

Linzer biol. Beitr.	31/1	373-379	30.7.1999
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## New and little-known Synthemistidae from Australia (Insecta: Odonata)

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**Abstract:** Two new species of Australian Synthemistidae, *Eusynthemis netta* (holotype ♂: Queensland, streams on Mt Lewis, NW Julatten, 3000 ft) and *Eusynthemis ursula* (holotype ♂: New South Wales, Barrington Tops, Dilgry River), are described. Also presented are illustrations of *Choristhemis olivei* (TILLYARD) and illustrated descriptions of the hitherto unknown females of *Eusynthemis ursula* THEISCHINGER and *Tonyosynthemis ofarrelli* (THEISCHINGER & WATSON).

**Key words:** Synthemistidae, new and little-known species, undescribed females, Australia.

### Introduction

Continuous studies on Australian Synthemistidae and a recent collecting trip of Dr D.R. Paulson and Mrs Netta Smith (Seattle, USA), dedicated to Australian dragonflies, have added substantially to the knowledge of the Australian synthemistid fauna. These additions are presented below. The material treated is from the following collections: Australian Museum, Sydney (AM), Australian National Insect Collection, CSIRO Canberra (ANIC), British Museum, London, England (BMNH), Dennis Paulson, Seattle, USA (DP), Günther Theischinger, Sydney (GT).

### Systematics

#### *Choristhemis olivei* (TILLYARD) (Figs 1-3)

*Synthemis olivei* TILLYARD 1909: 747.

*Choristhemis olivei* (TILLYARD); TILLYARD 1910: 371.

Not long ago, in letters to F. CARLE (Warren, USA) and to H. LOHMANN (Freiburg i. Br., Germany), I expressed some doubt about *Choristhemis flavoterminata* (MARTIN) and *Choristhemis olivei* (TILLYARD) being congeneric. Reasons for my doubt were the available illustrations of the male anal appendages of *C. olivei* (TILLYARD 1909, 1910). Recently, however, D.R. PAULSON and N. SMITH showed me a fresh male very similar in overall appearance to *C. olivei*, and I had no doubt that this was a *Choristhemis* species as its anal appendages differed significantly from TILLYARD's (1909, 1910) illustrations of *C. olivei*. Study of the holotype of *C. olivei* finally convinced me that holotype and the

fresh *Choristhemis* specimen are one and the same species, and that this species belongs in *Choristhemis* TILLYARD. TILLYARD (1909, 1910), illustrating *C. olivei*, apparently had a bad day and D.R. PAULSON and N. SMITH, rediscovering *C. olivei* after more than 90 years, had a good one. For demonstration, an illustration of the anal appendages of the holotype (Fig. 1) and of the recently collected male (Fig. 2) of *C. olivei* are presented below, together with a reproduction of TILLYARD's (1909) illustration (Fig. 3).

**Material examined:** holotype ♂, Queensland, Cooktown, January 1908, R.J. Tillyard (BMNH); 1♂, Queensland, stream and swamp 2.1 road km N Daintree River crossing on Cape tribulation Road, 24.12.1998, D.R. Paulson & N. Smith (ANIC).

#### *Eusynthemis netta* spec. nov. (Figs 4-7)

**Primary type:** Holotype ♂: Queensland, streams on Mount Lewis, NW Julatten, 3000 ft, 25.12.1998, D.R. Paulson & N. Smith (ANIC). 1♂ paratype, same data as holotype (DP).

**Name:** Dedication to Mrs N. Smith, cocollector of this species.

**Male** (Figs 4-7)

**Dimensions:** Hindwing 32.2-33.0 mm; abdomen (including anal appendages) 40.4-40.7 mm.

**Head** (Fig. 4): Labium brown, lobes black; mandibles largely black, apically dark brownish red and black; genae greenish grey; labrum black; anteclypeus largely pale yellow, an ill-defined greyish brown patch each side; postclypeus black; frons black with two large greenish yellow marks, taking most of upper 4/5 of anterior portion and only lateral borders of posterior portion, and separated widely along midline; vertex, antennae, occiput and postgenae black.

**Pronotum:** Pronotum largely black, only rim of anterior lobe dark yellow, some ill-defined patches along midline of median lobe greenish grey and rim of posterior lobe greyish yellow; coxa, trochanter and much of femur greyish- to greenish yellow; rest of femur, tibia and tarsus black; claws largely dark brown; tibial keel largely brown, c. 50% of tibial length.

**Synthorax** (Fig. 5): Spiracular dorsum, mesostigmatic lamina and collar largely brownish black; dorsal carina yellow; antealar ridge black; antealar sinus yellow; front of synthorax metallic black with subtriangular yellow patch in basal half; mesepimeron metallic black; mesokatepisternum brownish grey to black; metanepisternum largely yellow, only posterior third adjacent to metapleural suture black; metakatepisternum black; anterior half of metepimeron metallic black, posterior half largely yellow; subalar ridges largely black; metapostepimeron yellow; poststernum largely brownish grey; post-coxae greyish yellow; terga brownish black except for postscutella which are bright yellow; meso- and metacoxa brownish black with posterior third greyish yellow; trochanters, femora, tibiae and tarsi black; claws brownish black; tibial keels brownish black, c. 55 % length of mesotibia, c. 75 % length of metatibia.

**Wings:** Membrane hyaline; venation black except for yellow median ray of costae; axillary and humeral plates black; intermediary pieces bright yellow; antenodals 13-14/9-10; postnodals 7-8/8-9; generally Ax1, Ax3 and Ax5 of forewing and every second antenodal of hindwing distinctly thickened, other antenodals of first and second series sometimes irregular; pterostigma 2.5-2.6 mm long, black, overlying 2-3 crossveins; sectors of arcus with long stalk; triangles and subtriangle more often free than crossed; supertriangles

of forewing crossed by 2 veins, of hindwing by 1 vein; discoidal field of forewing starting with 1 or 2 cells, then 1 cell wide for generally 6 rows, broadening to 10-13 cells at wing margin; discoidal field of hindwing 1 cell wide for 4-6 rows, broadening to 9-11 cells at wing margin; 4-5 bridge crossveins; 2 crossveins in basal space; 4-5 crossveins in cubito-anal space; anal loop of 5-7 cells, 2-3 cells wide and 2 cells deep; anal triangle 2-celled, anal angle almost evenly rounded; membranules yellowish grey.

**A b d o m e n** (Figs 6, 7): Segments 1 and 2 subcylindrical, slightly enlarged; segments 3-10 subcylindrical, parallel sided. Tergum 1 black; terga 2-9 black, marked with yellow as follows: 2, two large laterodorsal almond-shaped patches along supplementary transverse carina, connected with patch across most of auricle area, a large patch along the lateral margin; 3, large spectacle-shaped dorsal patch along supplementary transverse carina, small anterolateral mark close to lateral margin, narrow line along lateral margin; 4-7, large spectacle-shaped dorsal patch along supplementary transverse carina, very narrow line along lateral margin; 8, two separate almond-shaped marks along supplementary transverse carina, narrow line along lateral margin; tergum 9 and segment 10 black; sterna largely black. Genital hamules as in Fig. 6. Anal appendages (Fig. 7) black; superiors widely curved throughout, converging and slightly arched dorsoventrally, basally distinctly strengthened, with small ventrally pointing tooth at about 1/3 length and distinct lateral bump at about 1/6 length; inferior appendage hardly arched, truncate, with two subequal dorsal teeth on each side of apex.

**F e m a l e** unknown.

**L a r v a** unknown.

**A f f i n i t i e s a n d d i a g n o s i s**: The combination of black labrum, yellow marked front of synthorax, medially broadly connected pale dorsolateral patches on abdominal segments 2-7, and black tergum 9 make the identification of *E. netta* easy. There are also structural differences from all other *Eusynthemis* species in the shape of the secondary genitalia and of the male anal appendages. It is clear that *E. netta* does not belong to the *E. guttata* group (Theischinger 1995, 1998c), but otherwise its affinities are rather obscure. Closer ties with *E. virgula* (SELYS) appear possible.

*E. netta* is the third species of *Eusynthemis* FÖRSTER from the Mt Lewis area. Only *E. barbarae* (MOULDS) was known from there previously, but D.R. PAULSON and N. SMITH found *E. netta* and *E. nigra nigra* (TILLYARD) along the same stream at Mt Lewis.

### ***Eusynthemis ursula* spec. nov. (Figs 8, 9)**

*Eusynthemis ursula* THEISCHINGER, 1998b: 143 (part).

**Primary type**: Holotype ♂: New South Wales: Barrington Tops, Dilgry River, 10.12.1979, P. Brookhouse (ANIC). 1♂ paratype: New South Wales, Barrington Tops, Big Hole, 27.11.1979, G. Theischinger and L. Müller (ANIC).

**N a m e**: *Ursa* = Latin for "she-bear"; the species is markedly more massive than *E. ursula* (= Latin for "little she-bear") THEISCHINGER.

**R e m a r k s**: *E. ursula* is very similar to *E. ursula*. Material of both species was included in the type series of *E. ursula*. Unfortunately *E. ursula* was used for all illustrations of *E. ursula* (THEISCHINGER 1998b). Only a brief description of *E. ursula* stressing its differences from *E. ursula*, is given. Even though the colour patterns of *E. ursula* and *E. ursula* are extremely similar, the two forms are considered distinct at specific level. The differences

between them in secondary genitalia and male anal appendages are more marked than the differences between some other species of *Eusynthemis*. *E. ursula* is known only from extreme situations at Telegherry River and Whitehouse Creek (both Karuah catchment), whereas the available material of *E. ursula* comes from much less specialised habitats in the Manning catchment.

**Male** (Figs 8, 9)

**Colouration**: Whereas the markings of *E. ursula* appear rather pale greenish yellow, they are bright yellow in *E. ursula*.

**Dimensions**: Hindwing 28.8-30.0 mm; abdomen (including anal appendages) 33.7-36.2 mm.

**Thorax**: Longer and wider than in *E. ursula*.

**Abdomen** (Figs 8, 9): Markedly wider than in *E. ursula*, but pattern extremely similar. Tip of glans penis (Fig. 8) markedly less strongly curved and with base narrower than in *E. ursula*. Anal appendages with superiors thicker and set markedly wider than in *E. ursula*, basally not strengthened at all (Fig. 9).

**Female** unknown.

**Larva** unknown.

**Affinities and diagnosis**: *E. ursula* is very close to *E. ursula* THEISCHINGER. The two species seem to form a group of their own. *E. ursula* is the more massive species with longer and wider thorax and wider abdomen. The anal appendages of *E. ursula* are thicker and more widely set than those of *E. ursula* and lack the subbasal lateral angulation of *E. ursula*. The tip of the glans penis of *E. ursula*, however, is less strongly curved and has a narrower base than that of *E. ursula*.

### ***Eusynthemis ursula* THEISCHINGER (Figs 10-12)**

*Eusynthemis ursula* THEISCHINGER 1998b: 143 (part).

*E. ursula* is restricted here to the type material from Telegherry River and to fresh material from Whitehouse Ck (both Karuah catchment), whereas the paratypes from Barrington Tops (Manning catchment) are regarded as different at specific level (see above, under *E. ursula*).

It has to be stressed again that *E. ursula* was used for all illustrations of *E. ursula* (THEISCHINGER 1998b). In *E. ursula* there is a distinct subbasal lateral angulation (Fig. 11) before the small tooth of the superior anal appendages.

The female of *E. ursula* has since been collected. It is described below with reference to the description of the male as given by THEISCHINGER (1998b).

**Female** (Fig.12)

**Dimensions**: Hindwing 31.2 mm; abdomen 33.0 mm.

**Head**: Much as in male. Mediobasal spot of labrum brown; anteclypeus greyish yellow.

**Prothorax**: Much as in male. Medial portion of posterior lobe of pronotum yellow; no tibial keel.

**Synthorax**: Much as in male. No tibial keels.

**W i n g s :** Much as in male. No yellow median ray in costae; 13-14/10 antenodals; 11-12/12 postnodals; subtriangles of forewing and triangles crossed by 1 vein each; discoidal field of forewing starting 2 cells wide; discoidal cell of hindwing 1 cell wide only for 2-3 rows; anal loop of 10-11 cells, 3 cells deep; no anal angle.

**A b d o m e n :** Much as in male. Tergum 2 with yellow dorsal patches of more irregular shape and lateral patch along most of lateral margin; terga 3 and 4 additionally with narrow yellow anterolateral patch each side; yellow dorsal marks on tergum 8 subtriangular; tergum 9 dorsally completely black; supra-anal plate black; sterna black except for anterior half of sternum 9 which is greyish to brownish yellow. Valves (Fig. 12) black, narrowly subtriangular; styli brownish yellow, obscured by valves in ventral aspect.

**Notes on ecology and behaviour:** *E. ursula* has hitherto been found only along the top 50 m (springs) of Telegherry River and of Whitehouse Ck in dark Nothofagus Forest. Even in bright sunshine which does not last long in those habitats, and when chased, it barely and only very slowly moved away. Its flight appears poor.

**M a t e r i a l e x a m i n e d :** 4♂♂, New South Wales, Chichester State Forest, springs of Telegherry River (Karuah catchment), December 1997, G. Theischinger and L. Müller (ANIC); 2♂♂, 1♀, New South Wales, Chichester State Forest, spring of Whitehouse Creek (Karuah catchment), January 1999, G. Theischinger (GT).

### *Tonyosynthemis ofarrelli* (THEISCHINGER & WATSON) (Fig. 13)

*Synthemis ofarrelli* THEISCHINGER & WATSON, 1986: 458.

*Tonyosynthemis ofarrelli* (THEISCHINGER & WATSON); THEISCHINGER 1998a: 140.

The larva and exuviae of what is most probably *Tonyosynthemis ofarrelli* were recently collected at several sites in north-eastern New South Wales (Timbara River at Billyrimba; downstream Boonoo Boonoo Falls; Wild Bull Park along Wilson River) (THEISCHINGER 1998a, HAWKING & THEISCHINGER 1999). More recent attempts to collect adults, particularly females, of *T. ofarrelli* in New South Wales have been unsuccessful. They have, however, added more supporting evidence to the identity of New South Wales *Tonyosynthemis* larvae. At "The Bluff" (Wilson River) a final instar exuviae of *Tonyosynthemis* has been collected together with 3 final instar exuviae of *Micromidia convergens* THEISCHINGER & WATSON, a species known from only very few sites, amongst them the type locality of *T. ofarrelli*.

Fortunately D.R. Paulson and N. Smith have collected a female of *Tonyosynthemis* which, apart from gender characters, agrees with the description of the male of *T. ofarrelli*. This female is presented as the female of *T. ofarrelli*. The description is given with reference to the description of the male (THEISCHINGER & WATSON 1986).

**F e m a l e** (Fig. 13)

**D i m e n s i o n s :** Hindwing 34.2 mm; abdomen 36.5 mm.

**H e a d :** Much as in male. Brownish black mediobasal stripe of labrum reduced to a spot; postgenae with yellow spot just below evagination of eyes.

**C e r v i x a n d T h o r a x :** Much as in male. No tibial keels.

**W i n g s :** Much as in male. Costae without yellow median ray; membrane suffused with brownish yellow at the base of wings; antenodals 13-14/9; postnodals 7/9-11; only Ax1 and Ax3 thickened in forewing; pterostigma overlying 2-3 cells; discoidal field of hindwing starting with 2 cells in one wing, a single row of cells for 3 cells in the other; 5-6

bridge crossveins in forewing, 4 in hindwing; 1 crossvein in median space of forewing, 1-2 in median space of hindwing; 4 cux in forewing, 5 in hindwing; anal loop 4-5 cells long, 2-3 cells deep; anal angle missing.

**A b d o m e n :** Slightly compressed from segment 3 to end; tergum 3 without yellow dorsal patch; terga 4-8 with yellow lateral patch; dorsal patch of tergum 6 divided along midline; tergum 7 with large yellow dorsal patch across basal half; tergum 8 with yellow anterodorsal spot and smaller dorsolateral and larger ventrolateral patch. Valves (Fig. 13) narrow with laterodistal point; styli well developed.

**M a t e r i a l e x a m i n e d :** 1♀, Queensland, Canungra Creek, 4.3 km road S Canungra, 700 ft, 16.12.1998, D.R. Paulson (ANIC).

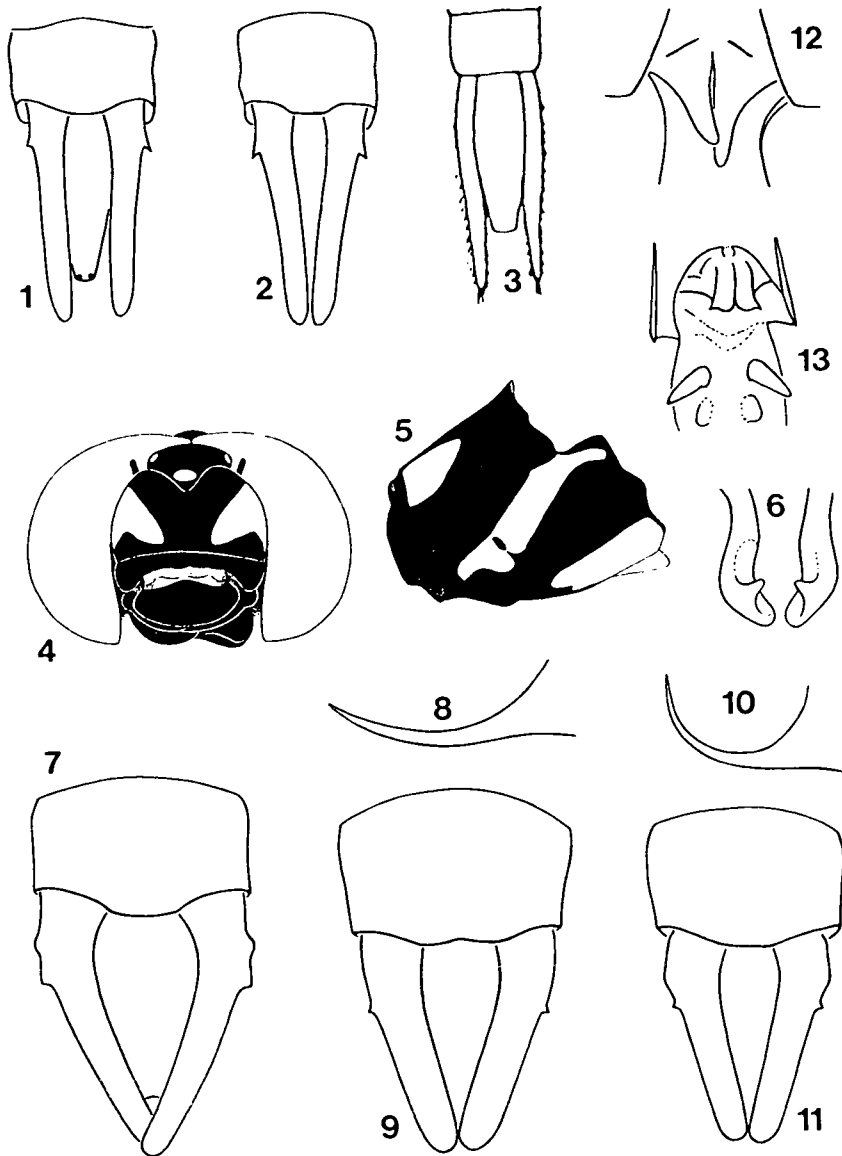
### Acknowledgements

I wish to thank the people who helped to obtain or lent material for this study. They are: Dr. P.S. Cranston (Canberra), J. Ling and L. Müller (Sydney), D. Goodger (London), Dr D.R. Paulson and N. Smith (Seattle, USA).

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**Figs 1-3:** *Choristhemis olivei* (TILLYARD), male anal appendages, dorsal aspect: 1 – holotype; 2 – from Cape Tribulation; 3 – reproduced from TILLYARD (1909). **Figs 4-7:** *Eusynthemis netta* sp. n., male: 4 – head, frontal aspect; 5 – synthorax, lateral aspect; 6 – genital hamules, ventral aspect; 7 – anal appendages, dorsal aspect. **Figs 8, 9:** *Eusynthemis ursa* sp. n., male: 8 – tip of glans penis, ventral aspect; 9 – anal appendages, dorsal aspect. **Figs 10-12:** *Eusynthemis ursula* THEISCHINGER, male: 10 – tip of glans penis, ventral aspect; 11 – anal appendages, dorsal aspect; 12 – female genitalia, ventral aspect. **Fig. 13:** *Tonyosynthemis ofarrelli* (THEISCHINGER & WATSON), female genitalia, ventral aspect.

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Zeitschrift/Journal: [Linzer biologische Beiträge](#)

Jahr/Year: 1999

Band/Volume: [0031\\_1](#)

Autor(en)/Author(s): Theischinger Günther

Artikel/Article: [New and little-known Synthemistidae from Australia \(Insecta: Odonata\). 373-379](#)