Notes on the genus *Harmonicon* F.O.P.-Cambridge, 1896 (Araneae, Dipluridae) with description of a new species from French Guyana

Bastian Drolshagen¹, Christian M. Bäckstam²

1 Institute of Environmental Sciences, University of Koblenz-Landau, Fortstrasse 7, 76829 Landau, Germany
2 Olshammargatan 36, S-12475 Bandhagen, Sweden

† urn:lsid:zoobank.org:author:4B37AE80-1180-4FDD-ADE8-1C5463B1FA89
‡ urn:lsid:zoobank.org:author:360B7D57-2829-4AB1-B3E1-E6AB9B82F34E

Corresponding author: Bastian Drolshagen (drolshagen@dipluridae.de)

Academic editor: Rudy Jocqué

Received 7 March 2011 | Accepted 6 May 2011 | Published 24 June 2011

Citation: Drolshagen B, Bäckstam CM (2011) Notes on the genus *Harmonicon* F.O.P.-Cambridge, 1896 (Araneae, Dipluridae) with description of a new species from French Guyana. ZooKeys 112: 89–96. doi: 10.3897/zookeys.112.1205

Abstract

Information on the genus *Harmonicon* F.O.P.-Cambridge, 1896, a key to the species and a new diagnosis differing from the one in Maréchal and Marty (1998) are provided. A new species is described: *Harmonicon oiapoqueae* differing from other species of the genus by the morphology of the posterior sternal sigilla, the more recurved, inverted U–shaped fovea, the amount and arrangement of maxillary cuspules, a single row of teeth on the claws of the palpal tarsus, longer and more slender legs III and IV in females, longer embolus, thinner bulb, and longer, more slender legs in males. The status of the putative junior synonyms of *Harmonicon*, *Pseudohermachura* Mello-Leitão, 1927 and *Prosharmonicon* Mello-Leitão, as well as the two species formerly assigned to *Harmonicon*, *Harmonicon nigridorsi* Mello-Leitão, 1924 and *Harmonicon riveti* Simon, 1903, is discussed.

Keywords

spider taxonomy; diplurinae; new species; typus rediscovery
Introduction

The genus Harmonicon F.O.P.-Cambridge, 1896 was established on the basis of a single juvenile specimen with the type species Harmonicon rufescens F.O.P.-Cambridge, 1896 from Santarem, Brazil. Raven (1985) considered Harmonicon a junior synonym of Diplura C.L. Koch, 1850 because both genera possess a lyra consisting of few modified bristles on the prolateral side of the maxillae. Maréchal and Marty (1998) rejected this synonymy on the basis of the shape of the lyra bristles that differ between the two genera and a different leg formula, and they described an additional species: Harmonicon audeae Maréchal & Marty, 1998.

Material and methods

Material and methods follow Drolshagen and Bäckstam (2009). Abbreviations and measurement of male palpal organ follow Coyle (1995): PL = length of male palpal organ, BD = bulbus width. Measurements and leg proportion (diameter of femur/length of leg x 100) follow Maréchal and Marty (1998). The term megaspine is used according to Raven (1984). Additional abbreviations: imm = immature, Co = coxa, Fe = femur, Pa = patella, Ti = tibia, Mt = metatarsus, Ta = tarsus, STC = superior tarsal claw, ITC = inferior tarsal claw, PMS = posterior median spinnerets, PLS = posterior lateral spinnerets.

Acronyms of institutes, museums and collections:

IBSP: Instituto Butantã, São Paulo; SMNK: Staatliches Museum für Naturkunde Karlsruhe; MNHN: Muséum National d’Histoire Naturelle, Paris; MPSP: Universidade de São Paulo, Museu Paulista; NHM: The Natural History Museum, London (formerly British Museum, Natural History); NHMW: Naturhistorisches Museum, Wien; SMF: Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main; PCD = Drolshagen private collection.

Examined (type-) material: Diplura nigra (F. O. P.-Cambridge, 1896), female holotype, NHM (BMNH1896.12.13.49), Santarem, lower Amazonas, Brazil. Diplura sanguinea (F. O. P.-Cambridge, 1896), female holotype, NHM (BMNH1896.12.13.41), Santarem, lower Amazonas, Brazil. Harmonicon rufescens F. O. P.-Cambridge, 1896, imm male holotype, NHM (no collection number), Santarem, lower Amazonas, Brazil. Trechona rogenhoferi (Ausserer, 1871), female holotype, NHMW (N.I.: 62), Brazil. Trechona rufa (Ausserer, 1871), female SMF (Nr. 38604), Miracatu, São Paulo, Brazil. Trechona zebrata (Walkenaer, 1835) (currently in synonymy of Trechona venosa (Latreille, 1832)), female holotype, NHM (no collection number), Brazil.
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Taxonomy

Harmonicon F.O.P.-Cambridge, 1896
http://species-id.net/wiki/Harmonicon

Harmonicon  F.O.P.-Cambridge 1896: 755; Maréchal and Marty 1998: 500.

Diagnosis: Harmonicon is one of the genera of the subfamily Diplurinae with a lyra prolaterally on the maxillae. It differs from Diplura by the shape of the lyra bristles (claviform in Diplura rather than hookshaped in Harmonicon), a more dense scopula on Ta I and II, the presence of a dense scopula in more than the apical third of pedipalpal tarsus, the presence of a scopula in the apical third of most leg metatarsi, and by the leg tarsi being pseudosegmented instead of showing only a few cracks. Harmonicon can be distinguished from Trechona by a less dense scopula on Ta III and IV, and by fewer lyra bristles arranged in a single row.

Remarks: Cambridge (1896) and Maréchal and Marty (1998) regarded the presence of five lyra bristles a key feature for the genus. Research on the development on the new species described here showed that younger specimens have fewer lyra bristles than fully grown ones. Therefore the number of lyra bristles should no longer be considered diagnostic for Harmonicon. Maréchal and Marty (1998) stated that the leg formula of 1423 (rather than 4123 as in Diplura and Trechona C.L. Koch, 1850), is also a key feature of the genus Harmonicon, but show a leg formula of 4123 for the female holotype of H. audeae. Cambridge (1896) was incorrect in stating that the holotype of Harmonicon rufescens is a female; it is in fact a juvenile male. Maréchal and Marty (1998) did not comment on the putative synonyms of Harmonicon, Pseudohermachura Mello-Leitão, 1927 and Prosharmonicon Mello-Leitão, 1938, as well as those species formerly assigned to Harmonicon: Harmonicon nigridorsi Mello-Leitão, 1924 and Harmonicon riveti Simon, 1903. Mello-Leitão (1927) described the monotypical genus Pseudohermachura from a single female specimen of the type species Pseudohermachura catharinensis Mello-Leitão, 1927 (holotype deposited in MPSP) and did not mention the presence of a lyra at all. Bücherl (1962) re-described P. catharinensis and mentioned a lyra consisting of 7–10 claviform bristles. Mello-Leitão (1938) described the monotypical genus Prosharmonicon from a single female specimen of the type species Prosharmonicon maculatum Mello-Leitão, 1938 (holotype deposited in IBSP and destroyed in the fire of 2010) and explicitly mentioned claviform lyra bristles. We therefore consider Pseudohermachura and Prosharmonicon junior synonyms of Diplura and reject the synonymies with Harmonicon established by Bücherl (1962). Simon (1903) described H. riveti from a single male specimen, of which the palpal organ, distal part of Ti I and basal part of Mt I were later illustrated in Berland (1913): pl. 7, fig. 5–6. The illustrations show a palpal organ with a strongly curved apex of the embolus and a highly elevated tubercle laterally in the basal third of Mt I. The morphology of the palpal organ and the tubercle in the basal third of Mt I in (known) males is different in those species currently assigned to Harmonicon. Mello-Leitão (1924) described H. nigridorsi from a single female specimen, he explicitly mentioned claviform lyra bristles, which is
also supported by the illustration in Mello-Leitão (1926): fig. 4. We therefore support the transfer of those two species to *Diplura* by Raven (1985).

**Key to the species of *Harmonicon***

| Key | Description                                      | Species                  |
|-----|--------------------------------------------------|--------------------------|
| 1   | Female or juvenile                                |                          |
| 2   | Male                                             |                          |
| 3   | Tarsal claw of pedipalps with one row of teeth   | *H. audeae*              |
| 4   | Tarsal claw of pedipalps with a double row of teeth | *H. oiapoqueae* sp. n.   |
| 5   | Fovea slightly recurved, not inverted U-shaped; approximately 30–40 maxillary cuspules; posterior pair of sternal sigilla circular | *H. rufescens*          |
| 6   | Fovea strongly recurved, inverted U-shaped; approximately 40–50 maxillary cuspules; posterior pair of sternal sigilla oval | *H. oiapoqueae* sp. n.   |
| 7   | Palpal organ long, bulbous narrow [PL(100)/BD = 251]; tubercle in basal third of metatarsus I absent | *H. audeae*              |
| 8   | Palpal organ short, bulbous wide [PL(100)/BD = 147]; tubercle in basal third of metatarsus I present | *H. oiapoqueae* sp. n.   |

*Harmonicon oiapoqueae* sp. n.

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http://species-id.net/wiki/Harmonicon_oiapoqueae

**Type material:** Male holotype and 1 female paratype (SMNK) from Saint Georges, French Guiana, 3°56’56.12”N, 51°47’39.90”W (leg. T. Vinmann).

**Other material examined:** PCD–33–306–03 1 imm of *Harmonicon oiapoqueae*, same data as for holotype and paratype.

**Etymology:** The specific epithet, a feminine genitive singular, refers to the Oiapoque river, which is close to the type locality.

**Diagnosis:** *Harmonicon oiapoqueae* sp. n. can be distinguished from the other species of the genus by the posterior pair of sternal sigilla being oval instead of circular. It furthermore differs from *Harmonicon audeae* by only one row of teeth on the tarsal claws of the pedipalp and from *H. rufescens* by a more strongly recurved, inverted U-shaped fovea and position and arrangement of cuspules on the basal inner corner of the maxillae. *Harmonicon oiapoqueae* sp. n. differs from *Harmonicon audeae* and *Harmonicon rufescens* by more slender legs III and IV in females and juveniles and legs I-IV in males. Furthermore, males can be distinguished from those of *H. audeae* by a shorter embolus and a wider bulbus [PL(100)/BD = 147] and the presence of a tubercle in the basal third of the lateral metatarsus I.

**Description:** Male holotype: Colour in alcohol: carapace, legs and pedipalps mahogany brown, chelicerae red, opisthosoma grey. Carapace (length: 11.67; width: 10.38) covered with soft grey setae and longer, black setae in posterior thoracic area; margin with long, black setae and soft, silver setae; clypeus present, narrow; fovea slit-like, recurved, inverted U-shaped; striae marked. Chelicerae with two retrolateral bands
of plumose setae and one dorsal band, broadening to full width of chelicerae distally; ventrally with one row of 9 teeth (1–1–1–1–1–1–1–1–1–1) on promargin; cheliceral furrow with a field of small basomesal teeth; retroventral base with isolated bristles. Maxillae with pro- lateral lyra consisting of 7 hookshaped bristles (as in the female paratype - viz. Fig. 6); ventrally with few cusuples on basal inner corner, number and arrangement different in both sides. Labium trapezoidal, without cusuples; labiosternal suture short and divided. Sternum with 3 pairs of sigilla: anterior pair at height of Co I, circular, medial pair at Co II, circular, posterior pair between Co III and IV, oval, largest; anterior and medial pairs almost equal in size. Legs long and slender (measurements and proportions in table 1), with all tarsi pseudosegmented (Ta IV missing). All present tarsi with dense and entire scopula; metatarsi also scopulated in apical third, but less dense. STC at Ta I and II truncated (maybe worn off), not curved; normal at Ta III, curved and long; all with few teeth; ITC short, without teeth. Ti I retroventrally at apex with megaspine (Fig. 4, 7); Mt I with a low, domed tubercle retroventrally in basal third (Fig. 7). Number and position of spines on legs different on both sides. Opisthosoma (length: 12.34; width: 7.15) with two pairs of spinnerets: PMS small, consisting of one segment (length: 3.96), widely separated from each other. PLS elongated, consisting of three segments: basal (length: 5.62), medial (length: 6.18), apical (length: 10.68) longest. Palpal bulb pyriform with relatively long, almost straight embolus (Figs 1, 2).

Female paratype: Colour in alcohol: resembles male holotype, but legs darker. Carapace (length: 13.26; width: 12.54) and opisthosoma (length: 17.37; width: 7.58) larger than that of holotype. Different from male holotype by the presence of one more labial cusuple and several more cusuples on basal inner corner of maxillae (Fig. 3). Chelicerae with more teeth on promargin (1–1–1–1–1–1–1–1–3). Lyra as in Fig. 6. Legs not as long and slender (measurements and proportions in table 1 in parenthesis). Pedipalpal tarsus with slight scopula, divided by two parallel rows of spiniform setae in apical third, becoming more irregular beyond apical third. Slight scopula on Ta I and II; divided by two parallel rows of spiniform setae. Mt I and II with scopula less dense only covering apical third, divided by two parallel rows of spiniform setae, becoming more irregular basally. Ta III like Ta I and II; Mt III without scopula, only with hairlike setae. Ta IV with only thin scopula and more setae, Mt IV like Mt III. Leg spination as in male holotype. Opisthosoma resembles male holotype, but with PMS (length: 3.27) more widely (by length of segment) separated and basal segment of PLS (length: 5.12), medial (length: 4.44), apical (length: 8.55) slightly shorter. Vulva as in Fig. 5.

Remarks: Although the number of lyra bristles varies during the development of this species, the paratype of *H. oiapoqueae* sp.nov. has more such bristles than the female holotype of *H. audeae*, both specimens are of almost the same size.

Ecology: According to Thomas Vinmann (pers. comm.), who collected the specimens examined, females build large sheetwebs of ca. 2 m² which are attached to branches of trees and bushes. The sheetweb runs into a funnel which leads to a ca. 20 cm deep tube–shaped retreat. The burrow leads about 5 cm vertically into the ground and continues for ca. 10 cm at an angle of about 45°. At dusk the spiders come to the entrance of the funnel and wait for prey.
Figures 1–7. *Harmonicon oiapoqueae* sp. n. 1, 2, 4, 7 male holotype; 3, 5, 6 female paratype. 1 right palp, retrolateral view 2 right palp, prolateral view 3 sternum, labium and maxillae, ventral view 4 distal part of Ti and basal part of Mt I, retrolateral view 5 vulva (with left receptaculum seminis lost), dorsal view 6 lyra 7 distal part of Ti and basal part of Mt I, ventral view. Scale bars = 1 mm each.
Table 1. Measurements of male holotype and female paratype (in parenthesis) of Harmonicon oiapoqueae
sp. n. legs, pedipalps and proportions

|          | Leg I          | Leg II          | Leg III         | Leg IV          | Pedipalp        |
|----------|----------------|-----------------|-----------------|-----------------|-----------------|
| Fe       | 17.96 (13.34)  | 15.05 (12.54)   | 13.34 (11.18)   | 15.77 (13.47)   | 8.05 (7.95)     |
| Pa       | 6.75 (6.58)    | 5.52 (6.06)     | 3.70 (5.19)     | 5.05 (6.05)     | 3.31 (4.13)     |
| Ti       | 15.38 (10.50)  | 12.79 (10.08)   | 13.54 (8.38)    | 13.77 (10.89)   | 6.28 (6.23)     |
| Mt       | 17.65 (10.27)  | 15.59 (10.05)   | 15.11 10.48)    | 17.69 (14.27)   | -               |
| Ta       | 10.63 (7.03)   | 8.91 (6.89)     | 8.19 (6.44)     | - (7.24)        | 3.12 (6.58)     |
| Total    | 68.37 (47.72)  | 57.86 (45.62)   | 53.88 (41.67)   | 52.28 (51.92)   | 20.76 (24.89)   |
| Diameter of Fe | 2.61 (2.97) | 2.51 (2.91) | 2.38 (2.58) | 2.47 (2.83) | - |
| Proportion | 3.82 (6.22) | 4.34 (6.38) | 4.42 (6.84) | - (5.45) | - |

Acknowledgements

We want to thank Janet Beccaloni (NHM), Christine Rollard (MNHN), Christoph Hörweg (MNHW), Peter Jäger (SMF) and Hubert Höfer (SMNK), who granted us access to their collections. Furthermore we want to thank Thomas Vinmann and Gordon Telford for information regarding the ecology of H. oiapoqueae sp.nov. and for donating specimens. We also wish to thank Steve Nunn for reviewing the manuscript.

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