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DOI: <https://doi.org/10.3897/arphapreprints.e157634>

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The story of a Tailless Whip Scorpion in Eastern Mediterranean: First report of *Sarax ioanniticus* (Kritscher, 1959) in Cyprus (Amblypygi: Charinidae)

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Abstract

Background

Amblypygi, commonly known as tailless whip scorpions or whip spiders, is an order of Arachnida noted for its cryptic habits and predominantly tropical and subtropical distribution. Although the group was first mentioned on the island of Cyprus in 1990, no specific taxonomic information was provided at the time.

New information

Through a combination of literature review, targeted field surveys, and citizen-science contributions, we confirm the presence of *Sarax ioanniticus* (Kritscher, 1959) in Cyprus, representing the first documented record of this species on the island. Following seven years of dedicated searches, a live specimen was collected in 2023 and identified, thereby establishing *S. ioanniticus* as part of the island's fauna. This finding extends the known range of *S. ioanniticus* within the Eastern Mediterranean and underscores the importance of integrating biodiversity research with public engagement to detect elusive or underreported taxa. Future studies should investigate the species' local distribution, ecological requirements, and potential conservation concerns on Cyprus.

Keywords

Amblypygi, *Sarax ioanniticus*, *Charinus ioanniticus*, citizen science, Tailless Whip Scorpions, Whip spiders

Introduction

Amblypygi, commonly known as Whip spiders or Tailless Whip Scorpions, are a small, ancient order of Arachnida characterised by their very thin and elongated first pair of legs and flattened bodies. They are nocturnal predators, primarily feeding on insects and small invertebrates (Weygoldt 2000). This order is distinguished by their specialized first pair of legs, which act as sensory organs rather than for locomotion, aiding in prey detection (Harvey 2003). Furthermore, amblypygids differ from spiders by lacking venom glands in the chelicerae, secondary copulatory organs on the male palps and spinnerets on the opisthosoma (Dunlop 2010). In addition, they differ from other 'whipped' orders of arachnids, like whip scorpions (Uropygi) and Palpigradi, by the absence of a flagellum at the end of the opisthosoma (Weygoldt 2000, Harvey 2003). Amblypygi have a relatively wide geographical distribution, with species found in tropical and subtropical regions across the globe, including parts of the Mediterranean, where they inhabit caves and humid microhabitats (Miranda et al. 2021).

The Mediterranean and western Palearctic regions are home to several species of Amblypygi, although their diversity in these areas is relatively low compared to tropical regions. One of the most notable species in the Mediterranean is *Sarax ioanniticus* (Kritscher 1959), which was originally described as *Lindosiella ioannitica* and later classified as *Charinus ioanniticus*. This species was first described from the Greek island of Rhodes (Kritscher 1959, Harvey 2003). This species has since been recorded on other Greek islands, such as Symi and Kos, and in continental Greece, Egypt, Jordan, Israel, Italy and Turkey (Miranda et al. 2021). *Sarax ioanniticus* is typically found in humid caves and crevices but has also shown a tendency to inhabit human-made environments, such as buildings and bathrooms, which suggests a degree of synanthropy (Agapakis and de Miranda 2019). *Sarax ioanniticus* is also known to reproduce through parthenogenesis, a form of asexual reproduction where females produce offspring without fertilisation. This reproductive strategy is advantageous for the species, allowing populations to persist even in isolated or low-density environments, as seen in various Mediterranean and Middle Eastern populations (Weygoldt 2007, Blick and Seiter 2016). Another species, *Sarax israelensis* (Miranda et al. 2016), was described from Israel, where it inhabits caves in the Galilee and Golan Heights, further expanding the known distribution of Amblypygi in the region (Miranda et al. 2021).

In the western Palearctic, *Phrynychus deflersi* Simon, 1887 is the most prominent species, occurring primarily in the Arabian Peninsula, including Saudi Arabia, Yemen, and Oman (Weygoldt 1999). Like *S. ioanniticus*, this species prefers humid environments and is often

found in caves and rock crevices. Additionally, *Muscodamon atlanteus* Fage, 1939 is endemic to the Maghreb, with records in Morocco and Algeria, particularly in mountainous regions like the Atlas Mountains. *Muscodamon atlanteus* primarily inhabits caves and rocky habitats, demonstrating a unique adaptation to its environment (Fage 1939, Harvey 2003). Despite the relative scarcity of Amblypygi species in these regions, their adaptability to both natural and anthropogenic habitats highlights their ecological importance and evolutionary resilience.

The presence of Amblypygi on the island of Cyprus was first reported by Boris Sket in a study on Isopoda of Cyprus. In that publication, Sket (1990) noted a site at the monastery of Agios Neofytos (northeast of Paphos) with a limestone collector gallery that enriched a natural spring, where carcasses of Amblypygi were found at the bottom. However, no specimens were collected at the time, and no subsequent literature on Amblypygi in Cyprus has been published.

Materials and methods

On 11 July 2017, the second author posted a video of an Amblypygi on the Facebook group (FBG) "Biodiversity of Cyprus". The video was filmed in July 2012, from the old city of Paphos, with the second author hypothesising that it emerged from the sewer system that was under maintenance at the time. Unfortunately, the specimen was not collected. A subsequent literature review revealed no officially confirmed records of Amblypygi in Cyprus. Upon further discussion amongst the authors, the second author reported finding more than 20 small specimens of Amblypygi in July 2011, under the plates surrounding a pool during the renovation process of a house garden at Tsada village in Paphos district. Although specimens were collected in 50% ethanol, unfortunately, the vials were lost.

In the following years, the authors conducted extensive field investigations to locate specimens of this species in the reported areas and localities with caves and conditions suitable for whip spiders. Furthermore, they searched in groups related to nature and biodiversity in social media and online platforms (e.g. iNaturalist). On 23 March 2021, Mrs Aurore Proutheu posted a photo of a whip spider on a wall at the "Biodiversity of Cyprus" FBG asking for identification. The location was Lapithos village in the Kerynia district. The authors contacted her for more information. Unfortunately, by the time she responded to the authors, the specimen was no longer present.

Almost two years later, on 2 July 2023, the third author spotted a whip spider specimen walking on the wall of a house during his family holidays. The specimen was collected alive and brought to the first author the same evening. The specimen was placed in a small terrarium with coconut soil, dry leaves and some rocks with cracks and was provided water, moisture, and small mealworms and cockroaches as food. The specimen died after 3 days and was deposited in the personal collection of Michael Hadjiconstantis, in 90 alcohol and in a freezer.

Taxon treatment

Sarax ioanniticus Kritscher, 1959

- GBIF <https://www.gbif.org/es/species/2181422>

Material

- a. taxonID: <https://www.gbif.org/es/species/2181422>; higherGeographyID: Limassol district; country: Cyprus; municipality: Limassol district; locality: Pissouri village; verbatimCoordinates: 34°40'08.8"N 32°42'02.3"E; verbatimEventDate: 2 July 2023; individualCount: 1; sex: female; occurrenceRemarks: specimen walking on a house wall; recordedBy: Dr. Christos Zoumides; disposition: stored in 90% ethanol in M. Hadjiconstantis private collection; occurrenceID: B844670D-388A-53C9-A04B-3D6FEA395667

Taxon discussion

The collected female specimen (Fig. 1, Fig. 2A) was identified as Miranda et al. 2021 *Sarax ioanniticus* based on the available taxonomic key in Miranda et al. 2021 Miranda et al. 2021

Analysis

Other records of *Amblypygi* records in Cyprus: citizen science and literature records

Amblypygi sp., Holy Monastery of Saint Neophytos the Recluse, Tsada village (34°50'48.0"N 32°26'44.7"E), Paphos district; *Amblypygi* carcasses on the bottom of a natural spring (Sket 1990).

The following records are based on photographs and video material posted on social media. No material was examined to confirm the species identification:

- *Sarax* sp., Tsada village (34°50'19.0"N 32°28'29.9"E), Paphos district; July 2011, 20+ specimens under the plates surrounding a pool, Photographer: Matthew Stephen Smith (Fig. 2B).
- *Sarax* sp., Kennedy Square (34°46'30.8"N 32°25'19.7"E), Paphos city; July 2012, video with a walking specimen, Videographer: Matthew Stephen Smith (Fig. 2C)
- *Sarax* sp., Lapithos village (35°20'31.0"N 33°10'08.4"E), Kerynia district; 23 March 2021, Photo of a specimen on a house wall, Photographer: Aurore Proutheau (Fig. 2D)

Discussion

This article officially confirms the presence of *Amblipygy* on the island of Cyprus, after eight years of searching for specimens. This first record of *S. ioanniticus* in Cyprus adds one more order of organisms (*Amblipygy*), a new family (*Charinidae*), a new genus (*Sarax*), and a new species to the Island's fauna. Thus, filling gaps in our knowledge of the arachnids of Cyprus, and supplementing data on their distribution and ecology. The presence of an *Amblipygy* on Cyprus is an important addition to its already rich arachnid fauna, including a diversity of endemic and interesting species (Gantenbein et al. 2000, Yagmur 2011, Bosmans et al. 2016, Azarkina et al. 2018, Bosmans et al. 2019, Bayoumy et al. 2024).

Up-to-date, reports of *Amblipygy* in Cyprus have been obtained from the Southwestern and Northwestern parts of the island, at a maximum distance of 90 kilometres apart. This fact, in combination with Sket (1990), leads us to assume that *S. ioanniticus* holds established populations in Cyprus. The presence of the species in Cyprus was expected based on the known distribution on the surrounding mainland that spreads from Italy to Egypt (Miranda et al. 2021). Furthermore, its confirmed presence on the island shows that the species is more widely distributed than expected but is rarely observed due to its "cryptic" behavior and ecological requirements. Taking into consideration the synanthropic nature of *S. ioanniticus*, its parthenogenetic reproduction ability (Weygoldt 2007, Blick and Harvey 2011, Blick and Seiter 2016, Miranda et al. 2016, current study), as well as the overwhelming advances in smartphone technology and the surge in citizen-science participation these enable (Goodchild 2007, Dickinson et al. 2012), more observations are anticipated across the Mediterranean region.

Citizen science has played a crucial role in documenting species such as *S. ioanniticus* in Cyprus and the broader Mediterranean region. Local contributions, especially through platforms like iNaturalist and social media groups focused on biodiversity, have been instrumental in recording occurrences of numerous important alien and native species (Maistrello et al. 2016, Chandler et al. 2017, Kazilas et al. 2020, Kazilas et al. 2021, Demetriou et al. 2020, Johnson et al. 2020, Ruzzier et al. 2020, Davranoglou and Karaouzas 2021, Angelidou et al. 2022, González-Moreno et al. 2024). Such records, contributed by non-professionals, help fill gaps in species' distributions, offer valuable support for ecological research and assist conservation efforts. In Cyprus, citizen science data have contributed to significant findings, underscoring the importance of public engagement in preserving biodiversity (Hadjiconstantis and Zoumidis 2021, Demetriou et al. 2022, Christou et al. 2023, Hadjiconstantis et al. 2023, John et al. 2023).

In conclusion, more research on the distribution, ecological preferences, species interrelationships, and threats *S. ioanniticus* may face in Cyprus are necessary to monitor and safeguard this peculiar, rarely encountered species.

Acknowledgements

We extend our gratitude to Dr. Iosif Hafez of The Cyprus Institute for assisting us in examining the specimen using a digital microscope (Hirox KH8700, equipped with an MXG-2500REZ lens [35–2500x] and a high-precision motorized stand). Many thanks to Mrs. Aurore Proutreau, who photographed the second record and provided both the image and additional information. We are also grateful to George Konstaninou and Jakovos Demetriou for their help and for offering valuable comments on earlier drafts of this paper.

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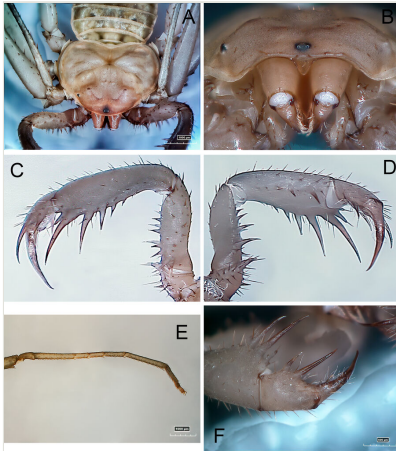


Figure 1.

Morphological parts of *S. ioanniticus*: **A** carapace dorsal view; **B** carapace frontal view (frontal process); **C** pedipalp dorsal view; **D** pedipalp ventral view; **E** basitibia IV; **F** pedipalps' tibia and tarsus frontal view.



Figure 2.

Habitus and online record photos of *S. ioanniticus*: **A** Habitus, Picture records from; **B** Tsada; **C** Paphos city; **D** Lapithos. Photograph credits are mentioned in Results and the Acknowledgements sections.