characters are poorly developed in the females and fail to separate the species at least in dried specimens. The brownish coloured wing apices, wing bases and costal area are variable in both species, but it appears that the brown area of the costal field usually reaches to proximal of the nodus in *Zyxomma obtusum* and distal of the nodus in *Zyxomma multinervorum*. One female of *Zyxomma obtusum* has supplementary bridge veins and there are females of *Zyxomma multinervorum* without them, so this character also is not useful for separation of both species. A consistent difference appears to be the slightly denser wing venation of *Zyxomma multinervorum*, although there is a range of overlap as well. The nodal index of *Zyxomma obtusum* is 10.5-13.5 (Fw)/7-10 (Hw) antenodals and 7-10/8-11 postnodals whereas *Zyxomma multinervorum* has 11.5-15.5/9-10 antenodals and 9-11/11-13 postnodals. With 11.5-12.5/7-8 antenodals and 7-8/9 postnodals the female from Timor-Leste corresponds with *Zyxomma obtusum* although the brown costal pattern reaches to distal of the nodus. However, records of males from Timor may be useful to verify the identification in the future.

In conclusion I add some species which may be found at Timor in the future because their known range includes some Lesser Sunda Islands and Australia or the Maluku Islands as well. These are *Lestes concinnus* Hagen, 1862, *Aciagrion fragile*, *Argiocnemis rubescens* Selys, 1877, *Ischnura aurora* (Brauer, 1865), *Anaciaeschna jaspidea* (Burmeister, 1839), *Anax papuensis* (Burmeister, 1839), *Hemicordulia australiae* (Rambur, 1842), *Agrionoptera insignis* (Rambur, 1842), *Brachydiplax duivenbodei* (Brauer, 1866), *Lathrecista asiatica* (Fabricius, 1798), *Rhodothemis nigripes* Lohmann, 1984, *Tholymis tillarga* (Fabricius, 1798) and *Urothemis signata* Rambur, 1842. Of course this is only a short proposal and it appears likely that there are more new records, and possibly new species from Timor awaiting discovery.

**Fig. 20. *Anax georgius* female, collected at Kolbano, West Timor (loc. 1; IRSNB). Photo: Malte Seehausen**

**Description of the female *Anax georgius***

Figures: 20 (lateral view of female from Kolbano, IRSNB, with labels), 22e (frons dorsal), 22f (abdomen dorsal), 23f (right cercus dorsal).

Material examined: 1 ♀, Kolbano [South Central Timor Regency], West Timor, Indonesia, ex.-Coll. Le Moult (IRSNB). 1 ♀, vi.1935, Niki-Niki [South Central Timor Regency], West Timor, Indonesia (NMB; via photos).

Head: Labium, clypeus and frons yellow-ocher; labrum yellow-ocher with anterior border brownish; black T-mark on top of frons, vertical stripe of T-mark thin; next to the T-mark a darker spot on each side (likely bluish when alive); occipital triangle brownish.

Thorax: Synthorax ocher (colour when alive perhaps greenish as in the males?); ventral border of mesepimeron and metepimeron tinted darker greyish-brown; all femora brown on basal two-thirds, then turn into blackish; tibiae and tarsi black; spines black.

Abdomen: colour of pale area when alive not to interpret; S1-2 pale with dark transverse dorsal bands at carina and before posterior margin; S3 brownish, dark band dorsally and pair of pale spots posteriorly; S4-7 brown with anterior margin diffusely pale, a pair of pale spots posteriorly, in one female additionally a pair of small pale spots around the anterior third; S8-10 dark brown-blackish without distinct pale markings; supplementary longitudinal ridge on S5-9; cerci brown, leaf-like with tips rounded.

Wings: hyaline; both wings tinted with yellow; one female has the wings almost completely colored, the other with yellow pattern from distal end of the triangle to beyond nodus and the subcostal area of both wings to the level of Pt; Pt brown.

Measurements (only the female from Kolbano, IRSNB): total length 86 mm, Ab length (without appendages) 63 mm, Fw length 55.5 mm, Hw length 54.5 mm, length of Pt of Fw 4.3 mm, cercus length 5.3 mm and width 1.5 mm, ratio of cercus length/width = 3.5:1.

## Remarks on the genus *Anax* and a preliminary key to species of the Lesser Sunda Islands

The key is based on characters given by Hagen (1867), Tillyard (1916), Kennedy (1934), Lieftinck (1942), Theischinger & Endersby (2009), Orr & Kalkman (2015) and my own studies. Generally I suggest a review of this genus is needed including study of all type specimens to verify the taxonomic classification and establish distinguishing characters.

Additionally to *Anax georgius* from Timor (n = 2 ♂♂ 2 ♀♀; held at AMS, IRSNB and NMB) I studied the following species:

*Anax fumosus celebense* Lieftinck, 1942 – Sulawesi (n = 4 ♂♂ 2 ♀♀; held at AG and SMF).

*Anax gibbosulus* – Australia (via photos, n = 15 ♂♂ 7 ♀♀; held at AMS and ANIC).

*Anax guttatus* – Aru Island (n = 1 ♂; held at SMF); Australia (via photos, n = 1 ♂ 5

♀♀; held at AMS and ZSM); China (n = 4 ♀; held at SMF); Java (n = 7 ♂♂ 7 ♀♀; held at SMF and ZSM); Philippines (n = 1 ♀; held at SMF); Seychelles (n = 2 ♂♂; held at SMF); Sulawesi (n = 2 ♂♂; held at SMF); Sumatra (n = 1 ♀; held at SMF); Sumbawa (n = 2 ♂♂; held at SMF); Taiwan (n = 1 ♂ 2 ♀♀; held at SMF); Timor-Leste (via photos, n = 1 ♂; held at AMS).

*Anax panybeus* – Aru (n = 1 ♂ 1 ♀; held at SMF); Java (n = 2 ♂♂ 2 ♀♀; held at SMF and ZSM); Lombok (n = 2 ♂♂ 6 ♀♀; held at SMF); Malaysia (n = 1 ♂; held at ZSM); Seram (n = 2 ♂♂; held at SMF); Sulawesi (n = 1 ♀; held at ZSM), Sumatra (n = 2 ♂♂ 1 ♀; held at SMF and ZSM); Sumba (n = 4 ♂♂ 1 ♀; held at SMF and ZSM).

*Anax papuensis* (Burmeister, 1839) – Australia (n = 26 ♂♂ 9 ♀♀; held at OLML, SMF and UMB).

*Anax fumosus celebense* was studied because Sulawesi is the terra typica of *Anax panybeus* as well. Lieftinck (1942) stated that the T-mark on the frons is much broader in *Anax fumosus* than in *Anax panybeus*. But I found specimens of *Anax panybeus* from the Sunda Islands with the T-mark on the frons similarly developed as in *Anax fumosus celebense* and also specimens of *Anax panybeus* from Japan as shown by Okudaira et al. (2001) and Ozono et al. (2011) have a broad T-mark. The same was found in photos of living individuals studied from several localities, thus I consider this character as of doubtful value for separating *Anax fumosus celebense* from *Anax panybeus*. The male cerci of *Anax fumosus celebense* examined have a length of 6.2-6.5 mm, a ratio of length/width = 3.4-3.9 and are similar to those of *Anax panybeus*. Hagen (1867) described the cerci of the holotype male of the nominate subspecies of *Anax fumosus* from Ternate as 5.5 mm long and the pattern on the abdomen as having two pale spots on the middle segments whereas Lieftinck (1942) recorded three pale spots on the middle segments for ssp. *fumosus celebense*. Further characters of male *Anax fumosus celebense* are a shorter abdomen with a ratio of Ab length/Hw length usually < 1.3 and the wings tinged yellow-brown whereas the ratio of Ab length /Hw length usually is around 1.3-1.4 in *Anax panybeus* and the wings are usually hyaline with just a yellow patch in Hw (in some specimens also in Fw). According to Lieftinck (1942) the female cerci of *Anax fumosus celebense* have a length of 4.0-4.3 mm, and I confirm this from both females examined. Thus the female cerci are shorter than in *Anax panybeus* and almost correspond with the length found in *Anax guttatus*.

The separation of *Anax gibbosulus* and *Anax panybeus* often causes problems and some characters noted by Lieftinck (1942) do not assist identification. He suggested length of abdomen (incl. appendages) as a reliable way of separating *Anax gibbosulus* and *Anax panybeus* (*Anax gibbosulus* ♂ 70-84 mm, ♀ 59-68 mm; *Anax panybeus* ♂ rarely exceeding 70 mm, ♀ not exceeding 59.5 mm). This is erroneous because all *Anax gibbosulus* studied from Australia (terra typica) have an abdomen (incl. appendages) ≤ 70 mm in length which corresponds with sizes given by Tillyard (1916). Neither the presence of dark latero-ventral streaks at the base of meso- and metepimeron of the synthorax in *Anax panybeus* nor the unicolourous labrum in *Anax panybeus* compared to a labrum bearing a black distal margin in *Anax gibbosulus* appear to be reliable characters. The pale pattern of the abdomen is variable. It seems as if

*Anax gibbosulus* and *Anax guttatus* almost always have three pale spots at least on S4-5, but there are also a few specimens of *Anax gibbosulus* bearing only two spots and some *Anax panybeus* bearing three spots (especially males examined from Malaysia, Sumatra and Java, as well as the female from Sulawesi and a female from Java; figs. 21l, 22k). Usually the pale abdominal spots in *Anax panybeus* appear smaller but there are also specimens bearing large spots (Figs. 21j-k; Watson & Theischinger 1987 also found this character variable in *Anax georgius*). Thus neither the number nor size of the pale spots on S4-5 appears reliable for the general separation of *Anax gibbosulus* and *Anax panybeus*. The size of the Pt is also of no use for separating the species because of a large range of overlap, although it appears as if *Anax gibbosulus* could have a slightly larger Pt than *Anax panybeus* (especially evident in the females).

The length of the male and female cerci of *Anax gibbosulus* and *Anax panybeus* is not useful for identification, but the shape of the male cerci is slightly different as already discussed by Lieftinck (1942) and also visible in the illustration of the holotype male of *Anax panybeus* given by Kennedy (1934). The different ratio of the length/width of the male cercus in the two species is clearly discernable due to the slightly broader cercus of *Anax gibbosulus*.

**1** Transverse carina on the abdomen lacking in males and presented only on S7-9 in females; abdomen with broadly pale mid-dorsal pattern on S4-6; S9 pale, usually with dark mid-dorsal stripe. Figs 21a-b, 22a-b, 23a-b. Lesser Sunda Islands, New Guinea, Australia, New Caledonia, New Zealand. ***Anax papuensis***

Transverse carina on the abdomen presented on S7-9 in males and on S4-9 or S5-9 in females; abdomen lacking a pale mid-dorsal pattern; S9 black with pale spots present or lacking. Figs 21c-l, 22c-k, 23c-j. → **2**

**2** males → **3**

females → ***6***

**3** Top of frons without T-shaped mark; abdomen comparatively short, usually ratio of Ab length/Hw length = < 1.3; cerci length 5.7-6.3 mm, ratio cercus length /width = 3.8-4.5. Figs 21c-d, 23c. Widespread in SE Asia, New Guinea, Australia, Pacific Ocean Islands and Japan. ***Anax guttatus***

Top of frons with T-shaped mark; abdomen long and slender, usually ratio of Ab length/Hw length = > 1.3. Figs 21e-l, 23e, g, i. → **4**

4 Cerci with rounded apex; epiproct longer than half of cerci; pale spots on S9 small or lacking. Figs 21e-f, 23e. Timor, North Australia. ***Anax georgius***

Cerci with pointed apex; epiproct shorter than half of cerci; pale spots on S9 usually broad. Figs 21g-l, 23g, i. → ***5***

5 Inner margin of cerci broad, base not distinctly slender, length 6.1-6.9 mm, ratio cercus length/width = 3.0-3.4; vertical stripe of T-mark on top of frons thin (at most the width of the anterior horizontal mark but usually thinner); Pt 4.6-5.1 mm. Figs 21g-h, 23g. Australia, New Guinea, [? Lesser Sunda Islands]. ***Anax gibbosulus***

Inner margin of cerci less broadened, base more slender, length 6.0-7.0 mm, ratio cercus length/width = 3.3-4.0; vertical stripe of T-mark on top of frons broad (at least the width of the anterior horizontal mark but could be broadened up to twice of it); Pt 4.5-5.5 mm. Figs 21i-l, 23i. Widespread from Myanmar to China, Sunda Islands, Maluku Islands, Philippines, Taiwan to Japan. ***Anax panybeus***

6 Top of frons without T-shaped mark; cerci length 3.5-4.4 mm (≤ S9-10, around as long as width of S9), ratio cercus length/width = 2.6-3.4. Figs 22c-d, 23d. Widespread in SE Asia, New Guinea, Australia, Pacific Ocean Islands and Japan. ***Anax guttatus***

Top of frons with T-shaped mark; cerci length 4.8-5.8 mm (≥ length of S9-10, longer than width of S9), ratio cercus length/width = 2.8-3.5. Figs 22e-k, 23f, h, j. → **7**

7 Distinct pale spots on S8-9 absent in both females; cerci length 5.3 mm (> length of S9-10, slightly longer than the distance between the intersegmental suture of S8 and end of S10), ratio cercus length/width = 3.5; Pt 4.3 mm. Figs 22e-f, 23f. Timor, North Australia. ***Anax georgius***

Distinct and usually broad pale spots on S8-9; cerci length 4.5-5.8 mm (≥ length of S9-10, about as long as the distance between intersegmental suture of S8 and end of S10), ratio cercus length/width = 2.8-3.4. Figs 22g-k, 23h, j. → **8**

8 Vertical stripe of T-mark on top of frons thin (at most the width of the anterior horizontal mark but usually thinner); cerci length 4.6-6.1 mm, ratio cercus length /width = 2.9-3.4; Pt 4.8-5.8 mm. Figs 22g-h, 23h. Australia, New Guinea, [? Lesser Sunda Islands]. ***Anax gibbosulus***

Vertical stripe of T-mark on top of frons broad (at least the width of the anterior horizontal mark but could be broadened up to twice of it); cerci length 4.5-5.3 mm, ratio cercus length/width = 2.8-3.4; Pt 4.2-5.1 mm. Figs 22i-k, 23j. Widespread from Myanmar to China, Sunda Islands, Maluku Islands, Philippines, Taiwan to Japan. ***Anax panybeus***

**Updated checklist of Timor Island**

The checklist is based upon available literature and new data provided in this paper. Currently 36 species of Odonata are known from Timor.

Selys (1854, 1897) claimed *Neurobasis chinensis* was present in Timor. Lieftinck (1936) considered that the locality might be wrong, although he supposed the occurrence at Timor as not unlikely. During my studies at IRSNB I was unable to find the appropriate specimen in the Coll. Selys. *Neurobasis chinensis* is distributed to Sumatra in the south and *Neurobasis florida* (former considered a subspecies of *Neurobasis chinensis*) is endemic to Java (Orr & Hämäläinen 2007). Thus the record from Timor is most certainly erroneous and likewise Polhemus & Helgen (2004) and Dow (2009) do not list *Neurobasis chinensis* for Timor.

The records of *Lestes praemorsus* Hagen in Selys, 1892 and *Ceriagrion erubescens* Selys, 1891 [currently considered a junior synonym of *Ceriagrion aeruginosum* (Brauer,

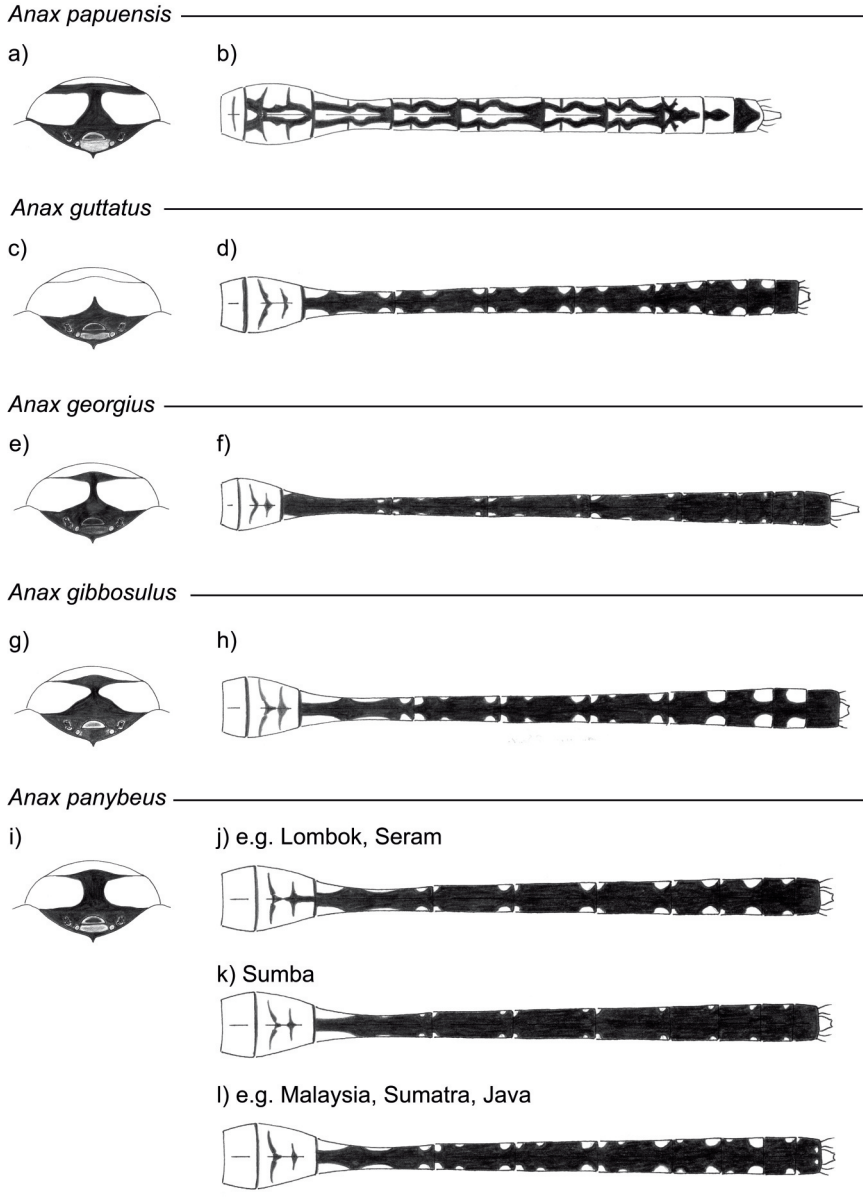


**Fig. 21: *Anax* species, male frons and abdomen dorsal. (a-b) *Anax papuensis*; (c-d) *Anax guttatus*; (e-f) *Anax georgius*; (g-h) *Anax gibbosulus*; (i-l) *Anax panybeus*. Illustrations: Malte Seehausen.**

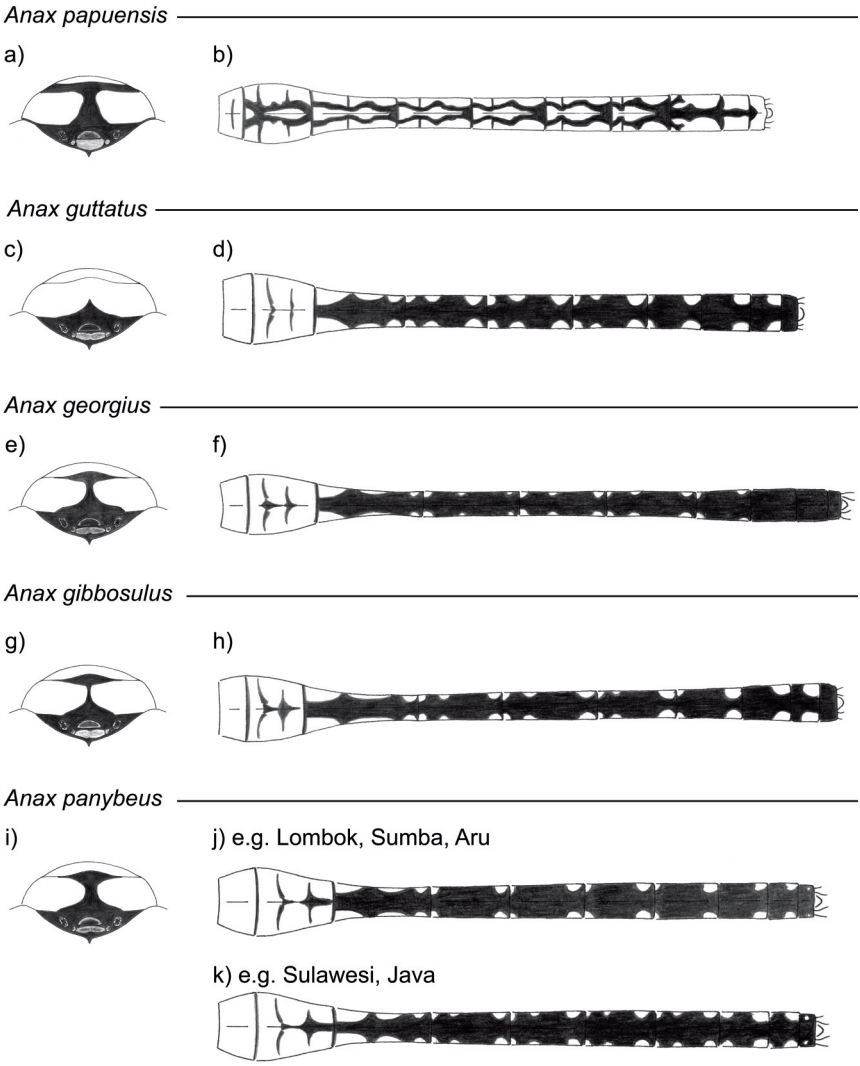


**Fig. 22: *Anax* species, female frons and abdomen dorsal. (a-b) *Anax papuensis*; (c-d) *Anax guttatus*; (e-f) *Anax georgius*; (g-h) *Anax gibbosulus*; (i-k) *Anax panybeus*. Illustrations: Malte Seehausen.**

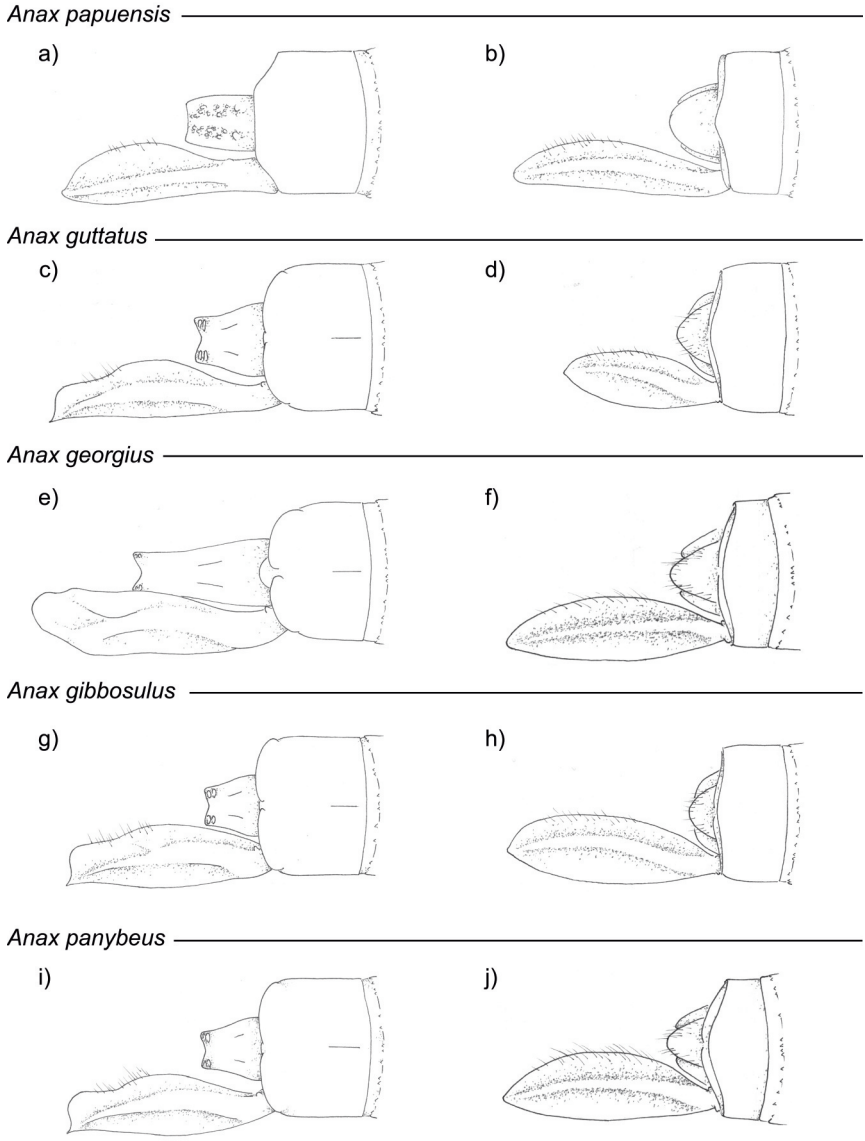


**Fig. 23: *Anax* species, right cercus of male and female dorsal. (a-b) *Anax papuensis*; (c-d) Anax guttatus; (e-f) *Anax georgius*; (g-h) Anax gibbosulus; (i-j) *Anax panybeus*. Illustrations: Malte Seehausen.**

1869)] are based on larvae (Lieftinck 1936). Subsequently Lieftinck (1953) listed the larvae of *Ceriagrion erubescens* under *Ceriagrion calamineum* Lieftinck, 1951. However, I consider them as not reliable because the larvae of the South East Asian representatives are poorly known and Lieftinck (1936) was already unsure about the identification. I have not found records of adults of any *Ceriagrion* in literature and also Phan (2011) did not include Timor as in the range of *Ceriagrion calamineum* and Kalkman (2009) considered *Ceriagrion aeruginosum* from Timor as doubtful.

Records of *Nosoticta selysi* were considered as doubtful by Seehausen & Theischinger (2017); on examination they found that specimens identified as *Nosoticta selysi* by Ris (1913c) and Lieftinck (1936, 1953) belong to *Nosoticta impercepta*.

The records of *Anax gibbosulus* from Timor are based on larvae and a single female (Lieftinck 1936, 1942). I consider the larval records as not reliable and examination of the female from Niki-Niki in West Timor (held at NMB) suggests that it belongs to *Anax georgius* rather than to *Anax gibbosulus*. Thus *Anax gibbosulus* is deleted from the checklist.

At IRSNB the female *Tramea* Hagen, 1861 from Timor identified by Ris (1913b) as *Tramea limbata* was studied. This specimen corresponds in all characters with the recently examined females from Timor (cf. discussion in this article) and is assigned to *Tramea stenoloba*.

The male *Epophthalmia vittigera* (Rambur, 1842) held at the Coll. Selys (IRSNB) and labelled as from «Timor?» (Fig. 24) was also studied. It agrees with *Epophthalmia vittigera* in the identification key of Lieftinck (1931) and corresponds in almost all characters with two males of *Epophthalmia vittigera* from Java and Borneo studied in the Coll. Ris (SMF). But the epiproct of the presumed Timorese male is longer than that of Javanese *Epophthalmia vittigera* (Figs 25a-b), although not as long as it is in *Epophthalmia australis* Hagen, 1867 from Sulawesi and the Maluku Islands as illustrated by Lieftinck (1931). Lieftinck (1936) considered the occurrence of *Epophthalmia vittigera* in Timor as uncommon and has doubts about the correct locality; subsequently Lieftinck (1953) does not list it for Timor. The known range of *Epophthalmia vittigera* in the Sunda region is from Sumatra, Java, Bali to Borneo (Lieftinck 1931, 1953), and I was unable to find reliable records from islands east of Bali. However, especially specimens of *Epophthalmia* from Indonesian Islands are generally rare to find in collections. I consider the validity of the label of *Epophthalmia vittigera* from Timor as feasible because other species collected by Vanderhoffen and labelled as from Timor (*Anax georgius* and *Tramea stenoloba*; held at the Coll. Selys, IRSNB) were verified. Nevertheless, for the present I list this species as uncertain for Timor until further material from the eastern part of the Lesser Sunda Islands is available.

The respective authority for the first indication is given in the checklist for each species.

Family Chlorocyphidae

1. *Rhinocypha pagenstecheri timorana* Lieftinck, 1936
   Ris (1916a) [as *Rhinocypha pagenstecheri* Förster, 1897]

Family Lestidae

2. *Indolestes lafaeci* Seehausen, 2017
   Seehausen (2017)

[?] *Lestes praemorsus* Hagen in Selys 1892
   Lieftinck (1936)

Family Platycnemididae

3. *Nososticta impercepta* Seehausen & Theischinger, 2017
   Ris (1913c) [as *Caconeura selysi* Förster, 1896]

[?] *Nososticta selysi* (Förster, 1896)
   Ris (1913c)

Family Coenagrionidae

4. *Agriocnemis femina* (Brauer, 1868)
   Lieftinck (1936)
5. *Agriocnemis pygmaea* (Rambur, 1842)
   this paper
6. *Austroallagma sagittiferum* (Lieftinck, 1949)
   this paper

[?] *Ceriagrion calamineum* Lieftinck, 1951
   Lieftinck (1936) [as larvae of *Ceriagrion erubescens* Selys, 1891]

7. *Ischnura heterosticta* (Burmeister, 1839)
   this paper
8. *Ischnura senegalensis* (Rambur, 1842)
   Lieftinck (1949)
9. *Pseudagrion microcephalum* (Rambur, 1842)
   Polhemus & Helgen (2004)
10. *Pseudagrion pilidorsum deflexum* Lieftinck, 1936
    Lieftinck (1936)
11. *Pseudagrion schmidtianum* Lieftinck, 1936
    Lieftinck (1936)
12. *Xiphiagrion cyanomelas* Selys, 1876
    this paper

Family Aeshnidae

13. *Anax georgius* Selys, 1872

Selys (1872)

14. *Anax guttatus* (Burmeister, 1839)

Lieftinck (1953)

Family Macromidae

[?] *Epophthalmia vittigera* (Rambur, 1842)

Lieftinck (1931)


**Fig. 24.** ***Epophthalmia vittigera*** **male labelled as from «Timor?» (Coll. Selys, IRSNB). Photo: Malte Seehausen.**

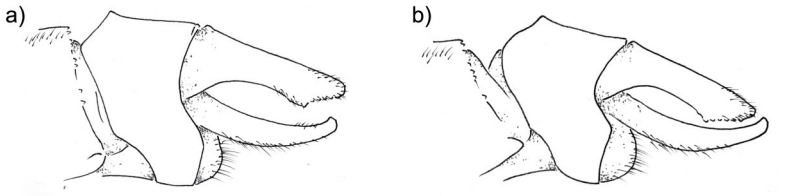


**Fig. 25.** ***Epophthalmia vittigera*** **from Java and labelled as from «Timor?». Male appendages lateral. Illustrations: Malte Seehausen.**

Family Libellulidae

15. *Camacinia gigantea* (Brauer, 1867)
    Hagen (1869)
16. *Crocothemis servilia* (Drury, 1773)
    this paper
17. *Diplacodes haematodes* (Burmeister, 1839)
    Lieftinck (1936)
18. *Diplacodes trivialis* (Rambur, 1842)
    Lieftinck (1953)
19. *Macrodiplax cora* (Brauer, 1867)
    Lieftinck (1953)
20. *Neurothemis ramburii* (Brauer, 1866)
    this paper
21. *Orthetrum caledonicum* (Brauer, 1865)
    Lieftinck (1933)
22. *Orthetrum glaucum* (Brauer, 1865)
    Ris (1916b)
23. *Orthetrum pruinosum* cf. *schneideri* Förster, 1903
    this paper
24. *Orthetrum sabina* (Drury, 1773)
    Hagen (1863)
25. *Orthetrum testaceum* (Burmeister, 1839)
    Ris (1916b)
26. *Pantala flavescens* (Fabricius, 1798)
    Lieftinck (1953)
27. *Potamarcha congener* (Rambur, 1842)
    this paper
28. *Rhyothemis graphiptera* (Rambur, 1842)
    Lieftinck (1936)
29. *Tetrathemis irregularis hyalina* Kirby, 1889
    Ris (1909a)
30. *Tramea loewii* (Brauer, 1866)
    Lieftinck (1953) [as *Tramea loewii tillyardi* Lieftinck, 1942]
31. *Tramea stenoloba* (Watson, 1962)
    Ris (1913b) [as *Tramea limbata* (Desjardins, 1832)]
32. *Trithemis aurora* (Burmeister, 1839)
    Lieftinck (1936)

33. *Trithemis festiva* (Rambur, 1842)
    Lieftinck (1936)
34. *Trithemis lilacina* Förster, 1899
    Lieftinck (1953)
35. *Zygonyx ida* Selys, 1869
    Ris (1912)
36. *Zyxomma obtusum* Albarda, 1881
    this paper

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## References

Asahina, S. 1977. Unrecorded or little known Taiwanese Odonata taken by Mr. Kazuo Matsuki. Tombo 20: 31-39.

Asahina, S. 1990a. *Anax georgius* Selys, 1872 from Timor, not from Natal! (Anisoptera: Aeshnidae). Odonatologica 19 (1): 71-74.

Dow, R.A. 2009. *Neurobasis chinensis*. The IUCN Red List of Threatened Species 2009: e.T163763A5648117. http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T163763A5648117.en. Downloaded on 05 June 2016.

Förster, F. 1899. Contributions à la faune odonatologique Indo-Australe. Annales de la Societé Entomologique de Belgique 43: 63-72.

Förster, F. 1903. Odonaten aus Neu-Guinea 3. Annales Musei Nationalis Hungarici 1: 509-554.

Garrison, R.W. 2012. *Skiallagma baueri* Förster 1906, a geographically misplaced damselfly, is a junior synonym of *Xiphiagrion cyanomelas* Selys 1876 (Odonata: Coenagrionidae). Zootaxa 3514: 84-88.

Hagen, H. 1863. Die Odonaten- und Neuropteren-Fauna Syriens und Klein-Asiens. Wiener Entomologische Monatsschrift 7: 193-199.

Hagen, H. 1867. Notizen beim Studium von Brauer's Novara-Neuropteren. Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft Wien 17: 31-62.

Hagen, H. 1869. Fragmente zur Gattung *Neurothemis* Brauer. Entomologische Zeitung Stettin 30: 94-106.

Hawking, J. 2009. *Orthetrum migratum*. The IUCN Red List of Threatened Species 2009: e.T163524A5611321. http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T163524A5611321.en. Downloaded on 16 September 2016.

Kalkman, V.J. 2009. *Ceriagrion aeruginosum*. The IUCN Red List of Threatened Species 2009: e.T163918A5667650. http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T163918A5667650.en. Downloaded on 21 March 2017.

Kalkman, V.J. & Orr, A.G. 2013. Field guide to the damselflies of New Guinea. Brachytron 16 (Supplement): 3-120.

Kennedy, C.H. 1934. *Anax piraticus* a new species of dragonfly (Odonata) from Guam. Annals of the Entomological Society of America 27: 346-356.

Lieftinck, M.A. 1929. Contributions to the Dragonfly fauna of the Sondaic Area. Tijdschrift voor Entomologie 72: 109-147.

Lieftinck, M.A. 1931. A revision of the genus *Epophthalmia* Burm. (Odon., Corduliinae) with notes on habits and larvae. Treubia 13: 21-80.

Lieftinck, M.A. 1933. Odonaten aus Nordaustralien. Revue Suisse de Zoologie 40: 409-439.

Lieftinck, M.A. 1936. Die Odonaten der Kleinen Sunda-Inseln. Revue Suisse de Zoologie 43: 9-160.

Lieftinck, M.A. 1942. The dragonflies (Odonata) of New Guinea and neighbouring islands, part vi: Results of the third Archbold Expedition 1938-1939 and of the Le Roux Expedition 1939 to Netherlands New Guinea (I. Anisoptera). Treubia 18: 441-608, plates 23-41.

Lieftinck, M.A. 1949. The dragonflies (Odonata) of New Guinea and neighbouring islands, part vii: Results of the third Archbold Expedition 1938-1939 and of the Le Roux Expedition 1939 to Netherlands New Guinea (II. Zygoptera). Nova Guinea (N.S.) 5: 1-271.

Lieftinck, M.A. 1951. Results of the Archbold Expeditions, No. 64. Odonata of the 1948 Archbold Cape York expedition, with a list of the dragonflies from the peninsula. American Museum Novitates 1488: 1-46.

Lieftinck, M.A. 1953. The Odonata of the island Sumba with a survey of the dragonfly fauna of the Lesser Sunda Islands. Verhandlungen der Naturforschenden Gesellschaft in Basel 64: 118-228.

Marinov, M. 2013. Contribution to the Odonata of the Kingdom of Tonga. Faunistic Studies in South-East Asian and Pacific Island Odonata 1: 1-18.

Michalski, J. 2012. A manual for the identification of the dragonflies and damselflies of New Guinea, Maluku and the Solomon Islands. Kanduanum Books, Morristown, New Jersey.

Ngoi, P.S., Tan, J. & Ngiam, R.W.J. 2011. New record of a dragonfly, *Zyxomma obtusum* Albarda, 1881 in Singapore (Odonata: Anisoptera: Libellulidae). Nature in Singapore 4: 241-244.

Okudaira, M., Sugimura, M., Ishida, S., Kojima, K., Ishida, K. & Aoki, T. 2001. Dragonflies of the Japanese Archipelago in Color. Hokkaido University Press, Japan.

Orr, A.G. & Hämäläinen, M. 2007. The Metallwing demoiselles of the eastern tropics. Their identification and biology. Natural History Publications, Kota Kinabalu.

Orr, A.G. & Kalkman, V.J. 2015. Field guide to the dragonflies of New Guinea. Brachytron 17, Supplement: 3-156.

Ozono, A., Futahashi, R. & Ozono, A. 2011. An interspecific hybrid between *Anax parthenope julius* female and *A. panybeus* male. Tombo 53: 115-118.

Paulson, D.R. & Buden, D.W. 2003. The Odonata of Pohnpei, Eastern Caroline Islands, Micronesia. International Journal for Odonatology 6: 39-64.

Phan, Q. 2011. *Ceriagrion calamineum*. The IUCN Red List of Threatened Species 2011: e.T174529A7083834. http://dx.doi.org/10.2305/IUCN.UK.2011-2.RLTS.T174529A7083834.en. Downloaded on 05 June 2016.

Polhemus, D.A. & Helgen, K.M. 2004. Preliminary studies on the biodiversity of mammals and aquatic insects in East Timor. Unpublished.

Ris, F. 1909a. Libellulinen monographisch bearbeitet, Vol. 1, Libellulinen 1. Collections Zoologiques du Baron Edm. de Selys Longchamps. Catalogue systematique et descriptif fasc. 9: 1-120. Hayez, Bruxelles.

Ris, F. 1909b. Libellulinen monographisch bearbeitet, Vol. 1, Libellulinen 3. Collections Zoologiques du Baron Edm. de Selys Longchamps. Catalogue systematique et descriptif fasc. 10: 121-244. Hayez, Bruxelles.

Ris, F. 1912. Libellulinen monographisch bearbeitet, Vol. 2, Libellulinen 6. Collections Zoologiques du Baron Edm. de Selys Longchamps. Catalogue systematique et descriptif fasc. 14: 701-836. Hayez, Bruxelles.

Ris, F. 1913a. Libellulinen monographisch bearbeitet, Vol. 3, Libellulinen 7. Collections Zoologiques du Baron Edm. de Selys Longchamps. Catalogue systematique et descriptif fasc. 15: 837-964. Hayez, Bruxelles.

Ris, F. 1913b. Libellulinen monographisch bearbeitet, Vol. 3, Libellulinen 8. Collections Zoologiques du Baron Edm. de Selys Longchamps. Catalogue systematique et descriptif fasc. 16: 965-1042. Hayez, Bruxelles.

Ris, F. 1913c. Odonata von den Aru- und Kei-Inseln, gesammelt durch Dr. H. Merton 1908. Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft 34: 503-536.

Ris, F. 1916a. Zwei Notizen über Calopterygiden (Odonata) vom Malaiischen Archipel. Entomologische Mitteilungen 5: 303-318.

Ris, F. 1916b. Libellulinen monographisch bearbeitet, Vol. 3, Libellulinen 9. Collections Zoologiques du Baron Edm. de Selys Longchamps. Catalogue systematique et descriptif fasc. 16: 1043-1278. Hayez, Bruxelles.

Ris, F. 1927. Odonaten von Sumatra, gesammelt von Edward Jacobson. Zoologische Mededelingen 10: 1-49.

Rowe, R. & Marinov, M. 2013. *Tramea loewii*. The IUCN Red List of Threatened Species 2013: e.T197100A2480630. http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T197100A2480630.en. Downloaded on 04 January 2017.

Seehausen, M. 2017. *Indolestes lafaeci* sp. nov. (Odonata: Lestidae) from Timor, with comparisons to related species. Zootaxa 4244 (1): 79-90.

Seehausen, M. & Dow, R.A. 2016. Morphological studies and taxonomic considerations on the 'reddish-brown-winged' group of *Neurothemis* Brauer, 1867 with the description of *N. taiwanensis* sp. nov. (Odonata: Libellulidae). IDF-Report 93: 1-101.

Seehausen, M. & Theischinger, G. 2017. *Nososticta impercepta* sp. nov. (Odonata: Platycnemididae) from Timor, with a key to the Sundaic species. Zootaxa 4250(3): 262-274.

Selys Longchamps, E. 1854. Monographie des Calopterygines. Muquardt, Bruxelles.

Selys Longchamps, E. 1872. Note sur plusieurs Odonates de Madagascar et des iles Mascareignes. Revue et Magasin de Zoologie pure et appliquee 23: 175-183.

Selys Longchamps, E. 1897. Causeries Odonatologiques No. 10. Annales de la Société Entomologique de Belgique 41: 427-432.

Sharma, G. 2010. *Orthetrum pruinosum*. The IUCN Red List of Threatened Species 2010: e.T167097A6301540. http://dx.doi.org/10.2305/IUCN.UK.2010-4.RLTS.T167097A6301540.en. Downloaded on 03 January 2017.

Subramanian, K.A. 2010. *Epophthalmia vittigera*. The IUCN Red List of Threatened Species 2010: e.T167492A6357235. http://dx.doi.org/10.2305/IUCN.UK.2010-4.RLTS.T167492A6357235.en. Downloaded on 25 December 2016.

Theischinger, G. & Endersby, I. 2009. Identification guide to the Australian Odonata. Department of Environment, Climate Change and Water NSW, Sidney.

Theischinger, G. & Hawking, J. 2006. The complete field guide to dragonflies of Australia. CSIRO Publishing, Australia.

Tillyard, M.A. 1916. Life-Histories and descriptions of Australian Aeshninae; with description of a new form of *Telephlebia* by Herbert Campion. The Journal of the Linnean Society 33: 1-83.

Trainor, C.R. 2010. Timor's fauna: the influence of scale, history and land-use on faunal patterning. A thesis submitted to satisfy the requirements for the award of the degree of Doctor of Philosophy (Science). Charles Darwin University, Australia.

Veiga, M.L. 1970. Contribuicao para um "conspectus" da entomofauna Timorense. Missao de Estudos Agronomicos do Ultramar (Junta de Investigacoes do Ultramar) Comunicacao No. 75.

Watson, J.A.L. 1962. The dragonflies (Odonata) of South-Western Australia. A guide to the identification, ecology, distribution and affinities of larvae and adults. Handbook Western Australian Naturalists' Club 7: 1-72.

Watson, J.A.L. 1967. An analysis of *Trapezostigma eurybia* (Selys, 1878) and related Indo-Australian species (Odonata, Libellulidae). Nova Guinea 36: 377-400.

Watson, J.A.L. 1976. The synonymy of *Ischnura heterosticta* (Burmeister) and *Ischnura torresiana* Tillyard (Odonata: Coenagrionidae). Journal of the Australian Entomological Society 15: 71-78.

Watson, J.A.L. & O'Farrell, A.F. 1991. Odonata (dragonflies and damselflies). In: Naumann, I.D. & Carne, P.B., Lawrence, J.F., Nielsen, E.S., Spradbery, J.P., Taylor, R.W., Whitten, M.J. & Littlejohn, M.J. (Eds.), The insects of Australia. 2nd Edition. Melbourne University Press, Melbourne.

Watson, J.A.L. & Theischinger, G. 1987. *Anax georgius* Selys, 1872 (Odonata: Aeshnidae) rediscovered, in Australia. Journal of the Australian Entomological Society 26: 67-71.

Yong, H.S., Lim, P.-E., Tan, J., Ng, Y.-F., Eamsobhana, P. & Suana, I.W. 2014. Molecular phylogeny of *Orthetrum* dragonflies reveals crypticspecies of *Orthetrum pruinosum*. Scientific Reports 4, 5553: 1-9. DOI: 10.1038/srep05553

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