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# THE PHILIPPINE GENUS *RISIOCNEMIS* COWLEY (ZYGOPTERA: PLATYCNEMIDIDAE). 1. SUBGENUS *RISIOCNEMIS**

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The genus is divided into 2 subgenera, viz. *Risiocnemis* (typified by *R. serrata* [Hagen]) and *Igneocnemis* subg. nov. (typified by *R. ignea* [Brauer]). The subgenus *Risiocnemis* is revised. 14 of the known 15 spp., incl. 10 new spp., are classified into 4 species groups, viz. (1) *appendiculata* group (*appendiculata* [Brauer], *erythrura* [Brauer], *praeusta* sp. n., *confusa* sp. n., *kiautai* sp. n., *moroensis* sp. n.); — (2) *arator* group (*arator* sp. n.); — (3) *rolandmuelleri* group (*rolandmuelleri* sp. n.); and — (4) *serrata* group (*serrata* [Hagen], *asahinai* Kitagawa, *gracilis* sp. n., *varians* sp. n., *pulchra* sp. n., *laguna* sp. n.). *R. elegans* Kitagawa is not placed into any group, since no material was available for examination. Of *gracilis* sp. n. only ♂ and from *moroensis* sp. n. only ♀ are known; from the other spp. n. both sexes are described. Females of *R. appendiculata* and *R. erythrura* are described for the first time. *R. cornuta* (Brauer), the lectotype of which is designated, is synonymized with *R. serrata* (Hagen). Separate keys to the males and females are given and a review of studies on the genus is presented.

## INTRODUCTION

*Risiocnemis* Cowley, 1934 is a rather aberrant genus of Platycnemididae endemic to the Philippine islands. Until now 15 species have been described, two of which are mere synonyms.

The present review is based mainly on two large collections of Philippine dragonflies. The material gathered by Mr Roland A. Müller and his collaborators contains over 1000 *Risiocnemis* specimens, referable to no less than 20 species, half of which are new. The collection of the late Dr F. Ris, deposited at

* Results of the Roland Müller Zoological Expeditions to the Philippines, No. 7.

the Senckenberg Museum, consists of ca. 250 specimens, mainly collected by G. Boettcher in the 1910's. This material includes many other new species, not represented in the Müller material. Besides these, all *Risiocnemis* specimens deposited at the Rijksmuseum van Natuurlijke Historie (Leiden) and the Institut Royal des Sciences Naturelles (Brussels) were also studied, and necessary type specimens were borrowed from other museums.

Since the material at hand more than doubles the number of known species, a revision of the genus is attempted, in spite of the belief that some further new species will soon be discovered from the numerous, still inadequately studied islands, or await description in different museum collections, not studied by me.

Using the criteria presented by LIEFTINCK (1981) in his species group division, the genus is divided into two subgenera, *Risiocnemis* and *Igneocnemis* subgen. nov. The revision will be presented in two parts, the present paper dealing with species of the subgenus *Risiocnemis,* typified by *R. serrata* (Hagen), while the second paper will be concerned with species of the subgenus *Igneocnemis,* typified by *R. ignea* (Brauer). The latter will also contain a general discussion on the genus, including a detailed comparison of the two subgenera, an attempt to clarify the affinity of the subgenera and species groups within them, and notes on the distribution pattern of the species.

It is evident that *Risiocnemis* is a fairly large genus, developed in an array of closely similar species in different islands, many of which appear restricted to one or a few islands. The bulk of the known species occur in Luzon and Mindanao; no species is known from the Palawan island group and from the Sulu archipelago. All species seem to be strictly rheophilous, mostly inhabiting small jungle streams and creeks.

## GENUS *RISIOCNEMIS* COWLEY

*Risiocnemis* COWLEY, 1934: 204.
= *Hypocnemis* Hagen *in* SELYS LONGCHAMPS, 1863: 153-154; preoccupied name.
= *Prionocnemis* SELYS LONGCHAMPS, 1886: 222-223; preoccupied name.
**Type species:** *Hypocnemis serrata* Hagen *in* SELYS LONGCHAMPS , 1863: 154-155.

### REVIEW OF LITERATURE

The genus *Hypocnemis* Hagen was erected in SELYS LONGCHAMPS (1863; pp. 153-154; sep.: pp. 9-10) to accommodate a single species, *H. serrata* Hagen, from Manila. It was one of the four full genera in the "Legion *Platycnemis*" of SELYS LONGCHAMPS (1863). In the corrections section of his "Révision du Synopsis des Agrionines", SELYS LONGCHAMPS (1886, pp. 222-223) proposed the name *Prionocnemis* as a substitute name for *Hypocnemis,* which is preoccupied by *Hypocnemis* Cabanis, 1847 in Aves.

A few years later SELYS LONGCHAMPS (1891a; p. 216) found out that *Prionocnemis* was also

a preoccupied name — by *Prionocnemis* Schiödte, 1837 in Hymenoptera, and he somewhat conditionally proposed *Nesocnemis* as a substitute name, stating "Cela nous oblige malheureusement à changer encore. Prenons si l'on veut le nom de *Nesocnemis*". This publication is dated 1st October 1891. However, in another paper published in the same year, but after 7th November (possibly in December), SELYS LONGCHAMPS (1891b) introduced the same name *Nesocnemis* as a new subgeneric name to accommodate a single species from Madagascar, *Nesocnemis sinuatipennis* n. sp., and placed the new subgenus into *Prionocnemis*[1]. Thus, he created a nomenclatorial confusion, which must have remained unnoticed by COWLEY (1934), who introduced the name *Risiocnemis* to replace *Prionocnemis*.

Strict adherence to the rules would require keeping *Nesocnemis* Selys, 1891 as the correct replacement name for *Prionocnemis* Selys, 1886 and to consider *Risiocnemis* Cowley, 1934 as an unnecessarily introduced junior synonym. However, I prefer to continue the use of *Risiocnemis*, since in my view, changing of this established name, in use for more than 50 years, to a name never used after its introduction 100 years ago and forgotten even by its own author after one month (!), would not help to bring stability in the nomenclature.

BRAUER (1868) described five species in *Hypocnemis: ignea, appendiculata, cornuta, atropurpurea* and *erythrura*. SELYS LONGCHAMPS (1882) added *H. haematopus* and *H. flammea* and provided an amended diagnosis of the genus and a key. SELYS LONGCHAMPS (1886; pp. 97-106) gave detailed descriptions of the 8 known *Hypocnemis* species.

Over 50 years elapsed until new species were described by KIMMINS (1936): *Risiocnemis incisa* and *R.reflexa*. NEEDHAM & GYGER (1939) treated the genus still under the name *Prionocnemis*. They pointed out the correlation of the crenulated wing apex with the distal position of the arculus, and described one new species, *P. rubripes*. Two further taxa, *Prionocnemis atripes* and *P. tendipes*, were added by NEEDHAM & GYGER (1941). These have remained the latest novelties of the genus until KITAGAWA (1990) recently described *R. asahinai* and *R. elegans*.

LIEFTINCK (1958, p. 254; 1963, p. 526) discussed briefly the affinities of *Risiocnemis* with some Oriental and Papuan platycnemidid genera. In a very useful paper on some little known species, LIEFTINCK (1981) pointed out that Kimmins's *R. incisa* and *R. reflexa* were erroneously labelled as originating from Borneo, and that they in fact came from the Philippines, likely from Luzon, *reflexa* being conspecific with *haematopus* Selys, 1882. He also presented a diagnosis of the genus, divided it into two species groups and gave a detailed characterization of the second species group, typified by *R. ignea*.

KIAUTA & KIAUTA (1981) studied the karyotypic morphology of *R. incisa* and discussed the survival potential and distribution of the species in terms of cytotaxonomic evidence.

The larval stage is known only in *R. serrata*. It was first described and illustrated by NEEDHAM & GYGER (1939; pp. 271-273, pl. 14). Subsequent descriptions and discussions on its affinities to larvae of related genera were presented by LIEFTINCK (1958, pp. 285-286; 1963, pp. 526, 533-534, 540; 1981, pp. 96-97).

## DIAGNOSIS OF THE GENUS

Diagnoses or definitions of the genus have been presented by SELYS LONGCHAMPS (1863, pp. 153-154, sep:. pp. 9-10; 1882, pp. 22-24; 1886, pp. 97-98), LIEFTINCK (1933, pp. 127-128), NEEDHAM & GYGER (1939, pp. 269-270) and LIEFTINCK (1981, pp. 94-95). Thus only a brief diagnosis is presented here:

[1] Already the next year SELYS LONGCHAMPS (1892, p. 106) found out that his subgeneric name *Nesocnemis* is a junior synonym of *Tatocnemis* Kirby, 1889, a genus at present placed in Megapodagrionidae.

A genus of the platycnemidid Calicnemidinae, characterized by the aberrant position of R4+5 and IR3, the origin of which is situated more distally than usual; R4+5 arise at the subnodus or slightly distal to it and IR3 is removed to the level of Px3-5. R3 and IR2 are situated further distally, in the position typical of the family. The border of the wing apex is either distinctly crenulated, or smoothly sinuate due to shallow emarginations between the tips of the main veins.

## DEFINITION OF SUBGENERA

LIEFTINCK (1981) divided the genus into two species groups, the first of these typified by *R. serrata* and the second one by *R. ignea*. He gave good characterizations of both groups and wrote (p. 95) that his "...group characters may ultimately prove useful for the definition of subgenera". Considering the scope of differences in the two groups, especially in venation and penile structure, I think that it is best to give the groups a subgeneric status.

Table I

Details of venation in species of the subgenus *Risiocnemis:* origin of veins IR3, R3 and IR2 (at level of postnodals ...—...), and the number of postnodals. — [Fw = fore wing, hw = hind wing]

| Species | IR3 | | R3 | | IR2 | | Postnodals | |
|---|---|---|---|---|---|---|---|---|
| | fw | hw | fw | hw | fw | hw | fw | hw |
| *appendiculata* | 4-5 | 3-4 | 7-9 | 6-8 | 10-13 | 9-12 | 17-21 | 15-20 |
| *erythrura* | 4-5 | 3-4 | 7-9 | 7-8 | 10-12 | 9-12 | 20-21 | 19-20 |
| *praeusta* sp. n. | 4-5 | 3-4 | 7-9 | 7-8 | 11-13 | 9-11 | 17-22 | 16-20 |
| *confusa* sp. n. | 4-5 | 3-4 | 8-9 | 7 | 11-12 | 10-11 | 20-22 | 19-21 |
| *kiautai* sp. n. | 3-4 | 3-4 | 8-9 | 6-8 | 10-13 | 8-12 | 17-21 | 16-19 |
| *moroensis* sp. n. ♀ | 4-5 | 4 | 8-9 | 6-7 | 12 | 10-11 | 20-21 | 19-20 |
| *arator* sp. n. | 4-5 | 3-4 | 8-10 | 7-8 | 11-12 | 9-11 | 19-21 | 17-20 |
| *rolandmuelleri* sp. n. | 3-5 | 3-4 | 7-9 | 6-8 | 10-12 | 9-11 | 16-20 | 15-18 |
| *serrata* | 3-5 | 3-4 | 7-9 | 6-7 | 10-13 | 9-12 | 17-21 | 16-20 |
| *asahinai* | 4-5 | 3-5 | 7-9 | 7-8 | 11-13 | 10-12 | 17-21 | 17-20 |
| *gracilis* sp. n. ♂ | 4 | 3 | 7 | 6 | 10-11 | 9-11 | 17 | 16 |
| *varians* sp. n. | 4-5 | 3-4 | 7-8 | 6-7 | 10-13 | 9-11 | 16-21 | 15-18 |
| *pulchra* sp. n. ♂ | 4-5 | 3-4 | 8 | 6-7 | 10-12 | 9-11 | 17-19 | 16-18 |
| *laguna* sp. n. | 4 | 3-4 | 8 | 6-7 | 11-12 | 10-11 | 19-20 | 18-19 |
| *elegans* | not studied | | | | | | | |

## Subgenus *RISIOCNEMIS* Cowley, 1934

**Type species:** *Hypocnemis serrata* Hagen *in* SELYS LONGCHAMPS, 1863, pp. 154-155..

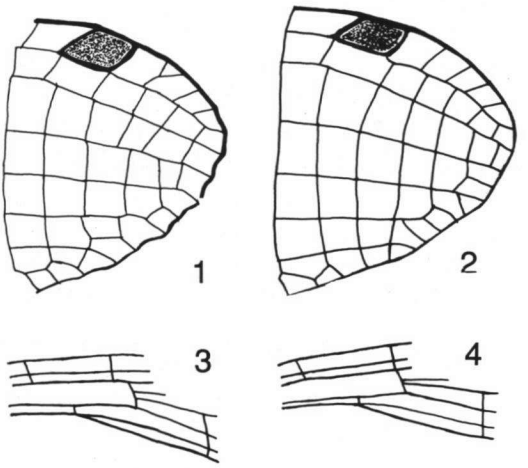
Diagnosis. — Wing apex distinctly crenulated; arculus placed well distal to Ax2 (Figs 1, 3). Penis structure variable, side lobes with or without filaments (Figs 6-16).

Subgenus *IGNEOCNEMIS* subgen. nov.

**Type species:** *Hypocnemis ignea* BRAUER, 1868, p. 547.

Diagnosis. — Wing apex only smoothly sinuous; arculus in line with Ax2 (Figs 2, 4). Penis structure quite uniform, glans deeply cleft into scoop-shaped lobes (Fig. 5).

A more detailed comparison of the characters of the subgenera, as well as a discussion of their affinity will be presented in the second part of the revision.




Figs 1-4. Wing apex and base in the two subgenera: — (1, 3) *Risiocnemis (Risiocnemis) serrata*, ♀. — (2, 4) *Risiocnemis (Igneocnemis) haematopus* (Selys), ♀.

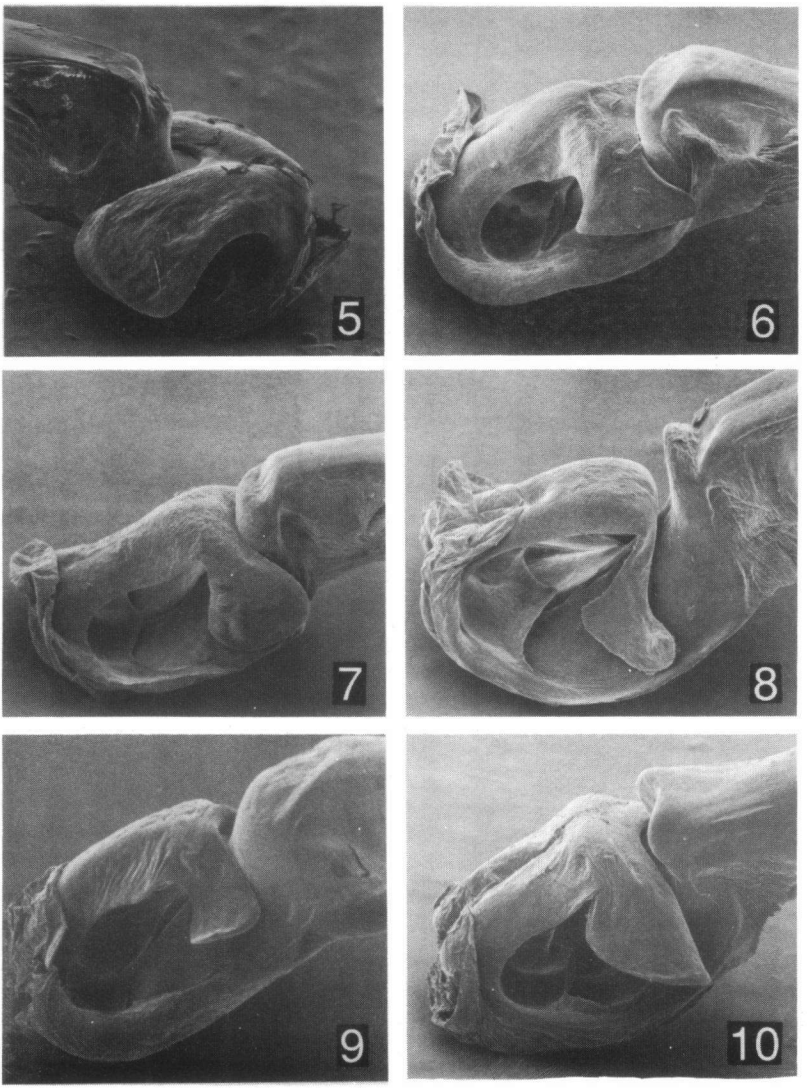
## TREATMENT OF THE SPECIES OF THE SUBGENUS *RISIOCNEMIS*

The subgenus is divided into four species groups, mainly on the basis of the penile structure. The sequence of the groups is not arbitrary, but shows an affinity, which will be discussed in the second part of the revision.

The structure of the anal appendages provides the best characters for separating males of different species. Females can usually be told apart by the structure of the prothorax. The keys are based on the study of these structures; in a few cases other characters must also be consulted for a reliable identification. The apex of the abdomen does not provide characters that allow species identification in females. The ovipositor valves extend to the level of the apex of the anal appendages, or very slightly exceed it; the lower margin of the ovipositor valves are usually furnished with 16-20 denticles.

SEM photography was used as means for illustration, since it provides an easy and accurate way to depict the complex structures. A JEOL JSM-820 scanning microscope was used. Prior to viewing specimens were coated with gold using JEOL Fine Coat Ion Sputter JFC-1100. Magnifications of 50-70x (120-140x in Figs 72, 76) were used for photographing male appendages and female thoracic structures and those of 150-220x for penile structures. For photographing females of some species, the prothorax was detached from the pterothorax in order to minimize the damage to the specimen.

The provenance of the specimens photographed or illustrated is indicated in the "material studied" section of each species.




Figs 5-10. Penis of six *Risiocnemis* species (oblique lateral view): — (5) representative of subgenus *Igneocnemis: R. flammea* (Selys); — (6) *R. appendiculata;* — (7) *R. erythrura;* — (8) *R. praeusta* sp. n.; — (9) *R. confusa* sp. n.; — (10) *R. kiautai* sp. n.

## KEY TO THE MALES[2]

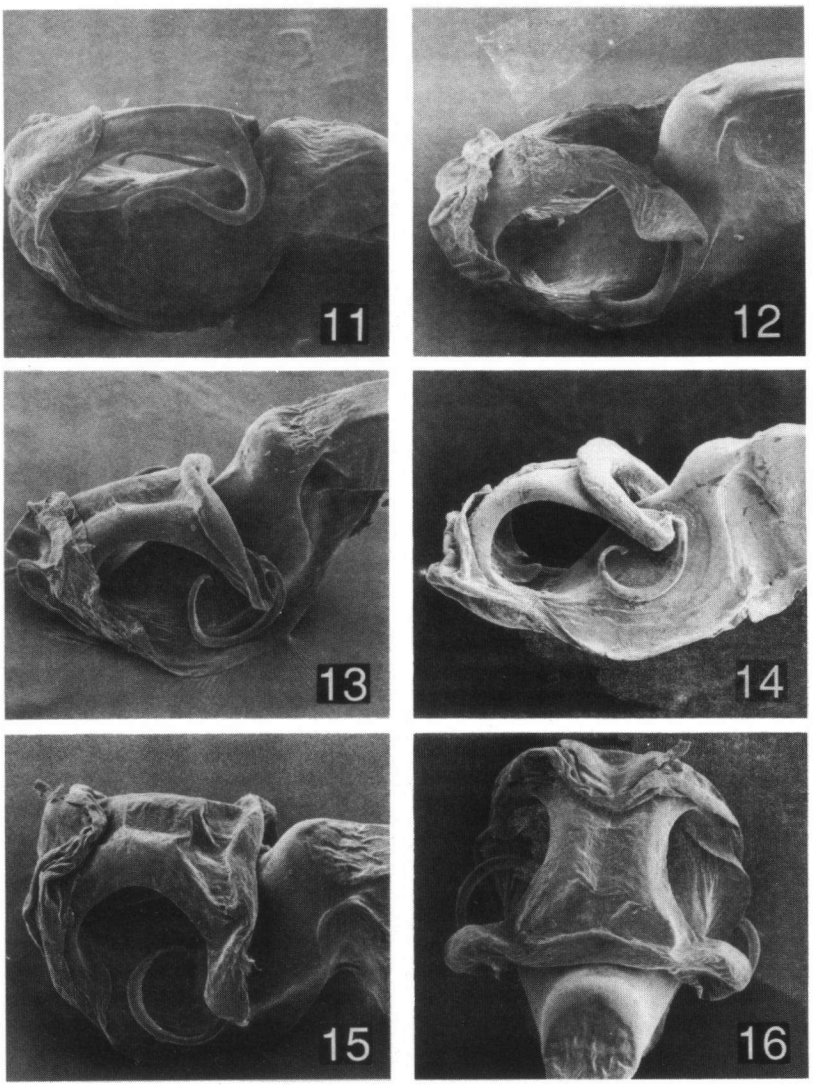
1 On dorsal view the inner margin of superior appendages sinuous, with a distinct bulge inwards in the apical third of the appendage (Figs 56-58) ..... 2
— On dorsal view the inner margin of superior appendages straight or slightly arched without a bulge inwards ..... 4
2 Superior appendages clearly longer than segment 10 (Fig. 59) ..... *varians*
— Superior appendages of the same length or only a little longer than segment 10 ..... 3
3 Superior appendages shaped on dorsal view as in Figure 58; very abruptly narrowed in apex ..... *laguna*
— Superior appendages shaped on dorsal view as in Figure 57 ..... *pulchra*
4 Inferior appendages not reaching to the level of the apex of superiors ..... 5
— Inferior appendages reaching or slightly exceeding the level of the apex of superiors ..... 9
5 Ventral process of superior appendages long and narrow or robust and triangular, ca 1/3 or more of the length of the appendage ..... 6
— Ventral process of superior appendages small, spine-like; 1/4 or less of the length of the appendage ..... 8
6 Ventral process very long and narrow near the base (Figs 32-33) ..... *kiautai*
— Ventral process more or less triangular ..... 7
7 Apical side of the ventral process at a 90° angle with the appendage (Fig. 54) ..... *gracilis*
— Apical side of the ventral process at a 130° angle with the appendage (Fig. 34) ..... *confusa*
8 Inferior appendages reaching only to midway of the length of the superiors (Fig. 50). *serrata*
— Inferior appendages reaching well over the midway of the length of the superiors (Fig. 52) .. ..... *asahinai*
9 Ventral process of superior appendages very broad and triangle shaped; the apical side of the process at 150° angle with the appendage (Figs 35-37) ..... *rolandmuelleri*
— Ventral process different ..... 10
10 Ventral process directed obliquely basalwards (Figs 44-45) ..... *arator*
— Ventral process directed straight ventrad or somewhat apicad ..... 11
11 Ventral process long, well removed from the base; superior appendages distinctly longer than segment 10 (Figs 17-18) ..... *appendiculata*
— Ventral process nearer the base; superior appendages only a little longer than segment 10. 12
12 Length of the ventral process about 1/3 of the length of the appendage (Figs 19-20). Glans of penis with pear-shaped, rounded side lobes (Fig. 7) ..... *erythrura*
— Length of the ventral process less than 1/3 of the length of the appendage (Figs 21-22). Glans of penis with boot-shaped side lobes with narrow stem (Fig. 8) ..... *praeusta*

## KEY OF THE FEMALES[3]

1 Median lobe of prothorax protuberated with distinct tubercles ..... 2
— Median lobe of prothorax more or less raised, but without distinct tubercles ..... 7
2 Tubercles rather low, very gently sloping on the anterior side (Fig. 72) ..... *serrata*
— Tubercles prominent, steeply raised ..... 3
3 Tubercles sharply pointed at apex; middle lobe of the posterior lobe broad, plate-like (Figs 46-47) ..... *arator*

[2] Male of *R. moroensis* unknown. *R. elegans* Kitagawa not included in the key, since no material was available for study.

[3] Female of *R. gracilis* unknown; *R. elegans* Kitagawa not included.




Figs 11-16. Penis of five *Risiocnemis* species: — (11) *R.arator* sp. n.; — (12) *R. rolandmuelleri* sp. n.; — (13) *R. serrata;* — (14) *R. asahinai;* — (15-16) *R. varians* sp. n. — [Fig. 16 dorsal view; — others oblique lateral view]

— Tubercles rather blunt at apex; middle lobe of the posterior lobe different ..... 4
4 Posterior side of the tubercle more steeply raising than the anterior side; thus the tubercle slanting slightly backwards; middle lobe of the posterior lobe bilobed (Figs 73-74) .. ***asahinai***
— Tubercle upright, very prominent ..... 5

5 Middle lobe of the posterior lobe triangular, with rather pointed apex (Figs 68, 75-76) ***varians***
— Middle lobe of the posterior lobe rounded or kidney-shaped, with bilobed or notched apex 6
6 Middle lobe of the posterior lobe rounded and notched at apex (Fig. 70) ..... ***laguna***
— Middle lobe of the posterior lobe kidney-shaped, distinctly bilobed (Fig. 69) ..... ***?pulchra***
7 In the posterior lobe, the lateral lobes forming a right angle with the middle lobe seen in lateral view ..... 8
— Lateral lobes parallel with the middle lobe in lateral view ..... 9
8 Lateral lobes very long and narrow, directed straight backwards (Figs 48-49) . ***rolandmuelleri***
— Lateral lobes directed obliquely forward, partly overlapping the middle lobe in frontal view (Figs 40-41) ..... ***confusa***
9 Lateral lobes longer than the middle lobe when seen in lateral view (Figs 42-43) . . ***moroensis***
— Lateral lobes shorter than the middle lobe in lateral view ..... 10
10 Lateral lobes well removed from the middle lobe, directed obliquely laterad in dorsal view (Figs 38-39) ..... ***kiautai***
— Lateral lobes near to the middle lobe, quite parallel with it ..... 11
11 Lateral lobes narrow or somewhat pointed (Figs 23-24) ..... ***appendiculata***
— Lateral lobes rather broad; rounded (Figs 25-28) ..... 12
12 Pterostigma with costal side slightly shorter than anal side (Fig. 30) ..... ***praeusta***
— Pterostigma with costal side much shorter than anal side; pterostigma thus more oblique (Fig. 29) ..... ***erythrura***

## THE *R. APPENDICULATA* SPECIES GROUP

This group contains species in which the structure of the glans is rather unspecialized, being divided into flat side lobes without flagella. The median lobe of the female prothorax is without distinct pronotal tubercles. Males are variably coloured: *appendiculata* reddish and *kiautai* black. Colouring of three species, *erythrura, praeusta* and *confusa* is quite similar, a combination of black and red. *R. moroensis* is placed into this group with some hesitation, since its male is still unknown. However, its prothoracic structures resemble those in the females of the *appendiculata* group.

Species of the group are widely distributed in the archipelago, but are predominantly southern.

### *RISIOCNEMIS APPENDICULATA* (BRAUER, 1868)
Figures 6, 17-18, 23-24

*Hypocnemis appendiculata* BRAUER, 1868: 548 (orig. descr. of a ♂ from Mindanao); — SELYS LONGCHAMPS, 1882: 24, 26, 27 (note on the type specimen: "Mindanao, au commencement de juillet et dans la seconde moitié du mois d'août [Semper]"); — SELYS LONGCHAMPS, 1886: 98, 105-106 (additional teneral ♂♂ from Mindanao; redescr.).
*Prionocnemis appendiculata:* KIRBY, 1890: 127 (Mindanao); — NEEDHAM & GYGER, 1939: 270, 276, pl. 14: figs 181-182 (♂♂ from some provinces in Mindanao and Dinagat, brief characterization of ♂, fig. anal app.
*Risiocnemis appendiculata:* LIEFTINCK, 1961: 142 (♂♂ from Mindanao, notes on size); — LIEFTINCK, 1974: 113, 129-130 (♂♂ from Mindanao; figs ♂ anal app.); — LIEFTINCK, 1981: 94 (wing crenulation); — DAVIES & TOBIN, 1984: 100 (Mindanao); — TSUDA, 1986: 49 (Philippines).

**Type material.** — Holotype: male specimen with pin labels: /Mind./ 32 / 561 / Hypocnemis appendiculata Brau. Mindanao/. I have added a label "Hypocnemis appendiculata Brauer, 1868.

Holotype. Rev. M. Hämäläinen 1990". Deposited in coll. Selys Longchamps at IRSN.

Other material studied. — From Mindanao. Coll. Müller: 3 ♂, South Cotabato prov., Koronadal, Barrio 8, (100-200 m), 13-IV-1985, R.A. Müller leg.; — 45 ♂ (Figs 6, 18), 6 ♀ (Figs 23-24), as above, 12/14-VII-1986; — 2 ♂, 1 ♀, site and date as above, J. de los Reyes leg.; — 1 ♂, South Cotabato prov., Parker Mts, Lake Maugham, (2500 ft), 11-XII-1983, Th. Borromeo leg.; — 1 ♂, Zamboanga del Norte prov., Sindangan, Barili (near big river), 16/17-VI-1988, W. Catal leg.; — 2 ♂, Lanao del Norte prov., Mt Puting, Bato Sapad, (250 ft), X-1988, W. Catal leg.; — 4 ♂, Bukidnon prov., Mt Imbayao, Baungon, Tanalaong River, 25-IX/1-X-1989, Th. Borromeo jr leg.; — 2 ♂, Bukidnon Prov., San Vicente, Tamalaong River (400-600 m), 30-VIII/2-IX-1990, Th. Borromeo jr leg. — RMNH: 1 ♂, Zamboanga del Norte, Upper Dohinog R., (500-600 m), 18-X-1959, Quate leg.; — 1 ♂, Zamboanga del Norte, Manucan 20 km S, 16-X-1959, (500-600 m), Quate leg.; — 3 ♂, 1 ♀, Misamis Oriental Prov., Bal-ason (Gingoog), 1/3-IV-1960, H. Torrevillas leg.; — 1 ♂, 3 mi E. Dansalan, jungle stream, (2500 ft), H.E.M. leg.; — 2 ♂, Agusan, S. Francisco, 10 km 12/17-XI-1959, Quate & Yoshimoto leg.; — 1 ♀, Agusan, San Fran., 10 km S, 12/17-XI-1959, Quate leg.; — 1 ♂, Cotabato, Parang, 13-I-1954, Henri Townes leg. — SMF: 13 ♂, 5♀, Surigao, various dates in 1915-1916, G. Boettcher leg. — From Dinagat. Coll. Müller (A. Buenafe leg.): 2 ♂, Loreto, Mt Canbinlio, Balitbiton River, 10/17-VI-1988; — 2 ♂, as above, 24-IV/6-V-1989; — 1 ♂, as above, IX-1989; 1 ♂, Loreto, Mt Canbinlio, Canbinlio River, 24/28-V-1988; — 6 ♂, 1 ♀, Mt Canbinlio, II-1989; — 1 ♂, Mt Redondo, II-1989. — From Homonhon. Coll. Müller: 10 ♂, Bitaogan, 4/5-IV-1988, Th. Borromeo leg.; — 11 ♂, 1 ♀, as above, 12/13-V-1988, R.A. Müller leg.; — 37 ♂ (Fig. 17), 5 ♀, Magellanes Point, 1/4-IV-1988, W. Catal leg.; — 1 ♂, as above, 15/18-V-1988, C. Treadaway leg.; — 66 ♂, 10 ♀, as above, 14/31-V-1988, R.A. Müller leg. — From Panaon. Coll. Müller (from San Francisco, W. Catal leg., if not otherwise stated): 1 ♀, Mt Anislagon (350 ft), VIII-1988; — 5 ♂, Pag-ubayan River, VIII-1988; — 1 ♂, Anislagon Gamay, (200 ft), VIII-1988; — 1 ♀, Mt Kanao, (400 ft), VIII-1988; — 5 ♂, 2 ♀, Batong Lapad, VIII-1988; — 13 ♂, 8 ♀ Gabing Gamay, big river, X-1988; — 6 ♂, 3 ♀, Lilo-an, Tabon River, X-1988; — 2 ♂, 3♀, Anislagon Creek, (200 ft), X-1988; — 9 ♂, 5 ♀, Anislagon River, 10/12-X-1990, Th. Borromeo jr leg. — From Leyte. — Coll. Müller: 8 ♂, 2 ♀, Mahaplag, Hilusig, Mt Balocaue, (600 m), 29-VIII/14-IX-1986, Th. Borromeo leg.; — 1 ♂, as above, 15/18-V-1987; — 5 ♂, 1 ♀, locality as above, (700 m), 28-XI/2-XII-1989, Th. Borromeo jr leg; — 4 ♂, 8 ♀, locality as above, Magsuganao River, (700 m), 18-30-IX-1990, Th. Borromeo jr leg.; — 1 ♂, South Leyte prov., St. Bernard, Catmon, 20/26-VI-1989, A. Buenafe leg. — RMNH: 1 ♂, Ormoc, 18/20-XI-1966, C. Plateros leg; — 1 ♂, South Leyte, St. Bernard, Ayahag, 30-V-1970, C. Plateros leg. — From Samar. — SMF: 1 ♀, Catbalogan, 21-IV-1915, G. Boettcher leg. — From Bohol. Coll. Müller: 1 ♂, Sierra Bullones, Pilar, 10/11-IV-1989, W. Catal leg.

Diagnosis. — Species with crenulated wing apex. Male: red. Superior appendages longer than segment 10, inferiors reaching as far as the superiors; superiors with a long and narrow process directed straight ventrad, well removed from base. Female: median lobe of prothorax only slightly raised. Posterior lobe with a broad middle lobe; separate lateral lobes rather narrow and pointed, lower than the middle lobe.

MALE. — The descriptions by BRAUER (1868) and SELYS LONGCHAMPS (1886) and figures of anal appendages by LIEFTINCK (1974) and those in the present paper (Figs 17-18) allow an easy identification of the male.

Specimens from Mindanao and Dinagat are uniformly bright reddish brown, most of the postclypeus being shining black; middorsal carina black and subalar ridge furnished with tiny black marks. In some older specimens from Mindanao the dorsum of the pterothorax is somewhat darkened. In specimens from

Panaon, Leyte, Homonhon and Bohol the dorsal side of abdominal segments 3-6 is distinctly darkened, blackish in older specimens. Teneral specimens are light reddish yellow with distinct whitish apical rings on segments 3-6.

Wings with brownish tinge in some specimens. Ac usually nearer to Ax1 than Ax2. R4+5 distal to subnodus in both wings. Other details of venation are presented in Table I. Pterostigma with anal side slightly longer than costal side; colour reddish brown.

Penis. — Glans gently cleft into rather broad and flat side lobes; the apical part of the lobes being expanded basalwards and apicad (Fig. 6).

Measurements (mm). Hw. 19-23; — abd. 31-38. — Specimens from Mindanao and Leyte are larger and those from Homonhon smaller than specimens from Dinagat and Panaon.

FEMALE (first description). — Postclypeus shining black, middorsal carina and parts of subalar ridge black. Body otherwise all brown. Dorsum of pterothorax somewhat darker than the sides. Teneral specimens with rather large and complete whitish subapical rings on segments 2-7, a reminiscence of which is also visible in mature specimens, except in the old ones. Pterostigma pale brown.

Prothoracic structures as in Figures 23-24. Median lobe only slightly raised. Middle lobe of the posterior lobe broad, bordered by small and rather narrow lateral lobes, more or less triangular and pointed. The lateral lobes vary in size to some extent, but are always lower than the middle lobe; smallest in Homonhon specimens.

Measurements (mm). — Hw. 19.5-23.5; — abd. 29.0-32.5.

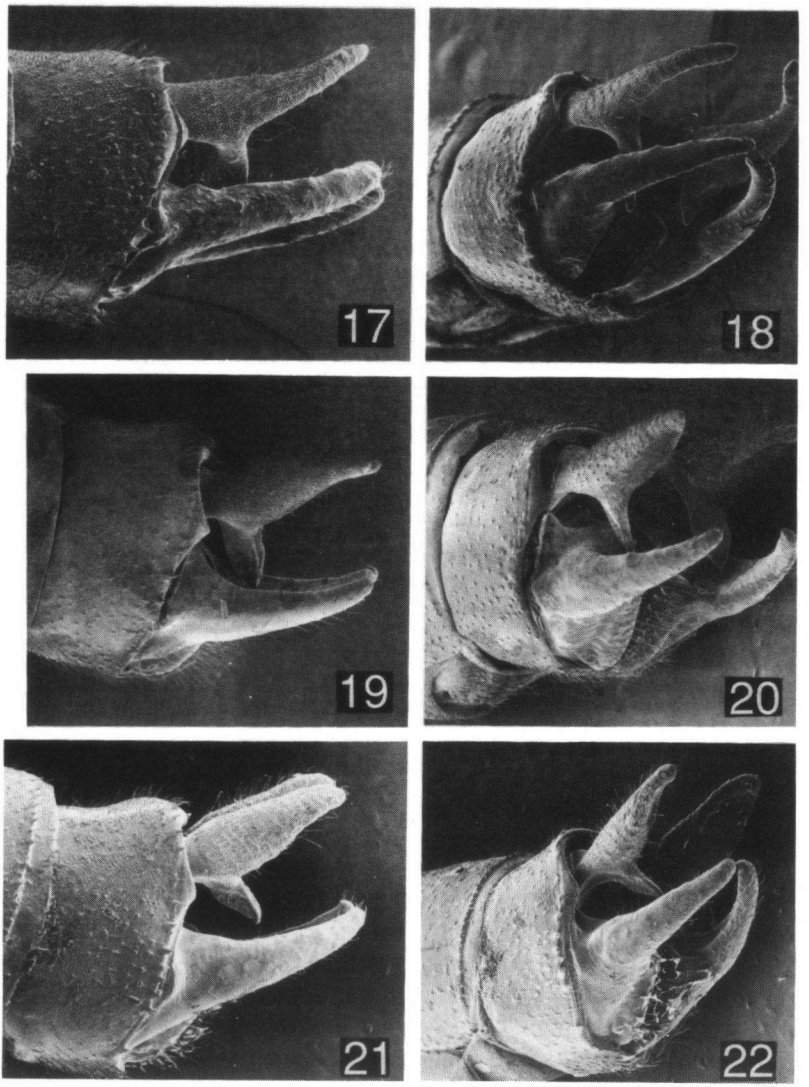
Distribution. — Mindanao, Dinagat, Panaon, Leyte, Samar, Homonhon, Bohol.

Notes. — There seem to be small structural differences in populations from different islands, which would require a more detailed analysis. Females are quite similar to those of *erythrura* and *praeusta,* but can easily be told apart by the narrower lateral lobes of the posterior lobe.

*R. appendiculata* seems to be a quite common species in the East Visayan and Mindanao subregions, occurring at the same sites with *praeusta* at least in Leyte, Panaon and Dinagat, and possibly also with *erythrura* in Mindanao.

### *RISIOCNEMIS ERYTHRURA* (BRAUER, 1868)
Figures 7, 19-20, 25-26, 29

*Hypocnemis erythrura* BRAUER, 1868: 550-551 (orig. descr. of ♂, based on a single specimen from "Philippinen"); — SELYS LONGCHAMPS, 1882: 23, 24-25 (brief note on the type ♂ from [Mindanao] "Placer, 24 et 25 mai [Semper]"); — SELYS LONGCHAMPS, 1886: 98, 101-102 (redescr. of type).
*Prionocnemis erythrura:* KIRBY, 1890: 127 (Philippines).
*Risiocnemis erythrura:* LIEFTINCK, 1981: 94 (wing crenulation); — DAVIES & TOBIN, 1984: 100 (Philippines); — TSUDA, 1986: 49 (Philippines).




Figs 17-22. Male anal appendages of three *Risiocnemis* species: — (17-18) *R. appendiculata;* — (19-20) *R. erythrura;* — (21-22) *R. praeusta* sp. n. — [Figs 17, 19, 21 lateral view and Figs 18, 20, 22 oblique posterolateral view]

**Type material.** — Holotype: male specimen with pin labels: /Placer / 562 / 130 / Hypocnemis erythrura Brau. Philipp./ Hypocnemis erythrura Br. ♂/. I have added the following label: "Hypocnemis erythrura Brauer, 1868. Holotype. Rev. M. Hämäläinen 1990". — The holotype (from Placer, Surigao del Norte province, North Mindanao) is deposited in coll. Selys Longchamps at IRSN. At present the specimen lacks abdominal segments 4-10 and appendages.

Other material studied. — 8 ♂ (Figs 7, 19-20), 6 ♀ (Figs 25-26, 29), Mindanao, Surigao, 12-II, 14/29-V, 30-X/16-XI-1915, G. Boettcher leg. (SMF); — 1 ♂, Siargao, 6-IX-1916, G. Boettcher leg. (SMF); — 1 ♂, Mindanao, Surigao, L. Mainit, 30-XI-1959, Quate leg. (RMNH).

Diagnosis. — Moderately large species with crenulated wing apex. Male: black and red. Superior appendages as long as segment 10, inferiors reaching as far as the superiors. Superiors with a robust subbasal ventral process. Female: median lobe of prothorax only slightly raised; posterior lobe with a broad middle lobe, bordered with rounded lateral lobes, much lower than the middle lobe.

MALE. — Head. — Labrum shining dark brown, apical border pale in some specimens. Anteclypeus yellowish. Postclypeus and genae shining black. Head above mat black, brownish dots on sides of the lateral ocelli.

Thorax. — Prothorax mat black. Dorsum and most of the sides of pterothorax mat black. Underside of thorax brown in the basal half, pale yellowish in the apical part; the pale colour extending upwards to the lower apical edge of metepisternum. Anterior half of metepimeron brown. Legs dark brown, hind femora yellowish brown.

Abdomen. — Long and slender, three apical segments somewhat broadened. Segment 1 yellowish white, apical half blackish on dorsum. Segment 2 blackish brown, yellowish ventrolaterally. Segments 3-5 blackish brown, with pale yellowish subapical rings, incomplete on dorsum, broadest below. Segment 6 blackish brown, turning scarlet red apicad. Segments 7-10 and anal appendages all scarlet red.

Teneral specimens are pale brown, with complete yellowish white subbasal rings on segments 3-5.

Superior appendages (Figs 19-20) as long as segment 10, with a robust subapical ventral process; the process about 1/3rd of the length of the appendage. Inferiors reaching as far as the superiors.

Wings. — Ac in fore wing nearer to Ax1 than Ax2, in midway in hind wing. R4+5 in continuation or distal to subnodus. Other details in Table I. Pterostigma rather large and oblique; anal side distinctly longer than costal side, proximal side oblique and distal side convex; colour brown.

Penis. — Of the *appendiculata* type; side lobes of glans pear-shaped, rounded (Fig. 7).

Measurements (mm). — Hind wing 25.0-27.5; — abdomen 39-44.

FEMALE (first description). — Brown, with black markings as in *appendiculata*. Prothoracic structures as in Figures 25-26. Median lobe only slightly raised. Posterior lobe with broad middle lobe, bordered with rounded lateral lobes, lower than the middle lobe. Pterostigma similar as in male, shaped as in Figure 29.

Measurements (mm). — Hw. 24.0-26.5; — abd. 34.5-36.5.

Distribution. — Mindanao, Siargao.

Notes. — See under the next species.

*RISIOCNEMIS PRAEUSTA* SP. N.
Figures 8, 21-22, 27-28, 30

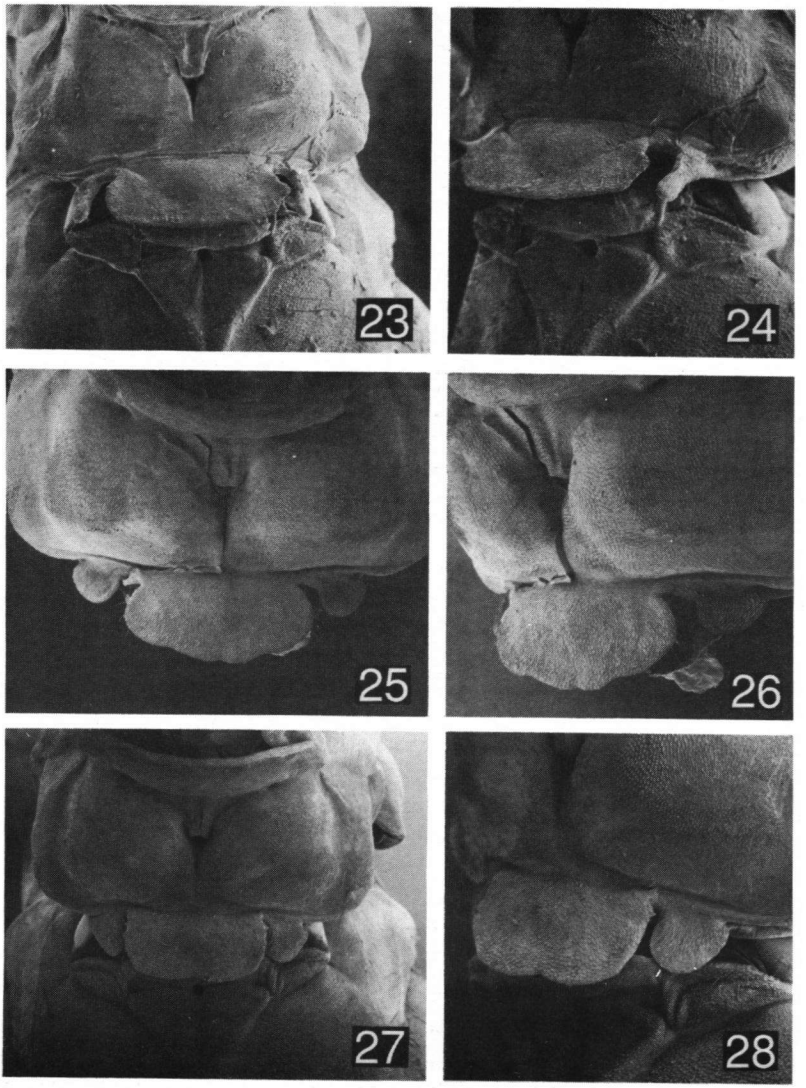
Material. — **Holotype** ♂: Leyte, South Leyte prov., St. Bernard, Catmon, 24-VI-1989, A. Buenafe leg.; at present in coll. Roland A. Müller (St Gallen, Switzerland), to be deposited at SMF — **Paratypes** (all from Müller's material and from Leyte): 16 ♂ (Figs 8, 21-22), 6 ♀ (Figs. 30), from the same site as the holotype, 20/26-VI-1989, A. Buenafe leg. ; — 1 ♂, South Leyte prov., Catmon, Mt San Bernhard, IV-1990, A. Buenafe leg.; — 1 ♂, South Leyte, St. Bernard, Bo Catmon, Mt Hapag, (1500 m), IX-1989, A. Buenafe leg.; — 1 ♂, Leyte, Mahaplag, Hilusig, Mt Balocaue, (600 m), V-1986, Th. Borromeo leg; — 1 ♂, as above, 29-VIII/14-IX-1986; — 1 ♂, as above, 15/18-V-1987; — 2 ♀, locality as above, (700 m), 29-XI/1-XII-1989, Th. Borromeo jr leg.; — 1 ♂, 1 ♀, locality as above, Magsuganao River, (700 m), 18/30-IX-1990, Th. Borromeo jr leg. — 1 ♂ and 1 ♀ paratype in RMNH, the rest in coll. Müller and Hämäläinen. — Other material from coll. Müller: From Panaon (all from San Francisco, W. Catal leg., unless otherwise stated): 6 ♂, 4 ♀, Mt Anislagon, (350 ft), VIII-1988; — 7 ♂, 3 ♀ (Figs 27-28), Anislagon Dako, (300 ft), VIII-1988; — 5 ♂, 1 ♀, Panan-awan Creek, VIII-1988; — 3 ♂, 2 ♀, Pag-ubayan River, VIII-1988; — 5 ♂, Anislagon Gamay, (200 ft), VIII-1988; — 17 ♂, Mt Kanao, (400 ft), VIII-1988; — 9 ♂, 7 ♀, Batong Lapad, VIII-1988; — 2 ♂, 3 ♀, Gabing Gamay, big river, X-1988; — 1 ♂, Tabon River, Lilo-an, X-1988; — 2 ♂, 1 ♀, Anislagon Creek (200 ft), X-1988; — 4 ♂, 6 ♀, Anislagon River, 10/12-X-1990, Th. Borromeo jr leg. — From Dinagat (all from Loreto, A. Buenafe leg.): — 1 ♂, Mt Canbinlio, Balitbiton River, 10/17-VI-1988; — 4 ♂, as above, 24-IV/6-V-1988; — 4 ♂, 1 ♀, as above, IX-1989; — 17 ♂, 2 ♀, Mt Canbinlio, Canbinlio River, 4/18-VI-1988; — 2 ♂, Mt Redondo, Midas River, 2/5-VI-1988; — 1 ♂, Danao Lake, II-1989; — 1 ♂, as above, 2-IV/5-V-1989; — 17 ♂, 1 ♀, Mt Canbinlio, II-1989; — 5 ♂, as above, VII-1989; 4 ♂, 1 ♀, Mt Tristan, II-1989; — 1 ♂, Mt Redondo, II-1989; — 2 ♂, 1 ♀, Maribo River, 25/26-IV-1989; — 1 ♂, Mt Redondo, Layonggan, 15-V-1989; — 1 ♂, Layonggan, Mt San Ramon, VI-1989. — Other material at SMF: 3 ♂, Biliran, 20-X-1915, G. Boettcher leg.; — 3 ♂, Panaon, 7-XII-1915, G. Boettcher leg.

Diagnosis. — Species with crenulated wing apex. Male: black and red. Superior appendages as long as segment 10, furnished with a subbasal ventral process. Inferiors reaching as far as the superiors. Female: median lobe of prothorax only slightly raised. Posterior lobe with broad middle lobe, bordered with rounded lateral lobes, lower than the middle lobe.

MALE. — Head. — Labrum and postclypeus shining black; anteclypeus and the base of mandibles yellowish white. Head above mat black, with brownish dots on the sides of the lateral ocelli.

Thorax. — Prothorax black, brownish on sides. Pterothorax black on dorsum and on sides above the level of the stigma. Whole ventral surface of thorax yellowish white, the pale colour extending upwards covering the posterior corner of the hind coxa, at least the posterior part of the metinfraepisternum, most of the metepisternum and the whole metepimeron. Base of wings white. Legs black or blackish brown, but in one paratype specimen all femora pale brown. In specimens from Dinagat hind femora are pale brown.

Abdomen. — Shaped as in *erythrura*. Dorsum of segment 1 blackish brown, sides broadly yellowish white. Segment 2 blackish brown, the ventrolateral edge narrowly pale yellowish. Segments 3-5 blackish brown; subapical markings




Figs 23-28. Structures of female prothorax of three *Risiocnemis* species: — (23-24) *R. appendiculata;* — (25-26) *R. erythrura;* — (27-28) *R. praeusta* sp. n. — [Figs 23, 25, 27 dorsal view; — Figs 24, 26, 28 oblique dorsolateral view]

restricted to small pale ventrolateral spots. Segments 6-10 wholly scarlet red; in specimens from Dinagat and Biliran also the dorsum of segment 5 red in the apical part.

Teneral males resemble mature females in colour; dorsum of thorax being

brown, ventral side paler. Abdomen with complete subapical pale rings on segments 3-5; apical segments pale red.

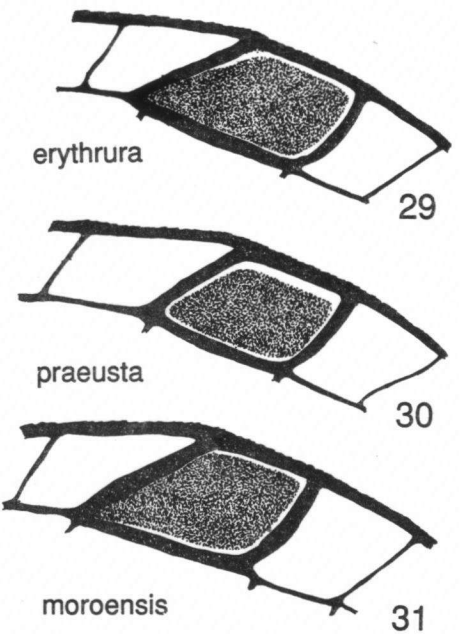
Anal appendages shaped as in Figures 21-22. Superiors as long as segment 10, furnished with a subbasal ventral process; the process a little less than 1/3rd the length of the appendage. Inferiors reaching as far as the superiors. Anal appendages red; apex of the ventral spine and apex of the inferiors black.

Wings. — Position of Ac variable, usually a trifle closer to Ax1 than Ax2. R4+5 distal to subnodus or in continuation to it. Other details in Table I. Pterostigma smaller and less oblique than in *erythrura,* anal side a little longer than costal side (the difference smallest in Dinagat specimens), proximal side less oblique than in *erythrura;* colour reddish brown.

Penis. — Of the *appendiculata* type; side lobes of glans boot-shaped with a narrow stem (Fig. 8).

Measurements (mm). — Leyte: hw. 23-25; — abd. 38-41. — Biliran: hw. 23--26; abd. 37-43. — Panaon: hw. 22-24; — abd. 35-38. — Dinagat: hw. 20.0-23.5; — abd. 34-39.

FEMALE. — Similarly coloured as *appendiculata* and *erythrura;* body brown apart from the shining black postclypeus, black middorsal carina and black marks on subalar ridge. Dorsum of abdomen dark brown in older specimens. Teneral females with broad whitish subapical rings on segments 3-5.




Figs 29-31. Pterostigma of female fore wing in three *Risiocnemis* species of the *R. appendiculata* group.

Prothoracic structures as in Figures 27-28, very similar to those of *erythrura.* Median lobe only slightly raised; posterior lobe with broad middle lobe, bordered with rounded lateral lobes, which are lower than the middle lobe.

Pterostigma a little smaller and the proximal side less oblique than in *erythrura* (Fig. 30); colour pale brown.

Measurements (mm). — Leyte: hw. 25-26; — abd. 36.5-37.0. — Panaon: hw. 22-25; — abd. 31.5-36.0. — Dinagat: hw. 21.0-22.5; — abd. 31-34.

Distribution. — Leyte, Panaon, Biliran, Dinagat.

Notes. — In its appearance this species is very similar to *erythrura.* Most confidently the males can be told apart by differences in the penile structure.

Furthermore, in *erythrura* the ventral process is somewhat larger than in *praeusta*. The pterostigma is differently shaped, in *erythrura* larger and more sharply angulated in its anterior corner than in *praeusta*. In *erythrura* the dark colouring on the thorax is more extensive, the ventral surface being darkened in the anterior half, whereas in *praeusta* the whole anterior surface is pale.

Females are more difficult to separate, since the prothoracic structures are very similar. The shape of the pterostigma provides the best separating characters (Figs 29-30).

According to the present knowledge the ranges of these two species do not overlap. It is interesting to note that the two islands (Dinagat, Siargao) just off the northern coast of Mindanao are inhabited by different species.

### *RISIOCNEMIS CONFUSA* SP. N.
Figures 9, 34, 40-41

*Prionocnemis erythrura* (nec. Brauer, 1868): NEEDHAM & GYGER, 1939: 270, 274, pl. 14, figs 178-179 (from [Luzon] Tayabas province, Quezon Park; Brief ♂ characters, with figs of appendages).

Material. — **Holotype** ♂ (semimature; Fig. 34): Paete, [Laguna Prov.], Luzon, Phil[ippines], 28-VI-1916, G. Boettcher leg.; deposited at Senckenberg Museum, Frankfurt/Main. — **Paratypes:** 1 ♂ (teneral; Fig. 9), 2 ♀ (Figs 40-41), same site and date as holotype (SMF); — 1 ♂ (mature) [Luzon], [Quezon Prov.], Quezon Park, Tabayas [Tayabas], P.I., F. Juan leg. (CU, preserved in alcohol vial, wings mounted on plate).

Diagnosis. — Species with crenulated wing apex. Male: black and red (?). Inferior appendages extending to midway of the length of the superiors. Superiors with a broad, triangular ventral process near the base. Female: median lobe of female prothorax only slightly raised. Posterior lobe of prothorax with a small and rounded middle lobe; in the lateral view at right angle with long, forwardly slanting lateral lobes.

MALE. — Head. — Labrum, postclypeus and genae shining black. Head above mat black, brownish on sides of the lateral ocelli and on the postocular area. In the holotype specimen the face is shining dark brown and the head above brown with a darker figure around the antennae and ocelli. In the teneral paratype specimen the head is pale brown throughout.

Prothorax and pterothorax very dark blackish brown throughout, also the ventral surface all dark. In the holotype specimen the thorax is wholly warm chestnut brown, pale brown in the teneral specimen. Legs reddish brown in the mature specimen and yellowish brown in younger specimens.

Abdomen in the mature specimen deep brown on segments 1-6, darkest on segments 1-2. Segments 7-10 paler (the colour faded; reddish according to NEEDHAM & GYGER (1939). In the holotype specimen the abdomen is warm

chestnut brown, somewhat darkened around the segmental joints; in the teneral specimen the abdomen is light brown, with broad whitish subapical rings on segments 3-6, the rings becoming broader towards the apical segments.

Anal appendages shaped as in Figure 34; superiors as long as segment 10, inferiors reaching to midway of the length of the superiors. Superiors with a broad, triangular ventral process near the base.

Wings. — Ac much nearer to Ax1 than Ax2. R4+5 distal to subnodus or in continuation to it. Other details in Table I. Pterostigma longer than high, sides almost parallel; colour brown.

Penis. — Of the *appendiculata* type: side lobes of glans short, of rather uniform width (Fig. 9).

Measurements (mm). — Hw. 22.5-23.5; — abd. 33-34.

FEMALE. — Head, thorax and abdomen chestnut brown. Segments 2-5 with pale subapical spots on sides. Postclypeus dark only in the middle and in the lateral edges. Head with a black figure as in the holotype male, but the surroundings of the lateral ocelli paler.

Prothoracic structures as in Figures 40-41. Median lobe only slightly raised. Posterior lobe with small and rounded middle lobe, directed obliquely up- and backwards. Lateral lobes closely bordering the middle lobe, long and narrow, curved both forward and inwards, their tips overlapping the margins of the middle lobe when seen in frontal view. In lateral view the middle and lateral lobes are at a right angle.

Lower margin of ovipositor valves with ca 25 fine denticles.

Measurements (mm). — Hw. 20-23; — abd. 34.0-37.5.

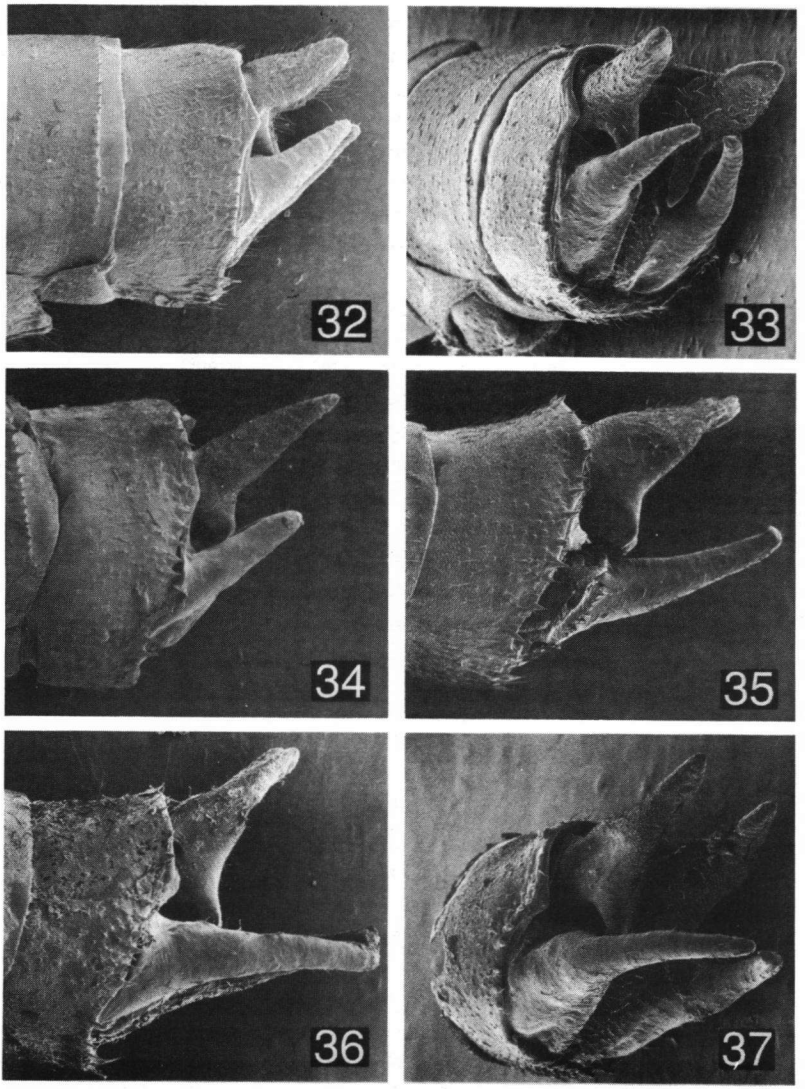
Distribution. — Luzon.

Notes. — The colouring of mature males of this northernmost species of the group resembles apparently quite closely that of *erythrura* and *praeusta*. It can easily be separated from these species by the shape of the anal appendages.

### *RISIOCNEMIS KIAUTAI* SP. N.
Figures 10, 32-33, 38-39

Material. — **Holotype** ♂: Philippines, Sibuyan Island, Magdiwang, Tampayan, Camp Ga-ong, (80-150 m), 1/12-IV-1987, Roland A. Müller leg.; at present in coll. Roland A. Müller (St Gallen, Switzerland), to be deposited at SMF. — **Paratypes** (all from Sibuyan Island, Magdiwang): 4♂ (Figs 32-33), 4 ♀, from the holotype site, 18-III/12-IV-1987, R.A. Müller leg.; — 3 ♀ Tampayan, New St. Gallen, (70 m), 5-IV-1987, R.A. Müller leg.; — 2 ♀, Jao-Asan, (20-100 m), 4-VIII-1986, R.A. Müller leg.; — 2 ♂, 2 ♀ (Figs 38-39), Tampayan, Pawala River, (50 m), 19/31-VII-1986, R.A. Müller leg.; — 1 ♂, 1 ♀, Silum (5-100 m), 3-VIII-1986, R.A. Müller leg.; — 2 ♂ (Fig. 10), 1 ♀, Mt Guiting-Guiting, (50-300 m), 19/26-VI-1986, Th. Borromeo leg.; — 1 ♂, 2 ♀, Katingas, 29-III-1987, A. Buenafe leg. — 1 ♂, 1 ♀ paratype at RMNH and in coll. B. Kiauta each, the rest in coll. Müller and Hämäläinen.

Etymology. — Named after Prof. Dr Bastiaan Kiauta (Bilthoven, The Netherlands) in appreciation of his generous help and support in my efforts in odonatology, and for bringing me in contact with Roland A. Müller.




Figs 32-37. Male anal appendages of three *Risiocnemis* species: — (32-33) *R. kiautai* sp. n.; — (34) *R. confusa* sp. n.; — (35) *R. rolandmuelleri* sp. n.; specimen from Negros; — (36-37) same, specimens from Sibuyan. — [Figs 32, 34-36 lateral view; — Figs 33, 37 oblique posterolateral view]

Diagnosis. — Species with crenulated wing apex. Male: black. Superior appendages short, inferiors not quite reaching to the level of the apex of the superiors. Superiors with a very long ventral process near the base. Female:

median lobe of prothorax only slightly raised. Posterior lobe with a rather broad middle lobe, directed obliquely up- and backwards, in lateral view forming a bridge over the apical margin of the raised median mesostigmal process.

MALE. — Head. — Labrum ivory blue, lower margin narrowly black. Base of mandibles partly blue. A broad metallic-blue belt crossing the face from eye to eye, covering ante- and postclypeus and frons up to the level of the upper end of the scape of antennae. In the frons of mature specimens the blue belt is more or less divided by black below the median ocellus. Head above mat black, with obscure brownish spots on the postocular area and around the ocelli.

Thorax. — Prothorax black with sickle shaped pale markings on median lobe. Pterothorax wholly black. Base of wings bluish. Coxae and trochanters black, femora pale brown, with extensor surface and joints dark brown. Tibiae and all spines blackish brown.

Abdomen black. Joint between segments 1-2 distinctly blue on dorsum. Dorsum of segment 2 with a pair of subapical spots, very small and obscure. Segments 3-6 with pale subapical X-shaped markings on dorsum, very obscure. Dorsum of segment 10 obscurely pale.

Teneral males are very pale. Head with blue band as in mature specimens. Prothorax bluish white. Sides of pterothorax broadly bluish white, pale brownish on middorsum and on the ventral side. Abdomen bluish white, pale brownish ventrolaterally; apical segments and all joints darker.

Anal appendages as in Figures 32-33. Superiors rather short, a trifle shorter than segment 10; furnished with a very long ventral process near the base. Inferiors not quite reaching to the level of the apex of superiors. Superiors pale blue, whitish on apex; inferiors black.

Wings. — Ac in midway between Ax1 and Ax2. R4+5 distal to subnodus, or in continuation to it in hind wing. Other details in Table I. Pterostigma slightly longer than high, sides almost parallel; colour dark brown.

Penis. — Of the *appendiculata* type; side lobes of glans very large and broad (Fig. 10; note the inward curled apical margin of the side lobe).

Measurements (mm). — Hw. 20-23; abd. 34.0-37.5.

FEMALE. — Dark brown, with obscure metallic bluish markings. Head coloured as in male. Median lobe of prothorax obscurely blue on dorsum, blackish brown below. A blue, somewhat obscure and irregular fascia extending from mesostigmal plate to the posterior end of the metepisternum. An obscure blue mark also in the posterior part of the metepimeron. In teneral specimens the pale blue colouring is more extensive on the sides. Coxae dark brown; legs otherwise pale brown, joints and extensor surface of femora darker.

Abdomen dark brown on sides. Dorsum of segments 2-10 very dark metallic bluish throughout (the colour obscure, and apparently disappearing in old specimens), with apex of segments 2-5 distinctly paler, whitish blue in some specimens. Abdomen of teneral females coloured as in teneral males.

Prothoracic structures as in Figures 38-39. Median lobe only slightly raised. Posterior lobe with rather broad middle lobe, directed obliquely up- and backwards towards the raised median mesostigmal process, forming a bridge over its apical margin. Lateral lobes drop-shaped in dorsal view, directed obliquely laterad.

Measurements (mm). — Hw. 20-24; — abd. 30-35.

Distribution. — Sibuyan.

Notes. — The black colouring and short appendages with a long basoventral process enable an easy identification of the male of this species. It occurs together with *rolandmuelleri* at the same sites in the Sibuyan Island.

### *RISIOCNEMIS MOROENSIS* SP. N.
Figures 31, 42-43

Material. — **Holotype** ♀: Philippines, Mindanao, Bukidnon [prov.], Mt Imbayao, Baungon, Tanalaong River, 25-IX-/1-X-1989, Th. Borromeo jr leg.; at present in coll. Roland A. Müller (St Gallen, Switzerland) to be deposited at SMF. — **Paratype:** 1 ♀ (Figs. 31, 42-43), Mindanao, Bukidnon prov., Mt Imbayao, (700 m) 1-IX-1988, Th. Borromeo leg.; in coll. Hämäläinen.

Diagnosis. — Rather large species with crenulated wing apex. Female: blackish brown. Median lobe of the prothorax somewhat raised. Middle lobe of the posterior lobe broad, lateral lobes higher than the middle lobe.

FEMALE. — Head. — Labrum brown, apical border paler. Anteclypeus and base of mandibles yellowish brown, postclypeus shining black. Head above blackish brown.

Prothorax dark brown. Prothoracic structures as in Figures 42-43. Median lobe somewhat raised in the apical part. Middle lobe of the posterior lobe broad and oblong, quite similar to that of *erythrura* and *praeusta*. Lateral lobes higher than the middle lobe. Pterothorax dark brown, paler ventrally. Legs pale yellowish brown, extensor surface of femora darker. Abdomen uniform dark brown.

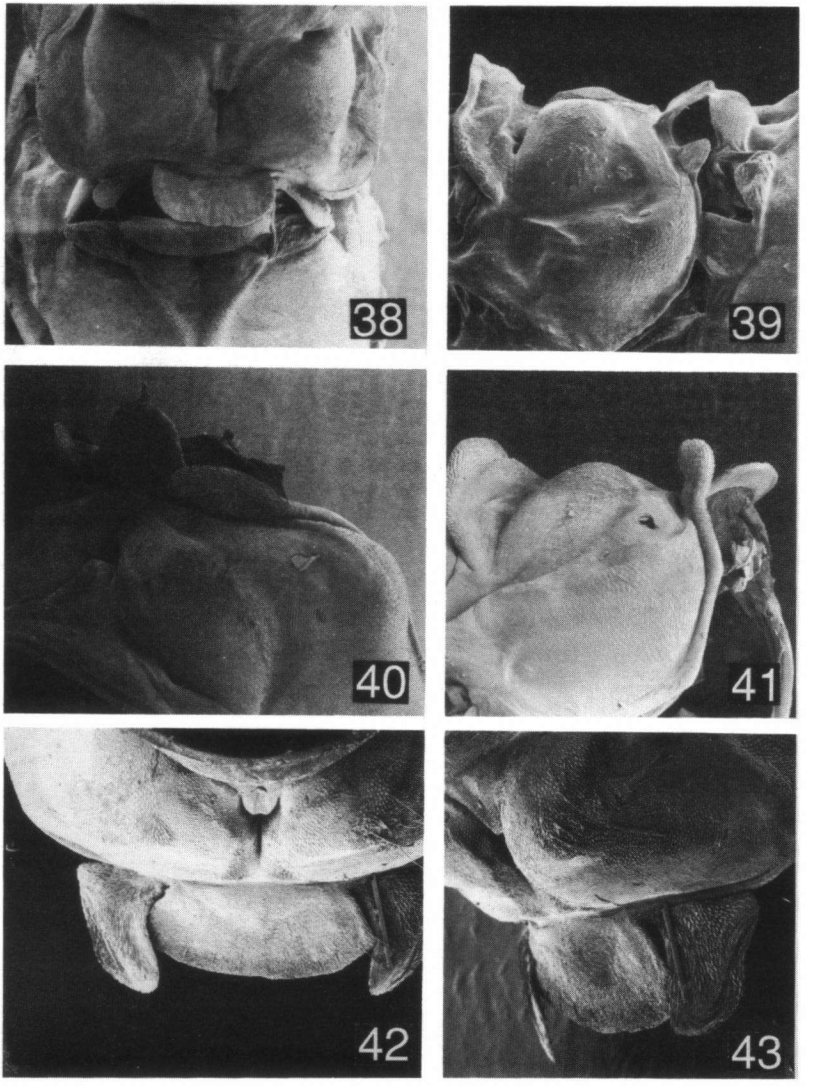
Wings. — Ac nearer to Ax1 than Ax. R4+5 distal to subnodus in fore wing and in continuation to it in hind wing. Other details in Table I. Pterostigma with anal side 1.5 times longer than costal side, shaped as in Figure 31; coloured pale brown.

Measurements (mm). — Hw. 29-30; — abd. 42-43.

MALE unknown.

Distribution. — Mindanao.

Notes. — This is apparently the largest species in the subgenus. Because of its superior size and distinct shape of the posterior lobe of prothorax, it was named even though the male is still unknown.




Figs 38-43. Structures of female prothorax of three *Risiocnemis* species: — (38-39) *R. kiautai* sp. n.; — (40-41) *R. confusa* sp. n.; — (42-43) *R. moroensis* sp. n. — [Figs 38, 42 dorsal view; — Figs 39, 41 lateral view; — Figs 40, 43 oblique dorsolateral view]

## THE *R. ARATOR* SPECIES GROUP

This group contains only a single known species from northern Luzon. The apical folds of the glans are modified to long whip-shaped processes. The female

prothorax is furnished with small and pointed pronotal tubercles.

### *RISIOCNEMIS ARATOR* SP. N.
Figures 11, 44-47

Material. — **Holotype** ♂: Philippines, Luzon, Nueva Vizcaya prov., Sta Fe, Dalton Pass, (800-1200 m), 25/30-VI-1989. A. Gorostiza leg.; at present in coll. Roland A. Müller (St Gallen, Switzerland) to be deposited at SMF. — **Paratypes.** Coll. Müller: 11 ♂ (Figs 11, 44-45), 5 ♀ (Figs 46-47), same locality and date as holotype; — 3 ♂, Luzon, Quirino prov., Sierra Madre, Sulong River, (550 m), 14/15-V-1990, Th. Borromeo leg. — 1 ♂, 1 ♀ deposited in RMNH, the rest in coll. R.A. Müller and M. Hämäläinen. — RMNH: 1 ♂ (appendages missing), Luzon, Ifugao prov., Jacmal Bunhian, 24 km E Mayoyao, (800-1000 m), 7/8-IV-1967.

Diagnosis. — Moderately large species with crenulated wing apex. Male: black. Superior appendages longer than segment 10; inferiors exceeding the length of the superiors. Superiors with very long and narrow ventral process slanting obliquely basalwards. Female: median lobe of prothorax with small, upright, pointed tubercles; middle lobe of the posterior lobe broad and bilobed, directed backwards; lateral lobes small and rounded.

MALE. — Head. — Labium, postclypeus and adjacent lateral genal portions shining black. Anteclypeus yellowish. Broad yellowish streak below the scape of the antennae from the lateral edge of the postclypeus to the eye margin. Frons and vertex mat black, with brown dots on the side of the lateral ocelli.

Thorax. — Prothorax and pterothorax wholly black. Coxae black, trochanters and femora pale; extensor surface of femora spotted with dark brown. Tibiae black.

Abdomen black, with small obscurely brownish subapical rings on segments 3-6; a brownish dorsal spot on segment 2.

Teneral male (from Ifugao) is brown with the dorsum of thorax slightly darker brown than the sides. Abdominal segments 3-6 with complete, pale brown subapical rings.

Anal appendages black with brownish tips. Superiors a trifle longer than segment 10; inferiors exceeding the length of the superiors. Superiors furnished with a prominent long and narrow ventral process directed obliquely basalwards (Figs 44-45).

Wings. — Ac usually much nearer to Ax1 than to Ax2, less markedly so in hind wing. R4+5 originates distal to subnodus in both wings. Other details in Table I. Pterostigma with anal side much longer (in fore wing over 1.5 x and in hind wing ca 1.8 x) than costal side; proximal side very oblique and distal side convex; colour dark brown, encircled with a distinct pale band.

Penis. — Glans narrow in the middle, divided apically into two attenuated whip-shaped branches (Fig. 11).

Measurements (mm). — Hw. 26-28; — abd. 37-42.

FEMALE. — Similarly coloured as the male, black or blackish brown. Tibiae yellowish brown.

Prothoracic structures as in Figures 46-47. Median lobe with small, upright and pointed tubercles. Posterior lobe with a very broad middle lobe, which is gently bilobed and directed backwards. Lateral lobes small and rounded, in dorsal view partly overlapped by the middle lobe.

Pterostigma with anal side much longer than costal side, but the difference in both wings less distinct than in male; colour paler brown than in male.

Measurements (mm). — Hw. 27-29; — abd. 36-39.

Distribution. — Luzon.

Notes. — This dark species is very easy to identify by the peculiar, plough-shaped superior appendages. It occurs together with *varians* in the same streams in northern Luzon.

## THE *R. ROLANDMUELLERI* SPECIES GROUP

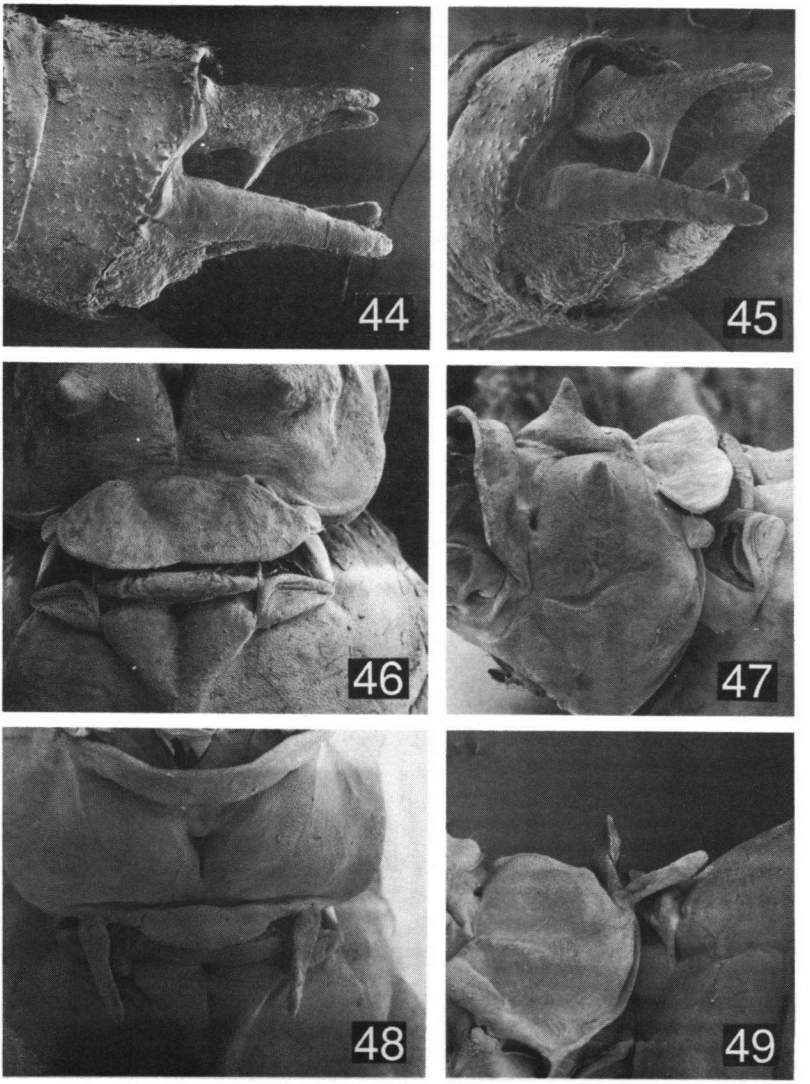
The group contains only a single known species, which seems to be widely distributed in the West Visayan faunal region. The structure of the glans is more complicated than in the previous groups: it is split by a deep longitudinal furrow and then divided into rather broad side lobes, which are furnished with a thick flagellum. The median lobe of the female prothorax is not raised.

### *RISIOCNEMIS ROLANDMUELLERI* SP. N.
Figures 12, 35-37, 48-49

Material. — **Holotype** ♂: Philippines, Sibuyan Island, Magdiwang, Tampayan, Camp Ga-ong, (80-150 m), 1/12-IV-1987, R.A. Müller leg.; at present in coll. Roland A. Müller (St Gallen, Switzerland); to be deposited at SMF. — **Paratypes:** (all from Sibuyan Island, Magdiwang) 7 ♂ (Fig. 36), 11 ♀ same site as holotype, 18-III/12-IV-1987, R.A. Müller leg.; — 11 ♂, 17 ♀, Silum, (5-100 m), 3-VIII-1986, R.A. Müller leg.; — 2 ♂, 1 ♀, Jao-Asan, (20-100 m), 4-VIII-1986, R.A. Müller leg.; — 6 ♂, 12 ♀ Tampayan, Pawala river, (50-200 m), 19/31-VIII-1986, R.A. Müller leg.; — 2 ♂ (Figs 12, 37), 2 ♀, Mt Guiting-Guiting, (50-300 m), 19/26-VI-1986, Th. Borromeo leg.; — 1 ♂, 8 ♀ (Figs 48-49) Mt Guiting-Guiting, (100 m), 1/12-I-1987, Th. Borromeo leg. — 1 ♂, 1 ♀ paratype in RMNH, BMNH and in coll. B. Kiauta each, the others in coll. Müller and Hämäläinen.

Other material: — From Panay: 1 ♂, Panay, Antique, Libertad, (100 m), 4-II-1987, Th. Borromeo leg (coll. Müller). — From Negros, coll. Müller (A. Buenafe leg., if not otherwise stated): 1 ♂, Negros Oriental prov., Mt Talinis, (800 m), V-1985, C. Treadaway leg.; — 1 ♀, Negros Oriental prov., Mt Can-laon Park (4800 ft), 23-V-1987; — 3 ♂, 1 ♀, as above, 25/26-VI-1987; — 2 ♂, as above, 2/3-VII-1987; — 4 ♂, Negros Occidental prov., Murcia, Mambucal, (2000-2500 ft), 1.V.-31.VIII-1987; — 1 ♂, Negros Occidental prov., Murcia, Mt Canla-on, (5000 ft), 17-IX-1987; — 7 ♂, 1 ♀, Murcia, Mt Canla-on, Red River, (5600 ft), 12/13-II-1988; — 3 ♂, Murcia, Mt Canla-on, Asia River, 16/18-II-1988; — 3 ♂, as above, 5-IV-1988; — 1 ♀; as above, 30-VI-1988; — 10 ♂, 2 ♀, as above, IX-1988; 1 ♂, as above, II-1989; — 15 ♂ (Fig. 35), 2 ♀, Murcia, Mt Canlaon, Pula River, 1/9-VII-1988; — 14 ♂, 1 ♀, as above, IX-1988; — 5 ♂, as above, IX-1990; — 1 ♀, Murcia, Mt Canlaon, V-1990. — RMNH: 1 ♂, Negros Oriental, L. Balingsasayao, 3-X-1959, Yashimoto leg.

Etymology. — Named after Mr Roland A. Müller in appreciation of his outstanding efforts to




Figs 44-49. Male anal appendages (44-45) of *Risiocnemis arator* sp. n. and structures of female prothorax of (46-47) *R. arator* sp. n. and (48-49) *R. rolandmuelleri* sp. n. — [Figs 44, 49 lateral view; — Figs 46, 48 dorsal view; — Fig. 45 oblique posterolateral view; — Fig. 47 oblique dorsolateral view]

discover as many dragonfly species as possible in the rapidly vanishing rain forests of the different islands in the Philippine Archipelago.

Diagnosis. — Species with crenulated wing apex. Male: black. Superior

appendages as long as segment 10, inferiors exceeding the length of the superiors. Basoventral process of superior appendages broad at base, giving the appendage a triangular outlook in lateral view. Female: median lobe of prothorax not raised. Middle lobe of the posterior lobe vertical and rounded. Lateral lobes long and narrow, directed backwards; in lateral view at right angle with the middle lobe.

MALE. — Head. — Labrum, postclypeus and genae shining dark brown; base of mandibles paler brown. Anteclypeus pale bluish. Obscurely pale streak below the scape of the antennae from the basolateral corner of the postclypeus to the eye margin. Head above mat black; brownish dots on sides of the lateral ocelli and obscure brownish postocular dots. Upper surface of second antennal joint blue.

Thorax. — Prothorax black; anterior lobe pale brownish in front, median lobe with pale sickle shaped streaks. Pterothorax wholly mat black in older specimens; semimature specimens with obscure paler brownish portions at the apex of the mesepisternum and in the middle of metepisternum and metepimeron. Base of wings strikingly pale blue. Coxae and upper part of trochanters black, lower part and femora pale bluish, with extensor surface spotted with dark brown. Tibiae blackish.

Abdomen black. The first and the two apical segmental joints blue. Segment 1 with a pair of obscure pale dots on dorsum. Segment 2 with a bluish white subapical ring, interrupted by black on middorsum. Larger bluish white subapical rings on segments 2-6, broadening ventrolaterally, interrupted narrowly by black middorsally. A vestige of a similar pale ring on segment 7.

Teneral males pale in colour. Head above pale brown, face paler. Thorax pale brown; whitish on middorsum, metepisternum and metepimeron. Dorsal carina, antealar ridge and subalar ridge at mesepimeron deep black and in strong contrast with the otherwise pale colouring. A black dot on the subalar ridge at the upper corner of the metepimeron. Posterior ridge of poststernum black. Abdomen whitish on dorsum, pale brown ventrolaterally. Joints darker brown. Appendages pale.

Anal appendages shaped as in Figures 36-37. Superiors of about the same length as segment 10, directed obliquely upwards. Inferiors longer than superiors, pincer-shaped. Superiors with a broad basoventral process, making the appendages triangular in lateral view. Superiors black above, the inner margins blue. Basoventral process paler brown. Inferiors black, brownish subapically with black tips.

Wings. — Ac usually nearer to Ax1. R4+5 originating distal to subnodus in both wings, or in continuation to it in hind wing. Other details in Table I. Pterostigma with anal side distinctly longer than the costal side, proximal side oblique and distal side slightly convex; colour brown.

Penis. — Glans rather broad in the middle; split by deep longitudinal furrow, and then divided into two broad side lobes, which are furnished with short and rather broad flagellum (Fig. 12).

Males from Negros differ consistently from those from Sibuyan in some details. They are larger. Labrum of male is pale blue, narrowly bordered by black. In some specimens labrum furnished with a pair of brown dots near the base. In mature males a distinct blue stripe in the middle of the metepisternum. Pterostigma with costal side relatively slightly shorter. There are also slight differences in the shape of the superior appendages (Fig. 35). The single specimen from Panay is teneral and its appendages somewhat broken.

Measurements (mm). — Sibuyan: Hw. 19.0-21.5; — abd. 29.5-33.0 — Negros: hw. 21-24; — abd. 33-37.

FEMALE. — Basic colour brown. Colour pattern of head rather variable, labrum usually paler than postclypeus and frons. Head above with a complex figure of black stripes around the base of antennae and ocelli. Median lobe of prothorax pale bluish above, blackish brown below. Pterothorax brown, darker in old specimens. Paler portions on the sides as in semimature males. Wing bases pale bluish. Coxae dark brown, legs otherwise pale brown, with extensor surface of femora spotted with darker brown.

Abdomen brown with very obscure, paler subapical spots on sides of segments 2-5, the spots getting smaller or lacking towards the apical segments in older specimens. Colouring of teneral specimens resembles that of the teneral males.

Prothoracic structures as in Figures 48-49. Median lobe not raised. Posterior lobe with rounded and vertically raised middle lobe, bordered with long and narrow lateral lobes directed backwards. In lateral view the middle and lateral lobes are at a right angle.

Females from Negros are larger and have an indistinct bluish marking on the metepisternum. Prothoracic structures quite similar to those in the Sibuyan specimens, lateral lobes of the posterior lobe a little longer.

Measurements (mm). — Sibuyan: hw. 19-22; — abd. 27-31. — Negros: hw. 23-24; — abd. 32.0-33.5.

Distribution. — Sibuyan, Panay, Negros.

Notes. — Until more material becomes available for study from Panay and from the other islands of the West Visayan region where the species may possibly occur, it is useless to consider the infraspecific status of the Negros populations. In the Sibuyan Island *rolandmuelleri* occurs together with *kiautai* at the same sites.

## THE *R. SERRATA* SPECIES GROUP

This group contains a number of quite similar species. The penile structure is rather complex, but quite uniform in all species. The apical margin of the glans is collar-shaped, extending to form narrow side lobes, which are furnished with a flagellum. The colour pattern of the males is similar, black with strikingly blue markings. The median lobe of the female prothorax is raised to form distinct pronotal tubercles. In three species, *varians, pulchra* and *laguna,* the tubercles are

very striking. The *R. serrata* group is northern in distribution, according to present knowledge confined to the Luzon and Mindora faunal regions.

### *RISIOCNEMIS SERRATA* (HAGEN, 1863)
Figures 1-2, 13, 50-51, 63, 71-72

*Hypocnemis serrata* Hagen *in* SELYS LONGCHAMPS, 1863: 154-155 (orig. descr. ♂ from Manila); — SELYS LONGCHAMPS, 1882: 23, 24 (brief descr. ♀; distr.: Manila, Luzon, Mindanao); — SELYS LONGCHAMPS, 1886: 98-99 (descr. ♂, ♀); — SELYS LONGCHAMPS 1891a: 216 (rec. Dolores)

*Prionocnemis serrata:* KIRBY, 1890: 127 (Philippines); — NEEDHAM & GYGER, 1939: 270-273, pl. 14, figs 171-173, 184-186, 191-195 (descr. & figs ♂, ♀, larva; rec. various prov. Luzon)

*Risiocnemis serrata:* COWLEY, 1934: 204 (genotype of *Risiocnemis* nom. nov.); — LIEFTINCK, 1958: 285-286 (ref. to larval descr. by NEEDHAM & GYGER, 1939, on the strength of which the gen. included in Platycnemididae larvae key); — LIEFTINCK, 1963: 533-534, 540, figs 22-24 (disc. & figs of ♀ exuviae from Los Banos); — ASAHINA, 1968: 350, 354, 355 (rec. Luzon); — LIEFTINCK, 1981: 93-97, figs 1-6 (characterization of the sp., figs of wings, details on exuviae); — DAVIES & TOBIN, 1984: 101 (Luzon); — TSUDA, 1986: 49 (Philippines); — KITAGAWA, 1990: 33, 36 (in a key to 4 spp. of the group)

*Hypocnemis cornuta* BRAUER, 1868: 548-549 **syn. nov.** (descr. ♀ from "Luzon, Mindanao"); — SELYS LONGCHAMPS 1891a: 216-217 (descr. immature ♂ from Dolores)

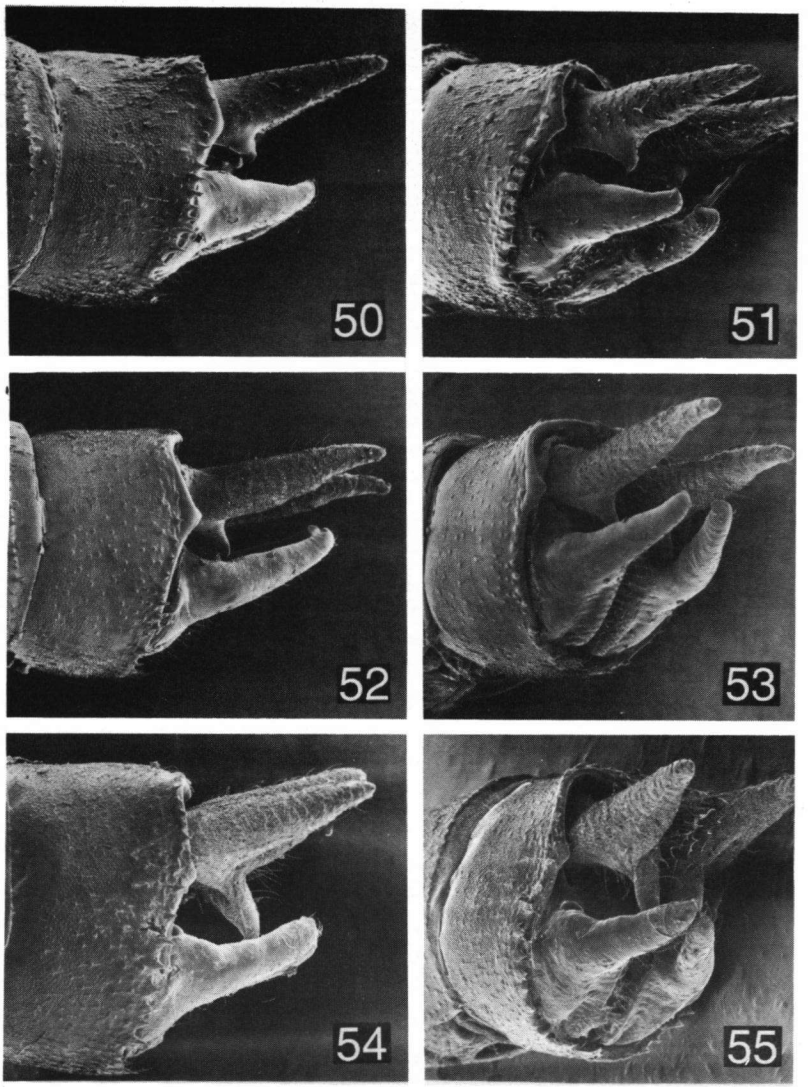
*Prionocnemis cornuta:* KIRBY, 1890: 127 (Philippines); — NEEDHAM & GYGER, 1939: 270, 273 (ref. to orig. descr. & to SELYS LONGCHAMPS 1882, 1891a)

*Risiocnemis cornuta:* ST. QUENTIN, 1970: 255 (note on types in NHMV); — LIEFTINCK, 1981: 94 (wing crenulation); — DAVIES & TOBIN, 1984: 100 (Philippines); — TSUDA, 1986: 49 (Philippines); — KITAGAWA, 1990: 33, 36 (in a key, ref. to earlier descr.)

*"Platycnemid damselfly":* NARUMI, 1979: 130 (col. phot. of perching ♂ from southern Luzon)

**Type** material — *Hypocnemis serrata* Hagen, 1863. Holotype: male specimen with pin labels /560 / 37 / Hypocnemis serrata Hg. Manilla / Hypocnemis serrata Hag. ♂ /. Abdominal segments 1-7 are glued on paper marked: / Hyp. serrata corps manque / Hypocnemis serrata Hag. /. I have added a pin label: "Hypocnemis serrata Hagen, 1863. Holotype. Rev. M. Hämäläinen 1990". Holotype deposited in coll. Selys Longchamps at IRSN. At present the specimen lacks abdominal segments 8-10 and appendages.

*Hypocnemis cornuta* Brauer, 1868. **Lectotype** designated here: female specimen with pin labels: / Semper 1869 / Luzon / cornuta det. Brauer / Mind. / Risiocnemis cornuta Brauer / Typus / Coll. Nat.-Mus. Wien /. I have added a pin label: "Hypocnemis cornuta Brauer. Lectotype. Rev. M. Hämäläinen 1990". This specimen is identic with the female of *R. serrata,* therefore *cornuta* is a junior synonym of *serrata.* There is an other specimen (**paralectotype**) of the original series in the same collection bearing the following pin labels: / Hypocnemis cornuta Brau. Mind. Luzon. / cornuta det. Brauer /. This specimen is in a rather bad condition and lacks the abdomen. It should be noted that the lectotype has two locality labels: Luzon and Mindanao, and the paralectotype is from "Mind. Luzon"! I presume that both come from Luzon. ST. QUENTIN (1970) calls these two




Figs 50-55. Male anal appendages of three *Risiocnemis* species: — (50-51) *R. serrata;* — (52-53) *R. asahinai;* — (54-55) *R. gracilis* sp. n. — [Figs 50, 52, 54 lateral view; — Figs 51, 53, 55 oblique posterolateral view]

specimens misleadingly as "Holotypus" and "Paratypoid" of *Risiocnemis (Hypocnemis) cornuta* (Brauer).

Other material studied. — IRSN: 8 ♂, 1 ♀, Mindanao; 1 ♂, Luzon; — 2 ♂, 1 ♀, Dolores, Mazarredo [leg.], the other male with identification label "Prionocnemis cornuta ♂" by Selys. —

SMF: 50 ♂, 17 ♀, Los Banos, Luzon, various dates in 1914-1915, G. Boettcher leg.; — 1 ♂, 3 ♀, Mt Isarog, Luzon, 7/10-IV-1916, G. Boettcher leg. — RMNH: 10 ♂ (Fig. 13), 5 ♀, Luzon, Los Banos, Molawin Creek, 22-XI-1953, M.A. Lieftinck leg.; — 2 ♂, Los Banos, Laguna, 13-XII-1953, H. Townes leg.; — 3 ♂, 1 ♀, Los Banos, 10-I-1954, H. Townes leg.; — 1 ♂, Luzon, Los Banos, 30-V-1954, H. Townes leg.; — 2 ♂, Los Banos; — 2 ♀, Los Banos, (50 m), 28-V-1949, L.B. Kicham leg.; — 1 ♂, Luzon, Laguna prov., III-1958, N.L.H. Krauss leg.; — 2 ♂, 1 ♀, Luzon, Camarines Sur, Mt Iriga, 28-III/6-IV-1962, H.M. Torrevillas leg.; — 2 ♂, Luzon, Los Banos, 15-V-1977, P.A. v.d. Laan leg.; — 5 ♂, Rizal, Mt Montalban, Wa-Wa-dam, 11-III-1965, H.M. Torrevillas leg.; 1 ♀, Luzon, Mt Montalban, Rizal, (150-200 m), 6-III-1965, H.M. Torrevillas leg.; — 1 ♂, 1 ♀, Mt Maquiling, Laguna, 22-V-1930, A.C. Duyag leg. — Coll. Müller: 2 ♂, 1 ♀ (Figs 1-2, 71-72), Luzon, Tagaytay, Ambon-Ambon, 9-II-1988, A. Schanowsky leg.; — 4 ♂ (Figs. 50-51) Luzon, Bulacan prov., Angat-Dam, (700 ft), 26-IV-1988, C. Treadaway leg.; — 4 ♂ (Fig. 63), Luzon, Cavite prov., Ternate, (1000 ft), 7/9-III-1989, C. Treadaway & Th. Borromeo leg.; — 1 ♀, Luzon, Quezon prov., Dolores, Mt Banahaw, (600 m), 23-V-1990, Th. Borromeo leg.

Diagnosis. — Species with crenulated wing apex. Male: black and blue. Inferior appendages extending to midway of the length of the superiors; superiors with a subbasal ventral spine. Female: prothorax with blunt pronotal tubercles, the anterior side of which is gently sloping. Posterior lobe with linguiform middle lobe, directed obliquely up- and backwards, smoothly bilobed at apex.

MALE. — Head. — Labrum, base of mandibles, ante- and postclypeus blue; an oblique band of the same colour below the scape of the antennae, extending from the lateral corner of the postclypeus to the eye margin. Head above mat black, brownish around the ocelli and on the occiput.

Thorax. — Anterior lobe of prothorax black, ventrolateral corners blue. Median lobe blue, except the dorsal sagittal groove black. Posterior lobe black, the lateral corners blue. Pterothorax black with extensive blue bands on the sides as in Figure 63; shape of the upper band very typical. Femora pale, finely striated with brown; the extensor surface obscurely spotted with blackish brown. Tibiae of the first pair dark brown, others pale brown.

Abdomen black with blue markings. Segment 1 mostly blue, black ventrolaterally. Segment 2 with a subapical ring, extending basalwards on dorsum, not quite reaching to the basal margin. Segments 3-6 with small subapical rings, usually wholly blue on segments 3-4, but on segments 5-6 blue only on dorsum and obscurely pale on sides. Segment 7 with a smaller blue subapical spot on dorsum. Segments 8-9 wholly black or with a pair of tiny subapical blue dots on segment 8 and a small subapical spot on segment 9. A blue spot covering most of the dorsum of segment 10.

Teneral specimens are pale brown on head and thorax. Abdomen first nearly white with brownish joints, turning to pale brown with distinct whitish subapical rings.

Superior appendages a trifle longer than segment 10, furnished with a small ventral and subbasal spine; inferiors reaching to midway of the length of the superiors, pincer-shaped (Figures 50-51). Superiors blue, inferiors black.

Wings. — Ac in midway between Ax1 and Ax2 or slightly nearer to Ax1. R4+5 originating distal to subnode or (in hind wing) in continuation to it. Other details of venation in Table I. Pterostigma longer than high, anal side a little longer than costal side, lateral sides nearly parallel; colour brown.

Penis. — Glans rather broad widening to form narrow side lobes in the apex; the lobes being furnished with a short curled flagellum. Glans with a longitudinal furrow in the middle; the apical margin with a distinct collar-shaped ridge, which extends to the apex of the side folds (Fig. 13).

Measurements (mm). — Hw. 20.5-23.5; — abd. 33-38.

FEMALE. — Dark brown or dark reddish brown. Blue markings on head quite similar to those in male, labrum partly ivory white. The upper blue lateral band of pterothorax similarly shaped or somewhat less sinuous than in male; the lower band often missing. Subapical blue markings on the abdominal segments as in male, but less distinct on sides.

Prothoracic structures as in Figures 71-72. Median lobe raised to form blunt pronotal tubercles, the anterior side of which is gently sloping. Posterior lobe with linguiform middle lobe, slanting obliquely up- and backwards, slightly bilobed on apex. Lateral lobes well separate from the middle lobe, ear-shaped. Posterior surface of the prothorax forms oval black "plates" between the middle and lateral lobes.

Measurements (mm). — Hw. 23.0-24.5; — abd. 31-34.

Distribution. — Luzon.

Notes. — Hagen in SELYS LONGCHAMPS (1863) described *serrata* on the basis of a single male specimen. BRAUER (1868) published a description of the female under the name *Hypocnemis cornuta* Brau. It should be noted that he wrote in the description: "Ich halte die mir vorliegenden Thiere für das noch unbekannte ♀ von *Hypocn. serrata* Hg.", and that he did not furnish the name with "n. sp.", unlike in all other names introduced in the same publication for the first time. He seems to have given a separate name for the female only for the possible case that it would later prove to be distinct from *serrata*. Study of the type now revealed that *cornuta* is synonym of *serrata*, thus confirming Brauer's original view.

The distribution of *R. serrata* is somewhat uncertain. LIEFTINCK (1981) states "Originally described from Manila, *serrata* occurs also in Mindanao and is possibly widely distributed in the Philippines". I presume that the inclusion of Mindanao in the range is based only on data of SELYS LONGCHAMPS (1882) and on the labels of specimens collected by Semper. These labels seem to be somewhat unreliable, as we can see in the type specimens of *cornuta* and in some other cases, where labels indicate both Mindanao and Luzon for the same specimen. So far I am not aware of any confirmed specimens of *R. serrata* outside Luzon. In Luzon it seems to be a common species at least in the central provinces.

*RISIOCNEMIS ASAHINAI* KITAGAWA, 1990
Figures 14, 52-53, 64, 73-74

*Risiocnemis asahinai* KITAGAWA, 1990: 33-34, 36, figs 1-11 (orig. descr. ♂, ♀ from Mindoro)

Material. — Coll. Müller: 12 ♂ Mindoro Is., Mindoro Oriental prov., Calapan, Comonal, Mt Tarugin, (350 m), 21/29-VI-1990, A. Gorostiza leg. — 39 ♂ (Fig. 14), 3 ♀, locality and collector as above, 17/26-VII-1990; — 1 ♂, Mindoro, Mindoro Occidental prov., Magsaysay, (100 m), 29-IX--1982, Th. Borromeo leg. — SMF: 8 ♂, 3 ♀ (Figs 73-74), Subaan, Mindoro, 25/28-I-1916, G. Boettcher leg.; — 5 ♂, 2 ♀, Naujan, Mindoro, 1911, Rolle leg.; — 1 ♂ Luzon, (Camarines Sur prov.), Mt Isarog, 7-IV-1916, G. Boettcher leg. — RMNH: 6 ♂ (Figs 52-53, 64), Mindoro, Alcate, Victoria, 5/6-IV-1954, H.Townes leg.

Type material not studied. Holotype ♂ and paratype ♀ deposited in coll. Asahina (Tokyo).

Diagnosis. — Species with crenulated wing apex. Male: black and blue. Superior appendages much longer than segment 10, inferiors reaching well over the midway of the length of superiors. Ventral spine of the superior appendages near the base. Female: median lobe of prothorax with blunt tubercles, somewhat slanting backwards. Middle lobe of the posterior lobe deeply bilobed at apex.

MALE. — Head. Labrum, base of mandibles and adjacent parts of genae shining black. A broad blue belt crossing the face from eye to eye covering ante- and postclypeus and lower part of frons up to the level of the scape of antennae. (In some specimens from Mt Tarugin also the basal half of labrum blue). Rest of the head mat black.

Thorax. — Anterior lobe of prothorax black, the ventrolateral corners blue. Median lobe blue, with the median sagittal groove variably black, very narrowly so in specimens from Mt Tarugin. Posterior lobe black. Pterothorax mat black with lateral blue bands as in Figure 64; the bands narrower and the upper one less sinuous than in *serrata*. Ventral side of pterothorax black, usually with a pair of blue spots of variable size, poststernum largely blue. Femora grayish yellow, with the extensor surface black, tibiae dark brown or black.

Abdomen relatively long; black or blackish brown. Segment 1 with large round ventrolateral blue spots. A complete blue ring in the apical half of segment 2, covering 1/3 of the length of the segment on the sides, but extending more basalwards on the dorsum. Complete subapical rings on segments 3-6, broader on the ventrolateral edge; blue on dorsum, whitish on sides. A little narrower, subapical ring on segment 7, interrupted by black middorsally. Segments 8-10 wholly black.

Teneral specimens are paler brown; pale bands on thorax wider, the lower band continuous from coxa to wing base. Subapical rings on abdomen larger and yellowish. Ring on segment 8 complete, traces of yellow rings on sides of segments 8-9, segment 10 wholly yellow.

Anal appendages shaped as in Figures 52-53; superiors 1.4 times longer than segment 10, furnished with a ventral spine near the base. Inferiors pincer-shaped, reaching well over the midway of the length of the superiors. Superiors whitish blue, spine dark brown; inferiors pale brown with darker base and apex.

Wings. — Ac as in *serrata*. In most specimens R4+5 in continuation to subnodus in both wings. Other details in Table I. Pterostigma with anal side slightly longer than costal side, colour brown.

Penis. — Quite similar to that of *serrata*, but the side lobes of glans less twisted and the median longitudinal furrow less distinct (Fig. 14).

The single male from Luzon differs slightly from the Mindoro ones. Its pterostigma is more oblique than in specimens from Mindoro, and the ventral spine of the superior appendages is a trifle more removed from the base.

Measurements (mm). — Hw. 20-25; — abd. 33-41.

FEMALE. — Body dark brown with pale bluish markings. Head with similar pale blue band as in male. Two complete pale bluish bands on sides of thorax extending from coxa to wing base. Upper band similarly shaped as in male, but slightly narrower in the middle. Abdomen with complete pale blue subapical rings on segments 2-7, the ring on segment 2 not extending basalwards.

Prothoracic structures as in Figures 73-74. Median lobe of prothorax with rather large, stout tubercles. The posterior side of the tubercles is steep, but the anterior side more gently sloping; thus the tubercles are slanting somewhat backwards. The tubercles are lower and thicker than in *varians*. Middle lobe of the posterior lobe directed obliquely upwards, distinctly bilobed on apex. Lateral lobes and the intermediate posterior surface similar as in *serrata*.

Measurements (mm). — Hw. 21-27; — abd. 31-37.

Distribution. — Mindoro, Luzon.

Notes. — This species seems to be quite common in Mindoro. More material is needed from Luzon before the infraspecific status of the Luzon population can be evaluated.

### *RISIOCNEMIS GRACILIS* SP. N.

Figures 54-55, 65

Material. — **Holotype** ♂: Philippines, Luzon, Nueva Vizcaya prov., Sta Fe, Dalton Pass, (800-1200 m), 25/30-VI-1989, A. Gorostiza leg.; at present in coll. Roland A. Müller (St Gallen, Switzerland), to be deposited at SMF.

Diagnosis. — Slender species with crenulated wing apex. Male: black and blue. Superior appendages as long as segment 10, inferiors reaching over the midway of the length of superiors. Superiors furnished with a robust subapical ventral process.

MALE. — Head. — Labrum, base of mandibles, clypeus and genae shining dark brown. Head above mat black, with brownish dots at the sides of the lateral

ocelli; postocular area obscurely brownish.

Prothorax. — Anterior lobe pale brownish on dorsum, black on sides. Dorsum of median lobe black, with blue crescent shaped streaks; sides of median lobe largely blue. Posterior lobe black.

Pterothorax narrower than in other species of the group, black with two narrow blue bands on sides, extending from coxa near to wing base (Fig. 65). Femora and tibiae coloured as in *serrata.*

Abdomen. — Segment 1 blue, the apical margin narrowly black. Segments 2--7 blackish brown on dorsum, paler brown ventrolaterally. Segment 2 with a subapical bluish ring, extending basalwards on dorsum. Segments 3-6 with pale subapical rings, bluish on dorsum and yellowish white on sides. Segments 8-10 black; segment 9 with a small blue dorsal dot on the apical half; segment 10 with a large blue spot, covering most of the dorsum.

Anal appendages shaped as in Figures 54-55. Superiors as long as segment 10, inferiors reaching over the midway of the length of superiors. Superiors with a robust ventral subbasal process, directed slightly apicad. Superior appendages pale blue, inferiors black.

Wings. — Ac nearer to Ax1 in fore wing, in midway of Ax1 and Ax2 in hind wing. R4+5 originating distal to subnodus in fore wing and in continuation to it in hind wing. Other details in Table I. Pterostigma nearly rhomboidal, brown.

Penis. — Of the *serrata* type. Glans without a distinct ridge on the apical margin and without a median longitudinal furrow.

Measurements (mm). — Hw. 21.5; — abd. 36.

FEMALE unknown.

Distribution. — Luzon.

Notes. — *R. gracilis* is easy to separate from the other species of the group by its slender shape and by the more robust ventral spine of the superior appendages. The single specimen was collected at the same site as *varians* and *arator.*

*RISIOCNEMIS VARIANS* SP. N.
Figures 15-16, 56, 59-60, 66, 68, 75-76

Material. — **Holotype** ♂: Philippines, Luzon, Nueva Vizcaya prov., Dalton Pass, Sta Fe, (500-900 m), Atbo, 13-II-1989, W. Catal leg.; at present in coll. Roland A. Müller (St Gallen, Switzerland), to be deposited at SMF. — **Paratypes:** 1 ♂, 1 ♀, Luzon, Nueva Vizcaya prov., Dalton Pass, Sta Fe, (800-900 m), 1/3-VI-1985, R.A. Müller leg.; — 36 ♂ (Figs 15-16, 56, 59-60, 66), 29 ♀ (Figs 68, 75-76), locality as above, (500-900 m; Batching, Tactac, Torner, Atbo, Perez Park and Zigzag), 9/16-II-1989, W. Catal leg.; — 9 ♂, 8 ♀, locality as above, (800-1200 m), 25/30-VI-1989, A. Gorostiza leg.; — 11 ♂, 6 ♀, Luzon, Quirino prov., Sierra Madre, Sulong River, (550 m), 13-V--1990, Th. Borromeo leg. — 2 ♂, 1 ♀ in RMNH and BMNH each, the rest in coll. Müller and Hämäläinen.

Diagnosis. — Species with crenulated wing apex. Male: black and blue. Superior appendages clearly longer than segment 10. Superiors on the dorsal

view sinuous; furnished with a ventral spine, well removed from the base. Inferior appendages not quite reaching to the apex of the superiors. Female: prothorax with large, erect pronotal tubercles. Middle lobe of the posterior lobe vertically raised, triangular in shape.

MALE. — Head. Labrum, base of mandibles and genae shining blackish brown. A u-shaped blue band crossing the face from eye to eye below the antennae, covering the whole anteclypeus and postclypeus. Head above mat black, with obscurely brownish postocular portions.

Prothorax. — Anterior lobe black. Median lobe blue with sagittal groove black. Posterior lobe variably coloured, either wholly black or blue with a mid-basal black spot.

Pterothorax. — Black, with two blue lateral bands as in Figure 66; the upper band extending from middle coxa just above the spiracle to the wing base. The lower band is rather short and tapering at both ends. Femora and tibiae coloured as in *serrata.*

Abdomen. — Black with blue markings of variable size. Segment 1 blue on dorsum, black ventrolaterally. Segment 2 with a large dorsal spot, attenuated basalwards, extending over the basal 2/3rd - 3/4th of the length of the segment. Segment 3 very variably coloured: most of dorsum blue in some specimens from Sierra Madre, black only at base and apex; in other specimens the dorsal blue is restricted to a subapical dorsal spot, attenuated basalwards, covering 1/10th - 1/3rd of the length of the segment. Segments 4-6 with blue, subapical spots on dorsum, attenuated basalwards, but variable in length, covering 1/10th - 1/3rd of the length of the segment; smallest spots in Dalton Pass and largest in Sierra Madre specimens. In a few specimens from Dalton Pass the subapical spots are restricted to tiny marks in segments 3-5, and are completely lacking from segment 6. Segment 7 wholly black or with a subapical dorsal spot, shorter than the spot on segment 6. Segment 8 wholly black in all specimens. Segment 9 with a variably shaped blue dorsal spot; ranging from a small oblong line on the middorsum in the apical half of the segment to a large variably shaped spot covering the apical 2/3rd of the segment; the spot lacking in a few Dalton Pass specimens. Segment 10 all blue on dorsum.

Teneral specimens are pale brown, with whitish blue markings. The pale spots on the abdomen are not larger in size than in mature specimens.

Superior appendages clearly longer than segment 10; inferiors pincer-shaped, not quite reaching the level of the apex of the superiors. Superiors furnished with a ventral spine, well removed from the base (Figs 59-60). Superior appendages strongly sinuous in dorsal view (Fig. 56). Superiors blue above, ventral spine brown; inferiors black with brown apex.

Wings. — Ac usually nearer to Ax1 than Ax2, but in midway in some specimens. R4+5 usually distal to subnodus in both wings, or in continuation to it in hind wing. Other details in Table I. Pterostigma oblique, anal side slightly

longer than costal side; colour brown, encircled with a distinct pale band.

Penis. Of the same type as in *serrata,* but the apical margin of glans with a less developed ridge, the ridge being rather indistinct along the side folds. Glans with shallow transverse furrow basad to the ridge (Figs 15-16).

Measurements (mm). — Hw. 19.5-24.0; — abd. 30.5-39.0.

FEMALE. — Head brown, labrum yellowish. Blue band crossing the face similarly shaped, but more obscure than in male. Anterior lobe of prothorax brown, median lobe largely bluish. Pterothorax brown; dorsal carina black. Upper bluish band on sides as in male, but more obscurely coloured; lower band missing in part of the specimens. Coxae bluish. Femora and tibiae pale, obscurely striated with dark brown as in *serrata,* knees darkened.

Abdomen dark brown, with very variable blue markings on dorsum. Markings are very reduced in specimens from Dalton Pass: on segments 1-6 quite similar, but usually smaller (sometimes hardly noticeable) than those in male. Segment 7 unmarked. A rather broad dorsal band covering the apical third of segment 8 and segments 9-10.

Prothoracic structures as in Figures 75-76. Median lobe raised to form prominent, erect and blunt pronotal tubercles. Middle lobe of the posterior lobe linguiform, vertically raised and triangular in shape (Fig. 68); lower than the tubercle. Lateral lobes well separated from the middle lobe, rounded and black. Black "plates" between the middle and lateral lobes as in *serrata* female.

Measurements (mm). — Hw. 20.5-25.0; — abd. 29-35.

Distribution. — Luzon.

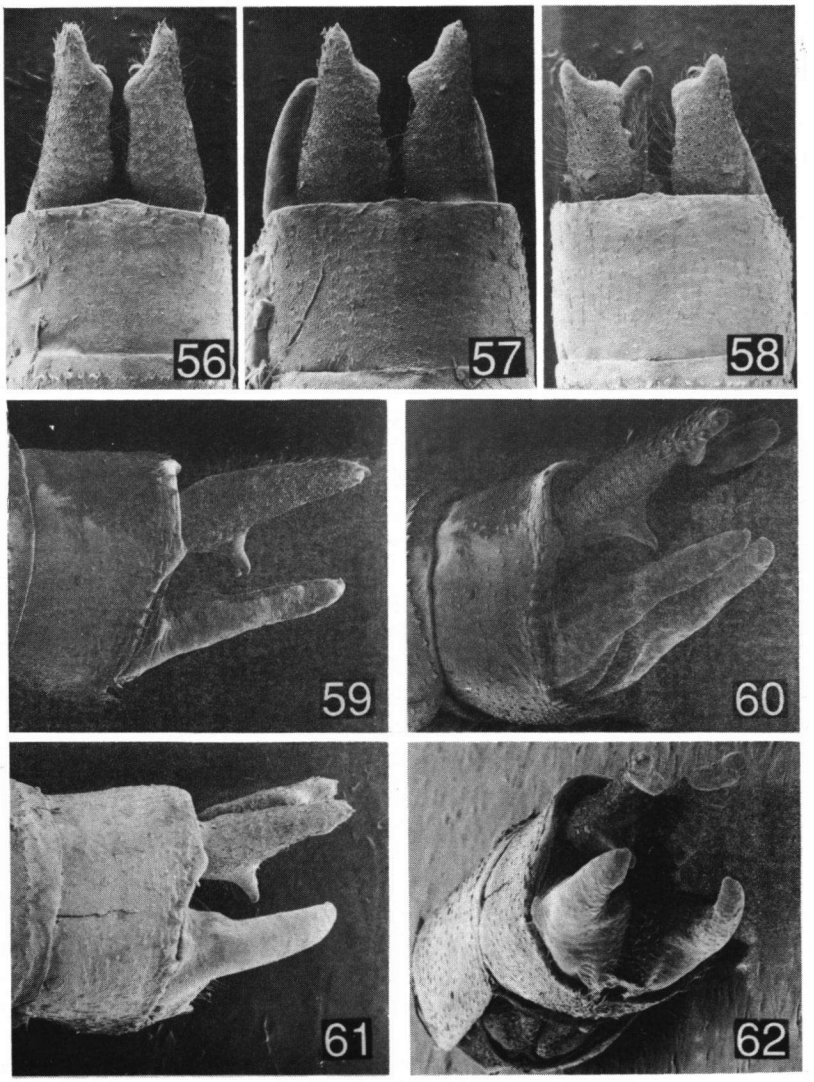
Notes. — See notes under *R. laguna* sp. n. and *R. elegans.*

### *RISIOCNEMIS PULCHRA* SP. N.
Figures 57, 61-62, 67, 69

?*Hypocnemis cornuta* (nec Brauer, 1868): SELYS LONGCHAMPS, 1882: 23, 24 (brief note on 2 ♀ from Luzon); — 1886: 100-101 (descr. 2 ♀ from Luzon)

Material. — **Holotype** ♂: Limay, [Bataan prov.], Luzon, 21-X-1913, G. Boettcher leg., deposited at SMF. — **Paratypes:** 3 ♂ (57, 61-62, 67) same locality and date as holotype; — 1 ♂, Limay, Luzon, 18-III-1914, G. Boettcher leg. (SMF). — Other material (identity supposed): 1 ♀, with pin labels / Luzon / 566 / cornuta Br. ? ♀ juv./ ; — 1 ♀ (Fig. 69), / Luzon / 80 / 565 / Hypocnemis cornuta Br. ♀ / Hypocnemis cornuta Brauer ? ♀ serrata Hg. Luçon ♀ /. Both specimens in coll. Selys Longchamps (IRSN).

DIAGNOSIS. — Species with crenulated wing apex. Male: black and blue, with extensive blue colouring. Male superior appendages only a trifle longer than segment 10, inferiors not quite reaching to the apex of the superiors. Superiors sinuous in dorsal view, with a ventral spine, well removed from base. Female (supposition): prothorax with large, erect pronotal tubercles; middle lobe of the posterior lobe directed upwards, kidney-shaped, bilobed at apex.




Figs 56-62. Male anal appendages of three *Risiocnemis* species: — (56, 59-60) *R. varians* sp. n.; — (57, 61-62) *R. pulchra* sp. n.; — (58) *R. laguna* sp. n. — [Figs 56-58 dorsal view; — Figs 59, 61 lateral view; — Figs 60, 62 oblique posterolateral view]

MALE. — Head. — Face blue up to the level of scape of antennae; the holotype with two small round blue spots below the median ocellus. Head above mat black, brownish on the postocular area in some specimens.

Thorax. — Anterior lobe of prothorax black; median lobe wholly blue; posterior lobe blue, the apical margin narrowly black. (In one specimen posterior lobe black also in the middle). Pterothorax black with two complete blue lateral bands extending from legs to wing bases (Fig. 67). Trochanters and lateral sides of femora bluish, extensor surface of femora dark or blackish brown.

Abdomen. — Black and blue; the blue colouring more extensive than in the related species. Segment 1 all blue. Segment 2 blue, except for a narrow black apical ring and black ventrolateral edge. A large blue dorsal triangle at the base of segment 3, reaching for 1/6 - 1/4th of the length of the segment. Complete blue subapical rings on segments 3-6, covering 1/6 - 1/4th of the length of the segments. A small blue subapical spot on dorsum of segment 7. Segment 8 wholly black. A variably shaped, blue apical spot on the dorsum of segment 9, ranging from a small line on middorsum to a large pear-shaped spot, extending near to the base of the segment. Segment 10 broadly blue on dorsum, black ventrolaterally.

Anal appendages resemble those of *varians*, but are relatively shorter; superiors only a trifle longer than segment 10. Inferiors are shorter and stouter than in *varians* (Figs 61-62), not reaching to the level of the apex of superiors. Superiors furnished with a ventral spine, well removed from the base. In dorsal view the superiors are sinuous, quite similar to those of *varians* (Fig. 57). Superiors blue, ventral spine tipped with black; inferiors black at base and apex, pale in the middle.

Wings. Ac slightly nearer to Ax1. R4+5 originating distal to subnodus in both wings, or in continuation to it in hind wing. Other details in Table I. Pterostigma with costal side shorter than anal side, more markedly so in fore wing. In fore wing proximal side more oblique than the distal side; colour brown.

Penis. — Of the *serrata* type; glans without distinct longitudinal or transverse furrow, side lobes rounded at apex.

Measurements (mm). — Hw. 21.5-24.0; — abd. 35-38.

FEMALE (supposition). — Quite similar to that of *varians*, but differs markedly in the shape of the middle lobe of the posterior lobe, and in having a more extensive blue colouring on the abdomen. Brown and blue colouring of head and thorax similar as in *varians* female. Abdomen brown, extensively coloured with blue. Segment 1 wholly blue on dorsum and sides. Segment 2 blue on dorsum for the basal 3/4th. Broad blue bands on dorsum of segments 3-7, reaching almost for the whole length of the segments. Dorsum of segments 8-10 all blue.

Prothoracic structures resembles those of *varians*, but the middle lobe of the posterior lobe is kidney-shaped and distinctly bilobed (Fig. 69).

R3 originating at Px 8-9 in fore wing and at Px 7-8 in hind wing, IR2 at Px 13 and Px 11-12 respectively. Postnodals number 21 in fore and 18-20 in hind wing. Venation otherwise as in male.

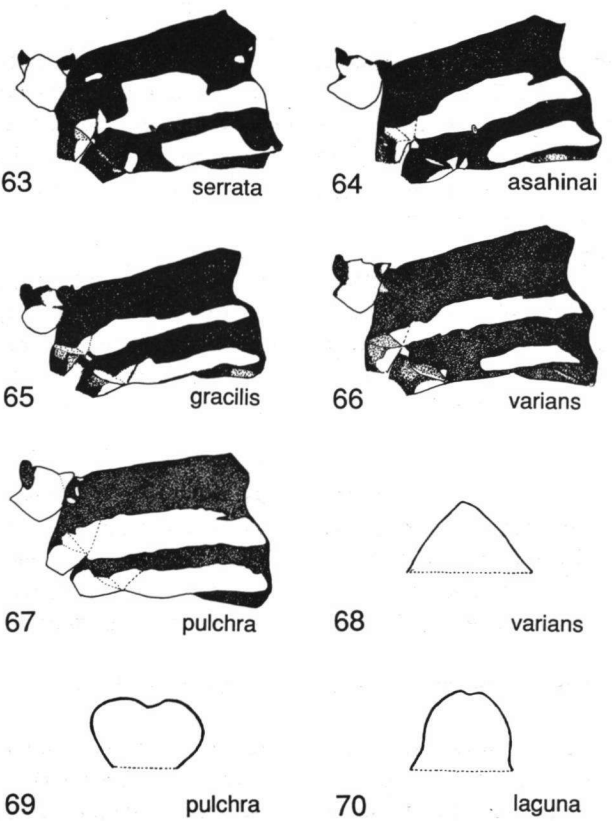
Measurements (mm). — Hw. 22.5-23.0; — abd. 33-34.

Distribution. — Luzon.

Notes. — The two female specimens in coll. Selys Longchamps are placed in this species with some hesitation. However, the extensive blue colouring of the abdomen and the similarity of the pterostigma support this supposition. Further notes under the next species.

*RISIOCNEMIS LAGUNA* SP. N.
Figures 58, 70

Material. — **Holotype** ♂ (Fig. 58): Paete, [Laguna prov.], Luzon, Phil[ippines], 29-VI-1916, G. Boettcher leg.; deposited at SMF. — **Paratype:** 1 ♂, 1 ♀ (Fig. 70), same locality and date as holotype; SMF.




Figs 63-70. Species of the *Risiocnemis serrata* group: (63-67) colour pattern of male thorax, lateral view; — (68-70) shape of the middle lobe of the posterior lobe in female prothorax, anterior view.

Etymology. *"Laguna"* according to Laguna de Bay, on the shore of which the type locality is situated. To be considered as a noun in apposition.

Diagnosis. — Species with crenulated wing apex. Male: black and blue. Superior appendages stout, about the same length as segment 10; strongly sinuous on dorsal view, furnished with a ventral spine, well removed from base. Inferiors not quite reaching to the level of the apex of the superiors. Female: median lobe of prothorax with prominent erect tubercles, middle lobe of the posterior lobe directed almost vertically; rather narrow and rounded with a small apical notch.

MALE. — Head. — Labrum, base of mandibles and genae shining dark brown; labrum of the paratype specimen with two round blue dots at base. A blue, irregular band crossing the face from eye to eye covering the whole clypeus, protruding in frons towards the middle so that the black colour forms a square in the middle of the frons, a branch of blue colour extending also along the scape of the antennae.

Thorax. — Anterior lobe black. Median lobe blue with the sagittal groove narrowly black. Posterior lobe blue with a balloon-shaped black spot in the middle and lateral edges narrowly black. Pterothorax black: the blue bands on the sides similarly shaped as in *varians*. Coxae with blue spots. Femora and tibiae pale, extensor surface of femora spotted with darker brown.

Abdomen. — Black with blue markings. Segments 1 and 2 coloured as in *varians*. Segments 3-7 with blue subapical dorsal spots covering 1/4 th of the length of segments 3-5, and about 1/3rd of segments 6-7. Segment 8 black. Segment 9 black in the holotype, but in the paratype with a small apical blue spot on the middorsum. Segment 10 with a large dorsal spot covering the apical 3/4th of the segment.

Anal appendages quite similar to those of *pulchra*, when seen in lateral view. In dorsal view the superiors are more abruptly narrowing in the apical part (Fig. 58). Superiors blue on dorsum, brown below; inferiors blackish brown, paler on the apex.

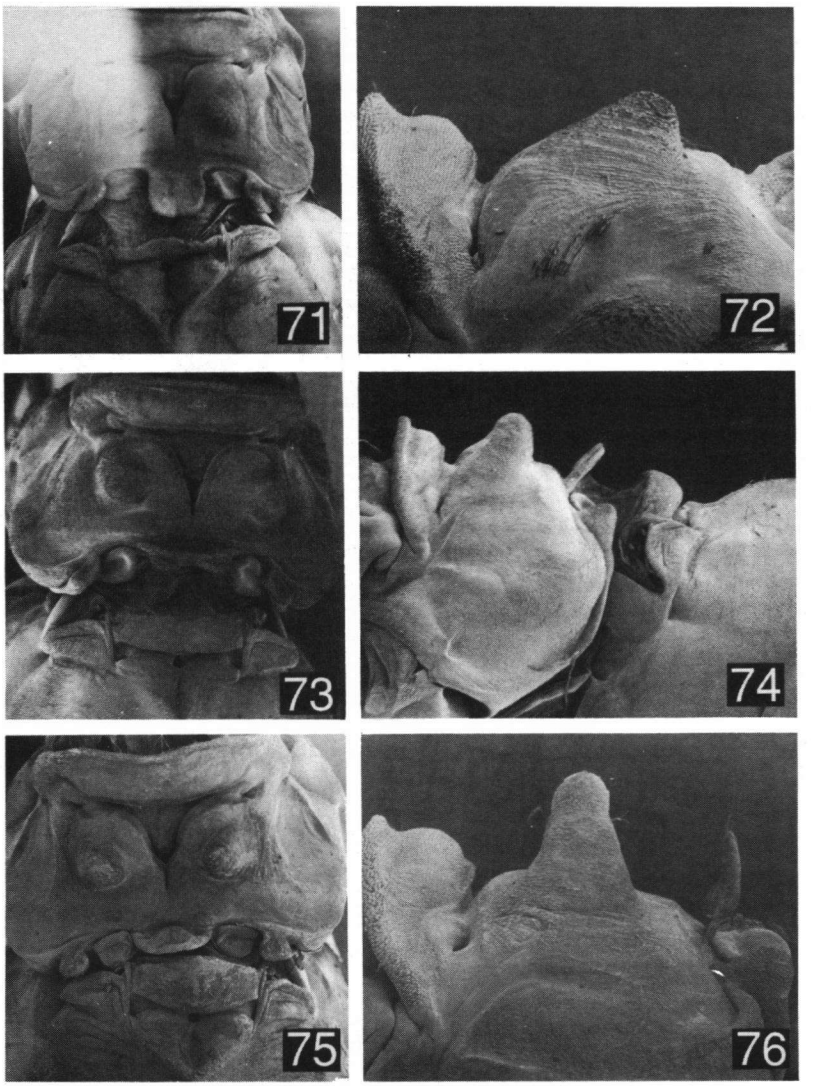
Wings. — Ac in midway between Ax1 and Ax2. R4+5 as in *pulchra*. Other details in Table 1. Pterostigma with anal side longer than costal side, less markedly so than in *pulchra*, thus the pterostigma less oblique than in *pulchra;* colour brown.

Penis. — Of the *serrata* type; similar to that of *pulchra*.

Measurements (mm). — Hw. 21.5-22.5; — abd. 37.5-38.0.

FEMALE. — Brown and blue colouring of head and thorax similar as in *varians*, but the blue markings on abdomen larger. Abdomen brown with blue subapical spots on segments 1-7 as in male, but those on segments 5-7 longer than in male. Whole dorsum of segment 8 and most of the segments 9-10 blue.

Prothoracic structures resemble those of *varians*. However, in lateral view the erect pronotal tubercles are somewhat less robust. Middle lobe of the posterior




Figs 71-76. Structures of female prothorax in three *Risiocnemis* species: — (71-72) *R. serrata;* — (73-74) *R. asahinai*; — (75-76) *R. varians* sp. n. — [Figs 71, 73, 75 dorsal view; — Figs 72, 74, 76 lateral view]

erect pronotal tubercles are somewhat less robust. Middle lobe of the posterior lobe rather narrow and rounded, with a small apical notch (Fig. 70); middle lobe in lateral view higher than in *varians*.

Measurements (mm). — Hw. 24; — abd. 35.

Distribution. — Luzon.

Notes. — *R. varians, pulchra* and *laguna* form an own "cluster" in the *serrata* group. Unlike in the other species of the group, the superior appendages are sinuous in dorsal view, and the pronotal tubercles of the female prothorax are upright and very prominent. BRAUER's (1868) description of the tubercles of his *cornuta* fits much better to females of these 3 species than to *serrata* female. Thus, it is no wonder that Selys Longchamps identified the two females of the supposed *pulchra* as *cornuta*. Correspondingly Ris had identified the *laguna* female as *cornuta*. *R. varians* is known from northern provinces of Luzon, *pulchra* and *laguna* from central provinces.

## SPECIES INCERTAE SEDIS

### *RISIOCNEMIS ELEGANS* KITAGAWA, 1990

*Risiocnemis elegans* KITAGAWA, 1990: 33-36, figs 12-22 (orig. descr. ♂, ♀, Isabela prov., Luzon)

Type material not studied. Holotype ♂ and paratype ♂♂ and ♀♀ in coll. Asahina (Tokyo).

It is not possible with confidence to place this species into any group on the basis of KITAGAWA's figures (17-18) of the penis; especially the lateral view of the penis (fig. 18) is peculiar (disordered structures?).

On the other hand, the sinuous shape of the male superior appendages and the upright pronotal tubercles in the female of *elegans* show an affinity with the cluster of species containing *varians* sp. n., *pulchra* sp. n. and *laguna* sp. n.

The male colour pattern of *elegans* is quite similar to that of *varians*. Also the anal appendages resemble those of *varians* to some extent, but the ventral spine of the superiors is more robust than in *varians*. The shape of the middle lobe of the posterior lobe of the female prothorax resembles that of *laguna* in frontal view.

Study of the type series, especially of the penile structure, is necessary before the affinity of this species can be confirmed. In case disordered penile structures were figured, the male may even prove to be conspecific with *R. varians* sp. n.

Distribution. — Luzon.

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