

Charinus bromeliaea sp. n. (Amblypygi: Charinidae); a new species of bromeliad inhabiting whip spider from French Guyana

MERLIJN JOCQUE^{1,2} & ALESSANDRO PONCE DE LEÃO GIUPPONI³

¹BINCO vzw Rijnmenamsesteenweg, 189 Haacht, Belgium. E-mail: MerlijnJocque@gmail.com

²Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2 Gagarin street, 1113 Sofia, Bulgaria

³Departamento de Invertebrados, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista s/n, São Cristóvão, Rio de Janeiro-RJ, Brazil. 20940-040. E-mail: agiupponi@gmail.com

Abstract

A new species of *Charinus* Simon, 1892 is described from French Guyana, raising the number of species in the genus to 48 (27 for the Neotropical region and 19 for South America). *Charinus bromeliaea* sp. n. is distinguished from the other species in the genus by morphological characteristics and unique ecology. Adapted to live in *Achmea* bromeliads on granite inselbergs, this species is an interesting addition to the wide range of habitats *Charinus* species are found in. This is also the first record of the genus from French Guyana and this record extends the geographic distribution of the genus.

Key words: Guiana, inselberg, *Charinus*, identification key, check list, whip spider, bromeliad

Resumo

Uma nova espécie de *Charinus* Simon, 1892 é descrita para a Guiana Francesa, elevando o número de espécies do gênero para 47 (27 para o Neotrópico e 19 para a América do Sul). *Charinus bromeliaea* sp. n. se distingue das demais espécies do gênero por suas características morfológicas e ecologia únicas. Adaptados a viver em bromélias *Achmea* em inselbergs de granito, esta espécie é uma adição interessante para a vasta gama de especialização em habitats nas espécies de *Charinus*. Esse é também o primeiro registro de *Charinus* na Guiana Francesa e o mesmo estende a distribuição geográfica do gênero.

Introduction

Amblypygids or whip-spiders occur worldwide in tropical and subtropical conditions. The most speciose genus is *Charinus* Simon, 1892, with 47 species currently described. The neotropical area has 27 species, but there is much work to be done on the amblypygid fauna of South America and in particular the genus *Charinus* as obvious from recent publications on *Charinus* in South America (Pinto-da-Rocha *et al.*, 2002; Giupponi & Kury, 2002; Baptista & Giupponi, 2002, 2003; Miranda & Giupponi, 2011).

Amblypygids in general are nocturnal predators, during the day hiding under logs, bark, stones, or leaves. Adaptations to this ecology typically include a broad and strongly flattened body. All species in the genus *Charinus* follow this general body plan and overall are relatively small (5–15 mm). The high number of species is partly associated with the occurrence and adaptation to a wide range of microhabitats like caves, forest litter, the interior of ants and termite nests, and crevices in synanthropic areas (Weygoldt, 2000; Weygoldt, 2005; Teruel *et al.*, 2009; Miranda & Giupponi, 2011).

During a biodiversity survey of the inselberg (=granite outcrop) Savanna Roche la Virginie in French Guyana in 2008, several specimens of an undescribed *Charinus* species were collected from bromeliads (*Achmea* cf. *melinonii* Hook). These bromeliads on this granite outcrop are large ground growing bromeliads with strong rigid leaves pointing upwards and forming a central water tank. The amblypygids were found living in between the

leaves of the plants. This is the first amblypygid collected from bromeliads as well as the first *Charinus* species to be documented from French Guyana, and we provide an overview and identification key of *Charinus* species from northern South America.

Material and methods

The material described here was collected during a 10-day fieldtrip in August 2008 to the inselberg Savanna Roche La Virginie in central French Guiana ($4^{\circ}11'24.00''\text{N}$, $52^{\circ}08'60.00''\text{W}$) (Fig. 1). The field trip was organised to study the fauna and flora on this inselberg, as a rapid baseline biodiversity inventory in order to evaluate the impact of expected higher number of visitors to the site after the recent construction of a new road between Regina and St. Georges. The amblypygids were encountered during a survey of the aquatic fauna in bromeliads (*Achmea* cf. *melinonii* Hook.), dismantling the plants leaf by leaf. Samples were preserved in 70% ethanol and studied in the laboratory with a Wild M10 binocular microscope. Photographs were taken with a Leica MZ16 microscope using the Leica Application Suite automontage software. Drawings were made using a *camera lucida* on a Leitz Dialux 22 microscope. All type specimens were stored in 70 % ethanol. Primary types and paratypes were deposited in Museu Nacional, Rio de Janeiro, Brasil (MNRJ).

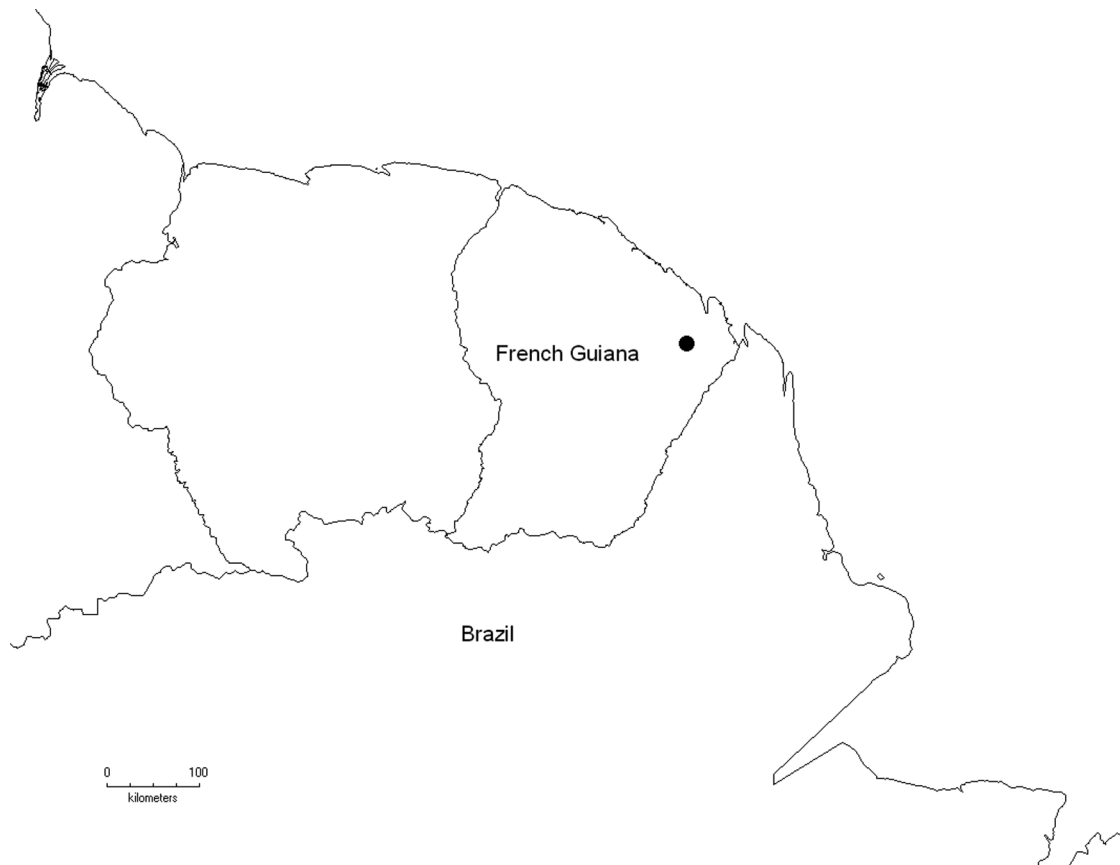


FIGURE 1. Map showing the location of Savanna Roche La Virginie in French Guiana.

Results

Taxonomic description

Charinidae Quintero, 1986

Charinus Simon, 1892Identification key for the *Charinus* species from Northern South America

Species currently found in northern South America and included in the identification key: *C. bordoni* (Ravelo, 1977)— Venezuela; *C. camacho*i (González-Sponga, 1998)— Venezuela; *C. gertschi* Goodnight & Goodnight, 1964— British Guyana and Surinam; *C. insularis* Banks, 1902— Ecuador, Galapagos Islands; *C. koepcke*i Weygoldt, 1972— Peru; *C. pardillalensis* (González-Sponga, 1998)— Venezuela *C. platnicki* (Quintero, 1986)— Surinam; *C. quinteroi* Weygoldt, 2002— Guyana; *C. tronchonii* (Ravelo, 1975)— *C. vulgaris* Miranda & Giupponi, 2011—Venezuela; and *Charinus bromeliaea* sp. n.— French Guyana.

- | | | |
|----|--|-----------------------------|
| 1. | Basitibia of the fourth leg divided into 4 articles (tibia with five) and carapace with or without median eye tubercle | 2 |
| - | Basitibia divided into 3 articles. | 4 |
| - | Basitibia divided into 2 articles (tibia with three). | 7 |
| 2. | Female gonopods with small vestigial claws | <i>C. koepcke</i> i |
| - | Female gonopods without small vestigial claws | 3 |
| 3. | Animal occurs in the Galapagos Islands | <i>C. insularis</i> |
| - | Animal occurs in the Guyanas | <i>C. gertschi</i> |
| 4. | Total body length maximum 6.0 mm | 5 |
| - | Total body length exceeding 8.0 mm | 6 |
| 5. | Meso- and metasternum are flattened plates | <i>C. pardillalensis</i> |
| - | Meso- and metasternum in the shape of a small granule | <i>C. camacho</i> i |
| 6. | Pedipalpal femur with 2 dorsal and 2 ventral spines and distitibia of leg IV with 16 trichobothria. | <i>C. bordoni</i> |
| - | Pedipalpal femur with 3 dorsal and 3 ventral spines and distitibia of leg IV with 15 trichobothria. | <i>C. tronchon</i> i |
| - | Pedipalpal femur with 3 dorsal and 2 ventral spines and distitibia of leg IV with 16 or 17 trichobothria | <i>C. vulgaris</i> |
| 7. | Carapace without median eye tubercle | <i>C. quinteroi</i> |
| - | Carapace with a small median eye tubercle | 8 |
| 8. | Color dark brown, distitibial spine of pedipalp about 1/4 the size of the medial spine basitibia + distitibia of leg IV with 2 + 16 trichobothria | <i>C. platnicki</i> |
| - | Color light brown, distitibial spine of pedipalp about 2/3 the size of the medial spine, basitibia + distitibia of leg IV with 1+ 14 trichobothria | <i>C. bromeliaea</i> sp. n. |

Charinus bromeliaea sp. n. Jocque & Giupponi

(Figs 2–4)

Type material. Holotype: Female (MNRJ 09185), French Guyana, Savanna Roche La Virginie, (4°11'24.00"N, 52°08'60.00"W), collected on 20 august 2008 by M. Jocque in *Achmea* cfr. *melionii* bromeliads. **Paratypes:** 3 females (MNRJ 09185), same data as the holotype.

Derivation of name. The name is based on the peculiar habitat of the animal.

Diagnosis. Total length: 5.2 mm. *Charinus bromeliaea* sp. n. can be distinguished from the remaining *Charinus* species by the median and lateral eyes reduced in comparison to average size for the genus (distinguishing it from *C. quinteroi*, *C. bordoni*, *C. tronchoni*, *C. camacho*i and *C. pardillalensis*); basitibia IV divided in two articles (distinguishing it from *C. gertschi*, *C. insularis* and *C. koepcke*i); sternal plates narrow, convex and rounded, tritosternum greater than 3 times longer than wide. *Charinus bromeliaea* sp. n. is similar to *C. platnicki* but is larger, has a lighter brown color and basal distitibial spine of pedipalp about 2/3 the size of the medial spine while in *C. platnicki* it is about 1/4. Basitibia and distitibia of leg IV have 15 trichobothria (1 + 14) compared to 18 (2 + 16) in *C. platnicki* and *C. caribensis* and 17 (1 + 16) in *C. quinteroi*.

MEASUREMENTS (in mm): Female holotype: cephalothorax: length: 2.12, width: 2.94; pedipalp: femur 1.59, tibia 1.62, basitarsus 0.81, distitarsus 0.54, tarsal claw 0.49.

Description. Color of specimen in alcohol is overall pale yellow-brown (Fig. 2A–B). Cephalothorax with linear stains, slightly darker lines radiating from fovea. Lateral and median eye edges bearing black stains. Legs slightly darker than overall color. **Cephalothorax** (Fig. 2A) flattened, wider than long (ratio a little over 4/5) with a posterior depression (opposite to median eye tubercle) from which a thin median groove starts that runs to a depression in between the pair of lateral humps situated behind lateral eye spots. Corners of anterior margin extending downwards in a wide, roundish boss. Median and lateral eyes reduced in comparison to average size for the genus.



FIGURE 2. *Charinus bromeliaea* sp. n. holotype (female). 1. Cephalothorax, dorsal view. 2. Cephalothorax, ventral view.

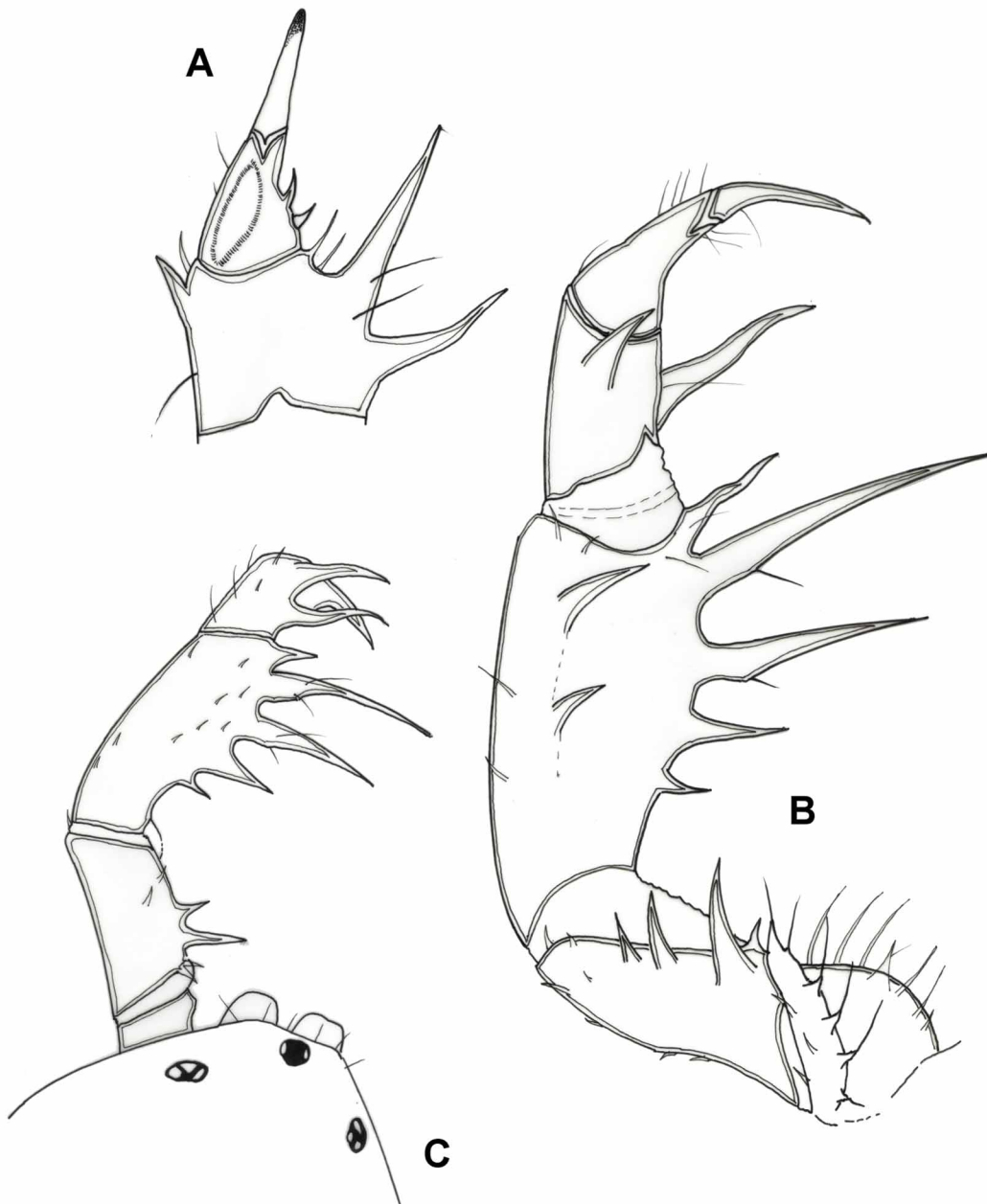


FIGURE 3. Tarsus of holotype (female); A. Tarsus of pedipalp, ventral, B. pedipalp ventral, C. pedipalp dorsal.

Frontal process well developed, much longer than large, with blunt, rebordered apex. **Sternum** (Fig. 2B) consisting of 3 sclerotized parts: tritosternum with a round base and projecting anteriorly between palpal coxa in an elongated, forked tubercle, a little over 3 times longer than wide, with 2 apical (1 on each prong of the fork), 2 middle and 2 basal setae; central part rounded, convex, anteriorly with 2 strong setae, and 2 setulae laterally and 1 posteriorly; third sclerite rounded and convex, slightly smaller or equally large as second sclerite, with 2 large setae positioned centrally. **Abdomen** (Fig. 2 A, B) oblong, with almost indistinguishable punctuations, finer than those on carapace. **Chelicera** with cheliceral furrow (Figs. 3A–D) bearing 4 internal teeth, the distal tooth bifid, the first cusp bigger than the second; fourth tooth twice as long as others and much stouter; relative teeth length (from tip to base) $IV > Ia > Ib > III = II$. **Pedipalp: Trochanter Femur** (Fig. 3 B,C) bearing 2 or 3 dorsal spines (I > II > III); basal spine almost 2 times longer than median and the latter over 2 times longer than distal spine; femur ventrally with 3 spines on primary series (I > II > III); basal ventral spine curved inwards and considerably longer than median spine; distal ventral spine half as long as median ventral spine. **Tibia** (Fig. 3 B, C) with 5 dorsal spines I < II > III > IV > V; spine IV $1/3$ longer than spine III; spine V approximately $1/3$ the length of spine IV. **Basitarsus** (Fig. 3 A–C) bearing 2 large



FIGURE 4. Trichobothria on tibia VI, left.

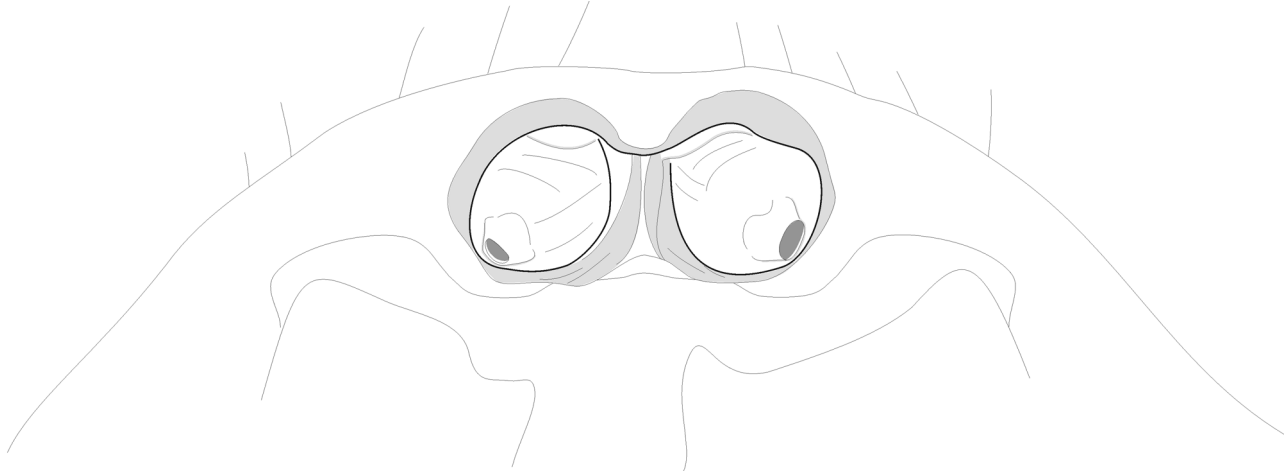


FIGURE 5. Gonopods of female, paratype.

dorsal spines, with the distal spine slightly longer than basal spine; basitarsus also bearing 2 smaller ventral spines, apical one approximately $\frac{1}{4}$ the length of the proximal dorsal spine. **Distitarsus** (Fig. 3 A, B) long, with 2 curved spines in basal half; basal spine about $\frac{2}{3}$ the size of distal one and this spine is $\frac{1}{4}$ the size of distitarsus; cleaning organ about $\frac{3}{4}$ the segment length. **Claw** (Fig. 3A–C) long, with an acute, curved tip. **Legs** with many small spines. Ventral corner of the prolateral face of femora II–IV projecting in a distinct spiniform process. **Femur length** I>II=III=IV=II. **Tibia** I with 23 articles. **Tarsus** (basitarsus + distitarsus) I with 25 articles. **Leg IV: Basitibia** with 2 pseudo-articles, 1 trichobothrium located on last pseudo-article. **Distitibia** with 1 basal, 3 median and 11 distal trichobothria (Fig. 4). **Genitalia**: Female gonopods (Fig. 5) small, a bit longer than wide, ball-shaped with sucker-like prehensile structure with divergent rounded openings, without smooth sclerotized finger-like appendage, with numerous acuminate setae in particular along its posterior edge. Male gonopods unknown.

Discussion

Charinus bromeliaea sp. n. is the first species recorded from French Guyana and the fourth species of *Charinus* occurring in the Guyanas besides *C. gertschi*, *C. platnicki* and *C. quintero*. It is easily distinguished from these species by morphological characteristics and the habitat occupied. The distinguishing morphological characteristics with the three other *Charinus* species in the Guyanas are the size of the median eyes, the division of basitibia IV into two articles and the size of the distal spine on the distitarsus of the pedipalp.

In terms of ecology, this is the only whip spider that is recorded from bromeliads in the Guyanas and as far as we know the first whip spider to be recorded from bromeliads at all. We would like to point out that although this species was only found in bromeliads we cannot exclude that it might as well occur in other habitats. It is slightly surprising however that no other whip spider has yet been recorded from bromeliads, but this is probably related to the temporal stability and structure of bromeliads as habitats for whip spiders. *Achmea* species have a very typical structure of very hard, broad leaves, almost vertically arranged in a tight rosette. The narrow space between the leaves is an ideal habitat for whip spiders. We found one or two animals in each plant. This particular species of *Achmea* is only found on granite outcrops in the neotropics (Joep Moenen pers. comm.). Granite outcrops in particular are some of the oldest and most stable habitats, estimated to be 20–30 million years old with a highly specialized fauna and flora adapted to them (Porembski & Barthlott 2000).

The highly specialized habitat and the often considerable distance between granite outcrops raises questions about the distribution of this species. Surveys of other outcrops are required to get a better idea of the rarity of this species.

The species of the genus *Charinus* globally can be divided into three species groups based on the morphology of the female genitalia (Weygoldt 2006, 2008). The first group is characterised by thin fingerlike female gonopods, a typical example is *C. bengalensis* (Gravely) occurring in India. In the second group the gonopods are described by Weygoldt (2006) as "superficially resembling suckers" and are more strongly protruding structures. A good example is *C. brasiliensis* Weygoldt occurring in Brazil. The third group is characterised by female gonopods that are flat cushions, each with an internal seminal receptacle such as *C. australianus* (L. Koch) from Samoa and islands nearby. The structural differences of the female gonopods between the three groups are associated with different mating behaviour. *Charinus bromeliaea* n.sp. fits as expected based on the geographic distribution of these three groups well into the second group, with the well developed and "sucker like" female gonopods.

The Neotropical *Charinus* species can be divided in two groups; a group of small-sized and short-legged species (previously grouped under *Charinides* and *Tricharinus* genera) in the north and a group of bigger species with proportionally longer legs (*Charinus sensu* Quintero) (Quintero, 1983) in the South. *Charinus bromeliaea* sp. n. belongs to the group typically occurring in the South and the occurrence in French Guyana is interesting, since it is the first species of this group that has been found in the northern regions of South America.

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