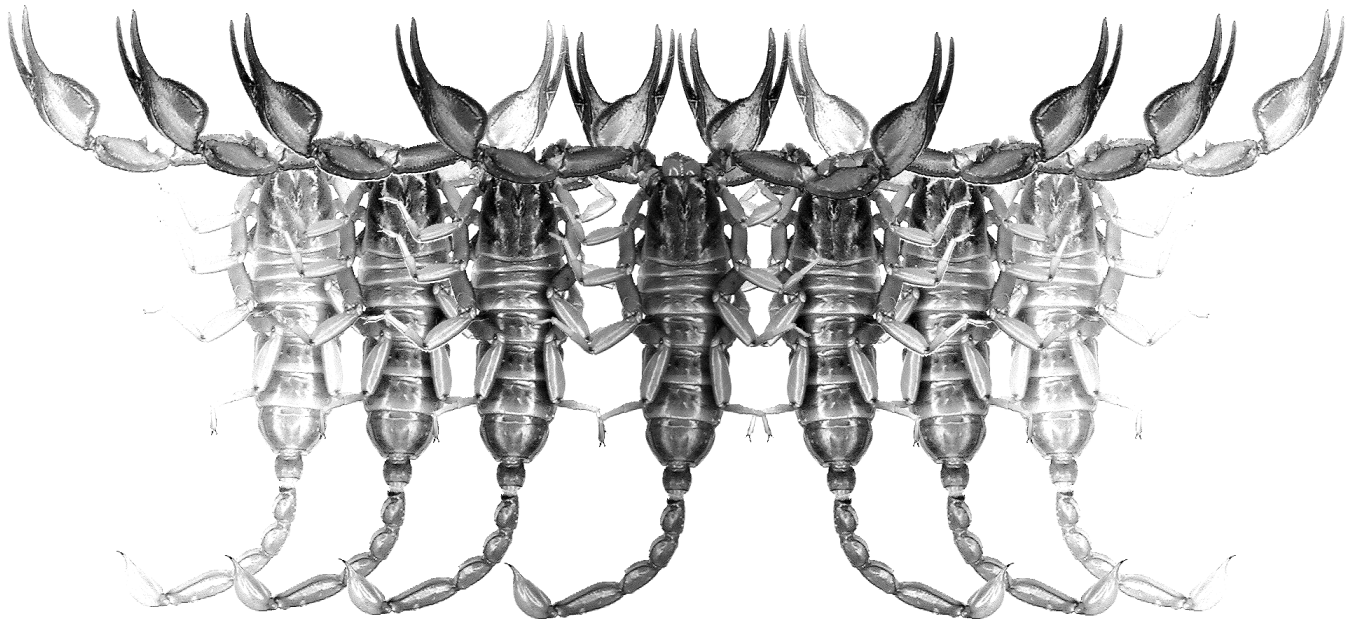


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**The Scorpions (Arachnida: Scorpiones) of Sint
Eustatius, Lesser Antilles**

Rolando Teruel & Hannah Madden

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The scorpions (Arachnida: Scorpiones) of Sint Eustatius, Lesser Antilles

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Summary

In the present note, we revise the scorpion fauna of the small island of Sint Eustatius, in the Lesser Antilles. A total of two families, three genera and three species are confirmed to occur there: the buthids *Centruroides barbudensis* (Pocock, 1898) and *Isometrus maculatus* (DeGeer, 1778), and the scorpionid *Oiclus purvesii* (Becker, 1880). These include the first record of the occurrence in Sint Eustatius of the family Scorpionidae and the genus *Oiclus* Simon, 1880, as well as the first published findings of *I. maculatus* since 1942. A key to the easy identification of all three species is provided.

Introduction

Sint Eustatius is a small (21 km²) island that lies in the northern Leeward Islands portion of the West Indies, located about 300 km roughly to the east of Puerto Rico, southeast of the Virgin Islands and immediately to the northwest of Saint Kitts and Nevis, at 17°30'N – 62°58' W / 17.5°N – 62.967°W. Formerly part of the Netherlands Antilles, Sint Eustatius currently is a special municipality within the Kingdom of Netherlands. The island has a saddle shape, with the 602 meter high volcano named The Quill to the southeast and smaller collection of hills to the northeast, known as the Northern Hills (Fig. 1).

The rich biodiversity of Sint Eustatius is reflected in the 15 different vegetation zones that are present. These harbor a large variety of different habitats from individual plants to complex floristic biomes, which all offer unique environments for arachnids, e.g., Stoffers (1956) referred to 18 different zones in his study of the flora of Curacao and the Caribbean islands.

The scorpion fauna of this island has undoubtedly been one of the most neglected amongst the West Indies. The first two scorpions from Sint Eustatius were officially recorded only about 35 years ago, in two simultaneous papers by the same author, after the study of a single museum collection: first, *Centruroides eustatius* was described by Armas (1976a) as a new species on the basis of one female with litter from The Quill, and second, *Isometrus maculatus* (DeGeer, 1778) was recorded by Armas (1976b) from one male and one

female from Oranjestad. Both species belong to the worldwide family Buthidae, the former was believed to be a local endemic from the island, and the latter has long been known to be a cosmopolitan scorpion.

A few years later, Armas (1983) revisited *C. eustatius* and concluded that it was not a valid species but a junior synonym of *Centruroides barbudensis* (Pocock, 1898), widespread all over the Leeward Islands, and this was the last paper that presented original information on the scorpions of Sint Eustatius. Some brief mentions were published since (e.g., Lourenço, 1984; Armas, 1988, 2001; Fet & Lowe, 2000), but all implied merely reproductions of both original references by Armas (1976a–b).

During early 2010, the second author collected a small sample of scorpions from Sint Eustatius, with the assistance of the nature enthusiast Fr. Alejandro J. Sánchez. The specimens were forwarded to the first author for identification, and it revealed to contain two species: *C. barbudensis* and a species of the genus *Oiclus* Simon, 1880. The latter represented a new record for the scorpion fauna of the island, but the species could not be accurately identified because the sample was inadequate, i.e., the single adult available was a female.

Then we decided to start a search for more specimens, and after two years of field work a better sample of *Oiclus* was obtained, which included the adult males and additional adult females, and made possible to determine the precise identity of this population. During the field work, additional specimens of *C. barbudensis* were also found, as well as two specimens of *I. macu-*

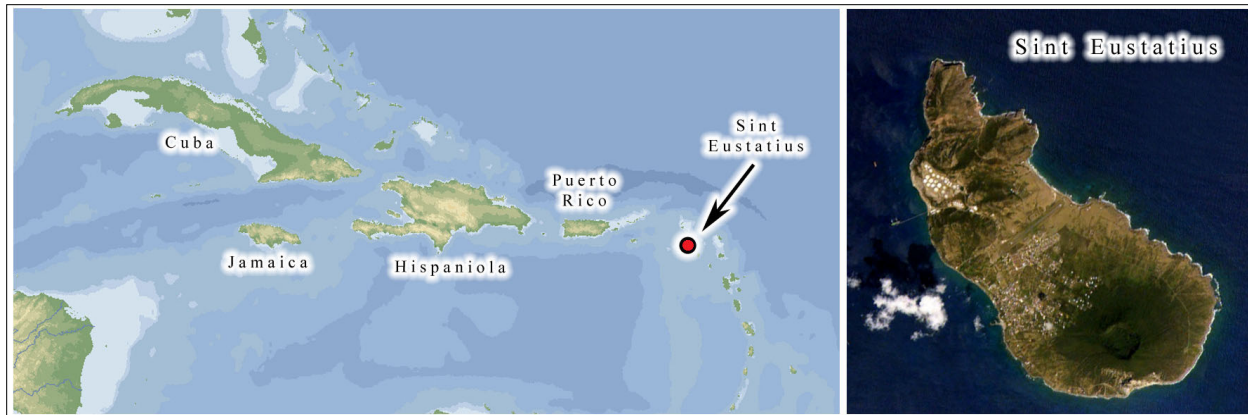


Figure 1: Sint Eustatius: location in the West Indies and detailed aerial photo; in the latter The Quill is clearly visible on the south part of the island.

latus, another important result because this scorpion had not been recorded here since 1942. Herein we present all those results, and complement the texts with high-quality color photos and a dichotomic key, which will enable the park rangers, conservation managers, and other interested readers to easily identify and know better the scorpions of Sint Eustatius.

Methods & Materials

Searches were carried out using simple yet effective techniques, primarily involving searching for specimens within all biomes of the habitat being studied (e.g. under rocks, within soil and leaf litter, under bark, and within vegetation). Specimens were captured in jars, photographed, and released safely to the same location in which they were found, except for representative samples which were preserved for identification. Originally, scorpions were searched for by peeling back bark and turning rocks during the day; this proved unsuccessful and techniques were modified to night searches with a UV light, which then yielded excellent results.

The specimens were studied and measured under a Zeiss Stemi 2000-C stereomicroscope equipped with line scale and grid ocular micrometers. Photographs were taken with a Canon PowerShot A620 digital camera. Digital images were slightly processed with Adobe Photoshop® 8.0, only to optimize bright and contrast features. Nomenclature and measurements follow Stahnke (1970), except for trichobothriotaxy (Vachon, 1974) and sternum (Soleglad & Fet, 2003). All measurements are given in millimeters. Unless otherwise noted, all specimens herein recorded are permanently deposited at the personal collection of the first author's personal collection (RTO); its labels are written in Spanish, but have been translated here into English for text coherence purposes.

The key herein included is intended for a wide range of readers, from scorpion specialists to students or simply interested readers, thus, it has been constructed using both microscopic and macroscopic characters. The reader must also complement it with the illustrations herein included for better interpretation. Also, it is 100% reliable only for local scorpions, i.e., it may not be useful to identify samples from other Caribbean islands.

Results and Discussion

Family Buthidae C. L. Koch, 1837

Centruroides barbudensis (Pocock, 1898)

Figures 2–3, 8a–b

Records: Gilboa Hill (17°30.602N, 62°59.120W), September 2010, H. Madden, J. Morpeth (specimens photographed alive and released). Courtar Mountain (17°29.020N, 62°58.058W), August–November 2010, H. Madden, J. Morpeth, 1♂, 4♀♀ (RTO: Sco-0522). The Quill (17°28.557N, 62°58.416W), 6 January 2010, A. Sánchez, J. Burgess, 5♂♂, 2♀♀ (RTO: Sco-0460). September 2010, H. Madden, J. Morpeth (specimens photographed alive and released).

Ecological Notes: all specimens were found at night with UV detection. The majority was discovered on the branches of trees and one was found in the leaf litter. It has been found in the following vegetation types: thorny woodland, dry evergreen forest, semi-evergreen seasonal forest, evergreen seasonal forest, and pioneer forest.

Comments: the above-given records are only a couple of representative samples which were collected for study. The species is common and widespread all over Sint Eustatius.

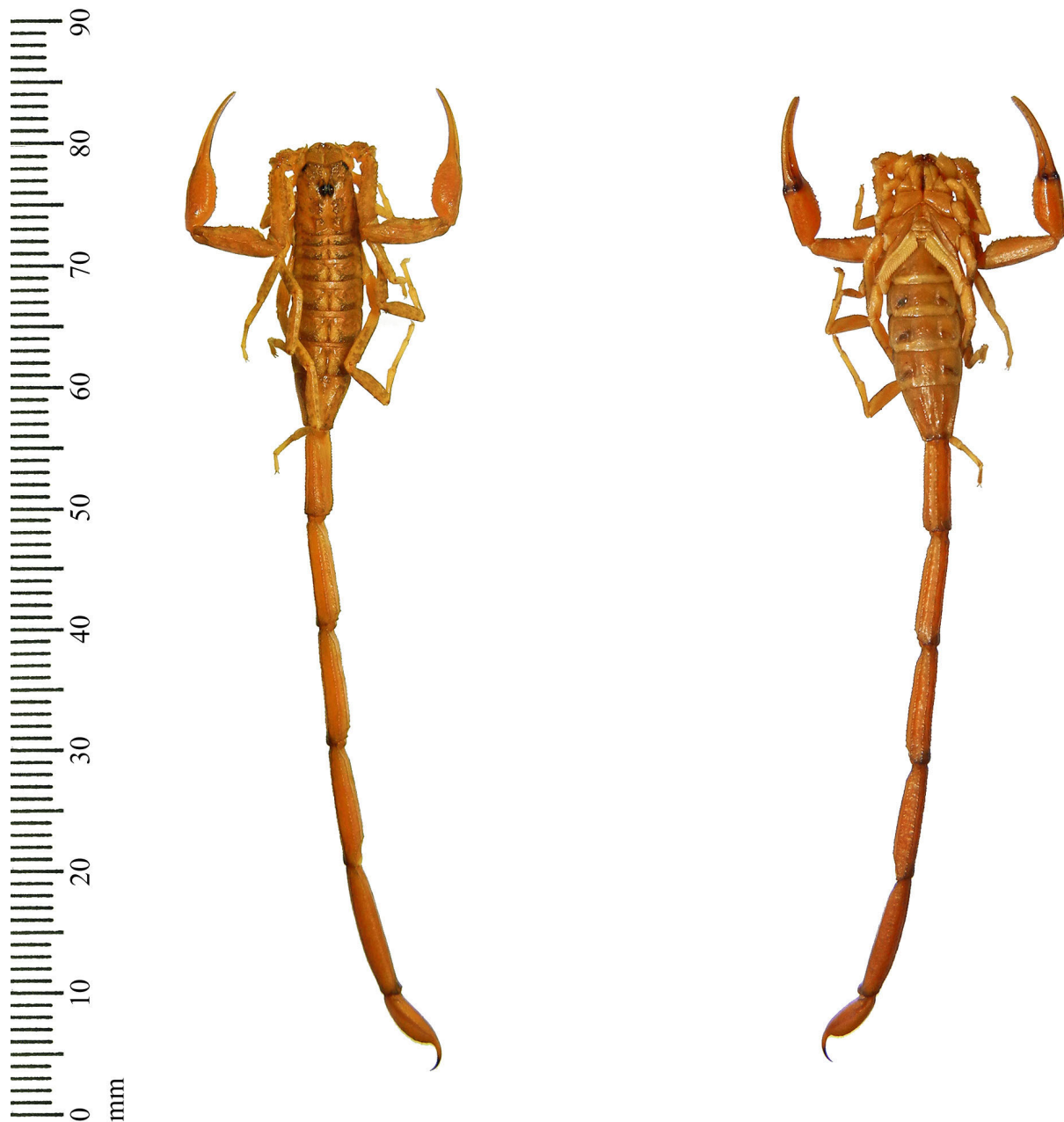


Figure 2: Adult male *Centruroides barbudensis* from Sint Eustatius, dorsal and ventral views.

The study of the holotype of *C. eustatius* (temporarily housed at the Instituto de Ecología y Sistemática, Havana, Cuba) and the specimens recorded herein, and their direct comparison to additional samples of *C. barbudensis* from other islands (type locality included), confirms that the synonymy proposed by Armas (1983) is correct.

***Isometrus maculatus* (DeGeer, 1778)**

Figures 4–5

Records: Zeelandia (17°30.222N, 62°59.014W), 7 April 2010, N. Esteban, 1♂ (specimen photographed alive and released). Cherry Tree (17°29.291N, 62°58.531W), 18 November 2010, C. Gibbs, 1♀ (RTO: Sco-0523).

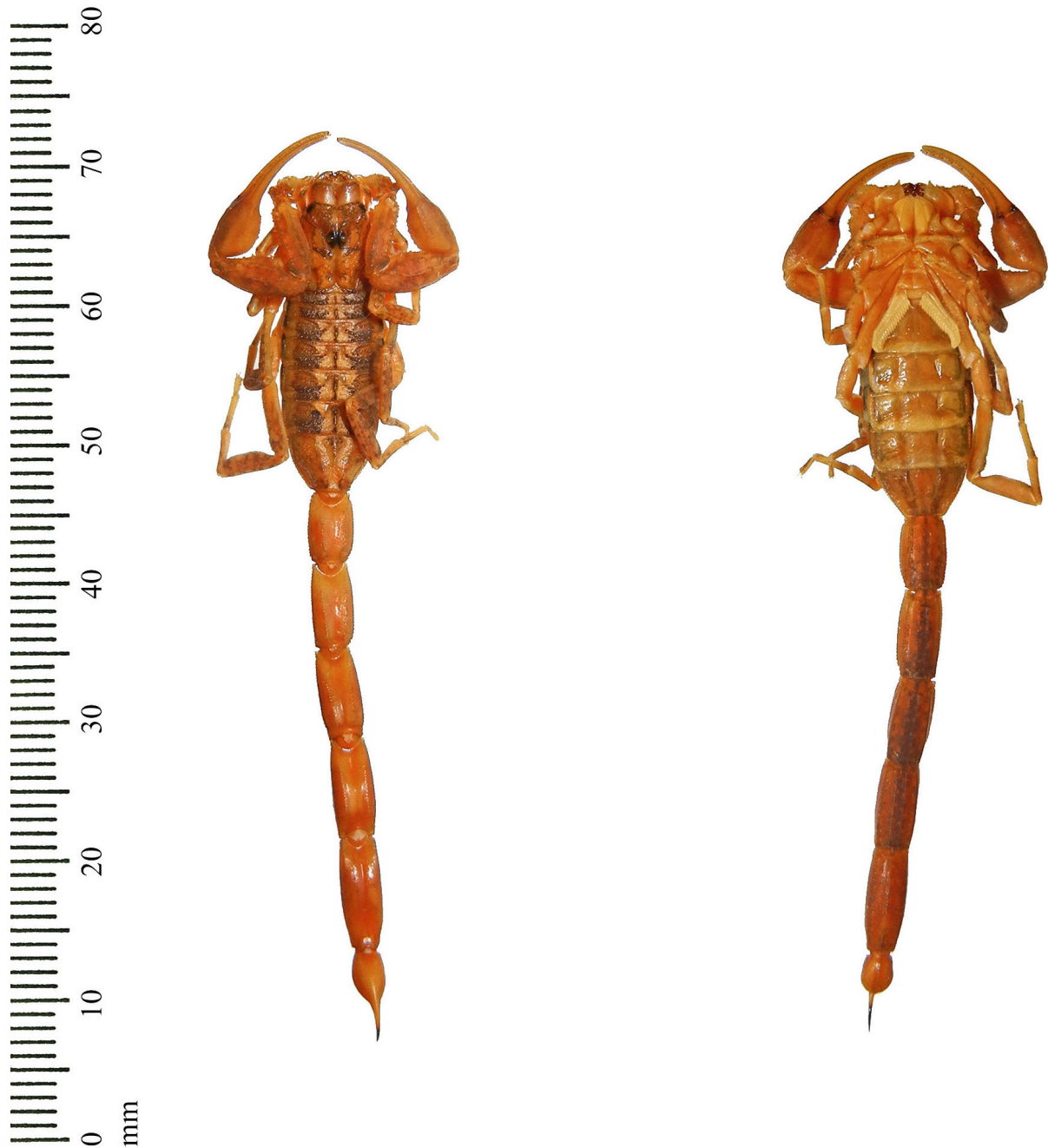


Figure 3: Adult female *Centruroides barbudensis* from Sint Eustatius, dorsal and ventral views.

Ecological Notes: both specimens were found inside inhabited houses, as it is the rule for most populations in the West Indies (Armas, 1976a; Teruel, 2009).

Comments: this scorpion is native from the Indian subcontinent, but due to a markedly synanthropic habit, it has been widely dispersed through the world and became cosmopolitan (Fet & Lowe, 2000).

Its occurrence in Sint Eustatius was first recorded by Armas (1976a) on the basis of an adult male and female collected near Oranjestad, in early 1942, and deposited in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden, The Netherlands. No additional records have been published since, only reproductions of this reference (e.g., Fet & Lowe, 2000). Thus, the specimens herein studied represent the first



Figure 4: Adult male *Isometrus maculatus* from Cuba, dorsal and ventral views.

confirmation that *I. maculatus* still keeps a viable population in this island.

Family Scorpionidae Latreille, 1802

Subfamily Diplocentrinae Karsch, 1880

Oiclus purvesii (Becker, 1880)
 Figures 6–7, 8c–d

Records: The Quill (17°28.557N, 62°58.416W), 6 January 2010, A. Sánchez, J. Burgess, 1♀, 6 juveniles (RTO: Sco-0459). September–October 2010, H. Madden, J. Morpeth, 2♂♂, 5♀♀, 3 juveniles (RTO: Sco-0521).

Ecological Notes: so far specimens of this species have only been discovered in and around The Quill, with a distribution stretching from the lower slopes to inside the crater. In general, adult specimens were located in and around small burrows on the hiking trails, whereas juveniles were mostly located under rocks. It has been found in the following vegetation types: thorny woodland, dry evergreen forest, deciduous seasonal forest, semi-evergreen seasonal forest, evergreen seasonal forest, and pioneer forest.

Capturing specimens proved somewhat more difficult because of two factors. Firstly, *Oiclus* resides in burrows at ground level, waiting at the entrance for prey to pass, therefore giving them a quick escape route. Secondly, they can see the UV light (unlike the two buthids), which caused them to retreat into their burrow



Figure 5: Adult female *Isometrus maculatus* from Sint Eustatius, dorsal and ventral views.

and made it difficult to make a capture. The same behavior has been observed in other Caribbean diplocentrines (R. Teruel, pers. obs.).

Comments: the genus *Oiclus* Simon, 1880, was considered to include a single polytypic species until very recently, when two additional new species were described (Teruel, 2008; Teruel & Chazal, 2010). The specimens herein examined match the redescription of *Oiclus purvesii purvesii* given by Francke (1978), but we refrain from assigning the Sint Eustatius specimens to a

subspecies because the validity and scope of the two subspecies of *O. purvesii* plus the supposedly hybrid population from Saint Kitts recognized by Francke (1978), are not satisfactory and need to be revised (Teruel & Francke, 2006).

This implies the first record of the genus *Oiclus* and the family Scorpionidae from Sint Eustatius. It was expected, however, because populations had already been recorded from the neighboring islands of Saba and Saint Kitts (Francke, 1978; Sissom & Fet, 2000; Teruel & Francke, 2006).



Figure 6: Adult male *Oiclus purvesii* from Sint Eustatius, dorsal and ventral views.



Figure 7: Adult female *Oiclus purvesii* from Sint Eustatius, dorsal and ventral views.



Figure 8: Live scorpions from Sint Eustatius, in their natural habitat: (a) adult male *Centruroides barbudensis*; (b) adult female *Centruroides barbudensis*; (c) adult female *Oiclus purvesii*; (d) juvenile *Oiclus purvesii*. Photos courtesy Alejandro J. Sánchez.

Key to the species of scorpions occurring in Sint Eustatius

1.- Pedipalps and metasoma short and robust. Coloration basically brown, densely spotted with black, so the scorpion looks uniformly dark to blackish to unaided eye. Trichobothrial pattern C: femur with only three trichobothria, patella with three ventral trichobothria. Sternum type 2: widely hexagonal, with a posterior emargination and convex lateral lobes. Leg tarsomere II ventrally with two parallel rows of stout spiniform seta.....
 (Scorpionidae)..... *Oiclus purvesii*
 - Pedipalps and metasoma long and slender. Coloration basically yellow, sparsely spotted with light to dark brown, so the scorpion looks pale and striped to unaided eye. Trichobothrial pattern A: femur with 10 trichobothria, patella without ventral trichobothria. Sternum type 1: narrowly pentagonal, with a posterior depression that does not bisect the posterior edge. Leg

tarsomere II ventrally with dense and irregular cover of thin setae..... (Buthidae)..... 2

2.- Pedipalp fingers dark brown to black, conspicuously darker than hand. Trichobothrial pattern A-β (angle of femoral trichobothria $d_1-d_3-d_4$ opens towards internal surface). Pedipalp fingers with 5–6 principal rows of denticles, the basalmost much longer and extended over the basal half of the finger; supernumerary denticles absent. Telson with subaculear tubercle very large, sharp and triangular *Isometrus maculatus*
 - Pedipalp fingers yellow, same-colored as, or lighter than hand. Trichobothrial pattern A-α (angle of femoral trichobothria $d_1-d_3-d_4$ opens towards external surface). Pedipalp fingers with 7–8 principal rows of denticles, all subequal and evenly distributed along the finger; supernumerary denticles flanking all principal rows of denticles internally and externally. Telson with subaculear tubercle obsolete to absent
 *Centruroides barbudensis*

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References

- ARMAS, L. F. DE. 1976a. Notas sobre distribución geográfica de *Isometrus maculatus* (DeGeer) (Scorpiones: Buthidae) en las Antillas. *Miscelánea Zoológica*, 5: 3–4.
- ARMAS, L. F. DE. 1976b. Escorpiones del Archipiélago Cubano. 5. Nuevas especies de *Centruroides* (Scorpiones: Buthidae). *Poeyana*, 146: 1–55.
- ARMAS, L. F. DE. 1983. The Lesser Antillean scorpions of the genus *Centruroides*. *Studies on the Fauna of Curaçao and other Caribbean Islands*, 65(197): 55–67.
- ARMAS, L. F. DE. 1988. *Sinopsis de los escorpiones antillanos*. Editorial Científico-Técnica, La Habana, 102 pp.
- ARMAS, L. F. DE. 2001. Scorpions of the Greater Antilles, with description of a new troglobitic species (Scorpiones: Diplocentridae). Pp. 245–253 in Fet, V. & P. A. Selden (eds.): *Scorpions 2001. In memoriam Gary A. Polis*. British Arachnological Society, Burnham Beeches, Bucks, xi + 404 pp.
- FET, V. & G. LOWE. 2000. Family Buthidae. Pp. 54–286 in Fet, V., W. D. Sissom, G. Lowe & M. E. Braunwalder (eds.), *Catalog of the Scorpions of the World (1758–1998)*. The New York Entomological Society, New York.
- FRANCKE, O. F. 1978. Systematic revision of diplocentrid scorpions (Diplocentridae) from Circum Caribbean Lands. *Special Publications of the Museum, Texas Tech University*, 14: 1–92.
- LOURENÇO, W. R. 1984. Contribution à la connaissance de *Centruroides barbudensis* (Pocock, 1898) (Scorpiones, Buthidae). *The Journal of Arachnology*, 11: 327–335.
- SISSOM, W. D. & V. FET. 2000. Family Diplocentridae. Pp. 329–354 in Fet, V., W. D. Sissom, G. Lowe & M. E. Braunwalder (eds.), *Catalog of the Scorpions of the World (1758–1998)*. The New York Entomological Society, New York.
- SOLEGLAD, M. E. & V. FET. 2003. High-level systematics and phylogeny of the extant scorpions (Scorpiones: Orthosterni). *Euscorpius*, 11: 1–175.
- STAHNKE, H. L. 1970. Scorpion nomenclature and mensuration. *Entomological News*, 81: 297–316.
- STOFFERS, A. L. 1956. *The Vegetation of the Netherlands Antilles*. Kremnik, Utrecht, 142 pp.
- TERUEL, R. 2008. A new species of *Oiclus* Simon 1880 (Scorpiones: Scorpionidae: Diplocentrinae) from Saint-Barthélemy, Lesser Antilles. *Boletín de la Sociedad Entomológica Aragonesa*, 43: 95–99.
- TERUEL, R. 2009. Morfología, ecología y distribución de *Isometrus maculatus* (DeGeer 1778) en Cuba (Scorpiones: Buthidae). *Boletín de la Sociedad Entomológica Aragonesa*, 45: 173–179.
- TERUEL, R. & L. CHAZAL. 2010. A new species of the genus *Oiclus* Simon, 1880 (Scorpiones: Scorpionidae: Diplocentrinae) from Guadeloupe, Lesser Antilles. *Euscorpius*, 92: 1–9.
- TERUEL, R. & O. F. FRANCKE. 2006. First record of the scorpion genus *Oiclus* Simon 1880 (Scorpionidae: Diplocentrinae) from St-Barthelemy, Lesser Antilles. *Boletín de la Sociedad Entomológica Aragonesa*, 38: 286.
- VACHON, M. 1974. Études des caractères utilisés pour classer les familles et les genres des scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les Scorpions. *Bulletin du Muséum national d'Histoire naturelle*, 3e série, 140 (Zoologie, 104): 857–958.