

# Revision of the Papuan *Idiocnemis bidentata*-group (Odonata: Platycnemididae)

D. Gassmann

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Dirk Gassmann, Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands.

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Eight species of the Papuan genus *Idiocnemis* Selys, 1878, sharing common traits in ligula structure and colour pattern, referred to here as the *Idiocnemis bidentata*-group, are redescribed or newly described. Taxonomy and distribution are updated and one new taxon, *Idiocnemis polhemi* spec. nov., is described from South-East New Guinea.

## Introduction

The Papuan damselfly genus *Idiocnemis* Selys, 1878, is characterized by wing venational features and structural traits of the male appendages (Gassmann, 1999). The genus is confined to the Papuan region, i.e. the region from Misool Island in the west to Sudest Island in the east. The present paper deals with a group of species closely related to *I. bidentata*, which was one of the two species described by Selys (1878) and placed in the subgenus *Idiocnemis* of his 'legion *Platycnemis*'; the subgenus was later raised to generic rank (Selys, 1886). Subsequently, one species was described by Ris (1913a) and all remaining species by Lieftinck (1932, 1937, 1949, 1958), who also summarized the knowledge on the entire genus (Lieftinck, 1958). The present paper, together with the revision of the *I. inornata*-group (Gassmann, 1999), provides an update of the taxonomy and the distribution of the genus and is partly based on recent collections from New Guinea. *I. leonorae* Lieftinck, 1949, is excluded from the genus because of the entirely different ligula structure and wing venational characters (Gassmann, in prep.). This revision brings the number of *Idiocnemis* species up to nineteen.

The species of the *I. bidentata*-species-group are characterized by the elongate, subrectangular terminal lobes of the male ligula, which is very uniform among the species and the more or less sickle-shaped superior appendages (figs 28-30; cf. Gassmann, 1999).

The present paper is part of a study of the phylogeny and historical biogeography of calicnemiine taxa in South-East Asia and the Indo-Pacific.

## Material and Methods

The present study is based on specimens from the following collections:

BMNH = Natural History Museum (British Museum (Natural History)), London.

BPBM = Bernice P. Bishop Museum, Honolulu.

ISNB = Institut Royal des Sciences Naturelles, Brussels.

RMNH = National Museum of Natural History (Naturalis; formerly: Rijksmuseum van Natuurlijke Historie), Leiden.

ZMAN = Zoölogisch Museum, Amsterdam.

The following collections are referred to in the text:

CNHM = Field Museum of Natural History, Chicago (= FMNH).

MCSN = Museo Civico di Storia Naturale 'Giacomo Doria', Genoa, Italy (= MCG).

SAM = South Australian Museum, Adelaide.

SMFD = Senckenberg-Museum Frankfurt (= SMF).

SUEL = Hungarian Natural History Museum, Budapest (= TMB).

UMMZ = University of Michigan Museum of Zoology, Ann Arbor

The scanning electron microscopy (SEM) studies were performed by using a JEOL SEM 6400 microscope. The objects were cleaned in 70% ethanol, air-dried and subsequently sputtered with gold for 1.5-2 min at 20 mA before examination.

### Systematic Part

#### Key to males of the *Idiocnemis bidentata*-group

- 1(0). Body colour predominantly light brown, colour markings of synthorax wanting, except for a black middorsal stripe; ocelli bordered by diffuse black rings ..... *I. dagnyae* Lieftinck
- Body colour light brown to black, with purple, blue and/or pink markings; ocelli bordered by a subquadrangular black marking, which can be extended laterally up to eye margin ..... 2
- 2(1). Superior appendage with a subtriangular basal protrusion; pro-, synthorax and anterior part of abdomen without pruinescence ..... 3
- Superior appendage with an acute or semi-acute basal process; pro-, synthorax and anterior part of abdomen usually partly pruinescent ..... 7
- 3(2). Antehumeral stripe complete ..... 4
- Antehumeral stripe broken up into an anterior stripe and a posterior elongate spot ..... 6
- 4(3). Distalmost process of superior appendage notched (fig. 14); antehumeral stripe about half as wide as the black carinal stripe ..... *I. bidentata* Selys
- Distalmost process of superior appendage more or less acute; antehumeral stripe broad, covering almost the entire mesepisternum (figs 26, 27) ..... 5
- 5(4). Median spine between basal and distal process of superior appendage present (fig. 15); distal process of superior appendage semi-acute; anal appendages predominantly black ..... *I. polhemi* spec. nov.
- Median spine between basal and distal process of superior appendage absent (fig. 18); distal process of superior appendage thumb-shaped; anal appendages predominantly yellow-orange ..... *I. mertonii* Ris
- 6(3). Distal process of superior appendage semi-acute (fig. 16) ... *I. obliterata* Lieftinck
- Distal process of superior appendage reduced to form a tubercle (fig. 17) ..... *I. nigriventris* Lieftinck
- 7(2). Basal process of superior appendage subequal in length to distal process (fig. 20); inferior appendages subequal in length to superior ones .... *I. inaequidens* Lieftinck
- Basal process of superior appendage more robust, one third longer than distal one (fig. 19); inferior appendages three-fourth the length of superior ones ..... *I. pruinescens* Lieftinck

**Key to females of the *Idiocnemis bidentata*-group**

- 1(0). Body colour light brown, with turquoise and yellow markings only; labrum brownish ..... *I. dagnyae* Lieftinck
- Body colour light brown to black, with white, purple, blue and/or pink markings; labrum yellow-orange or yellow-greenish, occasionally the basal half somewhat brownish obscured..... 2
- 2(1). Posterior pronotal lobe with median part triangular or broadly rounded, edges rectangular or rounded ..... 3
- Posterior pronotal lobe broadly rounded with edges distinctly protruded ..... 7
- 3(2). Antehumeral stripe broken up into an anterior stripe and a posterior elongate spot ..... 4
- Antehumeral stripe complete ..... 5
- 4(3). Ventral side of synthorax with a pair of dark or medium brown longitudinal stripes; postocellar spots not separated from anterior vertical coloration; intermediate abdominal segments with border between bright subdistal marking and distal dark ring diffuse ..... *I. obliterated* Lieftinck
- Ventral side of synthorax entirely dark brown; postocellar spots subtriangular, attached to the eye margin; intermediate abdominal segments with sharp border between bright subdistal marking and distal dark ring .... *I. nigriventris* Lieftinck
- 5(3). Ventral side of synthorax with a pair of dark or medium brown longitudinal stripes; intermediate abdominal segments with border between bright subdistal marking and distal dark ring diffuse; last abdominal segment throughout brown or black ..... 6
- Ventral side of synthorax dark brown throughout, except for a white unsclerotized square area which is distinctly delimited from the area anterior to it; intermediate abdominal segments with sharp border between bright subdistal marking and distal dark ring; last abdominal segment with yellow-orange colour markings at the level of the cerci ..... *I. mertonii* Ris
- 6(5). Dorsum of second abdominal segment with a pair of narrow, longitudinal yellow stripes; cerci yellow ..... *I. polhemi* spec. nov.
- Dorsum of second abdominal segment with a pair of diffuse spots; cerci black ..... *I. bidentata* Selys
- 7(2). Posterior lobe with edges protruded into acute elongate triangles; median pronotal lobe dark brown or black, without special markings; postocellar spots subtriangular, attached to the eye margin; cerci black ..... *I. inaequidens* Lieftinck
- Posterior lobe raised, distinctly trilobate (fig. 25); median pronotal lobe with a pair of black spots; postocellar spots not separated from anterior vertical coloration; cerci yellow ..... *I. pruinescens* Lieftinck

*Idiocnemis bidentata* Selys, 1878  
(figs 1-2, 14, 21, 28-32)

*Idiocnemis bidentata* Selys, 1878: 296, 321; 1879: 305, 313-314; 1886: 108-109; Kirby, 1890: 127 (catalogue); Van der Weele, 1909: 387; Ris, 1913b: 476-477 (key & description ♂ ♀ Waigeo); Lieftinck, 1937: 2, 6; 1949: 94; 1958: 256, 280 (key); Davies & Tobin, 1984: 99; Bridges, 1991: VII.28; Tsuda, 1991: 53; Steinmann, 1997: 379.

Type material.— Lectotype (designated by Lieftinck, 1958): ♂ (IRSN), New Guinea, Laglaize, '*Idiocnemis bidentata* holotype, rev. M.A. Lieftinck'. Paralectotypes: 1 ♂, 2 ♀ (IRSN), New Guinea, Laglaize. 1 ♀ (BMNH), New Guinea, Laglaize.

Additional material.— **NW New Guinea, Vogelkop:** 14 ♂, 4 ♀ (RMNH), Sorong, 28. & 30.viii., 2. ix., 24.-31.x.1948, M.A. Lieftinck. 2 ♂ (RMNH), Sorong, 550 m, 26.x.1948, M.A. Lieftinck. 6 ♂, 12 ♀ (RMNH), NW New Guinea, Sorong, Remu, 28. & 30.viii.1948, M.A. Lieftinck. 2 ♂, 1 ♀ (RMNH), Malano, 13 km from Sorong, 14.viii.1948, M.A. Lieftinck. 31 ♂, 26 ♀ (RMNH), Malano, 15 km from Sorong, 8., 10. & 27.viii. & 2.ix.1948, M.A. Lieftinck. 1 ♀ (RMNH), Kamp. Baroe, 5 km from Sorong, 31.vii.1948, M.A. Lieftinck. 12 ♂, 10 ♀ (RMNH), Kmp. Baroe, 11 km from Sorong, 15. & 26.viii.1948, M.A. Lieftinck. 8 ♂, 4 ♀ (RMNH), Kampong Baroe, 4 km Sorong, 25.viii.1948, M.A. Lieftinck. 2 ♂ (RMNH), Sorong Wal, 9.ii.1957, G.F. Mees. 2 ♀ (RMNH), Sorong Wal, 17.iii.1957, G.F. Mees. **NE Vogelkop:** 3 ♂, 1 ♀ (RMNH), NW. New Guinea, Manokwari, 15.vi.1938, L.J. Toxopeus. 4 ♂, 2 ♀ (RMNH), Manokwari, plain of Ransiki River, 5-10 m, 1.-15.viii.1948, A.J. Kostermans. 2 ♂, 2 ♀ (RMNH), W. New Guinea, Vogelkop, Kebar Valley, 550 m, 13. & 15.i.1962, L.W. & S. Quate. 2 ♂ (BPBM), Indonesia, Irian Jaya, small forest stream nr. Aimasi Hulu, Arfak Mountains, 65 km SW of Manokwari, 450 ft., 19.x.1991, D.A. & J.T. Polhemus. 1 ♂ (BPBM, in alcohol), Indonesia, Irian Jaya Province, stream nr. Aimasi Hulu, Arfak Mountains, 19.x.1991, D.A. & J.T. Polhemus. **Waigeo Island:** 1 ♂, 1 ♀ (ZMAN), Waigeo, 6.i.1910, Mevr. de Beaufort. **Batanta Island:** 8 ♂, 12 ♀ (ZMAN), Indonesia, Irian Jaya, Batanta Island, South Coast, 0°55'S 130°40'E, 6.-7.ii.1996, A. de Boer, ZMA-Exp. 1996.

Male (Lectotype).— Measurements of lectotype.— Forewing length 22 mm, hindwing length 21.5 mm (abdomen broken).

Head.— Labrum yellow-orange, the medio-basal deepening covered by a black spot. Anteclypeus yellow-orange, postclypeus black. Vertex with a roughly subrectangular black area around ocelli, the anterior border of which somewhat protruding medially beyond anterior ocellus and laterally up to antenna, respectively. All remaining parts of frons and vertex purple.

Thorax.— Posterior pronotal lobe not raised, rounded medially; laterally not protruding, corners subrectangular. Synthorax with complete purple antehumeral stripes, joining humeral suture, somewhat separated from the latter at beginning of posterior fourth of synthorax, not reaching ante-alar ridge, but including mesostigmal plates anteriorly. Mesepimeron and mesokatepisternum black throughout. Metakatepisternum, except for lower yellow part, black. Metepisternum with anterior fourth distinctly yellow-coloured, remaining parts purple to black, but original coloration hardly recognizable any longer in the present specimen. Metepimeron brown-black anteriorly, yellow posteriorly. Underside of synthorax yellow with a pair of medium brown longitudinal stripes.

Wings.— Pterostigma medium to dark brown, moderately oblique, the upper side somewhat longer than lower side and its lower distal corner angular. Forewing with 17-18, hindwing 16-17 Px. Arculus distal to Ax2.

Abdomen.— Mainly black-brown, with dorsal and lateral markings shaped as follows: second segment with an almost rectangular marking, covering more than half of the dorsal surface of that segment; third segment with a purple semi-circular dorsal marking anteriorly; segments 3 to 6 with a diffuse basal and subdistal yellow marking, respectively; segment 7 entirely black; dorsal side of segments 8 to 9 almost entirely covered by a contiguous rectangular marking, faded away in the present specimen. Entire segment 10 deep black; upper posterior margin of latter straight. Superior anal appendages somewhat longer than last segment, sickle-shaped, provided with a blunt

triangular inner basal process and a similar, but more slender process halfway the length of appendage. Inferior appendages one third shorter than superior ones, only very slightly curved upwards. Colour of superior appendages, except for their yellow inner sides, mainly black; inferior appendages black.

Variation in males.— Other examined specimens have the more distally situated inner process of superior appendage notched (fig. 14), most distinctly in the Batanta specimens. Colour of prothorax dark brown to black; a distinct bright marking covering pleura, continuing on mesostigmal laminae at same level as antehumeral stripe. The coloration of the antehumeral stripes ranges from purple to white. Legs light brown, with diffuse black coloration on posterior sides of femura and around joints. Px number in male forewing 17-21, in male hindwing 16-18.

Ligula.— Shaped as in figs 1-2. The pointed lateral hooks are characteristic for the present species (fig. 2). The ligula of the holotype specimen could not be examined by SEM.

Female.— Similar to male, except for the following differences:

Head.— Vertex with subtriangular postocellar spots, close to eye margin.

Thorax.— Posterior pronotal lobe with its broad lateral hooks slightly raised, median part of posterior margin protruded, moderately rounded (fig. 21). Antehumeral stripe of synthorax weakening posteriorly from the beginning of last third of mesepisternum, not reaching ante-alar ridge. A fine mesepimeral stripe arising at about the end of first third of first lateral suture, turning around at end of mesepimeron. Metepisternal stripe more or less straight, joining first lateral suture, lower border situated at the level of metepisternal stigma.

Wings.— Pterostigma moderately oblique, with acute corners. Forewing with 17-19 Px, hindwing 15-18 Px.

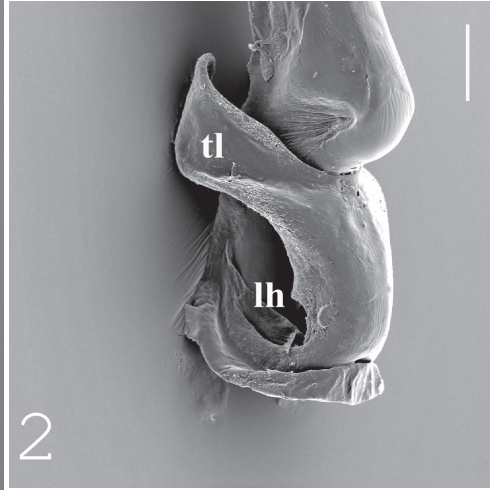
Abdomen.— Bright markings of anterior segments paired, i.e. more distinctly separated from each other than in male; dorsal markings on segment 2 occasionally reduced to a small spot, respectively. Basal markings of segments 3 to 6 bright and conspicuous, those of segments 5 to 6 forming a complete ring, respectively. Dorsal marking of segments 8 to 9 not contiguous transversally, but divided into two elongate dorso-lateral stripes, occasionally fused. Upper posterior margin of segment 10 only moderately notched, upper lateral corners not protruded. Cerci black. Valvae reaching beyond posterior margin of last segment, the projecting part being as long as almost the length of that segment.

Measurements.— Forewing length: ♂ 22-24, ♀ 21-24. Hindwing length: ♂ 21-22.5 mm, ♀ 20.5-23 mm. Abdomen length: ♂ 31-34 mm, ♀ 28-31.5 mm.

Remarks.— The male lectotype specimen is atypical with regard to the shape of the distalmost process of the superior appendage. In contrast to most other specimens examined, the process is not notched. Lieftinck presented a drawing of the appendages of the male lectotype (Lieftinck, 1937: fig. 1). However, the remaining structural and coloration characters of the type specimen agree with those in the remaining specimens listed above.

Altitudinal range.— 5-550 m.

Distribution.— Western and eastern part of Bird's Head Peninsula (Vogelkop) and the West Papuan islands Waigeo, Batanta (first record) and Salawati.



Figs 1-2, *Idiocnemis bidentata* Selys, 1878, ♂, Vogelkop, Malano: ligula from ventral (1) and lateral (2); tl = terminal lobe; lh = lateral hook. Scale bar = 100  $\mu$ m.



Figs 3-4, *Idiocnemis dagnyae* Lieftinck, 1958, ♂, Misool, paratype: ligula from ventral (3) and lateral (4). Scale bar = 100  $\mu$ m.

*Idiocnemis dagnyae* Lieftinck, 1958  
(figs 3-4, 22, 32)

*Idiocnemis dagnyae* Lieftinck, 1958: 258-260, 279 (key), figs 22-26; 1971: 83 (note on holotype ♂ and first described ♀); Davies & Tobin, 1984: 99; Bridges, 1991: VII.57; Tsuda, 1991: 53; Steinmann, 1997: 379.

*Idiocnemis mertonii* Ris, 1913a: 507-508; 1913b: 477 (p.p.: ♂ Bivak Islet).

Type material.— Holotype: ♂ (RMNH), West New Guinea, Sorong, 27.viii.1948. Paratypes: 1 ♂ (BMNH, labelled 'young specimen'), A.R. Wallace, det. M.A. Lieftinck 1958. 1 ♀ (BMNH), New Guinea, paralectotype *inornata*, Mc Lachlan Coll., BM 1938-674. **Western Vogelkop:** 1 ♀ (RMNH), West New Guinea, Sorong, 27.viii.1948. 8 ♂, 5 ♀ (RMNH), Malano, 13 and 15 km from Sorong, 8-27.viii.1948, M.A. Lieftinck. 3 ♂, 1 ♀ (RMNH), Remu, 28. & 30.viii.1948. **Central Vogelkop:** 3 ♂, 1 ♀ (RMNH), Berau Peninsula, Vengatap, nr. Aja Maroe, 500 m, xii.1937, J.M. van Ravenswaay-Claasen. **Eastern Vogelkop:** 3 ♂, 1 ♀, Steenkool & Tembuni, 24. & 28.v.1957, D. Bergman. **Misool Island:** 45 ♂, 5 ♀ (RMNH), Fakal, 17.-24.ix., 4.&7.x.1948, M.A. Lieftinck. 3 ♂ (BMNH), Fakal, 0-75 m, 8.ix.-20.x.1948, M.A. Lieftinck. 1 ♀ (BMNH), Fakal, 24.ix.1948, M.A. Lieftinck. 2 ♂ (RMNH), Solal, 14.x.1948, M.A. Lieftinck. **Southern New Guinea:** 1 ♂ (RMNH), Bivak Islet, Lorentz River, ix.1909, Dr F. Ris. Additional material.— **Southwestern New Guinea:** 1 ♂ (RMNH), surroundings of Jamur Lake, 12.xii.1954, L.D. Brongersma & L.B. Holthuis.

Male.— Head.— Labrum, ante- and postclypeus brownish-orange. Frons yellow-white. Vertex brown-greyish, without distinct postocellar spots, but occasionally intermingled with some diffuse black lines. Ocelli surrounded by black rings of variable extension, at its extreme forming a roughly subrectangular black marking as in all other *bidentata* - group species. Antennal scapus and pedicellus light brown, the latter somewhat obscured distally; flagellum dark brown.

Thorax.— Prothorax flat dorsally. Posterior pronotal lobe with its median part somewhat protruded posteriorly, but broadly rounded otherwise; dorsal coloration medium to dark brown, pleura light brown. Legs light brown, but areas around joints and subbasal parts of femura obscured by diffuse black markings. Synthorax mostly light brownish, with a broad black stripe covering middorsal carina; this carinal stripe usually broader than carina and somewhat variable: about double as wide as carina (western Vogelkop and Jamur Lake specimens) up to the same width of the carinal forks (Steenkool, Aja Maru and Misool specimens). Synthoracic colour pattern very variable, reaching from uniformly light brown (Jamur Lake) to a diffuse pattern of brown-purple, pink or violet colour markings. Underside of synthorax with a pair of medium brown longitudinal stripes.

Wings.— Pterostigma rhombic, posterior and distal side somewhat thickened; colour medium brown. Forewing with 16-19 Px, hindwing 15-17 Px. Arculus at or distal to Ax2.

Abdomen.— Segments 1 to 3 with pink dorsal markings, shaped as in *I. bidentata*. Segments 4-6 with a basal and subdistal bright marking, the border between the latter and the distal dark ring mostly not as sharp as in *I. mertonii*, except for the Aja Maru specimens; segment 7 uniformly brown; second dorsal half of segment 8 and entire dorsum of segment 9 with a pink marking. Anal appendages yellow, superiors shaped as in *I. mertonii* (fig. 18), inferior appendages two thirds the length of superiors.

Ligula.— Shaped as in figs 3-4; lateral hooks more rounded than in *I. bidentata*.

Female.— Head as in the male.

Thorax.— Median lobe of pronotum with a pair of small circular black spots covering the anterior fossae; pronotal tubercles moderately pronounced. Posterior lobe of pronotum subtriangular (fig. 22). Synthorax with carinal stripe as variable in width as in the male. Antehumeral stripes inconspicuous, consisting of an anterior diffuse yellow-white stripe closely attached to humeral suture and a posterior spot of same colour situated at the beginning of last fourth of mesepisternum. Metepisternum with its anterior third covered by a yellow marking and the posterior two thirds by a turquoise stripe. Metepimeron yellow-white. Longitudinal stripes on the underside of synthorax paler than in the male.

Wings.— Pterostigma comparatively oblique, anterior side slightly longer than posterior side. Forewing with 16-17 Px, hindwing 15-16 Px. Arculus distal or slightly distal to Ax2.

Abdomen.— Markings weaker than in the male, especially on second segment, but the border between subdistal marking and distal ring distinctly marked. Segments 8 to 10 with a dorsal black rectangle. Cerci yellow.

Measurements.— Forewing length ♂ 20.5-22.5 mm, ♀ 20-23 mm. Hindwing length: ♂ 20-22 mm, ♀ 19-22 mm. Abdomen length: ♂ 29-33 mm, ♀ 26.5-30.5 mm.

Altitudinal range.— Ca. 50-100 m.

Distribution.— Misool Island, Bird's Head Peninsula (Vogelkop), southwards to Lorentz River.

*Idiocnemis mertoni* Ris, 1913  
(figs 18, 23, 32)

*Idiocnemis mertoni* Ris, 1913a: 507-508; 1913b: 477, fig. 2 (p.p.: ♀ Alkmaar); Lief tinck, 1949: 94 (p.p.:



Figs 5-6, *Idiocnemis nigriventris* Lief tinck, 1937, ♂, Humboldt Bay (Nonno Mountains), paratype: ligula from ventral (5) and lateral (6); ligula head bent over in this specimen. Scale bar = 100  $\mu$ m.

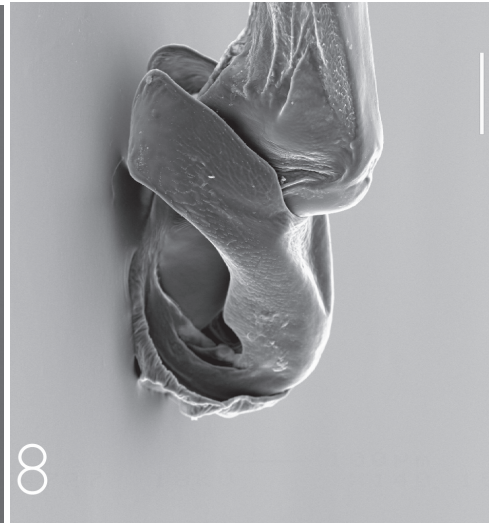
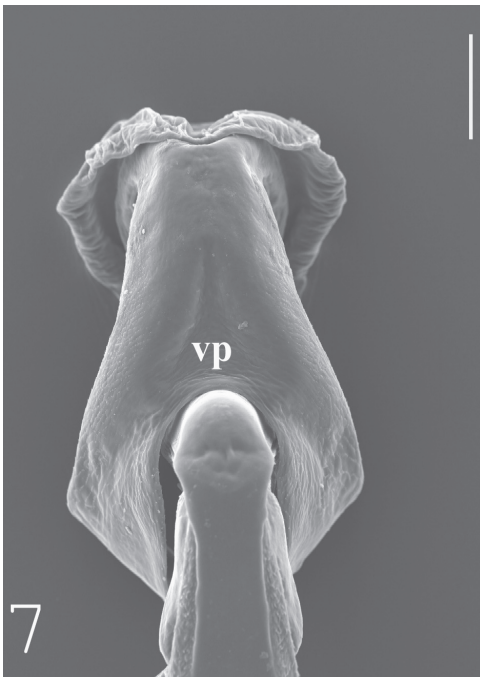


Digul River, Aru Islands); 1958: 259, 279 (key); Davies & Tobin, 1984: 99; Bridges, 1991: VII.135; Tsuda, 1991: 53; Steinmann, 1997: 380.

Material.— **Aru Islands:** 1 ♂, 1 ♀ (RMNH), Wamar Island, Dobo, iv.1932, Mrs M.E. Walsh. **Southern New Guinea:** 1 ♀ (RMNH), Alkmaar, xi.1909, Lorentz-Expedition 1909-10, Dr F. Ris. 2 ♀ (RMNH), Digul River, Mappi, iv.1938, J.M. v. Ravenswaay-Claasen. 52 ♂, 35 ♀ (RMNH), Mindiptana, ix.1958 & i-iii.1959, Br. Monulphus.

Male.— Head.— Labrum orange-brown, ante- and postclypeus medium to dark brown. Antennal scapus black, pedicellus and flagellum brown. Head colour pattern as in *I. bidentata*, but with semi-rectangular black marking around ocelli somewhat diffuse, the frontal and vertical parts anterior and lateral to it entirely purple.

Thorax.— Pronotal tubercles not modified, posterior pronotal lobe very slightly bow-shaped; pronotum dark brown to black medially, with a yellow-white lateral stripe at either side, the latter continuing on pronotal lobe anteriorly and on mesostigmal plate posteriorly, respectively. Legs light to medium brown, posterior sides and areas around joints darkened; fore legs usually somewhat darker than hind legs. Synthorax with a black stripe covering dorsal carina, laterally extending usually as far as the width of dorsal carina, respectively. Antehumeral purple stripe broad, covering almost the whole surface of mesepisternum, joining humeral suture up to the last fourth of mesepisternum, not reaching ante-alar ridge. Mesokatepisternum and anterior third of mesepimeron dark brown to black; remaining part of mesepimeron purple, with the exception of a dark square spot situated at the beginning of last third of mesepimeron, attached to humeral suture. Anterior third of metepisternum covered by a elongate yellow-white stripe, remaining two thirds black. Metepimeron with a



Figs 7-8, *Idiocnemis obliterata* Lieftinck, 1932, ♂, Araucaria Camp (3rd Archbold Expedition): ligula from ventral (7) and lateral (8); vp = ventral pit. Scale bar = 100 µm.

yellow-white triangular spot between posterior end of second lateral suture and antealar ridge; remaining parts of metepimeron medium to dark brown. Underside of synthorax dark brown to black with the exception of a white posterior area, which is sharply delimited from the remaining ventral surface.

Wings.— Pterostigma moderately oblique, medium brown. Forewing with 16-20 Px, hindwing 15-19 Px. Arculus at or slightly distal to Ax2.

Abdomen.— Segments 1 to 3 with purple dorsal markings as in *I. bidentata*; segments 3 to 5 with a subdistal bright and a distal dark brown marking, the border between them sharply defined, segments 4 to 5 also with a bright basal marking. Segment 6 with weaker markings, segment 7 mainly dark brown. Dorsal surface of nearly the entire posterior half of segment 8 and the whole length of segment 9 covered by a purple marking. Segment 10 with posterior dorsal margin medially incised, so that the paraproct is visible from dorsal; dorsal margin of that segment laterally hooked. Superior anal appendages strongly curved (fig. 18), yellow to yellow-brown. Inferior appendages two thirds the length of superiors.

Ligula.— Structurally not different from *I. dagnyae*.

Female.— Head.— Colour pattern more uniform than in the male; brown rings around ocelli and brown stripes lateral to ocelli, occasionally entirely reduced. Labrum and postclypeus light-orange, anteclypeus yellow-white.

Thorax.— Prothorax with anterior fossae marked with brown-black, posterior deepening traverse; posterior lobe characteristically shaped: a median - blunt or rounded - triangle is joined by two lateral hooks (fig. 23). Pro- and synthoracic colour patterns more or less as in the male, but generally somewhat paler.

Wings.— Forewing with 15-18 Px, hindwing 14-16 Px.

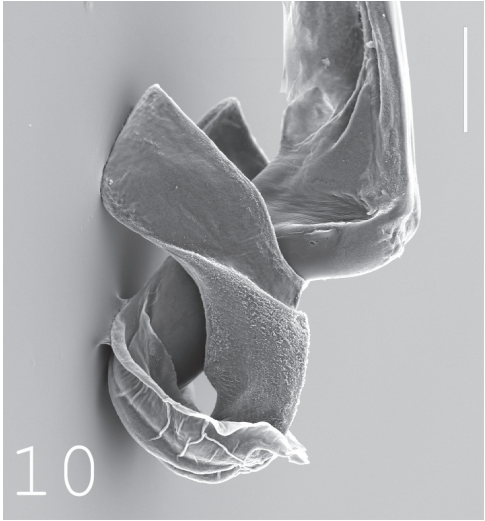
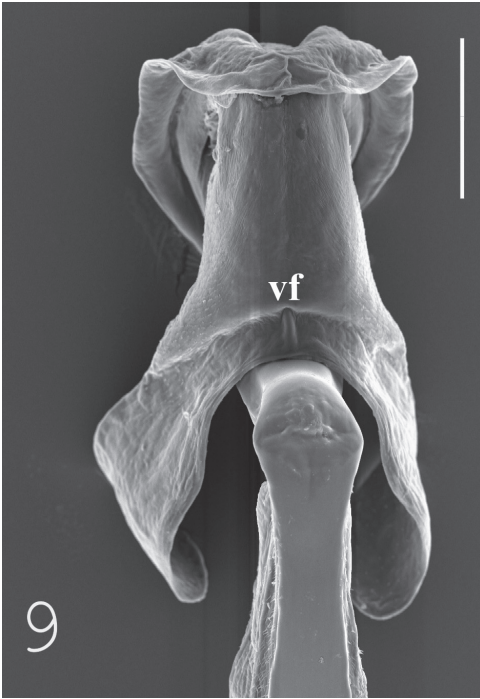
Abdomen.— Segment 2 with posterior margin of dorsal marking laterally somewhat extended, distal rings of segments very clearly defined. Dorsum of segment 8 entirely covered by a yellow rectangle. Segment 9 mainly yellow dorsally, but with a median black stripe reaching from anterior margin to the beginning of last third of that segment. Segment 10 with two yellow half-circles, in between a dorsal black triangle. Cerci yellow, their tips somewhat darker. Projecting part of valvae slightly shorter than length of last abdominal segment.

Measurements.— Forewing length: ♂ 20-23 mm, ♀ 18.5-23.5 mm. Hindwing length: ♂ 17.5-23 mm, ♀ 17.5-23 mm. Abdomen length: ♂ 28.5-31.5 mm, ♀ 26-32 mm.

Remarks.— The specimens examined were compared with Ris' sufficiently detailed original description of the type series (in SMF, Frankfurt). The present species is very similar to *I. dagnyae* with regard to structural characters, e.g. the male appendages and the ligula. However, the shape of the female posterior pronotal lobe (fig. 23) differs distinctly from that of *I. dagnyae* (fig. 22). Moreover, although some coloration characters underly a considerable intraspecific variability, especially in *I. dagnyae*, there are diagnostic character states which are apparently fixed in both population groups, as the coloration of the underside of the synthorax and the colour of the first antennal segment. This suggests that the two taxa indeed represent two historically separate lineages and can be considered two different species.

Altitudinal range.— Lowland species, no exact data available.

Distribution.— Aru Islands and southern New Guinea.



Figs 9-10, *Idiocnemis inaequidens* Lieftinck, 1932, ♂, Papua New Guinea, Morobe Province, ligula from ventral (9); ♂, Umi River, Markham Valley, ligula from lateral (10); vf = ventral fold.



Figs 11-12, *Idiocnemis pruinescens* Lieftinck, 1949, ♂, Cape Vogel Peninsula, Menapi, ligula from ventral (11) and lateral (12). Scale bar = 100  $\mu$ m.

*Idiocnemis nigriventris* Lieftinck, 1937  
(figs 5-6, 17, 32)

*Idiocnemis nigriventris* Lieftinck, 1937: 8-9, fig. 2 (♂ appendages); 1958: 257, 281 (key); 1971: 103 (lectotype designation; note on lectotype and first described ♀); Davies & Tobin, 1984: 99; Bridges, 1991: VII.147; Tsuda, 1991: 53; Steinmann, 1997: 380.

Type material.— Lectotype: ♂ (RMNH), Humboldt Bay, Hollandia, i.1932, W. Stüber. Paralectotypes: **Northern New Guinea:** 1 ♀ (RMNH), same data as lectotype. 4 ♂ (RMNH), Humboldt Bay, Hollandia, 300 m, xi-xii.31, W. Stüber. 7 ♂ (RMNH), Humboldt Bay, Hollandia, 40 km south of Hollandia, 300 m, iii.1932, W. Stüber. 2 ♂ (RMNH), Humboldt Bay, Hollandia, Nonno Mts., Koffo, 400 m, 19.-21.ii.1932, W. Stüber. 1 ♂ (RMNH), Humboldt Bay, Hollandia, Pim, 300 m, v.1933, W. Stüber. 8 ♂ (RMNH), Humboldt Bay, Hollandia, ix.1933, W. Stüber. 4 ♂ (RMNH), Humboldt Bay, Hollandia, Nonno Mts., Njan Sanke, 400 m, 20.xi.1935, W. Stüber. 1 ♂ (RMNH), Humboldt Bay, Hollandia, East Tami, 23.x.1935, W. Stüber. 1 ♂ (RMNH), Humboldt Bay, Hollandia, Njan Sanke, 15.-30.xi.1935, W. Stüber. 2 ♂ (RMNH), Humboldt Bay, Hollandia, Nonno Mts., Koffo, 400 m, 30.xi.1935, W. Stüber.

Male.— Head.— Labrum yellow, with medio-basal deepening covered by a dark marking. Anteclypeus light brown, postclypeus dark brown. Frons up to the level of antennal sockets yellow-orange, vertex black, except for a pair of brown-grey subtriangular postocellar spots and a narrow transverse stripe of same colour, joining the occipital ridge. Postocellar spots comparatively small, not touching frontal stripe as in *I. bidentata*, but broadly attached to eye margin. Antennal scapus dark brown, pedicellus light brown, flagellum medium to dark brown.

Thorax.— Pronotal tubercles flat, but slightly rounded in lateral view. Posterior pronotal lobe medially rounded, somewhat hooked laterally. Pronotum dark brown to black, pleura yellow-brown. Legs mainly light brown, comparatively bright, with black markings at joints only, but forelegs occasionally somewhat darkened. Antehumeral stripe interrupted, consisting of an anterior stripe joining humeral suture and a posterior elongate spot, apart from humeral suture and ante-alar ridge. A distinct square spot above the posterior end of upper margin of purple stripe covering mesepimeron and metepisternum. Underside of synthorax dark brown to black throughout.

Wings.— Pterostigma moderately oblique; colour medium brown. Forewing with 17-20 Px, hindwing with 15-18 Px. Arculus at or slightly distal to Ax2.

Abdomen.— Segments 1 to 3 covered by pink dorsal markings, segment 1 with a transverse stripe covering almost the whole dorsum of the second half of that segment, segment 2 with a roughly heart-shaped marking situated somewhat anterior to the middle of the segment, segment 3 with a similarly shaped anterior marking. Segments 4 to 6 with a basal and subdistal light marking, respectively, and a distal black ring. Segment 8 to 9 dorsally covered by a contiguous pink marking, its anterior border triangular, starting about halfway the length of segment 8. Segment 10 dark brown to black.

Superior anal appendage (fig. 17) with a tubercle instead of a distal third spine-like process as in *I. obliterated*. Inferior appendages three-fourth the length of superior ones. Colour of appendages mostly medium brown to black, but inner side yellow-brown.

Ligula.— Laterally compressed, narrow; distal part, just before insertion of terminal lobes, distinctly folded (fig. 5). Lateral hooks rounded (fig. 6).

Female (paralectotype).— Similar to male.

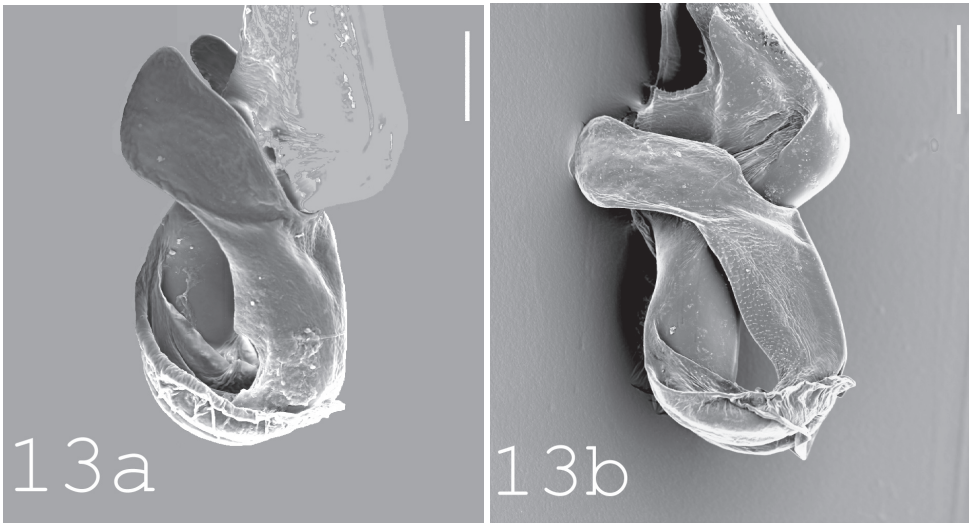
Thorax.— Pronotum with flat pronotal tubercles. Posterior lobe broadly rounded, very slightly bow-shaped, the sides shaped as somewhat rounded rectangles, not protruded. Colour of prothorax medium to dark brown, intermingled with black, the sides yellow. Synthorax of light brown ground-colour, with bright yellow antehumeral stripes, broken up as described for the male. Metepisternal stripe of same colour, partly reaching beyond first lateral suture. A yellow-white spot at anterior end of metepimeron. Anterior ends of humeral, first and second lateral suture marked with a more or less distinct elongate black spot. The entire underside of synthorax dark brown.

Wings.— Forewing with 18 Px, hindwing 17-18 Px.

Abdomen.— Dorso-lateral markings of segments 1 to 3 shaped as in *I. obliterata*, yellow-white coloured. Segment 8 with a yellow rectangle covering almost the entire dorsum except for its first fourth. Dorsum of Segment 9 mainly yellow, but intruded from anterior margin by a diffuse black irregular rectangle. Segment 10 with a dorsal black semi-circle extending from anterior to posterior margin. Cerci yellow.

Measurements.— Forewing length ♂ 22-24.5 mm, ♀ 23.5 mm. Hindwing length: ♂ 21-22.5 mm, ♀ 22.5 mm. Abdomen length: ♂ 32-34 mm, ♀ 30.5 mm.

Remarks.— Only a single female specimen of the present species is known. It differs from the *I. obliterata* females mainly in the shape of the posterior lobe of prothorax, the edges of which are not pronounced. No holotype had been designated in the original description. However, an envelope labelled 'types' in M.A. Lieftinck's handwriting in the Leiden collection contents the male (with associated female) from Humboldt Bay which later was designated as lectotype by Lieftinck (1971).



Figs 13a-13b, *Idiocnemis polhemi* spec. nov., ♂, Southern Highlands, North of Mount Bosavi, ligula from lateral, specimens from an altitude of 380 m (a) and 1250 m (b). Scale bar = 100  $\mu$ m.

Altitudinal range.— 300–400 m.

Distribution.— Northern New Guinea.

*Idiocnemis obliterata* Lieftinck, 1932  
(figs 7-8, 16, 24, 32)

*Idiocnemis obliterata* Lieftinck, 1932: 499, figs 4-5 (synthorax, ♂ and ♀ colour pattern; ♂ appendages; Hollandia, Cycloops Mts., Meervlakte); 1949: 95 (central northern New Guinea, Toricelli Mts.); 1958: 257, 280-281 (key); 1971: 103 (lectotype designation; note on lectotype and first described ♀); Davies & Tobin, 1984: 99; Bridges, 1991: VII.150; Tsuda, 1991: 53; Steinmann, 1997: 380.

Type material.— Lectotype: ♂ (RMNH), Hollandia, ix.1930, (from cop.), W. Stüber. Paralectotypes: **Northern New Guinea:** 24 ♂, 4 ♀ (RMNH), Humboldt Bay, Hollandia, 27.viii.-4.ix.1930, i.-ii., ix.-xi.1931. Additional material.— **Northern New Guinea:** 49 ♂, 11 ♀ (RMNH), Humboldt Bay: Hollandia, Kressi (300 m), Nettar (200 m), Njan Sanké, Sentani, Agaffo-Sojo, Tamivlakte, Tomfar (Bewani River-terr.), i., iv.-vi.1932, ii.1933, xi.1935, i.-ii., 25.ix.1939. 1 ♀, Genjem, 1.-10.iii.1960, T.C. Maa. 1 ♀ (RMNH), Sugoitei, W.W. Brandt. **Central northern New Guinea:** 6 ♂, 4 ♀ (RMNH), Bernhard Camp, 50-100 m, 17.ix.1938, 7.ii., 6.-13.iv., 13.vi.1939; 36 ♂, 28 ♀ (RMNH), Araucaria Camp/Araucaria River, 800-900 m, 2.-3.ii., 1.-30.iii., 2.iv.1939; 2 ♂ (RMNH), Rattan Camp (Tusschen Camp), 1000 m, 7.ii.1939; all from 3rd Archbold Expedition, L.J. Toxopeus.

Male.— Head.— Labrum yellow-orange, ante- and postclypeus medium to dark brown. A subquadrangular black marking covering area around the ocelli. Remaining parts of head grey-purple, without distinct postocellar spots. Antenna medium to dark brown.

Thorax.— Pronotal tubercles not modified, posterior pronotal lobe medially rounded, somewhat hooked laterally; colour of prothorax medium to dark brown. Legs light brown, but areas around joints and posterior ridges of femura darkened; subbasal areas of femura somewhat obscured. Synthorax with dorsal black stripe at its widest point nearly as broad as posterior carinal fork, but its median part laterally extended, so that antehumeral stripe is broken up into an anterior stripe reaching nearly up to middle of synthorax and a round or oval spot situated at the beginning of posterior third of mesepisternum. Mesepimeron with a purplish stripe, curving dorsal and usually touching humeral suture. Upper half of metepisternum covered by the continuation of the mesepimeral stripe; lower half of metepisternum with a black stripe, continuing on upper half of metepimeron; lower half of metepimeron yellow. Underside of synthorax with a pair of medium brown stripes.

Wings.— Pterostigma rhombic, moderately oblique, its corners angular; colour of pterostigma medium brown. Arculus at or slightly distal to Ax2. Forewings with 16-18 Px (Humboldt Bay specimens), 18-19 Px (Bernhard Camp specimens), 19-20 Px (Araucaria Camp specimens), hindwings with 15 Px (Humboldt Bay specimens), 16-17 Px (Bernhard Camp specimens), 17-18 Px (Araucaria Camp specimens).

Abdomen.— Segment 1 to 3 with dorsal purple markings as in *I. bidentata*. Segments 4 to 6 with posterior dark rings sharply delimited, segment 7 almost entirely black; segments 8 to 9 with purple dorsal marking, covering almost the entire posterior dorsal half of segment 8 and the complete dorsal half of segment 9. Segment 10 medium brown to black. Superior anal appendages with three inner processes: a basal

subtriangular protrusion and two more distal spines of subequal size, the distalmost of them situated halfway the length of the visible part of appendage (fig. 16). Inferior appendages half as long as superior ones. Colour of appendages dirty yellow, inferiors black at tips.

Ligula.— Comparatively broad, robust, with a conspicuous triangular ventral pit (fig. 7). Lateral hooks of ligula rounded (fig. 8).

Female.— Differs from male in having less distinct body markings, especially on synthorax.

Head.— Labrum yellow, anteclypeus black, postclypeus medium brown. Frons with a bright transverse stripe. Black marking around ocelli of smaller extension and rather rudimentary as in *I. dagnyae*, remaining parts of vertex reddish-brown. Occiput with a pair of drop-shaped postocellar spots, attached to eye margin, respectively.

Thorax.— Antehumeral stripe interrupted as in male, but far less distinct, occasionally no longer recognizable. Darkest parts of synthorax medium brown. Under-side of synthorax with two brown stripes, the space between them not purely yellow as in the male, but intermingled with some diffuse light brown markings.

Wings.— Forewings with 16-17 Px (Humboldt Bay specimens), 17-18 Px (Bernhard Camp specimens), 17-20 Px (Araucaria Camp specimens), hindwing with 14-15 Px (Humboldt Bay and Bernhard Camp specimens), 16-17 Px (Araucaria Camp specimens).

Abdomen.— Posterior dorsal markings not divided longitudinally as in *I. bidentata*, but shaped as follows: posterior half of segment 8 with a yellow-orange marking reaching laterally up to the half height of pleura; segment 9 with an anterior black conical spot, followed posteriorly by a yellow-orange marking covering the remainder of the segment; segment 10 similar to preceding one, but light marking of lesser extension. Cerci yellow.

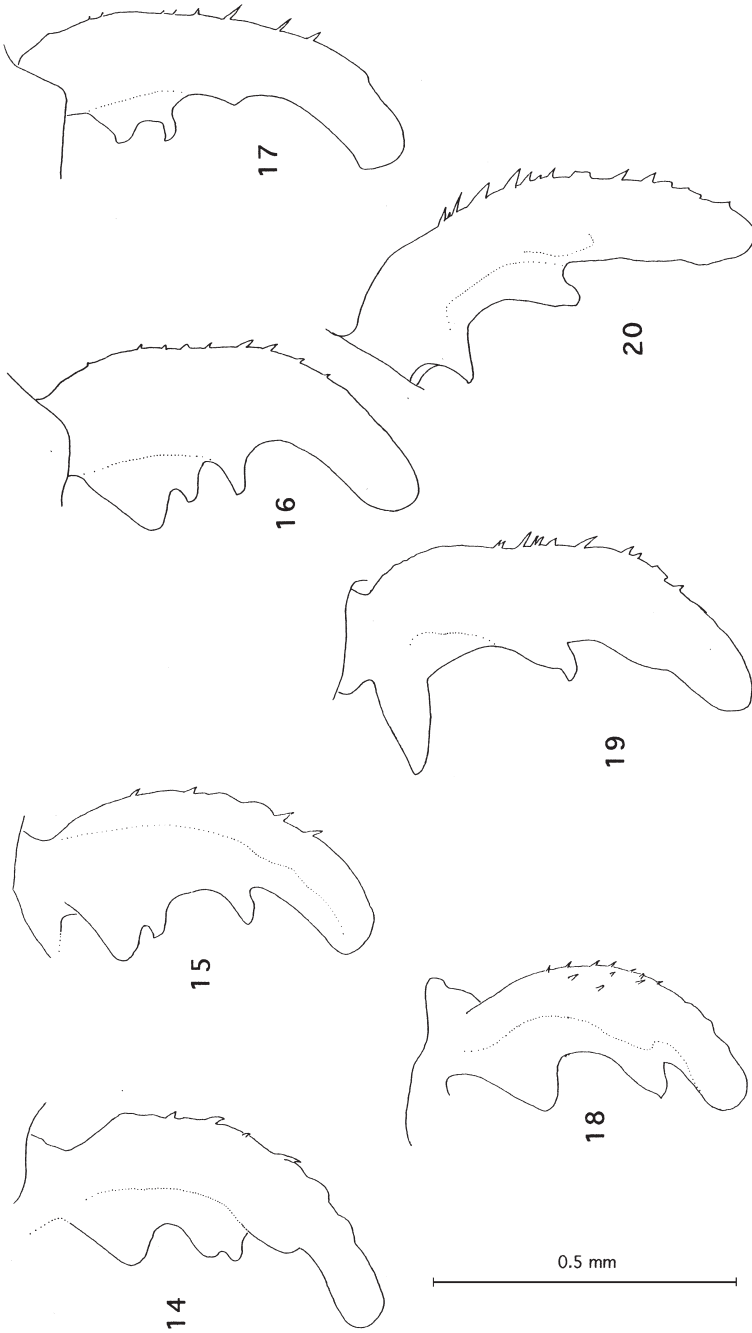
Variation.— There is considerable morphological variation in specimens from different sites and altitudes: beside the increase in size and Px number from lower to higher altitudes, the extent of bright abdominal markings differs among the specimens. The Araucaria specimens show reduced pale markings and are generally darker than the specimens from lower altitudes.

Measurements.— Forewing length: ♂ 19.5-21 mm, ♀ 21-22 mm (Humboldt Bay), ♂ 20.5-21.5 mm, ♀ 20.5-22 mm (Bernhard Camp), ♂ 23-24 mm, ♀ 23-25 mm (Araucaria River/ Camp). Hindwing length: ♂ 19-20 mm, ♀ 20-21 mm (Humboldt Bay), ♂ 19-20.5 mm, ♀ 20.5-22 mm (Bernhard Camp), ♂ 21.5-23 mm, ♀ 22-24 mm (Araucaria River/Camp). Abdomen length: ♂ 29-31.5 mm, ♀ 28-28.5 mm (Humboldt Bay), ♂ 30-32 mm, ♀ 28-30.5 mm (Bernhard Camp), ♂ 31.5-33 mm, ♀ 30-33 mm (Araucaria River/Camp).

Remarks.— No holotype had been designated in the original description. The male specimen from Humboldt Bay labelled as holotype in the Leiden collection was later designated as lectotype by Lieftinck (1971). The specimens from Meervlakte (collection?) and Toricelli Mts. (SAM, Adelaide) were not examined for the present study.

Altitudinal range.— 50-1000 m.

Distribution.— Northern and central northern New Guinea.



Figs 14-20, male superior appendages of *Idiocnemis* species, interior view: (14) *I. bidentata* Selys, Malano (Vogelkop), left superior appendage; (15) *I. pol-hemi* spec. nov., holotype, north of Mt. Bosavi, right superior appendage; (16) *I. obliterata* Liefstinck, paratype, Hollandia, left superior appendage; (17) *I. nigritenris* Liefstinck, paratype, northern New Guinea, left superior appendage; (18) *I. mertonii* Ris, southwestern New Guinea, Mindiptana, left superior appendage; (19) *I. pruinescens* Liefstinck, Menapi (Cape Vogel Peninsula), right superior appendage; (20) *I. inaequidens* Liefstinck, Morobe Province, right superior appendage. (Figs 14, 16-18 are mirror-images).



*Idiocnemis inaequidens* Lieftinck, 1932  
(figs 9-10, 20, 32)

*Idiocnemis inaequidens* Lieftinck, 1932: 503-504, figs 7-8 (♂synthoracic colour pattern, appendages); 1937: 7-8 (p.p.: NE New Guinea); 1949: 94-95 (p.p.: NE New Guinea); 1958: 256-257, 280 (key); Davies & Tobin, 1984: 99; Bridges, 1991: VII.101; Tsuda, 1991: 53; Steinmann, 1997: 379.

Material.— **NE New Guinea:** 1 ♀ (RMNH), Bainyik, nr. Maprik, 220 m, 21.vi.1961, J.L. Gressitt. 9 ♂ (4 in alcohol), 1 ♀ (BPBM), Papua New Guinea, Madang Province, tributary to Mangen River at Reinduk, on Sevan Road, 11 km SW of Bunabun, 150 m, 28.iii.1995, D.A. Polhemus, water temperature 26°C. 1 ♂ (BPBM), Papua New Guinea, Madang Province, Gum River, nr. Ohu, 11 km W. of Madang, 80 m, 27.iii.1995, D.A. Polhemus, water temperature 28°C. 2 ♂, 1 ♀ (RMNH), Papua New Guinea, Madang Province, Kau Wildlife Area, 3.vii.1997, D. Gassmann. 13 ♂, 1 ♀ (RMNH), Papua New Guinea, Madang Province, Siholum Creek, nr. Ohu village, Pos. S 05°13'59" E 145°40'44", ca. 250 m, 2.-3.vii.1997, D. Gassmann. 4 ♂, 2 ♀ (RMNH), Papua New Guinea, Madang Province, Behir Creek, nr. Ohu Community School, Pos. S 05°14'59" E 145°41'24", ca. 90 m, 2.vii.1997, D. Gassmann. 1 ♂ (RMNH), Huon Gulf, iii.1900, Carl Wahnes, 1936, ex coll. Foerster (Ann Arbor Museum No. 2078), acq. 1936. 1 ♂ (RMNH), Papua, Lae, Botanical Gardens, 6.vii.1957, E. Hardy. 1 ♀ (RMNH), Papua, Lae, Botanical Gardens, ca. 10 m, 15.v.1966, W. Vink. 1 ♀ (juvenile, RMNH), Papua New Guinea, Morobe Province, Lae, Botanical Gardens, 17.v.1997, D. Gassmann & M. Wiemers. 2 ♂ (RMNH), NE New Guinea, Lae, 0-100 m, N.L.H. Krauss. 2 ♂ (RMNH), NE New Guinea, Morobe Distr., 15 km E of Lae, tributary of Buhep River, 24.x.1972, ex coll. Donnelly. 34 ♂ (3 in alcohol), 5 ♀ (2 in alcohol, RMNH), Papua New Guinea, Morobe Province, Bualu & Gobari Creeks, nr. Lae, 21.v.1997, D. Gassmann. 6 ♂, 2 ♀ (RMNH), Papua New Guinea, Morobe Province, creeks/ponds nr. Gobari Plantation, 18.v.1997, D. Gassmann & M. Wiemers. 13 ♂, 1 ♀ (RMNH), Papua New Guinea, Morobe Province, creek nr. Mearambi River, 23.v.1997, D. Gassmann. 7 ♂, 4 ♀ (RMNH), Papua, Morobe District, Markham Valley, Umi River, 480 m, 13.-27.xi.1959, L.J. Brass, 6th Archbold Expedition. 1 ♂ (RMNH), Papua, Morobe District, Markham Valley, Water Rice, 450 m, 9.-13.xi.1959, L.J. Brass, 6th Archbold Expedition. 2 ♂ (RMNH), Territory of New Guinea, Morobe District, Finschhafen, Sago swamp, 24.ix.1964, H.M. van Deusen, ex Archbold Expedition. 1 ♀ (RMNH), Territory of New Guinea, Morobe District, nr. Finschhafen, ca. 500 ft., 13.ix.1964, H.M. van Deusen, ex Archbold Expedition. 2 ♂, 1 ♀ (RMNH), Papua New Guinea, Morobe Province, creek between Heldsbach and Sattelberg Mission, Pos. S 06°29'37" E 147°48'53", ca. 270 m, 28.v.1997, D. Gassmann. 1 ♂ (RMNH), Papua New Guinea, Morobe Province, Huon Peninsula, rocky creek, 30.v.1997, D. Gassmann. 1 ♂ (RMNH), Papua New Guinea, Morobe Province, Huon Peninsula, small creek nr. Heldsbach, 26.v.1997, D. Gassmann. 1 ♂ (RMNH), Papua New Guinea, Morobe District, stream at Gurakor, Wau Road, 500 m, 25.x.1972, ex coll. Donnelly. 3 ♂ (RMNH, in alcohol), Papua New Guinea, Morobe Province, stony creek at Gurakor, crossing Wau Road, 8.vi.1997, D. Gassmann. 2 ♂ (RMNH), New Guinea, Bulolo, 2400 ft., 29.viii.1956, Ford, ex BPBM. 2 ♂ (RMNH), Papua New Guinea, Morobe Province, Bulolo, small creek, 26.i.1997, M. Wiemers. 1 ♂ (RMNH), E. New Guinea, McAdam Park, nr. Wau, 1200-1400 m, 17.ix.1972, J.v.d. Vecht. 16 ♂, 1 ♀ (♀ in alcohol; RMNH), Papua New Guinea, Morobe Province, Little Wau Creek, Pos. S 07°20'36" E 146°42'25", ca. 1170 m, 3.-5.vi.1997, D. Gassmann & K. Yalamu. **Papuan Peninsula:** 1 ♂ (def.), 5 ♀ (RMNH), Papua, Komondo-Sengi, 26.iii.1956, J.L. Gressitt. 1 ♂ (RMNH), SE New Guinea, Mt. Lamington, Popondetta, 25 m, vi.1966, G. Lippert/P. Shanahan, ex BPBM. 1 ♀ (RMNH), Joma, Mambare River, 300 m, 27.vi.1970, R. Straatman.

Male.— Head.— Labrum dark brown to black; ante- and postclypeus black. Frons and largest part of vertex grey to reddish-brown, including antennal sockets. Area around ocelli covered by a distinct subquadrangular black marking, its anterior margin undulate. Scapus of antenna black with a distal white ring, pedicellus and flagellum dark brown. Occiput with no separate postocellar spots recognizable, the

area concerned of same colour as frons and lateral vertex. Underside of head black-pruinescent.

Thorax.— Prothorax with pronotal tubercles unmodified, posterior lobe broadly rounded, not raised; edges of posterior lobe slightly protruded. Prothorax black dorsally, its sides white-pruinescent. Legs medium to dark brown. Synthorax with dorsal black stripe as broad as anterior carinal fork at its widest point. The brown antehumeral stripes complete, almost reaching ante-alar ridge. Metepisternal stripe reaching beyond first lateral suture, showing a wave-like pattern which is characteristic for this species. Lower part of metepisternum and upper part of metepimeron black, the latter with a white-pruinescent triangular spot attached to its posterior basal corner. Underside of synthorax brown-black, its median part pruinescent.

Wings.— Pterostigma moderately oblique, anterior side slightly longer than posterior side; colour dark brown. Forewing with 16-17 Px, hindwing 14-16 Px. Arculus at or slightly distal to Ax2.

Abdomen.— Comparatively dark, dorsal markings of anterior segments as in *I. bidentata*. Segments 4 to 7 with inconspicuous and diffuse orange markings. The penultimate segments with a dorsal blue marking covering the last three fourths of segment 8 and the whole dorsum of segment 9. Segment 10, including the appendages, black. Proximal two thirds of superior appendages straight, their distal third bent in- and downwards. Inner side with a comparatively small basal spine, which is slightly curved downwards. A thumb-shaped spine situated about halfway the length of appendage (fig. 20).

Ligula.— A ventral fold close to the insertion of the terminal lobes (fig. 9). Lateral hooks of ligula rounded (fig. 10).

Female.— Head.— Labrum brown-black. Ante- and postclypeus entirely black. Frontal stripe yellow-white to grey. Occiput with conspicuous subtriangular turquoise postocellar spots as in *I. bidentata*. Remaining parts of head black.

Thorax.— Edges of posterior lobe of pronotum characteristically protruded into elongate acute triangles, but not as long and conspicuous as in *I. pruinescens*. Synthorax with grey antehumeral stripes; synthoracic coloration otherwise not as clearly defined as in the male, lacking the wave-like mesepimeral stripe.

Wings.— Forewing with 15-17 Px, hindwing 14-15 Px.

Abdomen.— Segment 1 with a pair of dorsal elongate triangles; segments 2 to 4 with bright basal and subdistal markings; segment 5 with basal marking only. Segments 8 and 9 with a dorsal pair of crescent-shaped yellowish markings, respectively.

Measurements.— Forewing length: ♂ 20-24 mm, ♀ 20-24.5 mm. Hindwing length: ♂ 19.5-23 mm, ♀ 19-22.5 mm. Abdomen length: ♂ 29.5-34 mm, ♀ 29-32 mm.

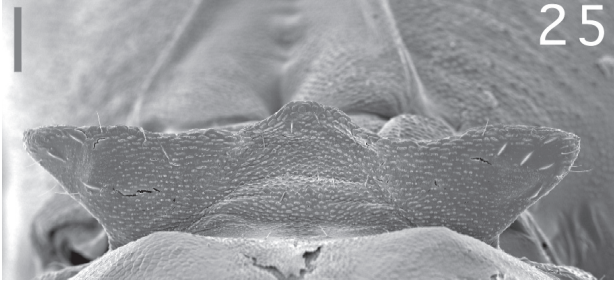
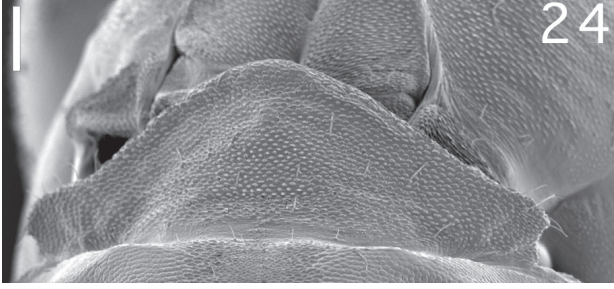
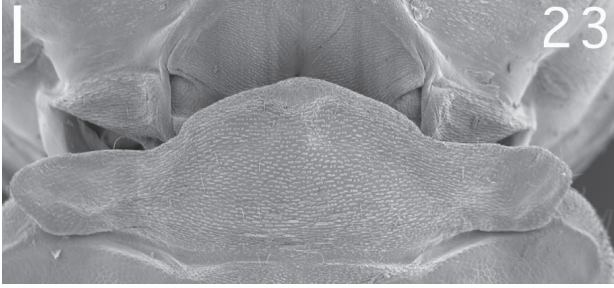
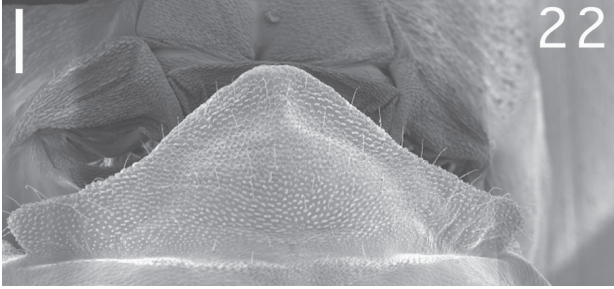
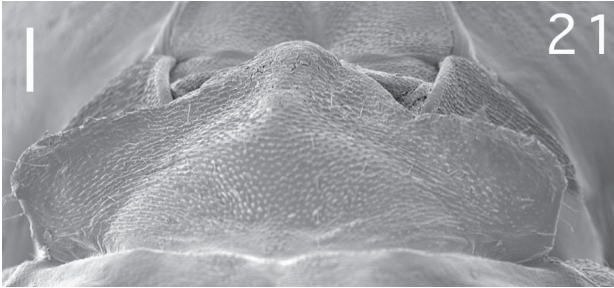
Remarks.— The male holotype (in TMB, Budapest) was not examined for this study.

Altitudinal range.— 10-1200 m.

Distribution.— Northeastern and eastern New Guinea from the northern hill-ranges up to the northern half of the Papuan Peninsula.

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Figs 21-25, posterior pronotal lobes of *Idiocnemis* females: (21) *Idiocnemis bidentata* Selys, Malano; (22) *Idiocnemis dagnyae* Lieftinck, paratype, Malano; (23) *Idiocnemis mertoni* Ris, Mindiptana; (24) *Idiocnemis obliterata* Lieftinck, Araucaria Camp (3rd Archbold Expedition); (25) *Idiocnemis pruinescens* Lieftinck, Moi Biri Bay. Scale bar = 100  $\mu$ m.



*Idiocnemis pruinescens* Lieftinck, 1949  
(figs 11-12, 19, 25, 32)

*Idiocnemis pruinescens* Lieftinck, 1949: 96-100, figs 105 (♂ appendages), 134 (♂ synthoracic colour pattern); 1958: 257, 280-281 (key); 1971: 108 (note on holotype ♂ and allotype ♀); Davies & Tobin, 1984: 99; Bridges, 1991: VII.171; Tsuda, 1991: 53; Steinmann, 1997: 380.

*Idiocnemis inaequidens* Lieftinck 1937: 7-8 (p.p.: ♂ ♀ Milne Bay).

Type material.— Holotype: ♂ (RMNH), Astrolabe Mountains, Haveri, ex cop., 700 m, 13.viii.1893, L. Loria. Paratypes: **East New Guinea, Papua:** 1 ♀ (RMNH), Astrolabe Mountains, Haveri, ex cop., 700 m, 13.viii.1893, L. Loria. 2 ♂ (RMNH), Haveri, 700 m, 31.vii.93, L. Loria, ex coll. MCG. 1 ♀ (RMNH), Milne Bay, Tauwara Bay, Dr O. Staudinger, ex coll. UMMZ Nr. 2095 (coll. Foerster), acq. 1936, labelled '*I. bidentata* Selys'. 4 ♂ (RMNH), Milne Bay, Staudinger, 1917, ex coll. SMF. Additional material.— **East New Guinea, Papua:** 3 ♂, 1 ♀ (RMNH), Bugiacoré, Ighiberei, viii.1890, L. Loria, det. M.A. Lieftinck 1957, labelled '*I. bidentata* det. R. Martin'. 1 ♂, 2 ♀ (RMNH), Moroka, ix.1893, L. Loria, labelled '*I. bidentata*' and '*I. inornata* det. R. Martin' ex coll. MCG. 1 ♂, 1 ♀ (RMNH), Hagita, near Milne Bay, 14.viii.1919, J.T. Zimmer, det. M.A. Lieftinck 1957, ex coll. CNHM. 16 ♂, 3 ♀ (RMNH), Cape Vogel Peninsula, Menapi, 0-150 m, 24.iii.1953, 11.-24.iv.1953, G.M. Tate, 4th Archbold Expedition, Camp 1. 3 ♂, 2 ♀ (RMNH), Maneau Range, 190 m, 2.viii.1953, 4th Archbold Expedition, Camp 3. 1 ♀ (RMNH), Kwagira River, Peria Camp, 50 m, 18.viii.1953, G.M. Tate, 4th Archbold Expedition, Camp 7. 4 ♀ (RMNH), Moi Biri Bay, Baiawa, 30 m, 8.-9.v.1953, G.M. Tate, 4th Archbold Expedition, Camp 2. 1 ♀ (RMNH), Jawarere Valley, Daradai Plantation, 4.ix.1959, T.C. Maa. 2 ♂ (RMNH) Brown River, edge of jungle, 23.x.1960, J.L. Gressitt.

Male.— Head.— Labrum mainly black, anteclypeus medium brown, postclypeus black. Antenna with scapus black, except for a narrow yellow ring at its distal end, remaining segments dark brown. Black quadrangular marking around ocelli comparatively regular at its borders, not extending laterally as stripes or offshoots. Remaining parts of head blue-grey. Occiput black, sharply delimited from vertex by a distinct line at either side, respectively.

Thorax.— Prothorax with pronotal tubercles unmodified; posterior pronotal lobe broadly rounded, the sides not protruded, but hooks somewhat pointed. Colour of prothorax dark brown to black medially, yellow-white (or blue-pruinescent) laterally. Legs medium brown to black, anterior sides pruinescent; forelegs darker than middle and hindlegs. Synthorax with black dorsal stripe broad, at its widest point as broad as anterior carinal fork, medially somewhat bulged out. Antehumeral purple stripes complete, covering the whole area between carinal stripe and humeral suture. Upper margin of blue-grey mesepimeral stripe more straight and less wavelike as in *I. inaequidens*. Anterior fourth of metepisternum and lower part of mesokatepisternum covered by a yellow-white stripe. Metepimeron mainly yellow-white. Underside of synthorax yellow with a pair of medium brown longitudinal stripes, pruinescent.

Wings.— Pterostigma moderately oblique, corners angular; colour medium brown. Forewing with 15-18 Px, hindwing 13-15 Px. Arculus at or slightly distal to Ax2.

Abdomen.— Anterior segments covered by purple markings which are shaped as follows: a trapezium on first, a basal rectangle on second and a basal triangle on third segment. Area around genital fossa yellow. Intermediate segments with subbasal markings wanting. Posterior dorsal marking rectangular, covering the posterior three

fourths of segment 8 and the whole dorsum of segment 9. Segment 10 entirely black. Superior anal appendages comparatively straight up to their posterior distal third, which is strongly bent in- and downwards. Inner basal process robust and semi-acute. Distal process about half as long as basal one, situated halfway between basal process and tip of appendage (fig. 19). Basal and distal processes are connected by an inner ridge. Inner dorsal tubercle distinct, yellow-coloured, as also the inner side of distal third of appendage. Remaining parts of appendages black.

Ligula.— Slender in ventral view, only very slightly folded shortly before insertion of terminal lobes (fig. 11). Lateral hooks very distinct, acute (fig. 12).

Female.— The female differs from the male as described in the following.

Head.— Labrum yellow, basally somewhat obscured. Ante- and postclypeus medium brown. Black marking around ocelli reduced to a elongate oval marking, not touching antennal sockets. A small black spot at either side of it, which is occasionally fused with the central marking.

Thorax.— Prothorax with pronotal tubercles slightly raised, the latter with a pair of comparatively large black spots. Posterior pronotal lobe somewhat elevated, with lateral ends strongly pronounced (fig. 25). Synthorax with much less clearly defined colour markings than in the male, mainly medium brown coloured. Antehumeral stripes absent. Humeral suture covered by a black stripe. Meso- and metathoracic fossae covered by a elongate black spot, respectively. Second lateral suture covered by a broad irregular black stripe, continuing on metakatepisternum. Remaining parts of synthorax medium brown, its lower half partly pruinulent.

Wings.— Forewing with 15-16 Px, hindwing 14-15 Px.

Abdomen.— Anterior segments with yellow markings, which are shaped as follows: segment 1 with a pair of dorsal yellow spots, segment 2 with two parallel dorsal yellow stripes, extending roughly about the anterior two thirds of that segment. Segment 3 with a short basal half-circle and a ventral half-ring, segment 4 to 6 coloured like third segment, but with light markings more diffuse. Segment 2 to 6 with a distal black ring, respectively. Segment 7 entirely black. Segment 8 to 9 with a pair of irregular yellow rectangles, respectively. Posterior dorsal margin of segment 10 yellow, its remaining parts and anal appendages black.

Measurements.— Forewing length: ♂ 19-23 mm, ♀ 22.5-24; hindwing length: ♂ 17.5-22 mm, ♀ 21-23 mm. Abdomen length: ♂ 28.5-32.5 mm, ♀ 30.5-32.5 mm.

Altitudinal range.— 0-700 m.

Distribution.— Papuan peninsula.

*Idiocnemis polhemi* spec. nov.  
(fig. 13a-b, 15, 26-27, 32)

Type material.— Holotype: ♂ (BPBM), Papua New Guinea, Southern Highlands Province, rocky stream at Ludesa Mission, N. of Mt. Bosavi, 700 m, water temperature 23°C, 20.iii.1995, D.A. Polhemus. Paratypes: **Papua New Guinea, Southern Highlands Province:** 12 ♂ (6 in alcohol), 1 ♀ (BPBM), Auwa Creek, nr. Kafka, NW of Kantobo, 520 m, water temperature 22°C, 9.iii.1995, D.A. Polhemus. 1 ♂ (RMNH), Auwa Creek, nr. Kafka, NW of Kantobo, 520 m, water temperature 22°C, 9.iii.1995, D.A. Polhemus. 6 ♂, 1 ♀ (BPBM), rocky stream at Ludesa Mission, N. of Mt. Bosavi, 700 m, water temperature 23°C, 20.iii.1995, D.A. Polhemus. 1 ♂ (RMNH), rocky stream at Ludesa Mission, N. of Mt. Bosavi, 700 m, water temperature 23°C, 20.iii.1995, D.A. Polhemus. 2 ♂ (BPBM), branch of upper Kara Creek (tributary

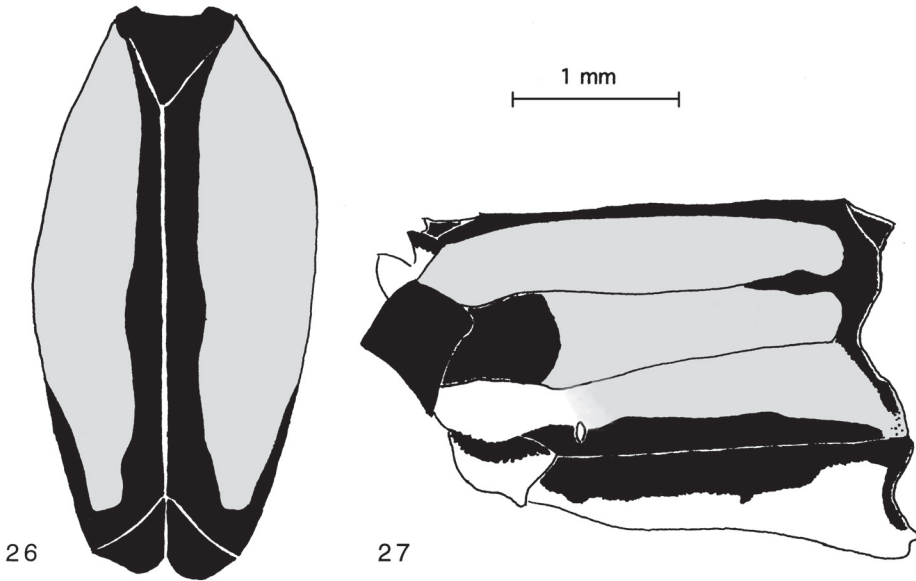


Fig. 26-27, *Idiocnemis polhemi* spec. nov., holotype ♂, synthorax from dorsal (26) and lateral (27).

to Digimu River), 5.5 km S of Moro oil camp on road to Iagifu Ridge, 900 m, water temperature 20°C, 12. and 13.iii.1995, D.A. Polhemus. 1 ♂ (RMNH), branch of upper Kara Creek (tributary to Digimu River), 5.5 km S of Moro oil camp on road to Iagifu Ridge, 900 m, water temperature 20°C, 12. and 13.iii.1995, D.A. Polhemus. 1 ♂, 1 ♀ (BPBM, in alcohol), stream 5.5 km S of Moro camp on road to Iagifu Ridge, 900 m, 12.iii.1995, D.A. Polhemus. 1 ♀ (BPBM), small rocky creek in disturbed primary montane forest, approx. 1 km N. of Tubage, NE of Moro, 1000 m, water temperature 21°C, 22.iii.1995, D.A. Polhemus. 4 ♂ (BPBM, in alcohol), small forest creek, ca. 1.25 km N. of Tobage, 1000 m, 14.iii.1995, D.A. Polhemus. 1 ♂ (BPBM, in alcohol), small rocky forest creek, ca. 1 km N. of Tobage, 1000 m, 14.iii.1995, D.A. Polhemus. 2 ♂, 1 ♀ (BPBM), small rocky creek in disturbed upland rain forest, approx. 1 km N. of Tubage, NE of Moro Oil camp, 1000 m, water temperature 21°C, 14.iii.1995, D.A. Polhemus. 1 ♀ (RMNH), small rocky creek in disturbed upland rain forest, approx. 1 km N. of Tubage, NE of Moro Oil camp, 1000 m, water temperature 21°C, 14.iii.1995, D.A. Polhemus. 5 ♂ (BPBM), small rocky stream on N. slope of Mt. Bosavi, 1250 m, water temperature 19°C, 16.iii.1995, D.A. Polhemus. 1 ♂ (RMNH), small rocky stream on N. slope of Mt. Bosavi, 1250 m, water temperature 19°C, 16.iii.1995, D.A. Polhemus. 3 ♂ (BPBM, in alcohol), creek on Mt. Bosavi, 1280 m, 16.iii.1995, D.A. Polhemus. 1 ♂ (BPBM, in alcohol), rocky stream at Ludesa Mission, N. of Mt. Bosavi, 1400 m, 20.iii.1995, D.A. Polhemus. Additional material.— **Papua New Guinea, Gulf Province:** 1 ♂ (BPBM), Wamivei Creek, near Veiru Creek, Kikori River delta, SW of Kikori, sea level, 5.iii.1995, D.A. Polhemus. **Papua New Guinea, Southern Highlands Province:** 6 ♂ (BPBM), Ofake Creek, tributary to Mubi River, 2 km NW of Kantobo, 380 m, water temperature 23.5°C, 11.iii.1995, D.A. Polhemus. 6 ♂, 1 ♀ (BPBM, in alcohol), Ofake Creek, off Mubi River, 2 km NW of Kantobo, 380 m, 11.iii.1995, D.A. Polhemus. From WWF Kikori Basin Biodiversity Survey 1995.

Male (holotype).— Measurements of holotype.— Forewing length: 22 mm, hindwing length: 21 mm. Abdomen length: 32.5 mm.

Head.— Labrum dirty orange-brown, except for the black marked medio-basal deepening. Anteclypeus dark brown, postclypeus black. Entire surface of head, except

for the central black marking around ocelli, grey coloured. Anterior extension of central black marking reaching the antennae. Scapus of antenna dark brown to black, with a narrow distal yellow ring; pedicellus dark brown, flagellum black.

Thorax.— Prothorax with median and posterior lobe flattened, posterior margin of the latter broadly rounded, but somewhat protruded medially. Colour of prothorax dark brown to black, with a bright marking covering posterior parts of pleura including mesostigmal laminae. Forelegs almost entirely black, middle and hind pair anteriorly yellowish, posteriorly blackish. Synthorax with dorsal black stripe as wide as anterior fork of carina, its median part distinctly bulged laterally (fig. 26). Antehumeral stripes grey, joining humeral suture posteriorly up to beginning of posterior third of mesepisternum. Mesokatepisternum and anterior third of mesepimeron entirely black, posterior two thirds of mesepimeron mainly covered by a grey marking (fig. 27). Metepisternum with a yellow stripe on its anterior fourth, otherwise upper part covered by a grey-purple stripe, lower part black. Upper part of metepimeron black, lower part yellow-white. Underside of synthorax with a pair of more or less diffuse blackish stripes.

Wings.— Pterostigma with anterior side longer than posterior side; colour dark brown. Forewing with 18 Px, hindwing 16 Px. Arculus at or slightly distal to Ax2.

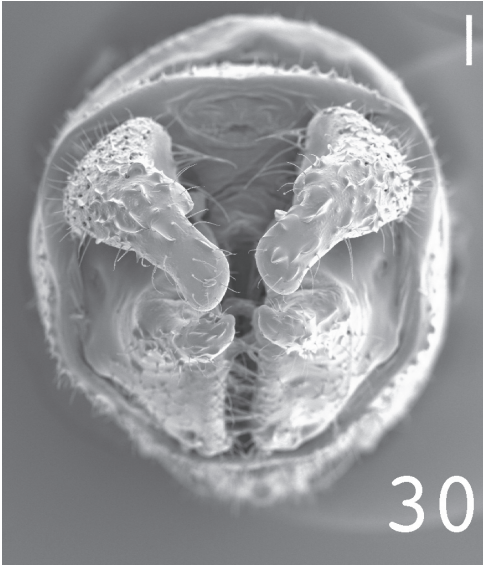
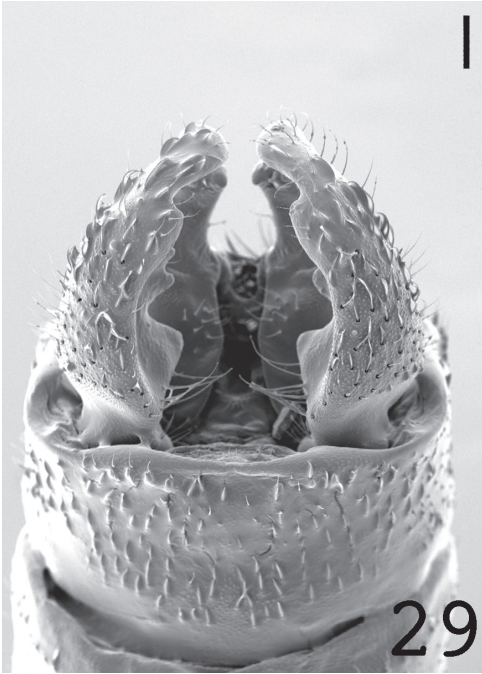
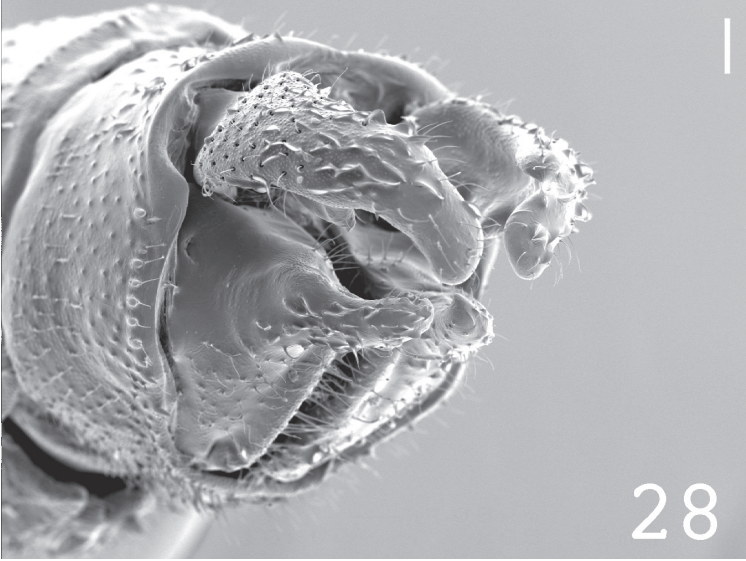
Abdomen.— Segments 1 to 3 with dorsal grey-purple markings as in *I. bidentata*. Segment 3 with a weak subdistal orange-brown marking, segments 4 to 5 with a basal and subdistal marking, respectively, segment 6 with a basal marking only. Segment 7 entirely black, segment 8 to 9 with a dorsal marking as in *I. bidentata*. Segment 10 entirely black, its upper posterior margin slightly notched, not raised. Superior appendages similar to *I. dagnyae* and *I. mertoni*, except for the additional median spine (fig. 15). Inner dorsal tubercle distinct, light-coloured. Inferior appendages three-fourth the length of superior ones. Colour of appendages black, except for the yellow tips of superior appendages.

Variation in males.— Although there is apparently no considerable variation in size and Px number among specimens from different altitudes, the specimens from 380 m (fig. 13a) and 1250 m (fig. 13b) differ in the structure of the ligula: the ligula of the first shows a ventral pit and is similar to that of *I. obliterateda*, although not as broad as in that species, the latter specimens share the overall shape of the ligula and the ventral ridge with *I. nigriventris*. There is also variation in the synthoracic colour pattern: whilst specimens in altitudes from 520 m upwards have the anterior two thirds of mesepimeron almost entirely filled up with the reddish-grey colour marking, the lower altitude specimens (380m) are close to *I. inaequidens* in their wave-like mesepimeral stripe. Px number of forewing ranges from 16 to 20, in hindwing from 15 to 18.

Ligula.— Shaped as in figs 13 a-b (see also variation section).

Female.— Head.— Labrum, ante- and postclypeus as in the male. Frons, including antennal sockets, covered by a yellow-white stripe, reaching up to the level of anterior ocellus. Postocellar spots subtriangular, greenish, attached to eye margin.

Thorax.— Posterior pronotal lobe shaped as half-circle, ending somewhat before lateral margin. Synthorax with antehumeral stripe rudimentary, fragmented into an anterior stripe covering anterior third of synthorax and a posterior spot situated at the beginning of posterior fourth of synthorax. Upper half of metepisternum covered by a yellow stripe, the posterior end of which is widened. Metepimeron as in the male.



Figs 28-30, *Idiocnemis bidentata* Selys, ♂, Malano, male appendages, (28) posterior lateral view, (29) dorsal view, (30) posterior view. Scale bars = 100 μm.



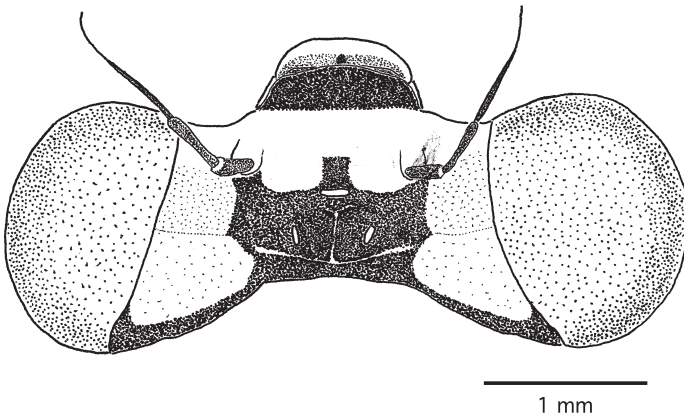


Fig. 31, *Idiocnemis bidentata* Selys, ♂, Sorong, head in dorsal view.

Wings.— Pterostigma medium brown, rather longer than wide in forewings. Forewing with 15-18 Px, hindwing 14-16 Px.

Abdomen.— Dorsal markings of segments 1 and 3 as in male, in contrast to that of segment 2 which is divided into two dorso-lateral stripes. Segment 8 to 9 with yellow-white latero-dorsal stripes as in *I. bidentata*. Cerci black.

Remarks.— This conspicuous new species is well characterized by the uniquely large extension of the synthoracic stripes and the presence of a median spine at superior appendage, which is lacking in the otherwise similar appendages of *I. dagnyae* and *I. mertoni*. From *I. obliterata*, the present species differs in the position of the distal spine, which is more distally situated than in that species.

Etymology.— The present species is named after the collector Dr D.A. Polhemus, who was so kind to make a large series of specimens available for the present study.

Measurements.— Forewing length: ♂ 21-23.5 mm, ♀ 22.5-23.5. Hindwing length: ♂ 19.5-22 mm, ♀ 21-21.5 mm. Abdomen length: ♂ 30-33.5 mm, ♀ 30.5-32 mm.

Altitudinal range.— 380-1400 m.

Distribution.— Southeastern central New Guinea.

### Distribution

Two species of the present group occur in the Bird's Head Peninsula (Vogelkop) region, whereby only *I. bidentata* is endemic to the Bird's Head Peninsula sensu stricto and *I. dagnyae* extends further to the south (fig. 32). One species (*I. mertoni*) is confined to the southern part of New Guinea including the lowlands, and the Aru islands. Furthermore, two species (*I. obliterata* and *I. nigriventris*) are endemic to the northern ranges of the mainland of New Guinea. One species (*I. polhemi*) is apparently endemic to southeastern central New Guinea, a further one (*I. pruinescens*) is restricted to the Papuan Peninsula, while *I. inaequidens* is more widespread and also occurs in the Finisterre and Adelbert Ranges.

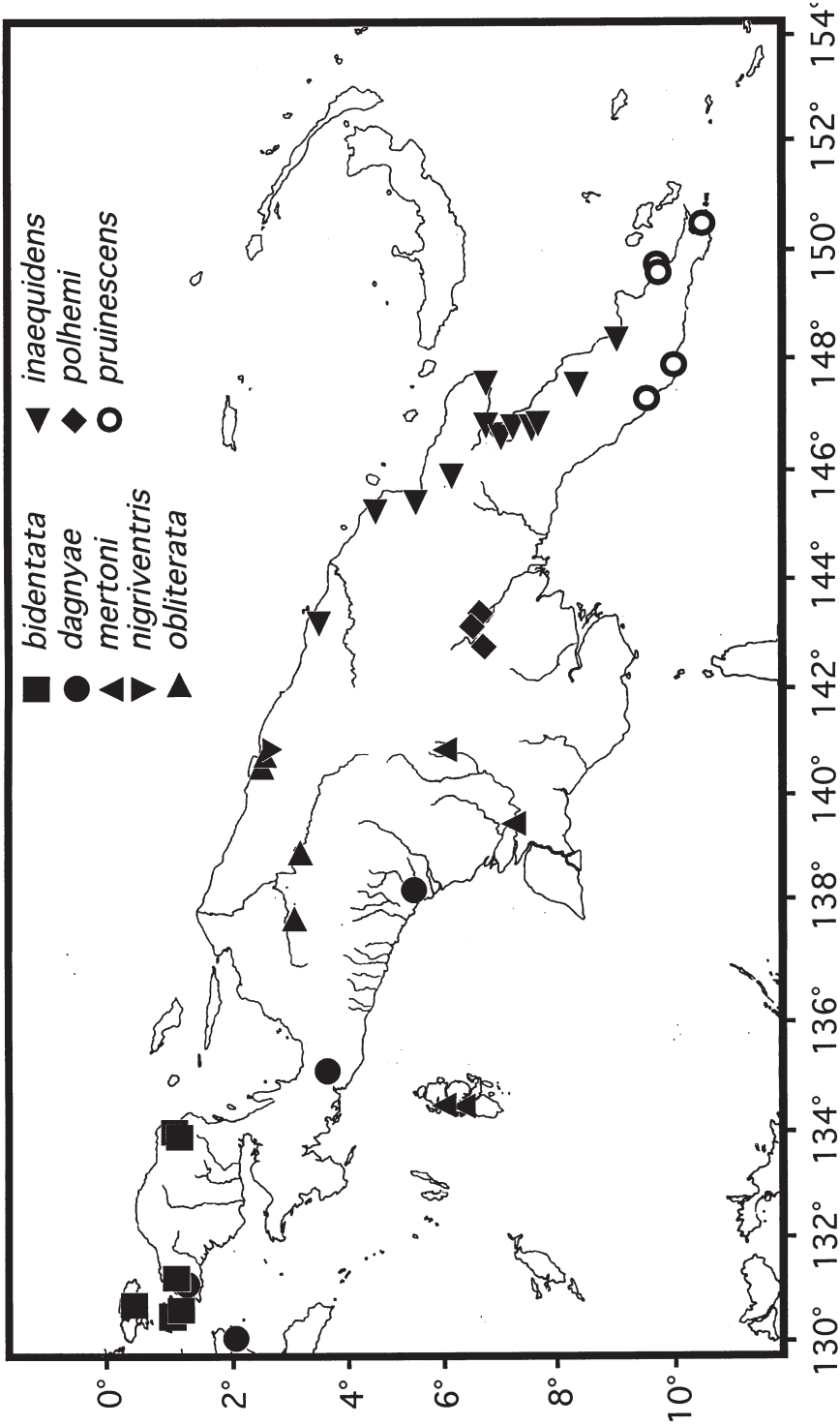


Fig. 32, distribution of species of the *Idiocnemis bidentata*-group in New Guinea.

The geographical range of the *I. bidentata*-group overlaps with that of the *I. inornata*-group (Gassmann, 1999) in the Vogelkop area, in central northern New Guinea, the northern Papuan Peninsula and in southern central New Guinea. The distribution differs from the *I. inornata*-group by the absence of species in the East Papuan Archipelagos (Lousiades, Marshall Bennett Islands) and the Bismarck Islands as well as its presence in southeastern central New Guinea. The *I. bidentata*-group reaches further southwards to the Aru Islands. Generally, the *I. bidentata*-group shows a more southern distribution than the *I. inornata*-group, which is more speciose and predominantly distributed in the northern ranges of New Guinea and its neighbouring islands.

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