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A new species of *Sarax* Simon, 1892 from the Philippines (Arachnida: Amblypygi: Charinidae)

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ABSTRACT

A new species of the genus *Sarax* Simon, 1892 is described from Panay Island, Philippines. *Sarax curioi* sp. n. is the second species of the genus from the country and can be distinguished from the other Philippine species (*Sarax brachydactylus* Simon, 1892) by the sclerotized granules of the pedipalp surface, the spines of the pedipalp distitibia, the number of denticles of the chelicerae claw and the shape of the denticles of the chelicerae basal segment. *Sarax newbritainensis* Rahmadi and Kojima, 2010 is newly recorded from New Ireland Island, Papua New Guinea.

Key words: Biodiversity, Southeast Asia, Taxonomy, Whip spider.

INTRODUCTION

Amblypygi are flattened arachnids with raptorial pedipalps and extremely elongate antenniform first legs, being commonly known as whip spiders. This order has approximately 160 species among five families distributed globally (Rahmadi et al. 2011). In the Southeast Asia, the amblypygid fauna encompasses the families Charinidae (with the genera *Catageus* Thorell, 1889, *Charinus* Simon, 1892 and *Sarax* Simon, 1892), Charontidae (with the genera *Charon* Karsch, 1879 and *Stygophrynus* Kraepling, 1895), Phrynidae (with the genus *Phrynus* Lamarck, 1801), and Phrynichidae (with the genus *Phrynichus* Karsch, 1879) (Harvey 2002, 2003). In this region, *Sarax* is the most diverse genus being composed by 12 species distributed on the continental and insular

Southeast Asia (from Laos to Indonesia) (Harvey 2003, Rahmadi et al. 2010). In the Philippines, just *Sarax brachydactylus* Simon, 1892 is recorded from the Luzon Island, Palawan Island and Cebu (Fig. 14). Although very similar to *Charinus*, mainly regarding the pedipalp tibia spination, *Sarax* can be distinguished by the presence of a ventral sac cover (Weygoldt 2000, Rahmadi and Kojima 2010). After studying a specimen sent by Dr. Eberhard Curio and examining some additional specimens, including the type series of *Sarax brachydactylus*, we recognized a new species from Malumpati, Antique Province, Panay Island, Philippines, which is described and illustrated here. To better visualize and compare both Philippine species of *Sarax*, pictures of *S. brachydactylus* are also given (Figs. 8-13). Moreover, a new record of *Sarax newbritainensis* Rahmadi and Kojima, 2010 is made.

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MATERIALS AND METHODS

The specimen was deposited in the National Museum of the Philippines, Manila. The observations, measurements and drawings were made using a stereomicroscope camera lucida (Wild). For measurements and nomenclature, we followed the proposals of Quintero (1981) in general. The article called tarsus by Quintero is here divided into distitarsus and tarsal claw (pretarsus) as the two articles are not fused in Charinidae. The pictures were taken with a Sony Cybershot DSC-V1 attached to the stereomicroscope. The measurements of pedipalp articles were taken between the external condyles of each segment, in order to establish fixed points and proper length measurements (illustration in Baptista and Giupponi 2002). The measurement accuracy is indicated in the legend of each figure.

The following abbreviations are used:

CAS – California Academy of Science, San Francisco, USA.

E.S – Eugène Simon.

MNHN – Muséum National d'Histoire Naturelle, Paris, France.

NMP – National Museum of the Philippines, Manila.

Comparative material: *Sarax brachydactylus* Simon, 1892: 1 juvenile MNHN 14801 (Type) E.S., 7 adults MNHN 14802 (Types) E.S., 1 adult and 2 juveniles MNHN 14803 (Types) E.S.. *Sarax davidovi* Fage, 1946: 3 male and 1 juvenile MNHN (Types), Indochine, Mission C. Dawydoff, Mars, Avril-1939, Phaniang, S. Annam. *Sarax newbritainensis* Rahmadi and Kojima, 2010: 1 male (CAS) Papua New Guinea: Namatanai, New Ireland, 6-XII-1969, J.B. Tobler (Det. Giupponi and Miranda, 2011). *Sarax willeyi* Gravely, 1915: 1 male (CAS) Papua New Guinea: Madang Province, Baiteta road, 2,5 km W of North Coast Road, 60m, 3-III-1989, D. H. Kavanaugh, G. E. Ball, N. D. Penny, and P. A. Meyer (Det. Giupponi and Miranda, 2011).

Taxonomy

Family Charinidae Quintero 1986

Genus *Sarax* Simon 1892

Sarax curioi sp. n.

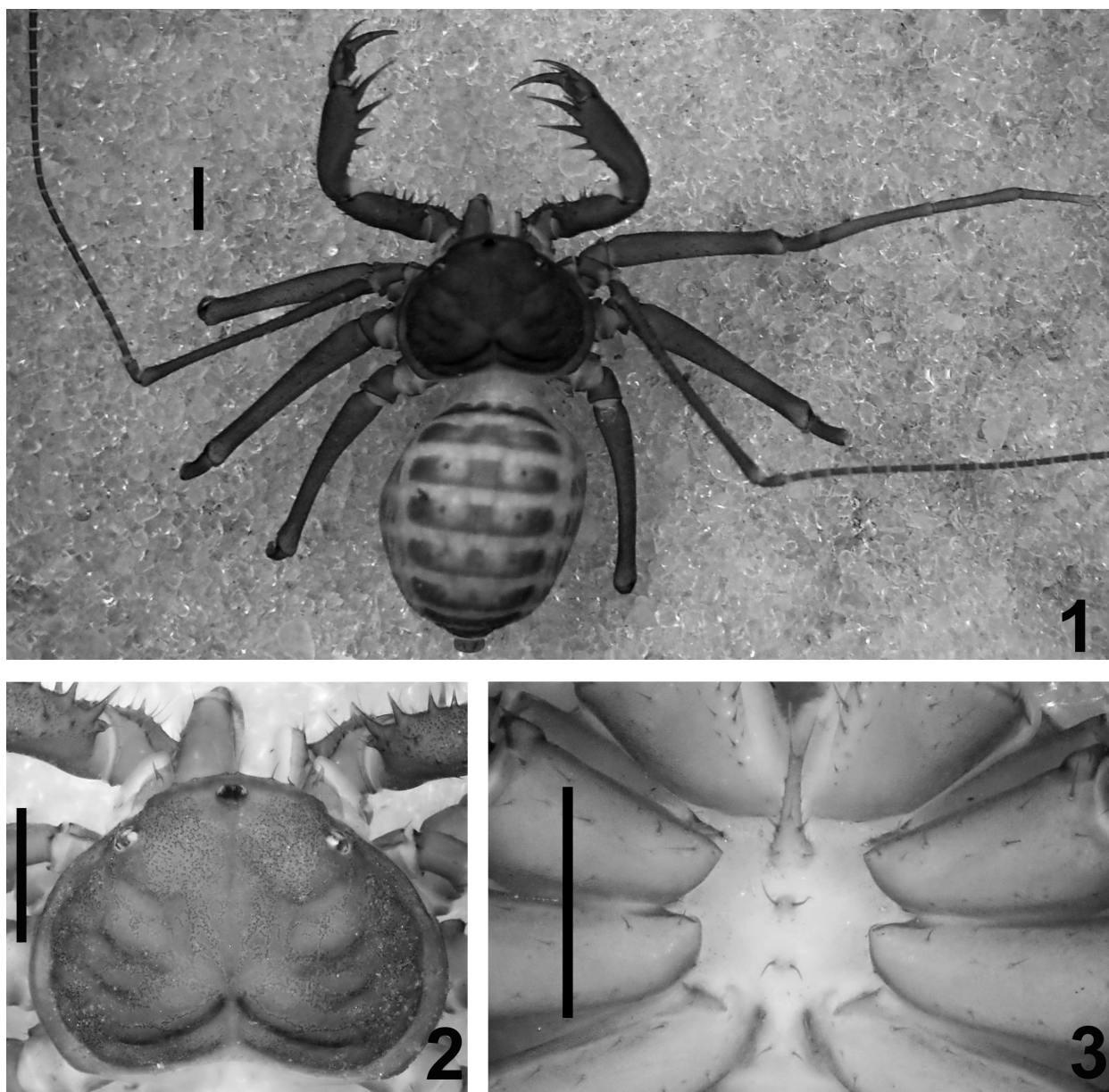
(Figs. 1–7)

Etymology: The species name is a patronym in honor of Eberhard Curio, who kindly sent the specimen.

Type material: Female holotype: PHILIPPINES: *Mahumpati*, 20-IX-2006, Bellhoff, D. (NMP).

Diagnosis: *Sarax curioi* sp. n. can be characterized by the following features: sclerotized granules on the surface of the pedipalp; presence of corners on the anterior margin of the carapace, in front of the lateral eyes; geminate dorsal spines on the distitibia of the pedipalp; absence of denticles in the chelicerae claw; and the shape of the denticles of the basal segment of the chelicerae.

Description of female (holotype): Carapace (Figs. 1-2): flattened, wider than long (ratio a little less than 3/4); prominent eyes, median eye tubercle dark-brown, without apical setae, triangular in shape; median eyes facing antero-laterally; lateral eyes close to the lateral margin of the carapace, yellowish pale in color; from the median eye tubercle starts a thin median furrow that reaches around the posterior area of the pair of lateral humps situated behind the lateral eye spots. Anterior margin with 6 small setae. Corners of the anterior margin extending downwards abruptly in front of the lateral eyes. Many tiny punctuations more abundant in the frontal area. Punctuations arranged in lines and spots, irradiating from the fovea and interspersed with smooth areas. 3 pairs of deep furrows and a deep, triangular fovea. The first pair of furrows placed just behind the lateral boss and not reaching the middle line. 3 lateral pairs of depressions (the first one placed over the first pair of furrows). Frontal process well developed, much longer than larger, with blunt, thickened apex.



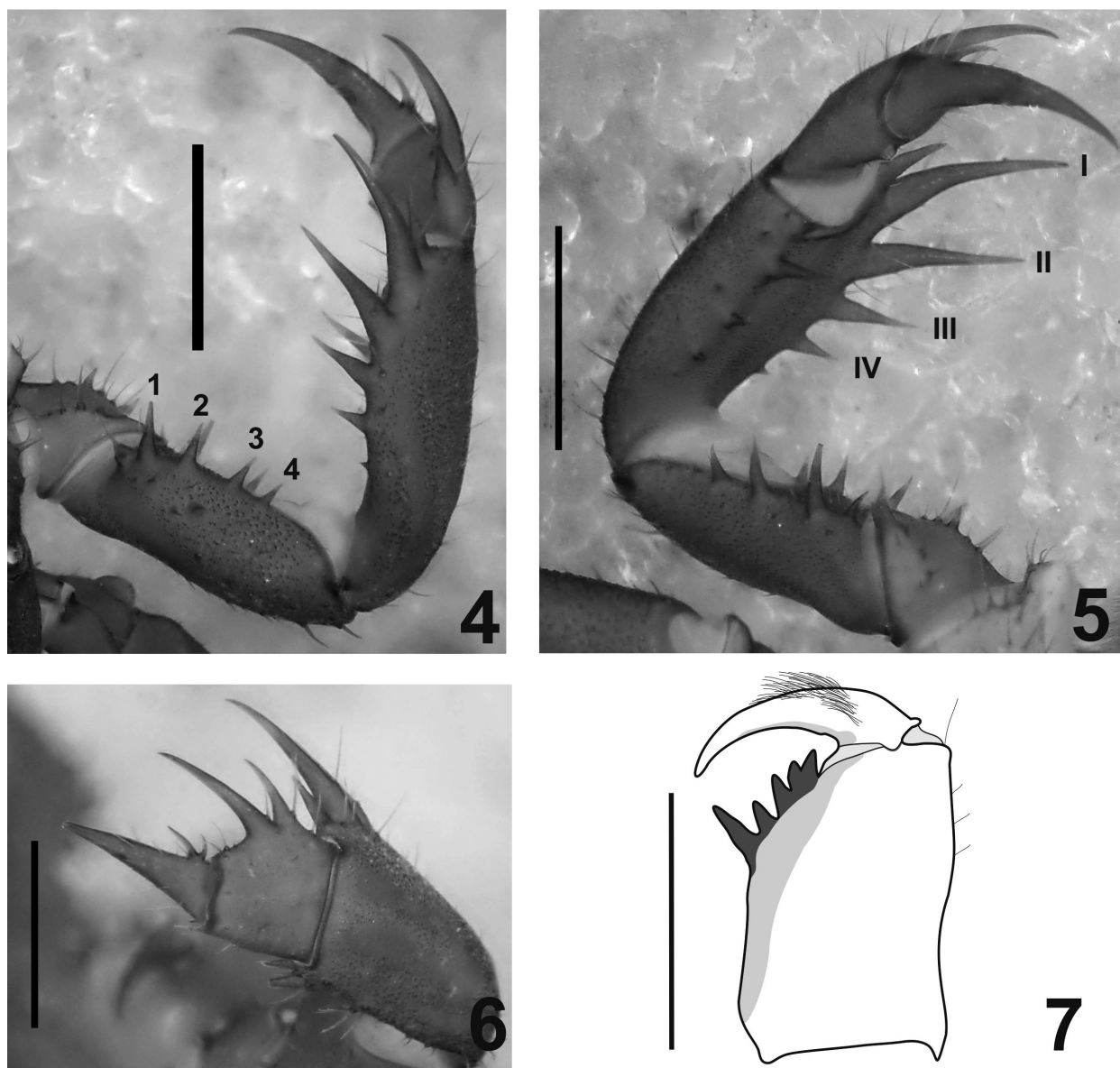
FIGURES 1-3: *Sarax curioi* sp. n. female holotype. 1 – Habitus. 2 – Carapace. 3 – Sternum. Scale bars: 1mm.

Sternum (Fig. 3): tri-segmented, all segments sclerotized and convex. Tritosternum with a round basis and projected anteriorly in a small blunt tubercle, with 2 apical, 3 medial and 2 basal setae, and some small setulae along the projection. Middle piece rounded, convex, with 2 setae and a few setulae. The third piece is also rounded and convex, but smaller and with smaller setae than the second piece. The second and third pieces are less sclerotized

than the tritosternum. Sternites separated from each other by the diameter of the third piece.

Abdomen (Fig. 1): oblong, with almost indistinguishable punctuations, thinner than in the carapace.

Chelicera: Cheliceral furrow (Fig. 7) with 4 internal teeth, the distal one bifid, the first cusp bigger than the second one. The fourth tooth twice as long as the others and much stouter. Teeth length (from tip to basis) $IV > Ia > Ib = II > III$. Claw without denticles.



FIGURES 4-7: *Sarax curioi* sp. n. female holotype. 4 – Dorsal view of the right pedipalp. 5 – Ventral view of the right pedipalp. 6 – Frontal view of the left basi and distitibia. 7 – Inner view of right chelicerae. Scale bars: 1mm.

Pedipalp: Trochanter (Figs. 4–5): large distal, spiniform, ventral apophysis, bearing many strong setae and with a blunt tip pointed forwards; apophysis with several subequal setiferous tubercles distributed along the apophysis length. Femur (Figs. 4–5): 4 dorsal spines ($1 > 2 > 3 > 4$), the first one three times bigger than the last one; prominent geminate setiferous tubercle before the first spine; 3 ventral spines ($1 > 2 > 3$) of approximately the same length of

the dorsal ones; one spine proximally placed to the first one, which is located more interiorly than the main series of spines, with a similar length of the third one, but less robust; last spine $\frac{1}{2}$ the length of the first one. Tibia (Figs. 4–5): main series with 4 spines ($I > II > III > IV$); one accessory spine anterior to spine I, with its length similar to spine III; one accessory spine located proximally, being almost vestigial. 4 ventral spines ($II > I = III > IV$), each

spine with an equivalent setiferous tubercle ventrally placed. **Basitarsus** (Figs. 4–6): 2 dorsal spines placed approximately in the middle of the article, the basal spine about $\frac{1}{2}$ the length of the distal one. 1 ventral spine at the distal half; this spine is broken, but the diameter of its base suggests that it is smaller than the dorsal one. **Distitarsus** (Fig. 6): long, with 2 curved geminated spines at the basal half; distal spine larger, reaching almost $\frac{1}{3}$ of the article length; the geminated spines are located on a tubercle-like lifting that is formed by the wider base of the distal spine; the proximal spine is smaller, slender and less sclerotized (which can be noticed for its clearer color). Cleaning organ about $\frac{1}{2}$ the article length. **Claw** (Fig. 6): long, with an acute, curved tip.

Legs: All densely setose. Ventral corner of the prolateral face of femora II–IV projecting in a distinct spiniform process. **Femur length** I > III > IV > II. Tibia I with 21 articles and tarsus (basitarsus+distitarsus) I with 37 articles in both legs. **Leg IV: Basitibia:** 4 pseudo-articles, one trichobothrium at the first and one at the last pseudo-article. **Distitibia:** 16 trichobothria, trichobothria *bc*, *sb* and *bf* equidistant. **Basitibia-distitibia length** BT1 > DT > BT3 = BT4 > BT2. **Basitarsus/distitarsus ratio** 7/4, distitarsus tetramerous.

Measurements: Females (n=1): Cephalothorax: Length: 2.67 mm, Width: 3.73 mm. Abdomen: 5.0 mm. Pedipalp: Femur 2.04 mm, Tibia 2.21 mm,

Basitarsus 1.04 mm, Distitarsus 0.69 mm, Tarsal claw 0.56 mm.

Color pattern (in alcohol): Chelicerae, pedipalps and carapace yellowish. Legs light colored. Abdomen pale yellow.

Genitalia: Unknown. The gonopod of the specimen was destructed before it could be analyzed.

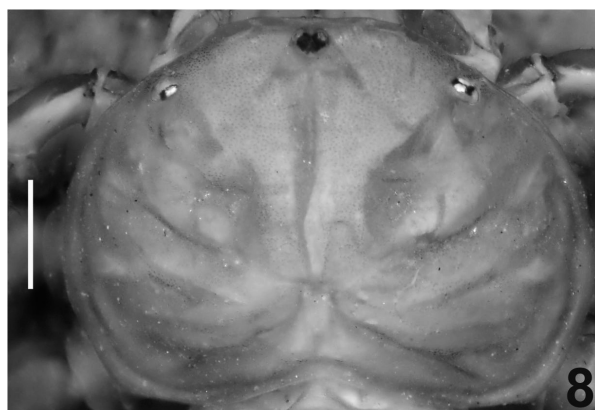
Natural history

The specimen herein described was collected on the forest floor of Malumpati. The female was carrying nine eggs.

DISCUSSION

The genus *Sarax* has currently 17 species and two subspecies, distributed from Greece to Papua New Guinea. Among all these species, *Sarax curioi* sp. n. is the only one with geminated spines on the pedipalp distitarsus, without denticles on the cheliceral claw and with 21 pseudo-articles on tibia I.

The amblypygid fauna in the Philippines is poorly known. With this new species, the number of species raises to three: *Charon grayi* Gervais, 1842, *Sarax brachydactylus* and *S. curioi* sp. n.. This is the first time that an amblypygid is recorded from the Panay Island, which shows that the Philippines is still a sub-sampled area. This is evidenced by the absence of species of the genus *Sarax* (the most diverse genus in the Southeast Asia) in three of the

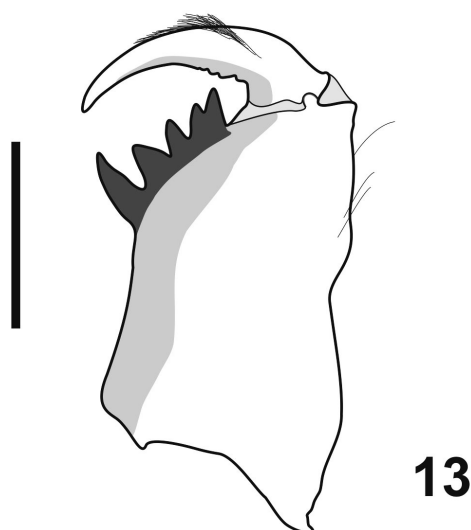
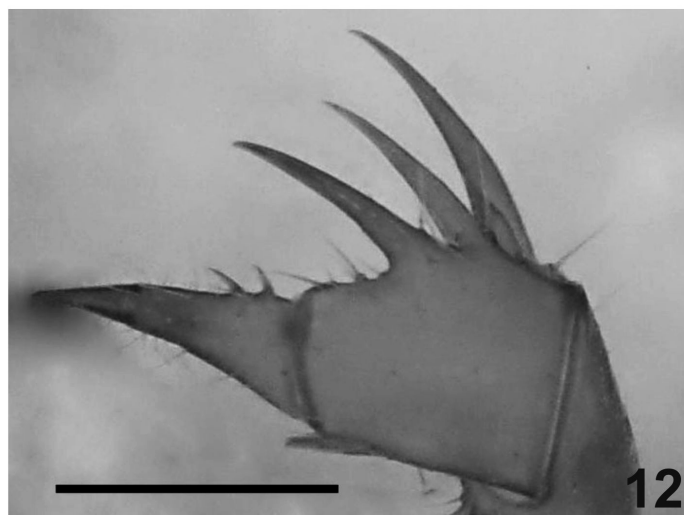
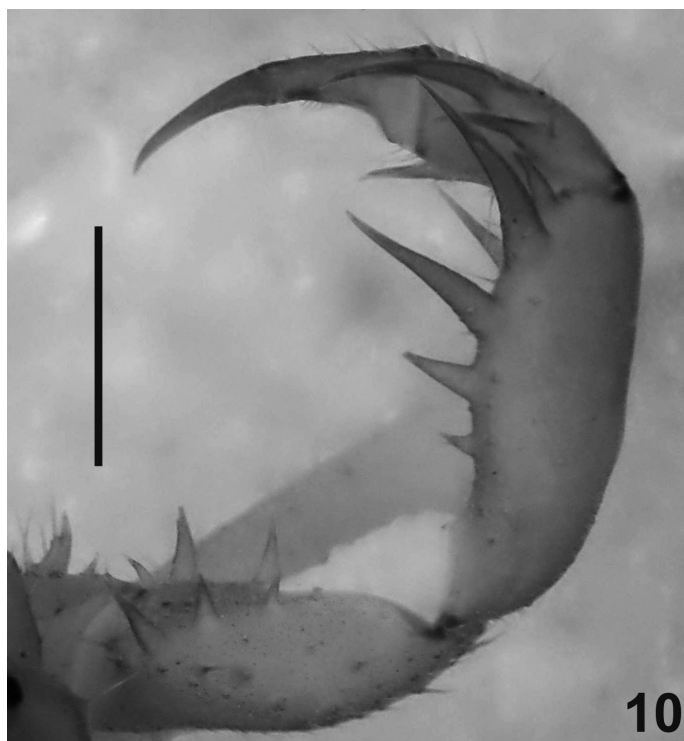


FIGURES 8-9: *Sarax brachydactylus* female, MNHN 14802. 8 – Carapace. 9 – Sternum. Scale bars: 1mm.

seven biggest islands that constitute the country (Mindanao, Mindoro and Samar) (Fig. 14).

Sarax curioi sp. n. can be easily distinguished from the other Philippine species. The corners of the anterior margin of the carapace in *S. curioi* sp. n extend downwards abruptly in front of the

lateral eyes (Fig. 2), which is different from *Sarax brachydactylus*, that has the lateral limits of the anterior margin of the carapace continued with the rest of the carapace edge (Fig. 8). The new species has the pedipalp with a strong granulation mainly on the femur and tibia, both on dorsal and ventral



FIGURES 10-13: *Sarax brachydactylus* female, MNHN 14802. 10 – Dorsal view of the right pedipalp. 11 – Ventral view of the right pedipalp. 12 – Frontal view of the left basi and distitibia. 13 – Inner view of right chelicerae. Scale bars: 1mm.

surfaces (Figs. 4 and 5). The granules are visibly more sclerotized and have a darker coloration when compared with *S. brachydactylus* (Figs. 10 and 11). Also, the shape of the basitibia of the pedipalp is different between the species; the anterior portion of the basitibia (i.e. between the distal spine and the articulation with the distitibia) in *Sarax curioi* sp. n. has a higher inclination (Fig. 6) when compared with *S. brachydactylus* (Fig. 12). Besides, the pedipalp distitibia of *Sarax curioi* sp. n. has a pair of geminated spines both sharing the same base (Fig. 6), while the distitibia spines of *S. brachydactylus* are clearly separated as the pattern conformation observed among the Charinidae species (Fig. 12).

Several differences can be observed concerning the chelicerae of both species. *S. curioi* sp. n. has the cheliceral claw without denticles (Fig. 7), whereas *S. brachydactylus* has four denticles (Fig. 13). The bifid denticles of the basal segment of the chelicerae in *S. curioi* sp. n. are curved upwards, while in *S. brachydactylus* the bifid denticles point forwards; the basal denticle (the largest) is straight in *S. curioi* sp. n. but is curved in *S. brachydactylus*; the denticle that follows the basal one (the largest) is much shorter than the others in *S. curioi* sp. n., while it is subequal in *S. brachydactylus* (but always smaller than the proximal one).

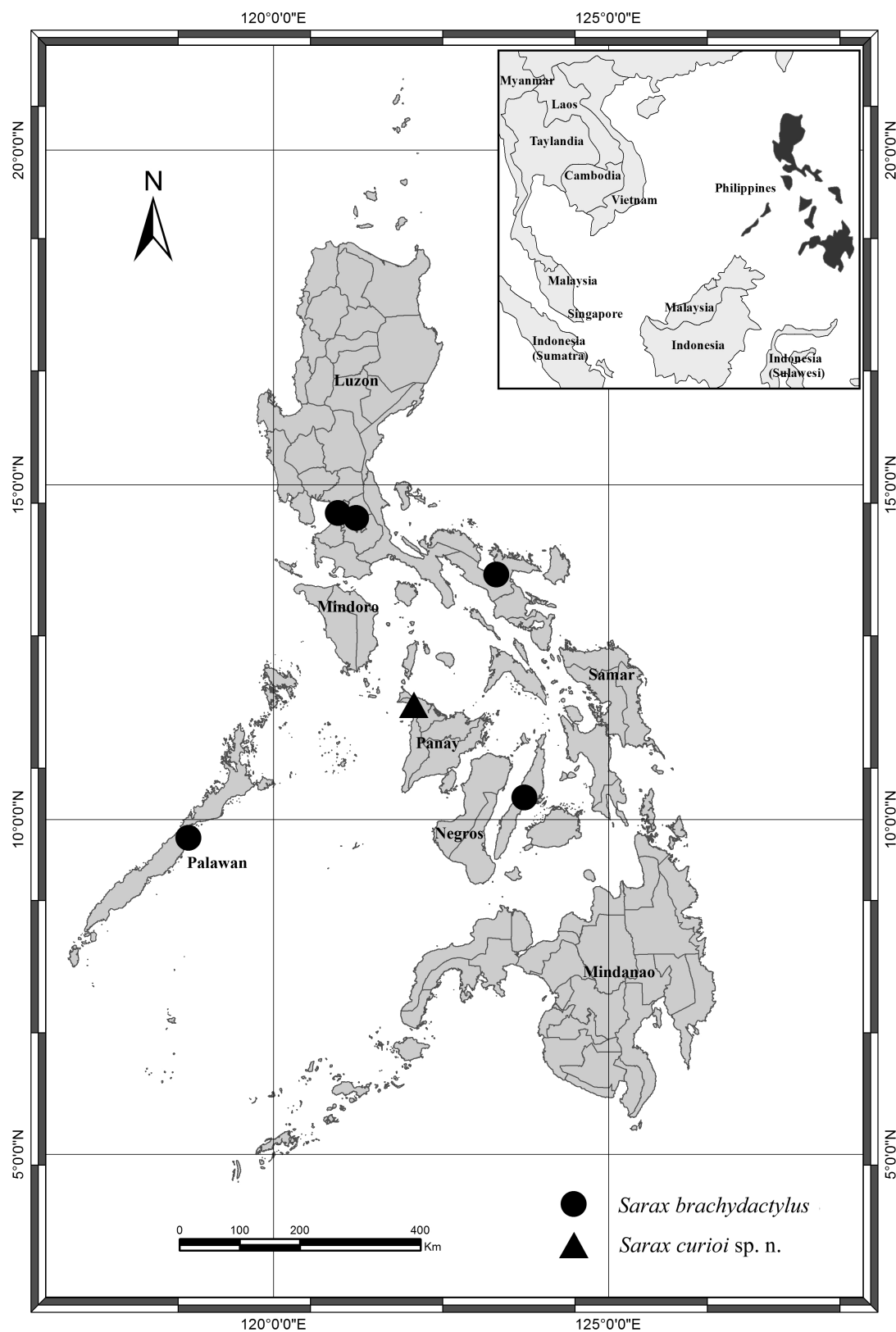
The new species can be distinguished from the other non-Philippines *Sarax* species by a set of characters, like the size of the individuals (e.g. *S. curioi* sp. n. is much smaller than *S. davidovi* (Fage, 1946)), the number of trichobotria on the basitibia of leg IV (*S. curioi* sp. n. has 16; *S. cavernicola* Rahmadi, Harvey and Kojima, 2010, *S. mardua* Rahmadi, Harvey and Kojima, 2010, *S. sangkulirangensis* Rahmadi, Harvey and Kojima, 2010 and *S. yayukae* Rahmadi, Harvey and Kojima, 2010 has 18; and *S. davidovi* has 20), the number of spines on the pedipalp distitibia (2 in *S. curioi*, 3 in *S. cavernicola* and 1 in *S. monodenticulatus* Rahmadi and Kojima, 2010, *S. cochiniensis* (Gravely, 1915) and *S. javensis* (Gravely,

1915)), and the size of the pedipal distitibia spines (much smaller in *S. sarawakensis* (Thorell, 1888) and in *S. rimosus* (Simon, 1901) than in the new species, and not geminated like in *S. curioi* sp. n.).

New record of Asian *Sarax*. *Sarax newbritainensis* Rahmadi and Kojima, 2010 is recorded from New Ireland Island, Papua New Guinea. This is the first record of the species elsewhere of the type locality, in New Britain. Rahmadi and Kojima 2010 say that this species has on its tibia and tarsus I 23 and 41 articles, respectively, but in the specimen here analyzed 29 and 41 articles were reported, respectively.

List of the *Sarax* species and subspecies with its known area of occurrence:

- 1- *Sarax brachydactylus* Simon 1892: Cambodia, Malaysia, Philippines; 2 - *Sarax buxtoni* (Gravely 1915): Malaysia, Singapore; 3 - *Sarax cavernicola* Rahmadi, Harvey and Kojima 2010: Indonesia; 4a - *Sarax cochiniensis cochiniensis* (Gravely 1915): India; 4b - *Sarax cochiniensis bispinosus* (Nair 1934): India, 5 - *Sarax davidovi* (Fage 1946): Cambodia, Laos, Vietnam; 6 - *Sarax javensis* (Gravely 1915): Indonesia (Java); 7 - *Sarax mardua* Rahmadi, Harvey and Kojima 2010: Indonesia; 8 - *Sarax mediterraneus* Delle-Cave 1986: Greece; 9 - *Sarax monodenticulatus* Rahmadi and Kojima 2010: Indonesia; 10 - *Sarax newbritainensis* Rahmadi and Kojima 2010: Papua New Guinea; 11 - *Sarax rimosus* (Simon 1901): Malaysia; 12 - *Sarax sangkulirangensis* Rahmadi, Harvey and Kojima 2010: Indonesia; 13 - *Sarax sarawakensis* (Thorell 1888): Andaman Islands, Indonesia (Java, Kalimantan), Malaysia (Sarawak, Selangor), Papua New Guinea, Singapore, Solomon Islands; 14 - *Sarax singaporeae* (Gravely 1911): Malaysia, Singapore; 15 - *Sarax willeyi* (Gravely 1915): Papua New Guinea; 16 - *Sarax yayukae* Rahmadi, Harvey and Kojima 2010: Indonesia, Malaysia; 17 - *Sarax curioi* sp.n.: Philippines.

FIGURE 14: Distributional map of the Philippine species of *Sarax*.

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RESUMO

Uma nova espécie do gênero *Sarax* Simon, 1892 é descrita da Ilha Panay, Filipinas. *Sarax curioi* sp. n. é a segunda espécie do gênero descrita no país e se diferencia da outra espécie filipina (*Sarax brachydactylus* Simon, 1892) pela superfície do pedipalpo que possui grânulos esclerosados, pelos espinhos da distitibia do pedipalpo, pelo número de dentes na garra da quelícera e pela forma dos dentes do segmento basal da quelícera. É feito um novo registro de *Sarax newbritainensis* Rahmadi e Kojima, 2010 para a ilha Nova Irlanda, Papua Nova Guiné.

Palavras-chave: Biodiversidade, Sudeste Asiático, Taxonomia, Amblipígio.

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