

Studies on Neotropical Protoneuridae. 10. *Forcepsioneura lucia* sp. n. from the Parque Estadual Rola Moça, Minas Gerais, Brazil (Odonata, Zygoptera)

Angelo B. M. Machado¹

ABSTRACT: *Forcepsioneura lucia* is described and compared with the other species of the genus, which is easily distinguished from *F. garrisoni*, *F. itatiaiae* and *F. sancta* by the short vertical branch of the superior anal appendages. It differs from *F. ephippigera* by the structure of the anal appendages having the lateral tubercle of the median lobe of prothorax more prominent and the rear of the head yellow (black in *F. ephippigera*). The habitat of the new species is described, and its conservation status discussed. A key is also provided to the males of the five species of *Forcepsioneura*. **Key words:** *Forcepsioneura*, Odonata, Parque Estadual Rola Moça, Protoneuridae.

RESUMO: **Estudos sobre protoneurídeos neotropicais. 10. *Forcepsioneura lucia* sp. n. do Parque Estadual Rola Moça, Minas Gerais, Brasil (Odonata, Zygoptera).** *Forcepsioneura lucia* é descrita e comparada com as outras espécies do gênero, que é facilmente separada de *F. garrisoni*, *F. itatiaiae* e *F. sancta* pelo tamanho curto do ramo vertical dos apêndices anais superiores. Difere de *F. ephippigera* pela estrutura dos apêndices anais, pelo tubérculo lateral do lobo mediano do protórax mais proeminente e pela coloração amarela da parte posterior da cabeça (negra em *F. ephippigera*). É descrito o habitat da espécie nova e é discutido seu *status* de conservação. É apresentada uma chave para machos das 5 espécies de *Forcepsioneura*.

Palavras-chave: *Forcepsioneura*, Odonata, Parque Estadual Rola Moça Protoneuridae.

Introduction

As part on my studies on the Selysian types of *Protoneura*, *Phasmoneura ephippigera* (Selys, 1886) was redescribed (Machado,

¹ - Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Av. Antônio Carlos, 6627 - Pampulha, 31270-901, Belo Horizonte, MG, Brasil.

1985a) and discussed its generic affinities (Machado, 1985b). One conclusion was that *P. ephippigera*, *P. ciganae* Santos, 1968 and *P. itatiaiae* Santos, 1970 form an homogeneous group of species whose differences with *P. exigua* (Selys, 1886), the type species of *Phasmoneura*, might justify the erection of a new genus. This has been done recently by Lencioni (1999) who erected the genus *Forcepsioneura* to contain these three species and *F. garrisoni*, from Iguape, São Paulo. Simultaneously I demonstrated (Machado, 1999) that *P. ciganae* is a synonymous of *P. sancta* (Hagen in Selys, 1860). Thus, the genus *Forcepsioneura* Lencioni, 1999 contains now four species: *F. ephippigera*, *F. garrisoni*, *F. itatiaiae* and *F. sancta*. To these I add now *F. lucia* sp. n. from the Parque Estadual Rola Moça, near Belo Horizonte.

Forcepsioneura lucia sp. n.

Male. Head: labium yellowish. Labrum dark brown bordered with yellow. Anteclypeus and postclypeus brownish black. Genae and base of mandible yellow. Anterior part of frons black with a transverse elongated yellowish line (or stripe in two paratypes) at its lower border. Upper part of head dark with a slight metallic copper shining. Rear of the head yellow.

Prothorax: laterally yellow; dorsally black with two comma shaped yellowish brown markings at each side of the median lobe. Posterior lobe narrower than the median one, with the margin uniformly convex (Figure 1). Postero-lateral corner of the median lobe with a prominent tubercle (Figure 1).

Pterothorax: mesepisternum dark with a slight metallic green or copper shining, except for a yellowish brown line adjacent to the humeral suture. Anterior part of mesepimerum and posterior part metepisternum brownish. Remaining parts of these sclerites yellowish. Metepimerum yellowish. Legs yellow. Claws with a well-developed tooth. Wings hyaline. Pterostigma brown surrounded by a yellow line, occupying one cell or slightly less, its costal side slightly smaller than the radial one, the inner side straight and oblique, the outer side slightly convex.

Venation: postnodal: in fore wing, 12 (12.5 %), 13 (50 %), 14 (12.5 %), 15 (25 %); in hind wing 11 (62.5 %), 12 (37.5 %). R3 in fore wing originating at the 5th (25 %), 6th (50 %) or 7th (25 %) postnodal; in hind wing at the 3rd (12.5 %), 4th (75 %) or slightly proximal to the 5th (12.5 %) postnodal. IR2 in fore wing originating at the level of the 8th (75 %), or 9th (25 %) postnodal; in hind wing at the level of the 6th (25 %), 7th (62.5 %) or 8th

(12.5 %) postnodal. CUP in fore wing terminating at $1/5$ (12.5 %), $1/4$ (12.5 %), $1/3$ (50 %) or $1/2$ (25 %) of the distance between the crossvein descending from the subnodus and that descending from the first postnodal; in hind wing terminating at $1/3$ (37.5 %), $1/2$ (37.5 %), $2/3$ (12.5 %) of this distance or at the crossvein descending from the first postnodal (12.5 %). Arculus distinctly distal (100 %) to the 2nd antenodal in both wings (100%). Upper limb of the arculus about one half of the lower limb in length (100 %). CuA situated in the middle of the distance between the 1st and 2nd antenodal (100 %); in hind wing in the middle (87.5 %) or slightly distal (12.5 %). IR3 in fore wing arising at the subnodus (62.5 %) or slightly distal to it (37.5 %), in hind wing, at the subnodus (50 %) or slightly distal to it (50 %). R4 + R5 proximal to the subnodus in both wings (100 %). In all the wings IR3 is distinctly separated from R4 + R5 by a small crossvein. First antenodal costal space larger than the second and as long as the third. Abdomen: black dorsally with a basal yellow ring at segments 1-7. Lateral and ventrally yellow. A dorsal yellow transverse stripe at the distal part of segment 10. Superior anal appendages yellow except for the distal halves of the forceps, which are black (yellowish in a teneral paratype). Distal border of 10th segment dorsally straight (Figure 4) or with a very slight concavity. Superior appendages slightly longer than segment 10, directed upwards (Figure 3), in dorsal view with the basal half dilated and the distal one slender and convergent (Figure 4). Each appendage bears at its base a short and stout vertical branch (Figure 3) which ends in a small up curved black tooth (Figure 5). Occupying the basal half of each appendage there is a process (Figs. 4-6) visible in lateral view (Figure 3) directed ventrally and medially (Figure 3), with a small spine anteriorly (Figure 4). Inferior appendages absent. Penis with a well developed internal fold and two long filaments on the apex (Figure 6).

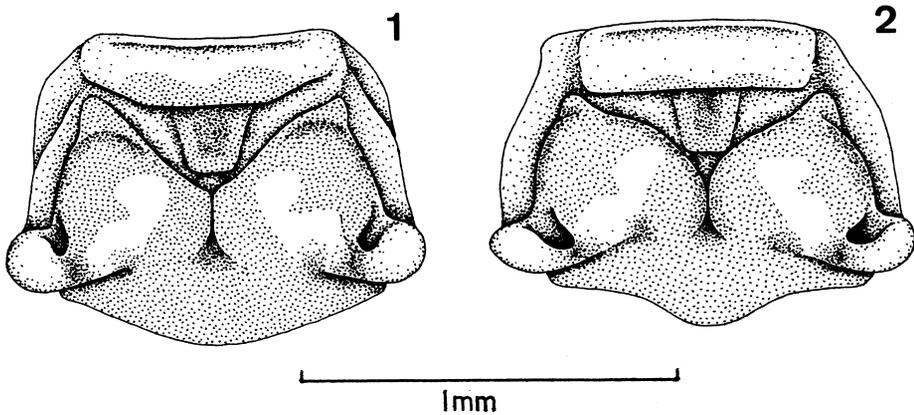
Measurements (mm): abdomen with appendages 22-23 (mean 22.6); appendages 0.5-0.6 (mean 0.58); length of fore wings 22-23 (mean 22.5), of hind wings 20.5-22.3 (mean 21.6). Costal side of pterostigma 0.6.. Antenodal costal spaces in fore wings 2.2-2.5 (mean 2.3), 1.7-1.9 (mean 1.8), 2.0-2.5 (mean 2.3); in hind wing 2.4-2.5 (mean 2.4); 1.7-1.8 (mean 1.75), 2.3-2.5 (mean 2.4).

Female. Head: as in the male, except for the yellow labrum and a wider yellow area on the anterior part of frons.

Prothorax: as in the male, except for the posterior lobe, more strongly convex in the middle (Figure 2).

Pterothorax: as in the male.

Venation: postnodals in fore wing, 14; in hind wing 11-12. R3 in fore wing



Figures. 1-2. Prothorax in antero-dorsal view of *Forcepsioneura lucia* sp. n. 1. Male holotype, 2. Female allotype.

originating at the 6th postnodal; in hind wing at the 4th or slightly proximal to the 5th postnodal. IR2 in fore wing originating at the level of the 8th postnodal; in hind wing at the level of the 7th. CUP in fore wing terminating at 1/3 or 1/2 of the distance between the crossvein descending from the subnodus and that descending from the first postnodal; in hind wing terminating at 1/3 of this distance. Arculus distinctly distal to the 2nd antenodal in both wings. Upper limb of the arculus about one third of the lower limb in length. CuA in both wings situated in the middle of the distance between the 1st and 2nd antenodal (50 %) or slightly beyond (50 %). In fore wings IR3 arising at the subnodus (100 %); in one of the hind wings arising at the subnodus (50 %), in the other slightly distal to it (50 %). R4 + R5 proximal to the subnodus (100 %). In all the wings IR3 is distinctly separated from R4 + R5 by a small crossvein. First antenodal costal space larger than the second and slightly smaller than the third.

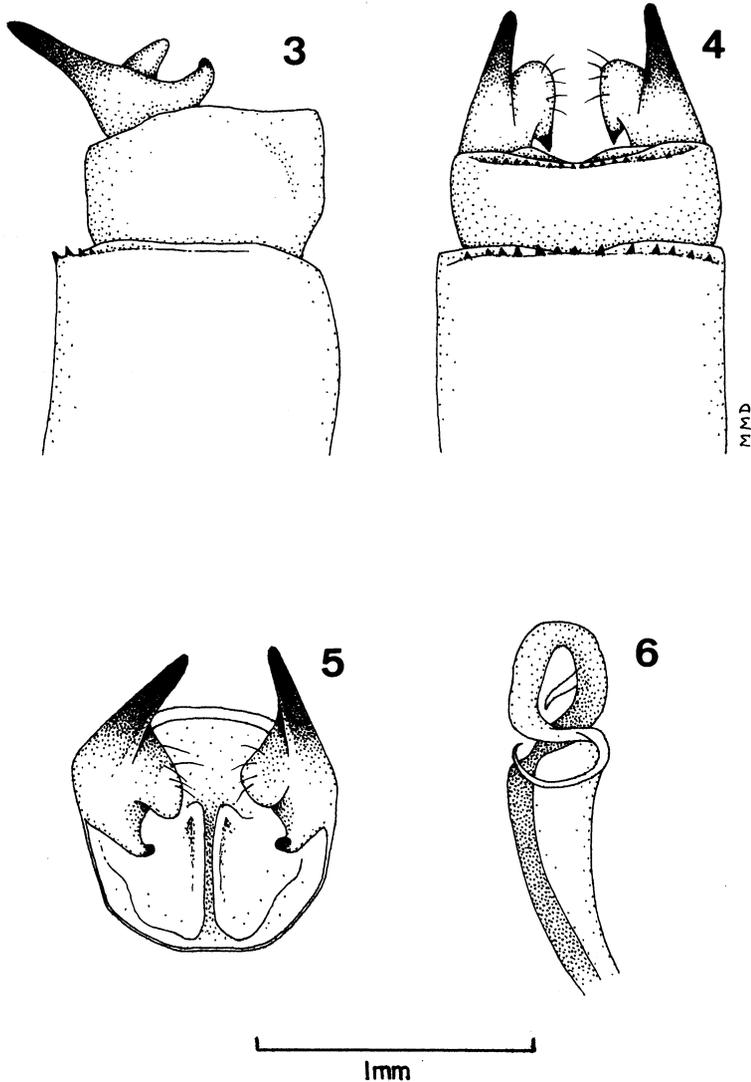
Abdomen: as in the male. Distal border of segment 10 with a very slight dorsal concavity in the middle. Anal appendages conical, brownish with the distal halves black.

Measurements (mm): abdomen 31.5; appendages 0.4; length of fore wings 22.8; of hind wings 21.9; costal side of pterostigma 0.6. Antenodal costal spaces in fore and hind wings 2.4, 1.7, 2.6.

Material: Brazil, *Minas Gerais*, Ibirité (Parque Estadual do Rola Moça, 1000 m): Holotype male, allotype female and 7 paratypes, 8-XII-1980, 15-X-1981, 17-X-1982, 15-X-1983, 30-XII-1984, A. Machado, P. A. Machado

& E. Machado leg. Holotype, allotype and 6 paratypes deposited in the author's collection. One paratype deposited in the entomological collection of the Departamento de Zoologia, Universidade Federal de Minas Gerais, Belo Horizonte.

Etymology: name in allusion to my daughter Lucia.



Figures. 3-6. *Forcepsioneura lucia* sp. n. 3-5. Apex of the abdomen and anal appendages of male holotype, 3. Lateral view, 4. Dorsal view, 5. Posterior view, 6. Penis in lateral view.

Discussion

Two groups of species can be distinguished within the genus *Forcepsioneura*, the *sancta* and *ephippigera* groups. In the *sancta* group the species have a well-developed postero-lateral tubercle on the median lobe of the prothorax (Figures 1-2) and the rear of the head is pale. They occur in Atlantic forest. This group contains *F. garrisoni*, *F. itatiaiae*, *F. sancta* and *F. lucia*. In the *ephippigera* group the postero-lateral prothoracic tubercles are poorly developed, the rear of the head is black and the species occur in the western Amazonian forest. Besides *F. ephippigera*, this group contains an undescribed species from Ecuador, which seems to be the same as a Peruvian species whose structural characters have been recently illustrated by Lencioni (1999) and believed to be *F. ephippigera*. However it can be clearly distinguished from the true *F. ephippigera*, whose lectotype I described (Machado 1995b), mainly by the structure of the superior anal appendages.

Within the *sancta* group *F. lucia* is very close to *F. sancta*, but can be easily distinguished from it and other species of the group by the very short vertical branch of the superior appendages (Figure 3), character shared with *F. ephippigera*. It further differs from *F. garrisoni* by the shape of posterior lobe of the prothorax, and from *F. itatiaiae* by the completely different shape and position of the ventro-medial process of the superior appendages.

Out of the five described species of *Forcepsioneura* only *F. lucia*, *F. itatiaiae* and *F. sancta* have known females. The female of *F. lucia* differs from that of *F. sancta* mainly by the posterior lobe of prothorax which is only slightly convex in *F. sancta* and more strongly convex at the middle in *F. lucia* (Figure 2). On the other hand, the female of *F. lucia* is very similar to that of *F. itatiaiae*, but smaller.

The following key differs from that published by Lencioni (1999) by incorporating *F. lucia* and by emphasizing the characters that allow the distinction of two groups in the genus.

Key to Males of *Forcepsioneura*

- 1 - Median prothoracic lobe with well-developed postero-lateral tubercles (Figure 1). Rear of the head pale. Distribution: Atlantic forest (*sancta* group)2
 - Median prothoracic lobe with poorly-developed postero-lateral tubercles.

- Rear of the head black. Distribution: western Amazonian forest (*ephippigera* group) *F. ephippigera*
- 2 - Vertical branch of the superior appendages short, not reaching to the level of the ventral part of segment 10 (Figure 3) *F. lucia*
 - Vertical branch of the superior appendages long, reaching to the level of the ventral part of segment 10 or nearly so3
- 3 - Posterior lobe of prothorax with a central depression *F. garrisoni*
 - Posterior lobe of prothorax convex4
- 4 - Vento-medial process of superior appendages in the proximal half of the appendage, with an acute anterior spine similar to that of *F. lucia* (Figure 4). Inferior appendages present *F. itatiaiae*
 - Vento-medial process of superior appendages in the proximal third of the appendage lacking a spine. Inferior appendages absent..... *F. sancta*

Ecology and Conservation

As all species of the *sancta* group, *Forcepsioneura lucia* is a forest species. So far it has been found only in the forest of the Tabuões Reserve now belonging to the Parque Estadual Rola Moça at Ibitaré, near Belo Horizonte. In this forest it occurs only in a very small, slightly steep area bordering a swiftly flowing stream with a tiny waterfall. At this place *F. lucia* was found flying, or perching in small twigs near the very humid forest floor. Since the species has never been found at the banks of the stream it is possible that their larvae live on the humid leaf litter of the forest floor rather than in the stream itself. This hypothesis, which deserves further investigation, would be consistent with the fact that adults of the genus *Forcepsioneura* were never found in swiftly flowing streams. It is worth mentioning that about 20 meters bellow the area in which *F. lucia* was found, the same stream becomes sluggish with flooded banks. In this area *F. lucia* is replaced by an abundant population of *F. sancta* flying or perching near the water, the two species never being found together.

Species of *Forcepsioneura* have been rather intensely collected in the Atlantic forest from Espírito Santo and Minas to Santa Catarina (Machado, 1999). In spite of this rather intense collecting *F. lucia* has been found only at the above described place in the Tabuões forest where it is not abundant. Based on these facts I think it should be regarded as a

threatened species and I propose for it the IUCN Red Data Book category of endangered (IUCN, 1996). The main factor that threatens *F. lucia* at Tabuões is forest fire that would be extremely damaging to a species with such a specialized habitat. Fortunately, thanks to the efforts made by COPASA (Companhia de Saneamento de Minas Gerais) the Reserva de Tabuões has been well protected and this protection is expected to continue now that the area became Parque Estadual Rola Moça.

Acknowledgements

We are indebted to the Companhia de Saneamento de Minas Gerais (COPASA) for providing the facilities during my visits to the Reserva de Tabuões, now Parque Estadual Rola Moça, and to Myriam Morato Duarte for the drawings of this paper.

References

- IUCN. 1996. 1996 IUCN Red List of threatened animals. Gland, IUCN.
- LENCIONI, F. A. A. 1999. The genus *Phasmoneura* with description of *Forcepsioneura*. gen. nov. and two new species (Zygoptera, Protoneuridae). *Odonatologica*, 28(2):127-137.
- MACHADO, A. B. M. 1985a. Studies on neotropical Protoneuridae. 4. Notes on some Selysian types of *Protoneura* (Zygoptera). *Odonatologica*, 14(3):211-217.
- MACHADO, A. B. M. 1985b. Studies on neotropical Protoneuridae. 5. Redescription of the types of *Phasmoneura ephippigera* (Selys 1886) (Zygoptera). *Odonatologica*, 14(4):363-368.
- MACHADO, A. B. M. 1999. Studies on neotropical Protoneuridae. 9. *Phasmoneura ciganae* Santos, conspecific with *Phasmoneura sancta* (Hagen) comb. n. (Zygoptera). *Notul. Odonatol.*, 5(3):37-38.
- SANTOS, N. D. 1868. Fauna do Estado da Guanabara. 63. *Phasmoneura ciganae* sp. n. enotas sobre outras espécies (Odonata, Protoneuridae). *Atas Soc. Biol. Rio de Janeiro*, 11(6):221-226.
- SANTOS, N. D. 1970. *Phasmoneura itatiaiae* sp. n. (Odonata, Protoneuridae). *Atas Soc. Biol. Rio de Janeiro*, 13(1/2):25-26.