



## NOTES ON *KEMPNYIA*, WITH THE DESCRIPTION OF THREE NEW SPECIES (PLECOPTERA: PERLIDAE)

Claudio Gilberto Froehlich

Departamento de Biologia, Universidade de São Paulo  
14040-901 Ribeirão Preto, SP, Brazil  
E-mail: cgfroeh@usp.br

### ABSTRACT

Three new species of *Kempnyia*, *K. kaingang* sp. n., *K. ocellata* sp. n. and *K. pinhoi* sp. n., are described. Illustrations of the egg and female sterna 8-9 are presented for *K. neotropica* (Jacobsen and Bianchi). *Kempnyia serrana* (Navás) is recorded from the State of São Paulo. The female of *K. petersorum* Froehlich is described and a new illustration of the penial armature of that species is presented. New illustrations of the penial armature of *K. tenebrosa* Klapálek are also provided and a figure of the female sternum 9 of *Nedanta fusca* Navás is presented.

**Keywords:** *Kempnyia*, new species, Brazil, comments on species

### INTRODUCTION

The perlid genus *Kempnyia* is known from mountains of Central Brazil, from about parallel 14°S, south to Rio Grande do Sul State (Froehlich 2010). However, Derka et al. (2010) recently reported nymphs from Venezuela. Herein three new species are described, *K. ocellata* sp. n., based on a single male from the State of Rio de Janeiro, *K. kaingang* sp. n., based on a male and a female and *K. pinhoi* sp. n., based on one male and two females, both from the State of Santa Catarina. Additionally, the egg and a new figure of the female sterna 8-9 are presented for *K. neotropica* (Jacobsen & Bianchi). Also, the female of *K. petersorum* Froehlich is described and a new figure of the penial armature of the male is given. The occurrence of *K. serrana* (Navás), known from the states of Rio de Janeiro and Espírito Santo, is recorded for the first time from the State of São Paulo. Finally, a new figure of the penial armature of the male of *K. tenebrosa* Klapálek is provided for comparison and a figure of the female subgenital plate of *Nedanta fusca* Navás, a possible synonym of *K. tenebrosa*.

### MATERIAL AND METHODS

Examination of stonefly material deposited in the Natural History Museum, London (BMNH) resulted in the discovery of *K. kaingang* sp. n. and *K. ocellata* sp. n. The syntype ♀ of *Nedanta fusca* Navás, of the Zoologisches Institute und Zoologisches Museum, Hamburg, Germany (ZMUH) was examined. The remaining material listed in this study is deposited in Museum of Zoology of the University of São Paulo (MZSP). All illustrations were produced with the aid of a camera lucida. Terminalia were cleared with KOH.

### RESULTS AND DISCUSSION

#### Genus *Kempnyia* Klapálek 1914

*Kempnyia neotropica* (Jacobson & Bianchi 1905)  
(Figs. 1-2)

*Perla obscura* Pictet, 1841:269.

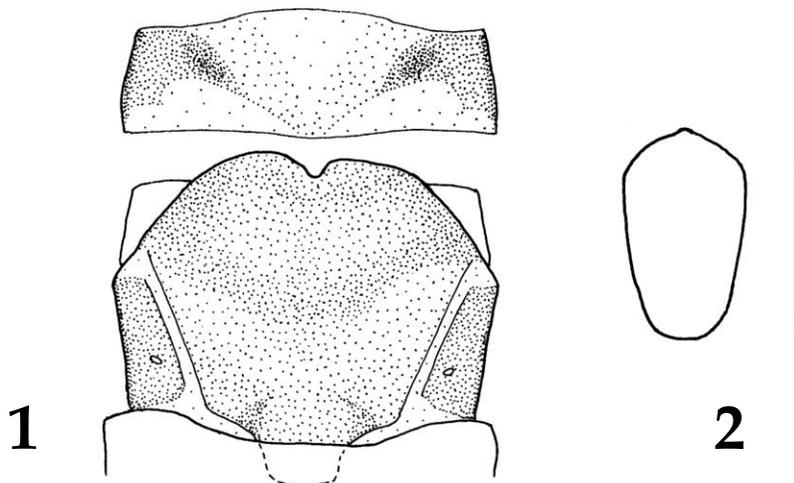
*Perla neotropica* Jacobson & Bianchi, 1905:617.

*Kempnyia neotropica* – Zwick, 1972:1168.

*Kempnyia neotropica* – Froehlich, 2010:181.

**Remarks.** Bispo & Froehlich (2004) noted, that “as presently understood, the species is widely distributed, its area being similar to the distribution of the genus. A careful analysis of specimens from different areas is needed to evaluate if they really belong to a single species”. Zwick (1972) examined specimens from four States, Espírito Santo, Rio de Janeiro, Santa Catarina and Rio Grande do Sul. Besides Santa Catarina, I have examined material from Minas Gerais (Serra do Cipó) São Paulo (Municipalities of Campos do Jordão, Cubatão, Iporanga, Jundiá, Pindamonhangaba, Salesópolis

and Santo André) and Goiás (Pirenópolis). These specimens are similar in the dark body color, the structure of the male genitalia, the elliptical contour of the female subgenital plate covering part of sternum 10 and with a small apical indentation (Fig. 1). Local populations differ in body length and in color, sometimes a lighter band may be present on the pronotum and the femora may be more or less bicolored. The species concept presented by Bispo and Froehlich (2004) is confirmed. A new figure of the female subgenital plate and sternum 9 is presented in Fig. 1 and of the egg (Fig. 2) based on a female from the Boracéia Biological Station (Salesópolis Municipality).



Figs. 1-2. *Kempnyia neotropica*. 1. Female sterna 8 and 9. 2. Egg. Scale bar: Fig. 1, 1.00 mm; Fig. 2, 0.29 mm.

### *Kempnyia petersorum* Froehlich 1996

(Figs. 3-4)

*Kempnyia petersorum* Froehlich, 1996:119.

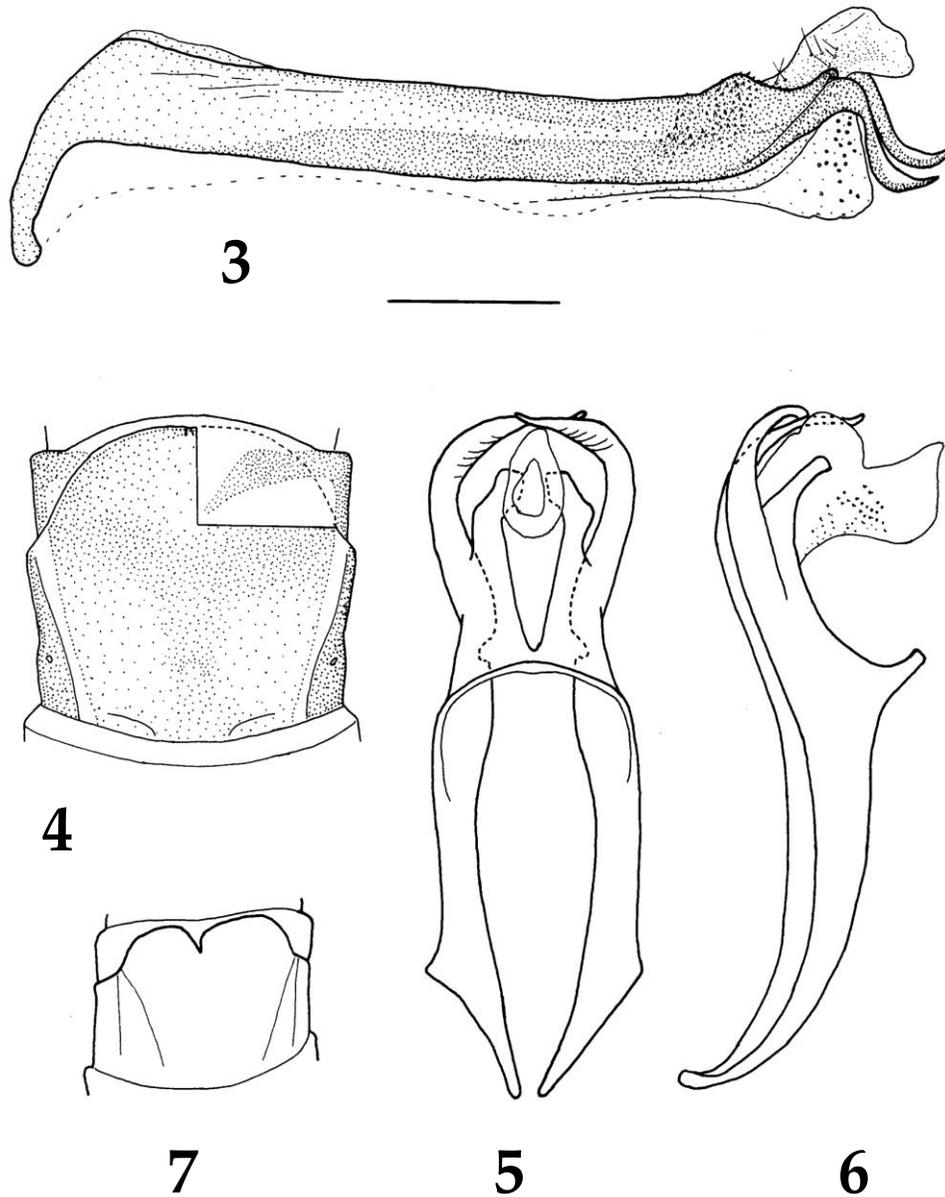
*Kempnyia petersorum* – Bispo & Froehlich, 2004:110.

**Material examined.** BRAZIL, São Paulo, Ubatuba, Maranduba, Sítio Santa Cruz, 1♂, 13.IX.2006, at light, A.R. Calor, F.O. Roque, T. Siqueira. São Paulo, São Sebastião, Maresias, Pousada Piccolo Albergó, 1♀, 15.IX.2006, at light, A.R. Calor, F.O. Roque, T. Siqueira.

**Remarks.** This species is recognized by the

distinctive color pattern, the head with a broad dark middorsal band and paler lateral areas, the uniformly brown pronotum, and the light-colored, translucent wings. The forewing length of the male is 10.5 mm. A new figure of the penial armature in lateral view (Fig. 3) is given as for comparison to the figure presented of the type by Froehlich (1996).

**Female.** Forewing length, 14.5 mm. Subgenital plate (Fig. 4) large, elliptical, covering most of sternum 9, with a minute apical indentation, shades of brownish in color. Sternum 9 mostly colorless but with the brownish extensions towards the midline, usual in the genus.



Figs. 3-4. *Kempnyia petersorum*. 3. Penial armature in lateral view, 4. Female sterna 8 and 9. Figs. 5-6. *Kempnyia tenebrosa*, penial armature in dorsal and lateral views. Fig. 7. *Nedanta fusca*, outline of female sternum 8. Scale bar: Fig. 3, 0.22 mm, Fig. 4, 1.00 mm; Fig. 5-6, 0.30 mm.

***Kempnyia serrana* (Navás 1936)**

*Diperla serrana* Navás, 1936:729.  
*Eutactophlebia gracilentata* – Zwick, 1973 (in part: males from Santa Leopoldina, ES).

*Kempnyia serrana* – Froehlich, 2010:182.

**Material examined.** BRAZIL, São Paulo, Salesópolis, Estação Biológica de Boracéia, 2♂, 11.XI.1990, at light, C.G. Froehlich, L.G. Oliveira, M.J.N. Ferreira.

**Remarks.** This species was known from the States of Rio de Janeiro and Espírito Santo. The forewing lengths of the above males are 13.4 and 13.9 mm.

***Kempnyia tenebrosa* Klapálek 1916**  
(Figs. 5-6)

*Kempnyia tenebrosa* Klapálek, 1916:50, 69.  
*Nedanta fusca* Navás, 1932:86 ?  
*Kempnyia tenebrosa* – Zwick, 1972:1172.  
*Kempnyia tenebrosa* – Froehlich, 2010:182.

**Material examined.** BRAZIL. Santa Catarina, Blumenau, banks of Rio Garcia, 1♂, beating sheet, 5.XII.1975, S.A. Vanin. Santa Catarina, Boiteuxburgo, *Nedanta fusca* Navás, ♀ syntype (ZMUH).

**Remarks.** This species, the type of the genus *Kempnyia*, has been seldom collected and is the subject to some confusion (Zwick 1972). Zwick (1972, fig. 9, a, b) figured the penial armatures of two males, one from Corupá, SC, and the second from Rio de Janeiro, RJ. Differences between the two specimens Zwick attributed in part to the teneral condition of the second specimen. The penial armature of the above listed male (Figs. 5-6) agrees relatively well with the specimen from Corupá, but in the basal part of the longitudinal bars there is an outer angle, the base of the hooks is broader and basally to the gonopore tube there is a large protuberance (present, but smaller, in the specimen from Rio de Janeiro). As the species is known from only a few specimens, and the above specimen agrees with Klapálek's original description, I place it as *K. tenebrosa*.

Females of *K. tenebrosa* and *K. neotropica* can be distinguished by the shape of the subgenital plate. In *K. neotropica* the contour of the subgenital plate is elliptical with a small apical notch and covers most of sternum 9 and part of sternum 10, whereas in *K. tenebrosa* the plate is shorter and with a larger notch (Zwick 1972, fig. 9c; Fig. 1).

Navás (1932) studying material in the ZMUH collected in Boiteuxburgo (a locality ca. 60 km south of Blumenau), Santa Catarina, erected the genus *Nedanta* with three included species, one of which was *Nedanta fusca*. This species was based on one male and one female, but Navás had doubts whether they belonged to the same species. Zwick (1972) synonymized the male syntype with *K. neotropica*. In

1968 I examined the female syntype. The subgenital plate (Fig. 7) is shorter than that of *K. neotropica* and has a deep apical notch, indicating this female could belong to *K. tenebrosa*, but not to *K. neotropica*, confirming Navás's doubts. *Kempnyia neotropica* and *K. tenebrosa* are sympatric both in Rio de Janeiro and in Santa Catarina. *Kempnyia neotropica*, however is a common species, but *K. tenebrosa* is rare, known for a few specimens. *Kempnyia tenebrosa* may be a species that is not attracted to lights, the more usual way of collecting adult stoneflies in the Neotropics. The male from Santa Catarina was collected using a beating sheet.

***Kempnyia kaingang* sp. n.**  
(Figs. 8-15)

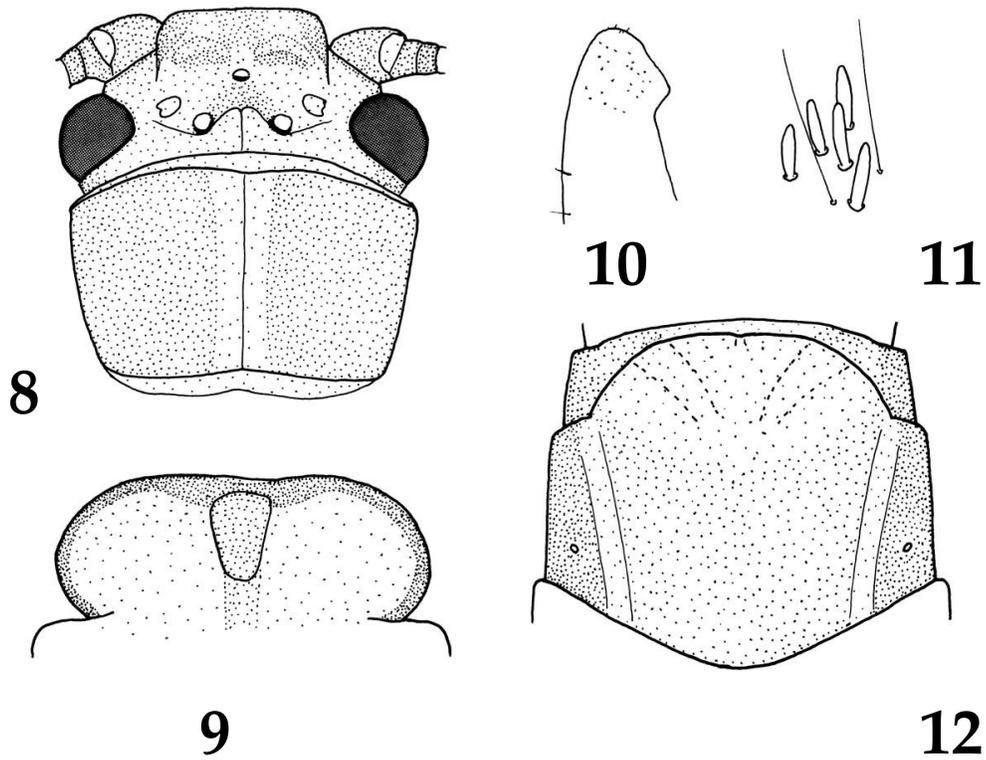
**Material examined.** Holotype ♂, BRAZIL, Santa Catarina, Nova Teutônia, 27°18' 52"23', 300-500 m, Jan. 1956, F. Plaumann, *K. klugii*. Paratype, ♀, same data as holotype (BMNH).

**Adult habitus.** General color light brown-ochraceous. Head light brown to yellowish, darker at lappets, in part around M-line and from the anterior ocellus to the postfrontal line and paired ocelli (Fig. 8). Pronotum light brown with yellowish mid stripe. Legs, wings and cerci light brown-ochraceous.

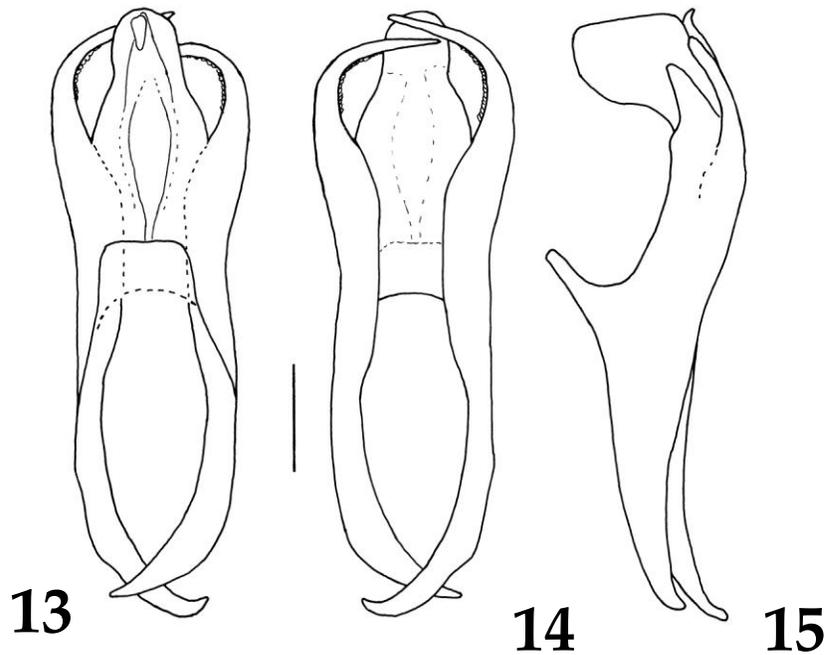
**Male.** Forewing length 13 mm. Subgenital plate short, less than half its width, bases turned inwards (Fig. 9). Hammer oval, broader posteriorly. Basiconic sensilla of tergum 10 long (Fig. 11). Paraprocts with a large subapical tooth and minute apical sensilla (Fig. 10). In the penial armature (Figs. 13-15), the foramen is large, the posterior rim is high and bent backwards, the anterior tips of the longitudinal bars are loose. The hooks are large and curved medially, crossing under the gonopore tube. The inner part of the curve presents thin-walled crenulations.

**Female.** Forewing length 18 mm. Subgenital plate light in color, apical contour rounded, apically a minute indentation Sternum 9 with the darker extensions extending anteromesially (Fig. 12).

**Remarks.** The above two specimens were identified as *K. klugii* (Pictet), a dark species with completely different penial armature (Zwick, 1972). In fact, *K. kaingang* is most similar to *K. tenebrosa*, with its large hooks that cross under the gonopore tube (cf Figs. 5-6) or rises at its side (Zwick, l.c.), but in *K. kaingang*



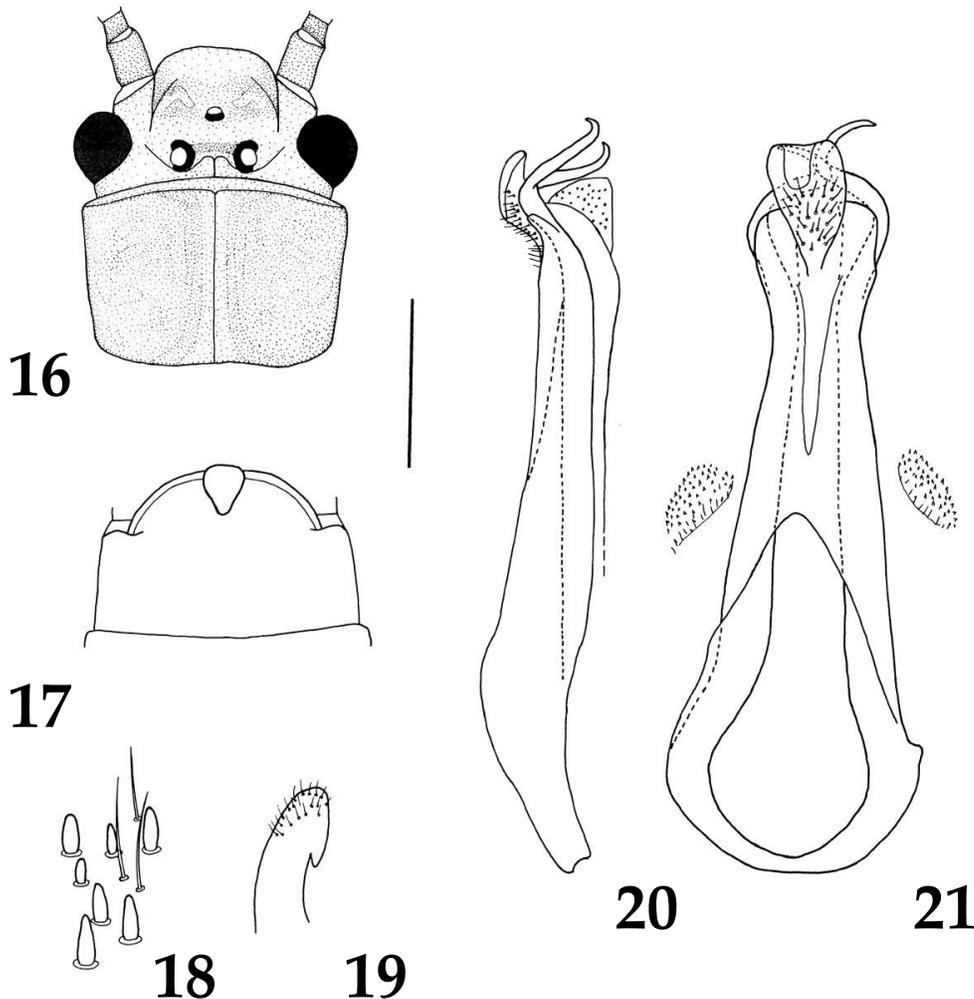
Figs. 8-12. *Kempnyia kaingang* sp.n. 8. Head and pronotum. 9. Male sternum. 10. Apex of male paraprot. 11. Basiconic sensilla of tergum. 12. Female sternum.



Figs. 13-15. *Kempnyia kaingang* sp.n., penial armature in dorsal, ventral and lateral views. Scale bar: 0.20 mm.

the dorsal rim of the armature projects posteriorly more strongly, the hooks are stronger and the gonopore tube is thick. In addition, *Kempnyia tenebrosa*, as the name implies, is a dark species, in contrast to the light-colored *K. kaingang*.

**Etymology.** The name honours the Kaingang native people of Brazil, of the Macro-Ge language group, that still lives in indigenous areas in Santa Catarina and in nearby states. Name in apposition.



Figs. 16-21. *Kempnyia ocellata*, n. sp. 16. Head and pronotum. 17. Outline of male sternum. 18. Basiconic sensilla of tergum. 19. Apex of male paraproct. 20-21. Penial armature in lateral and dorsal views. Scale bar: Fig. 23, 2.00 mm; Figs. 27-28, 0.21 mm.

***Kempnyia ocellata* sp. n.**  
(Figs. 16-21)

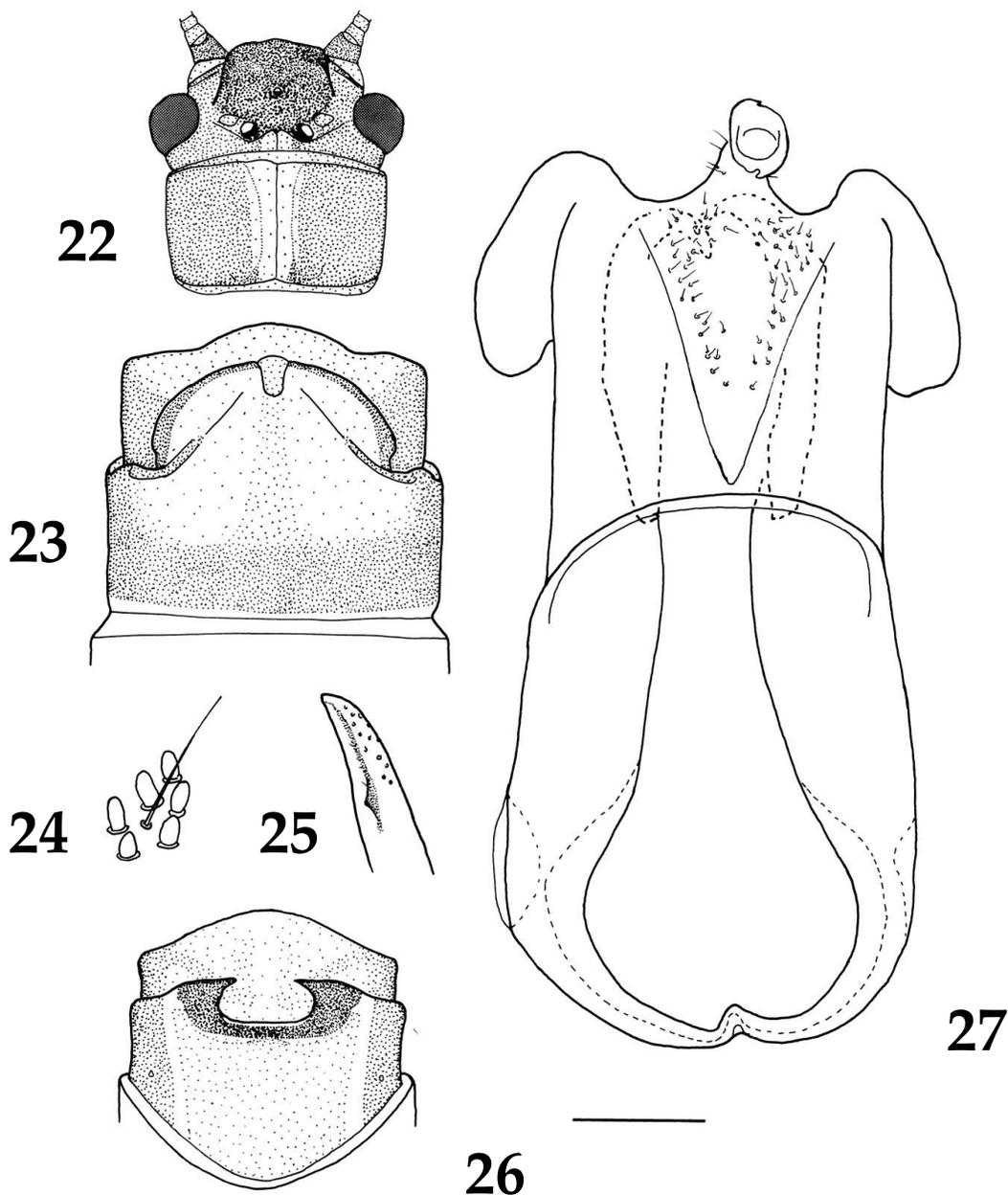
**Material examined.** Holotype ♂, BRAZIL, Rio de Janeiro, Teresópolis, 30/09/1887. Purchased of Herr Fruhstorfer (BMNH).

**Male.** Forewing length 20 mm. General color light brown. Head (Fig. 16) light rusty brown, somewhat darker along a band at level of M-line, a darker stripe between paired ocelli. Antennae light brown basally, then ochraceous. Pronotum light rusty brown, rather uniform, with an inconspicuous lighter mid stripe.

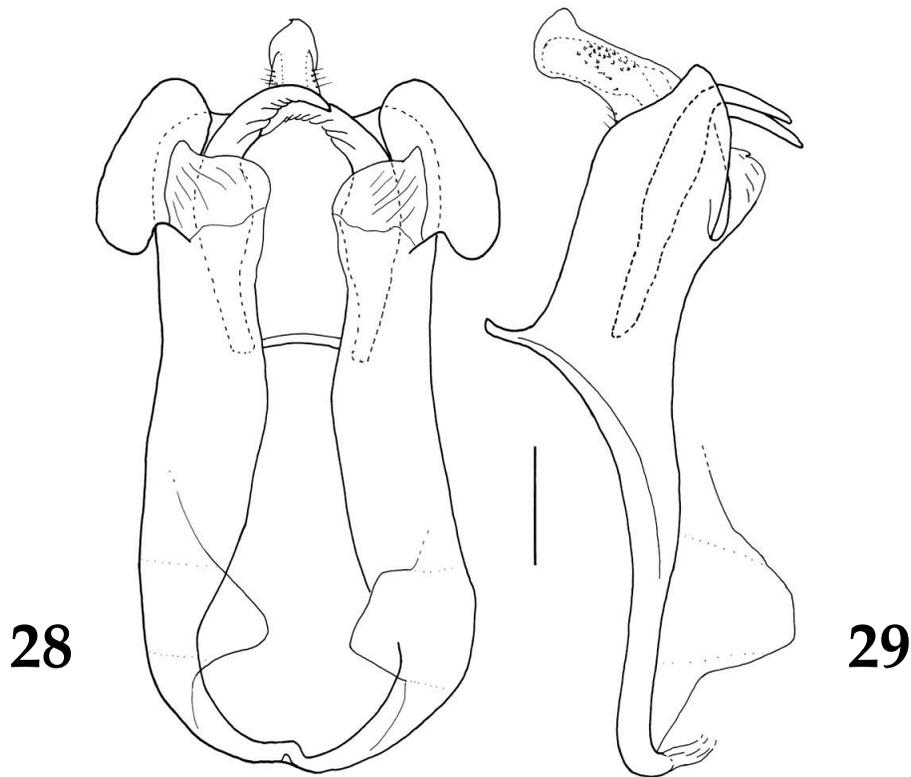
Legs light brown. Wing membrane and veins yellowish.

Tergum 10 basiconic sensilla carrot-shaped (Fig. 18), similar to those of *K. auberti*; paraprocts (Fig. 19) with a blunt subapical tooth, several long hair sensilla present. Subgenital plate oval, relatively

short, hammer pear-shaped (Fig. 17). On penis tube basal to armature, a pair of rather flat spiny patches (Fig. 21). Penial armature long, hooks thin and twisted apically, gonopore tube broad as seen dorsally (Figs. 20-21).



Figs. 22-27. *Kempnyia pinhoi* sp.n. 22. Male head and pronotum. 23. Male sterna 9 and 10. 24. Basiconic sensilla of tergum 10. 25. Apex of male paraproct. 26. Female sterna 8 and 9. 27. Penial armature in dorsal view. Scale bar: Fig. 22, 1.00 mm; Fig. 23, 0.5 mm; Figs. 24-25, 0.15 mm, Fig. 26, 0.18 mm.



Figs. 28-29. *Kempnyia pinhoi* sp.n., penial armature in ventral and lateral views. Scale bar: 0.20 mm.

**Remarks.** The above male bears the label “ocellata Klapálek”, likely in Klapálek’s original handwriting. He did not publish the name. The species belong to the group of *Kempnyia* that have a pair of rather flat spiny patches on the penis tube basally and ventrally from the armature. When the penis is everted, the patches are on the dorsal side. This group includes *K. neotropica*, *K. auberti* Froehlich, and *K. petersorum* Froehlich. *Kempnyia neotropica* is a dark species smaller than *K. ocellata*, *K. petersorum* has a different color pattern (see above) and is smaller, wing length of males 11.1-12.4 mm. *Kempnyia auberti* is of similar size to *K. ocellata*, with wing lengths of the two known males 18.4 and 22 mm, respectively, but the head pattern is different, lacking the dark bridge between the paired ocelli, the subgenital plate is shorter, the paraprocts lack a subapical tooth and the gonopore tube is narrower.

**Etymology.** I have kept Klapálek’s name, *ocellata*,

probably given in reference to the species’ conspicuous ocelli.

*Kempnyia pinhoi* sp. n.  
(Figs. 22-29)

**Material examined.** Holotype, ♂, BRAZIL, Santa Catarina, Florianópolis, Unidade de Conservação Ambiental Desterro (UCAD), 20/11-21/12/2003, Malaise trap, L.C. Pinho. Paratypes: 1♀, same data as holotype but 24/10-24/11/2003; 1♀, same data as holotype (MZSP).

**Adult habitus.** Small and dark species. Central frons (Fig. 22) dark brown, M-line a shade lighter. Genae and parietalia brown, area on sides of coronal line lighter. Antennae brown. Pronotum brown, broad mid stripe yellowish. Wings infuscated, veins brown, C, Sc paler; 1-3 extra crossveins in distal half of forewings, none in hindwings. Legs brown, femora

bicolored. Cerci ringed.

**Male.** Forewing length, 8.5 mm. Basiconic sensilla of tergum 10 short-elliptical (Fig. 24). Paraprocts flattened distally, with a low subapical tooth and minute sensilla (Fig. 25). Length of projecting part of subgenital plate slightly less than half its breadth; subgenital plate whitish, mid stripe pale brownish (Fig. 23). Hammer elongate, broader apically. Penial armature broad in dorsal/ventral views, distally, conspicuous lateral flanges (Figs. 27-28). Anterior foramen large, rim elevated (Fig. 29). Hooks stout and short, bent inwards.

**Female.** Forewing length, 11.9 mm. Subgenital plate (Fig. 26) with the deep, constricted notch, characteristic of the *serrana*-group of *Kempnyia* (Froehlich 1984).

**Remarks.** *Kempnyia pinhoi* is most similar to *K. mirim* Froehlich (1984). Both species are of similar size, but *K. pinhoi* is darker than *K. mirim*; in the penial armature, the dorsal rim of the foramen is higher in *K. pinhoi* and the hooks of *K. mirim* are bent more laterally.

**Etymology.** The epithet honours Luiz Carlos de Pinho, specialist in Chironomidae and collector of the specimens.

#### ACKNOWLEDGMENTS

I thank Dave Goodger and Mick Webb (BMNH) for assistance during my visits, H. Weidner (ZMUH) who at the time (1968) was responsible for the Plecoptera collection, L.C. Pinho for forwarding to me material from the State of Santa Catarina, an anonymous referee for text improvement and the Brazilian Council of Science and Technology (CNPq) for research fellowships.

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Received 27 April 2011, Accepted 13 May 2011, Published 13 June 2011