

Asthenocnemis linnaei, a new damselfly species from Dumaran island, Philippines (Odonata, Platycnemididae)

D. Gassmann & M. Hämäläinen

Gassmann, D. & M. Hämäläinen. *Asthenocnemis linnaei*, a new damselfly species from Dumaran island, Philippines (Odonata, Platycnemididae).

Zool. Med. Leiden 82 (5), 1.i.2008: 35-41, figs 1-6, table 1.— ISSN 0024-0672.

D. Gassmann, Institute of Biology, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands (gassmann@naturalis.nl).

M. Hämäläinen, Department of Applied Biology, P.O. Box 27, FI-00014, University of Helsinki, Finland.

Key words: Platycnemididae, Calicnemiinae, *Asthenocnemis*, new species, Dumaran Island, Palawan region, Philippines.

Asthenocnemis linnaei spec. nov. is described from the Philippine island of Dumaran in the northeastern Palawan subregion. Notes on the taxonomic history of the genus *Asthenocnemis* are provided.

Results of the Roland Müller Zoological Expeditions to the Philippines, No. 18.

Introduction

The platycnemidid (Odonata) fauna of the Philippines is dominated by the large genus *Risicocnemis* Cowley (Gassmann & Hämäläinen, 2002; Hämäläinen, 1991). The only other genus known to be endemic to the Philippines is *Asthenocnemis* Lieftinck, 1949, which ranks among the most interesting genera of the subfamily Calicnemiinae (Platycnemididae). However, only one species was known until now. *A. stephanodera* was described by Lieftinck (1949) from a single female specimen. Since that specimen had not been labelled correctly, Lieftinck considered it to be of Papuan origin, noticing, however, that it was lacking the crenulation of the apical wing margin so characteristic of the Platycnemididae from New Guinea. Finally, new specimens of both sexes became known from the Philippine island of Palawan, and Lieftinck corrected the distributional range of this species (Lieftinck, 1974).

Since *A. stephanodera* exhibits several unique features as the exaggerate male appendages or the elaborate female posterior pronotal lobe, Lieftinck placed it in a separate genus, although he considered it to be closely related to *Coelliccia* Kirby (Lieftinck, 1974). A cladistic analysis of the Calicnemiinae based on morphological characters (Gassmann, 2005) revealed *Asthenocnemis* to be the sister group to a clade containing all the taxa from the Papuan region and from the Philippines proper (i.e. excluding Palawan region), although the phylogenetic affinities were not unambiguously resolved. *Asthenocnemis* also plays a key role in unravelling the historical biogeography of the subfamily Calicnemiinae (van Tol & Gassmann, 2007).

The Roland Müller Expeditions (1985-1997) to the Philippines have rendered new specimens of Calicnemiinae also from the Palawan region. The description of the present species is the first in a small series of papers revising the Palawan group of *Asthenocnemis*, including two to three new species in total (Gassmann & Dijkstra, in prep.). According to preliminary results obtained by K.-D.B. Dijkstra, the genus *Asthenocnemis* has to be

adapted to include a broader range of species traditionally assigned to *Coeliccia*, from both the Greater Sunda Islands as well as the continental parts of the Philippines. A re-definition of the genus *Asthenocnemis*, based on remarkable structural morphological characters, will be provided in a forthcoming paper (Dijkstra & Gassmann, in prep.).

Material and methods

All specimens examined, formerly in collection Roland A. Müller, are now held in the Nationaal Natuurhistorisch Museum (Naturalis) Leiden, The Netherlands (RMNH).

Scanning electron microscopy.— All scanning electron micrographs were made by the first author. The male appendages were examined at the Zoological Museum of Copenhagen using a JEOL JSM-6335F. The object was coated with platinum/palladium (80/20%) for 1min 40s using a JEOL JFC-2300HR sputtercoater. The male ligula and prothorax were scanned with a JEOL JSM 6480 microscope at Museum Naturalis Leiden (gold-palladium coating).

Measurements.— Measurements of the length of wing and abdomen were taken with a precision of 0.5 mm.

Terminology.— To denote details of odonate wing venation, we follow the modified Tillyard-Fraser system (Watson & O'Farrell, 1991).

Systematic Part

Asthenocnemis linnaei spec. nov.

Coeliccia sp. n. (59), Hämäläinen & Müller, 1997: 263 (species list Philippine Platycnemididae), 306 (list of Odonata from Dumaran).

Type specimens.— Holotype: ♂, Araceli, Opoy Hill, Mawringin, 50 m, 28-30.iii.1997, leg. F. Mohagan, in RMNH. Paratypes (all in RMNH): **Philippines, Palawan Province**: 5 ♂, Araceli, Baeng Muringon, 1st Creek, 20-25.xii.1995, 80-150 m, leg. A. Buenafe. 3 ♂ Araceli, Opoy Hill, Mawringin, 50 m, 28-30.iii.1997, leg. F. Mohagan.

Male (holotype).— Measurements of holotype.— Forewing length 24.5 mm, hindwing length 24.0 mm. Abdomen length: 36.5 mm.

Habitus.— A medium-sized, largely brown-coloured species with blue markings and comparatively simple anal appendages (fig. 1).

Head.— Labium with U-shaped median incision; yellow throughout. Labrum blue, diffusely bordered with yellow; central pit brownish. Genae bluish. Anteclypeus blue, postclypeus black throughout. Frons of black ground colour, with the following markings: a reddish-brown stripe covering the area above the postclypeus up to half-way between the latter and the antennae; a short rectangular yellow-white stripe traversing median part of frons at the level of anterior ocellus, encompassing the latter. Posterior ocelli anteriorly adjoining a pair of yellow-white patches, posteriorly a reddish-brown patch covering the immediate postocellar area as well as the space between posterior ocelli. Vertex and occiput blue, interrupted by black ground colour at border between vertex and occiput, and halfway on the latter. Rear of head yellow-white, its lateral areas blue. Antennae with scapus and basal part of pedicellus yellow-white; remaining parts medium-brown.

Thorax.— Prothorax with two distinct nipple-shaped pronotal horns (fig. 3b). Posterior pronotal lobe tapezoid in dorsal view (fig. 3a). Colour of pronotum black, intermingled with brown; a large blue marking at either side of prothorax. Legs (including coxae) yellowish-white; posterior ridges, and the spurs, black; a pair of black spots, respectively, at outer border between (second pseudo-segment of) trochanter and femur. Synthorax with broad black stripe on upperside; remaining part of mesepisternum with rudimentary antehumeral stripe, broken up into two bright markings, shaped as in fig 1. The first longish marking whitish, the second one oval-shaped, blue; the area in between medium-brown. Posterior area of mesepisternum black. Mesepimeron medium-brown, posterior quarter covered by blue marking. A conspicuous but diffuse black spot at the border between mesepimeron and metepisternum at the level of anterior border of mesepimeral blue marking. Metepisternum and metepimeron largely bluish-white. Underside of synthorax mainly yellow-white, with a few dark-brown spots. Posterior part of synthoracic venter (i.e. the intersternum) covered by a field of short, small, but robust bristles.

Wings.— Anal crossvein (Ac) at insertion of anal bridge (Ab). All wings with 3 post-quadrangular cells. Arculus at Ax2 in forewings, slightly distal to it in hindwings. R4 inserting at subnodal vein (Sn); IR3 at about halfway between R4 and Px1; R3 inserting at Px7 in forewings, at Px6 in hindwings; IR2 inserting at Px10 in forewings and Px9 in hindwings. Right forewing with 17 postnodal veins (Px), left forewing 16 Px; both hindwings 15 Px. All wings, except for pterostigma, fully transparent. Pterostigma with anterior side slightly, but noticeably shorter than posterior side; colour medium brown.

Abdomen.— Ground colour of abdomen medium brown, darkening dorsally and at the level of the intersegmental annules; subdistal light brown rings at segments 3 to 9.

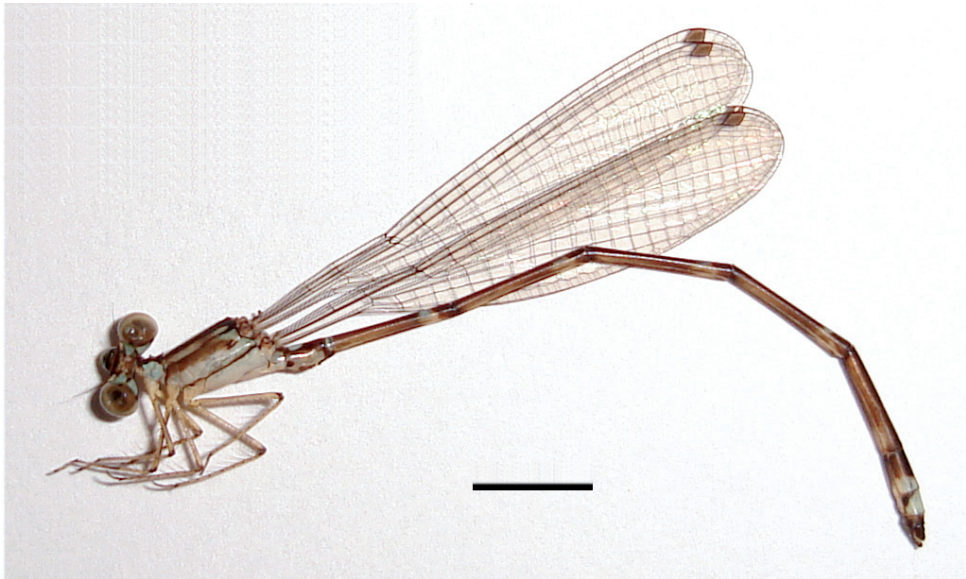


Fig. 1. *Asthenocnemis linnaei* spec. nov., male holotype, Dumaran Island, Araceli, habitus. Scale bar = 0.5 cm.

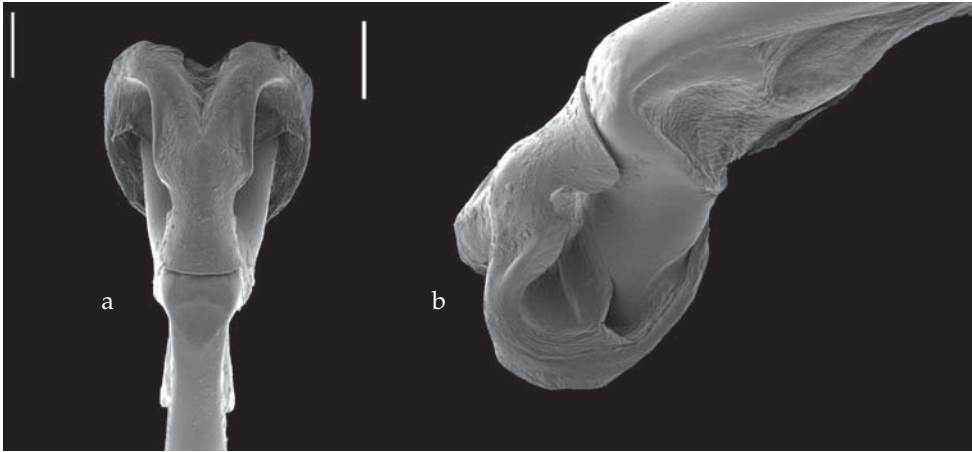


Fig. 2. *Asthenocnemis linnaei* spec. nov., male, Dumaran Island, Araceli, ligula: a) ventral view b) lateral view. Scale bar = 100 μ m.

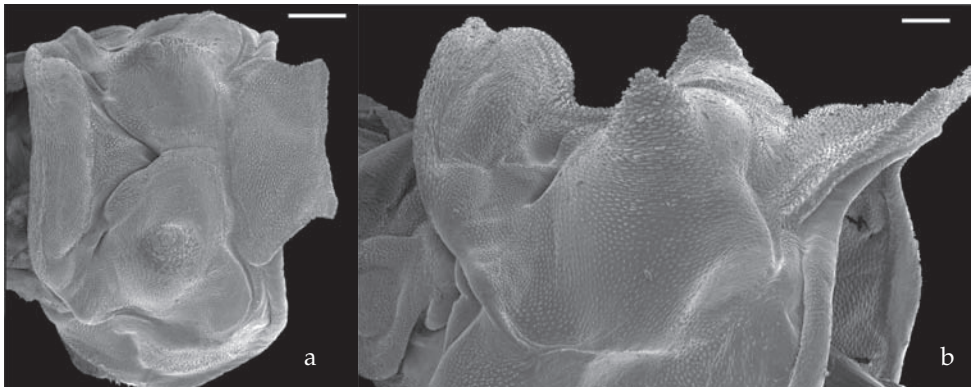


Fig. 3. *Asthenocnemis linnaei* spec. nov., male, Dumaran Island, Araceli, pronotum: a) dorsal view b) posterior lateral view. Scale bar = 200 μ m (a), 100 μ m (b).

Blue markings covering segment 1 laterally, segment 2 laterally and dorsally (only anterior half), segment 3 basally. Segment 3 to segment 6 with dorsal blue markings at the levels of the subdistal annules. Segment 7 with dorsal surface wholly darkened. Segment 8 with a blue patch at either side of posterior half. Segment 9 almost entirely covered with blue. Segment 10 black, diffuse brownish basally. Superior appendages only about two-third the length of inferior ones, very robust (fig 4a), with a massive protrusion bearing two prominent teeth in lateral view (figs 4b, c). Surface of superior appendages covered with robust spines (fig. 4b); superior appendages black, apical area white; inferior appendages much more slender than superiors, apices slightly bent inwards and downwards (fig. 4a); inferiors proximally and distally black, the area in between yellow-white.

Variation in males.— Wing venational features: see table 1. Colour pattern of head and abdomen more darkened and black areas more expanded in some specimens. The

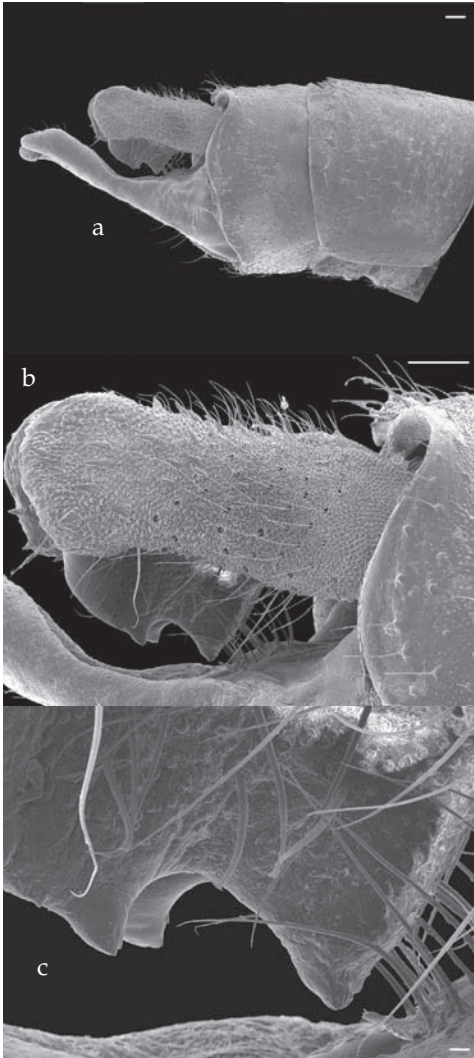


Fig. 4. *Asthenocnemis linnaei* spec. nov., male, Dumaran Island, Araceli, anal appendages, lateral view: a) total b) superior appendages, detail c) inner two-toothed protrusion, detail. Scale bar = 100 μ m (a,b), 10 μ m (c).

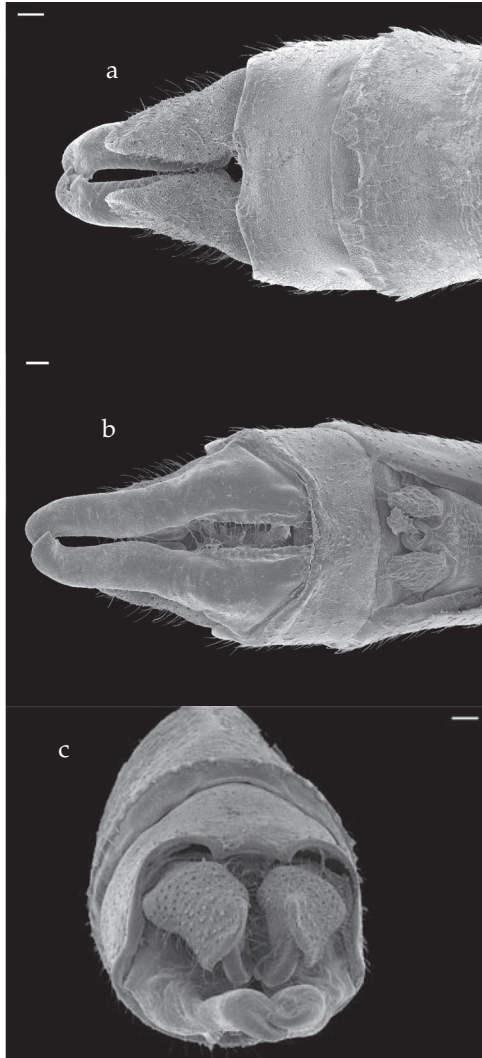


Fig. 5. *Asthenocnemis linnaei* spec. nov., male, Dumaran Island, Araceli, anal appendages: a) dorsal view b) ventral view c) caudal view. Scale bar = 100 μ m.

Table 1: Variation of venational traits in males of *Asthenocnemis linnaei* spec. nov.: origin of veins R3, and IR2 (numbers refer to postnodal veins), and number of postnodals (Px). [fw = forewing; hw = hindwing]; (n = 8).

R3		IR2		Px	
fw	hw	fw	hw	fw	hw
6-8	6-7	9-12	9-11	16-17	14-17

rudimentary antehumeral stripe entirely blue in most specimens (probably also the original state in holotype specimen).

Measurements.— Forewing length ♂: 24.0-26.0 mm (n = 8); hindwing length ♂: 23.0 - 25.0 mm (n = 8). Abdomen length: 35.0 - 39.0 mm (n = 8).

Female.— Unknown.

Remarks.— The present new species can easily be distinguished from the remaining platycnemidids of the Palawan subregion by the characteristic shape of the male superior appendages of which the inner process is not flap- or axe-shaped as in other species but instead bears two teeth. A further unique feature are the nipple-shaped pronotal horns which are more rounded or only bulgy otherwise.

Etymology.— The species is named after Carolus Linnaeus on the occasion of the 250th anniversary of zoological nomenclature at January 1st, 2008. It also stands for the dilemma of present-day taxonomists as they are often describing species which are doomed to vanish in the near future.

Altitudinal range.— 50-150 m.

Distribution.— Dumaran Island (northeastern Palawan region).

Remarks.— According to Hämäläinen & Müller (1997), the original forests of Dumaran have been cut down to form small scattered patches across the island. The current situation is not known to the authors, but the present new species is probably threatened of extinction, like many other species of Philippine odonates (Gassmann, 2006).

Acknowledgements

For most of the present work the first author was able to use the facilities of the Zoological Museum of Copenhagen University during his visit to Denmark in August/September 2006. Professor Dr Niels P. Kristensen provided valuable support and access to the collections. Jan Pedersen assisted with the SEM. The present study was supported by a European Union SYNTHESYS grant (DK-TAF-2356) to the first author. C. van den Berg supported the SEM work at Naturalis (Leiden). The present paper profited from information provided by Dr Klaas-Douwe B. Dijkstra (Paramaribo, Suriname). We thank Roland A. Müller (St. Gallen, Switzerland) for support of various kind and Jan van Tol (Naturalis, Leiden) for critically reviewing the manuscript.



Fig. 6. Map of the Philippine archipelago, with the position of Dumaran Island indicated.

References

- Gassmann, D., 2005. The phylogeny of Southeast Asian and Indo-Pacific Calicnemiinae (Odonata: Platycnemididae).— *Bonner Zoologische Beiträge* 53: 37-80.
- Gassmann, D., 2006. Artenvielfalt philippinischer Libellen.— *Naturwissenschaftliche Rundschau* 11/2006: 617-618 [in German].
- Gassmann, D. & M. Hämäläinen, 2002. A revision of the Philippine subgenus *Risioecnemis* (*Igneocnemis*) Hämäläinen (Odonata: Platycnemididae).— *Tijdschrift voor Entomologie* 145: 213-266.
- Hämäläinen, M., 1991. The Philippine genus *Risioecnemis* Cowley (Zygoptera: Platycnemididae). I. Subgenus *Risioecnemis*.— *Odonatologica* 20: 151-194.
- Hämäläinen, M. & R.A. Müller, 1997. Synopsis of the Philippine Odonata, with lists of species recorded from forty islands.— *Odonatologica* 26: 249-315.
- 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., 1974. Dragonflies collected by the Noona Dan Expedition in the southwestern Philippine Islands (Insecta, Odonata).— *Steenstrupia* 3(12): 111-147.
- van Tol, J. & D. Gassmann, 2007. Zoogeography of freshwater invertebrates of Southeast Asia, with special reference to Odonata. In: Renema, Willem (Ed.): *Biogeography, Time and Place - Distributions, Barriers and Islands. Topics in Geobiology*, Vol. 29. Dordrecht (Springer).
- Watson, J.A.L. & A.F. O'Farrell, 1991. Odonata (Dragonflies and Damselflies). Pp. 294-310 in: Naumann I.D. (ed.) *The Insects of Australia*. 2nd ed., Vol. I.— Melbourne.

Received: 27.xi.2007

Accepted: 29.xi.2007

Edited: J. van Tol

