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Lanthanusa bilineata sp. nov. from New Guinea (Odonata: Libellulidae)

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Lanthanusa bilineata, a new libellulid from the mountains of central New Guinea (holotype: Mekil Research Station (04°48′ S, 141°39′ E), leg. 1 September 2004, dep. at RMNH, Leiden), is described. The new species combines characteristics previously used to distinguish between *Huonia* and *Lanthanusa* with wing venation characteristic of the genus *Huonia* and accessory genitalia characteristic of *Lanthanusa.* We propose a revision of the *Huonia–Lanthanusa* complex to clarify the characteristics distinguishing the genus *Lanthanusa*.

Keywords: Odonata; dragonfly; New Guinea; Papuan region; new species; *Lanthanusa*; *Huonia*

Introduction

The Papuan libellulid genera *Huonia* (Förster, 1903) and *Lanthanusa* (Ris, 1912) comprise 15 and five species, respectively, and are considered to be closely related. A new species discovered in the mountains of central New Guinea has characters of both. In this paper we describe the new species and discuss some of the taxonomic issues it raises.

Materials and methods

Line drawings were made using a Wild M5 stereomicroscope equipped with a camera lucida; measurements are in millimeters. Counts and qualitative characters were assessed by direct observation. Specimens were measured and observed directly and studied from figures in Lieftinck (1935, 1942, 1953, 1955, 1963). Terminology for body morphology follows Lieftinck, except abdominal segments are designated S1–S10, while that for venation follows Tillyard and Fraser (1940).

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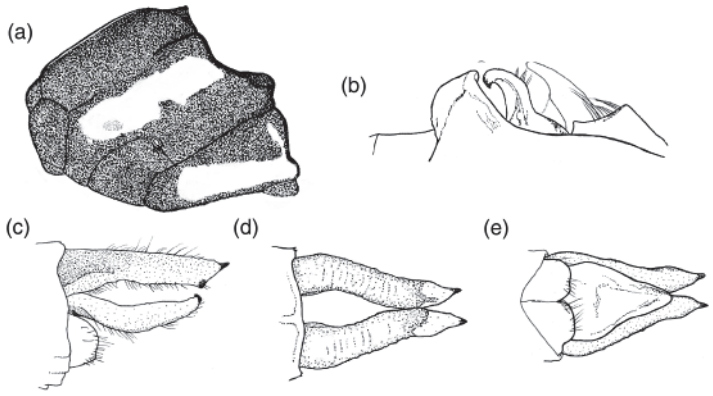

Figure 1. *Lanthanusa bilineata* sp. nov.: (a) thoracic pattern; (b) male accessory genitalia, left-lateral view; (c) male terminalia, left-lateral view; (d) same, dorsal view; (e) same, ventral view.

Lanthanusa bilineata sp. nov.
(Figures 1, 2, 3a)

Specimen studied

Holotype male: Papua New Guinea, Sandaun Province, Telefomin District, Mekil Research Station (04°48′ S, 141°39′ E; 1700 m), S. Oppel leg., ca. 1 September 2004, deposited at the National Natural History Museum Naturalis, Leiden, The Netherlands.

Etymology

The species is named for the two isolated green stripes that adorn each side of the pterothorax. The name is a first declension adjective.

Description of male

The single holotype is badly damaged and broken into multiple fragments, but no piece of the insect has been lost.

Head. Color preservation of head very poor. Labium pale, perhaps light brown or olive green in life, without any trace of a median black stripe. Labrum pale, probably olive green in life, anterior border very narrowly bordered blackish, hind margin also very dark, with small protruding median dark spot. Clypeus apparently very dark olive green, frons seemingly very dark brown or black, without any paler marks. Vertex and occipital triangle apparently entirely blackish. Rear of head dark brown to blackish, with pale triangular spot along lower margin of compound eye.

Thorax. Pronotum dark brown to black, anterior lobe tipped with yellow or pale green; middle, section with median green saddle-mark. Hind lobe fringed with long brownish yellow hairs. Synthorax matt black, striped with light green as shown in Figure 1a. Mesepisternum black with thin green stripe on either side of middorsal carina. Mesopleural suture obliterated in middle third. Mesepimeron black with single, broad, well-defined diagonal green band running from wing-bases to just above mesinfraepisternum, avoiding thoracic spiracle and leaving narrow black area behind mesopleural suture. Remainder of synthorax black except for well-defined green stripe covering lower half of metepimeron.

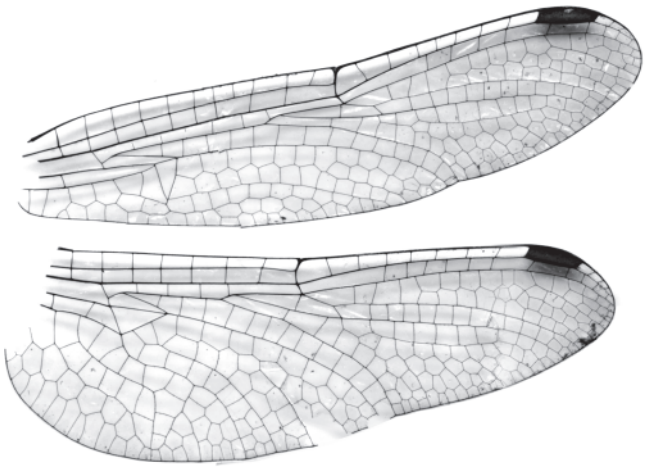

Figure 2. *Lanthanusa bilineata* sp. nov.: composite image of wings from holotype. The wings on the type were badly damaged during collection or storage, and the image presented incorporates sections of both the left and right sides.

Legs. Black, inner surfaces of anterior femora with what appears to have been a broad green stripe. Hind femora armed with small tubercles along basal half, and ca. 12 backwardly directed, short, hooked black teeth in distal half, followed by one or two long spurs near femoro-tibial joint.

Wings. (Figure 2) Hyaline. Arc at second antenodal. Fw triangle uncrossed, distal side slightly bent outward midway along its length. Fw subtriangle with single crossvein. Discoidal field of Fw commencing with two cell-rows, increasing to three at level of nodus. Cubital space of Hw with two crossveins. Proximal side of Hw triangle at Arc. 10 1/2 Ax in Fw, seven in Hw. Both wings with seven Px. Pterostigma brown with black borders.

Abdomen. Black and spindle-shaped, widest at posterior margin of S8. Marked with green as follows: S1 with median dorsal round spot; S2 with lateral spot distal to supplementary carina; S3 with lateral spot both before and after supplementary carina; S4 + 5 with pair of small round basodorsal spots; S6 with pair of large, angular, diagonal pale dorsal spots; S7–10 black, unmarked. Male terminalia shaped as in Figure 1c–e; cerci black, distal third yellow. Epiproct yellow.

Accessory genitalia. (Figures 1b, 3a) Hamular hook large, sickle-shaped; genital lobe overlying posteriorly, but not acutely pointed. Sclerotized hood of penis with pair of blunt terminal apices as shown in Figure 3a, similar to *L. donaldi* (Figure 3b) but with the paired apices more conical and not flattened as in that species.

Measurements (mm). Length of abdomen (excl. appendages) 25.5 (reconstructed from fragments); Hw length 28.

Female. Unknown.

Diagnosis

This insect, with its stout legs, black-and-green body pattern, yellow terminalia, and wing venation is unquestionably a member of the *Huonia–Lanthanusa* complex. However, it is the only known species that possesses two simple diagonal pale stripes along the side of the thorax. It also uniquely

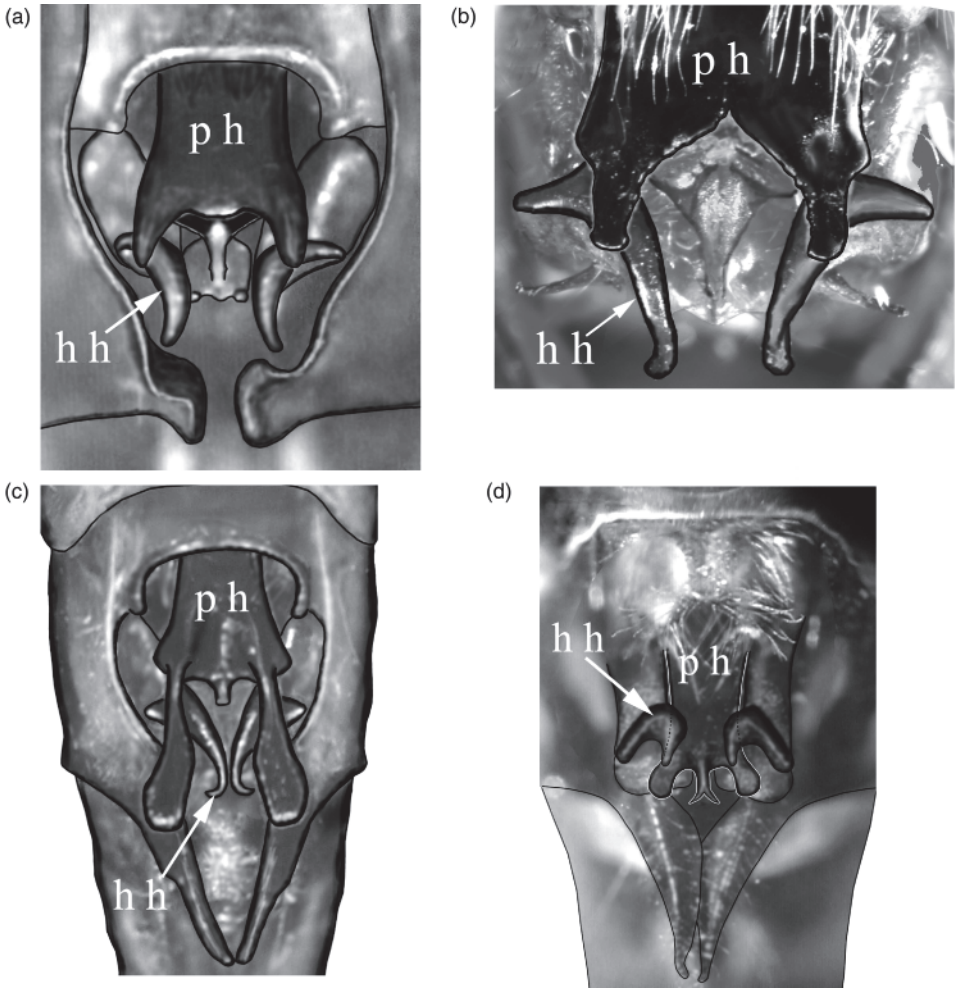

Figure 3. Ventral view of penis hood and genital hamules: (a) *Lanthanusa bilineata* sp. nov.; (b) *Lanthanusa donaldi*; (c) *Lanthanusa sufficiens*; (d) *Huonia oreophila.* Abbreviations: hh = hamular hook; ph = penile hood.

lacks antehumeral spots or stripes. *L. bilineata* possesses a terminally hooked hamule that closely resembles that of *L. lamberti* (Lieftinck, 1942), but it is distinguished from this species by its thoracic pattern, cerci, and the shape of the sclerotized hood of the penis.

Ecological data

The insect was collected at the Mekil Research Station in the western part of the central mountain range of Papua New Guinea near Mt. Stolle in the Telefomin District, Sandaun Province. The study area was in pristine montane moss forest set aside by the Sokamin people for the conservation of wildlife. The elevation of the study site ranged from 1700 to 2100 m asl and received about 5000 mm of aseasonal rainfall annually. The whole of Mt. Stolle was more or less protected as a Wildlife Management Area, and no tree cutting occurred within the study area. The site was on a broad ridge and did not have many creeks. The largest water sources were the Mei River at ca. 600 m asl at the base of the mountain and its smaller tributaries.

The collection of specimens was carried out between 25 August and 14 September 2004. During that time precipitation was very sparse and most smaller creeks had dried out or were only flowing

after occasional heavy rain. The insect was collected along small forest trails by local assistants, and the nominal collector (S. Oppel) has no personal recollection of having captured the insect.

Discussion

Fifteen species and one subspecies of *Huonia* and five species of *Lanthanusa* have been described to date, all of them from New Guinea and the neighboring islands (Schorr & Paulson, 2012), with the exception of *Huonia melvillensis* from Melville Island, Northern Territory, Australia (Brown & Theischinger, 1998). The wing venation of *L. bilineata* sp. nov. is typical of *Huonia*, according to the diagnosis of Ris (1912), but the accessory genitalia are more like those of *Lanthanusa*, as figured by Lieftinck (1942) for the four species he described. The terminalia show similarities to species in both genera. The thoracic color pattern is simplified, as discussed above. Hence, the new species we describe here possesses physical characteristics that have been used to identify either *Huonia* or *Lanthanusa* in the past, and thus casts doubt on the validity of these traits as generic level distinguishing characteristics. The combination of characteristics in *L. bilineata* sp. nov.

Table 1. Character states of known *Huonia* and *Lanthanusa* species. Character details: FW triangle (Fwt): 1 – crossed, 2 – uncrossed; crossveins in HW cubital space (Cux): 1 – one, 2 – two; HW triangle (Hwt): 1 – proximal to arculus, 2 – at or distal to arculus; thoracic pattern (thp): 1 –mesepimeron black in ventral half, with at most a narrow yellow stripe bordering interpleural suture, 2 –mesepimeron bearing large (or at least isolated) yellow spots or stripes in ventral half, often contiguous with pale areas above; genital lobe (gl): 1 – long, acutely pointed, 2 – wedge-shaped or blunt at apex; hamular hook (hh): 1 – large and robust, sickle-shaped, terminal, 2 – intermediate size, somewhat sickle-shaped, not terminal, 3 – small, usually not sickle shaped, marginal; penile hood (ph): 1 – lateral lobes short, triangular, acute, 2 – laterodistal lobes short (slightly longer than wide), conical, 3 – laterodistal lobes short (about as long as wide), spatulate, 4 – laterodistal lobes spatulate, somewhat elongate (about twice as long as wide) but much shorter than remainder of terminal segment of penis, 5 – laterodistal lobes spatulate, as long as remainder of terminal segment of penis.

Species	Fwt*	Cux*	Hwt*	thp	gl	hh	ph
L. bilineata	2	2	2	2	2	1	2
L. cyclopica	1[a]	2	1	1	—[e]	—[e]	—[e]
L. donaldi	2	2	2	1	2	1	4
L. lamberti	2	2	2	1	2	1	4[h]
L. richardi	2	2	2 or 1[c]	1	1	1	5
L. sufficiens	2	2	2	1	1	1	5
H. arborophila	2	1	2	2	1	—[f]	4
H. aruana	2	2	2[d]	2	1	3	3[g]
H. daphne	2	1 or 2	2	1 or 2	1	2	1
H. epinephela	2	1 or 2	2	2	1	2	3
H. ferentina	2	1	2	2	1	2	4
H. hylophila	2	1	2	2	1	2	3
H. hypsophila	2	—[b]	—[b]	2	1	2	4
H. moerens	2	—[b]	—[b]	2	1	2	4
H. oreophila	2	1 or 2	2	2	1	2	4
H. rheophila	2	1	2	2	1	2	4
H. silvicola	2	1	—[b]	2	1	3	3
H. thais	2	—[b]	—[b]	2	1	2	4
H. thalassophila	2	1	2	2	1	2	4
H. thisbe	2	1	2	2	1	2	1

*Characters suggested by Ris (1912) to diagnose *Huonia* from *Lanthanusa*; see text.
[a]Not evident in the original figure of Ris.
[b]No reference in original description, but Lieftinck presumed Ris's characters to be valid.
[c]17 ♂, 6♀ = 2; 1♀ = 1
[d]No reference in original description, but Lieftinck did not mention any distinction from its near ally *H. epinephela*.
[e]Male unknown.
[f]Not figured.
[g]From Lieftinck (1953): "... and probably also *aruana*."
[h]From Lieftinck (1942): "... a short, squarish, shining black, two-pronged process; the prongs flattened, slender, finger-shaped, widely distant, extending back to only half-way the curled hook of hamuli."

suggests that a reconsideration of *Lanthanusa* as a distinct genus may be warranted, and a formal revision of the *Huonia–Lanthanusa* complex is needed to clarify distinctions and similarities.

Huonia and *Lanthanusa* share a number of traits setting the two genera apart from other members of the Papuan Libellulidae. These include (a) the strongly sclerotized hood of the penis; (b) the nodus of the forewing located beyond the midpoint of the wing; (c) the spindle-shaped abdomen, which is widest about the distal margin of S8; (d) the body colors of matt black with isolated spots of yellow or bright yellow-green on the head and thorax; (e) the relatively robust blackish legs, the distal half of the hind femora bearing a series of short, stout, recurved teeth; and (f) the bright yellow color of the male and female terminalia, which contrasts starkly with the black terminal abdominal segments.

The characters set forth by Ris for the separation of the two genera are listed in columns 2–4 of Table 1, along with several other traits which might be used for this purpose.

The most informative trait may be the size and location of the penis hood in relation to the hamular hooks. The penis hood of *Huonia* typically rests inside the hamular hooks (Figure 3d), but in the known males of *Lanthanusa*, and in *L. bilineata* sp. nov., the penis hood rests outside the hamular hooks (Figure 3a–c), and this may be the only reliable means by which males of *Huonia* and *Lanthanusa* might be distinguished – we have placed the new species within *Lanthanusa* because of the position of the hamular hooks. However, we believe the distinction is not compelling when juxtaposed against the numerous similarities and points of overlap between the genera, as described above.

Species descriptions of *Huonia* and *Lanthanusa* written by Lieftinck provide ample support for uniting the two genera (Lieftinck, 1955, 1963). The discovery of *L. bilineata* sp. nov. strengthens the impression that the criteria used to distinguish the two are highly plastic and unreliable when considering larger series of specimens taken in a wider array of collecting locales and habitats.

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