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First report of *Heriaeus buffoni* (Araneae: Thomisidae) from the Canary Islands

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Abstract. *Heriaeus buffoni* (Audouin, 1826) is reported for the first time from the Canary Islands, where it was found on Lanzarote. This also represents the first record of the genus in the archipelago. All individuals were collected with pitfall traps installed in nitrophilous synanthropic shrub vegetation near urban areas. Species identification was based on male genitalia only as females were not sampled. A map including all known records from Lanzarote, drawings of the pedipalps and photographs of living and preserved specimens are presented.

Keywords: biodiversity, crab spider, distribution, Macaronesia, new record

Zusammenfassung. Erstnachweis von *Heriaeus buffoni* (Araneae: Thomisidae) für die Kanarischen Inseln. *Heriaeus buffoni* (Audouin, 1826) wird zum ersten Mal von den Kanarischen Inseln gemeldet, wo die Art auf Lanzarote gefunden wurde. Dieser Nachweis ist auch der erste der Gattung im Archipel. Alle Individuen wurden mithilfe von Bodenfallen gesammelt, welche in nitrophiler, strauchiger Vegetation nahe urbanen Gebieten installiert waren. Die Artidentifikation basiert nur auf männlichen Exemplaren, da keine weiblichen Tiere gefunden wurden. Es werden eine Karte, welche alle bekannten Nachweise von Lanzarote enthält, Zeichnungen der Pedipalpen sowie Bilder von lebenden und konservierten Individuen präsentiert.

The Canary Islands are an archipelago of volcanic origin located off northwest Africa, comprising eight major islands. Lanzarote is the second oldest (15 my) and the easternmost island, being only 140 km off the African coast (Troll & Carracedo 2016). Due to a comparatively low altitude of the island's topography, the humidity of the tradewinds is not retained, which results in little precipitation and desert-like conditions. Thus, together with the high erosion and aridification experienced by this island, Lanzarote exhibits a reduced habitat diversity in comparison with younger central-western islands (Macías-Hernández et al. 2016). Among the more than 500 spider taxa that have been reported for the Canary Islands only 98 have so far been recorded from Lanzarote (Suárez 2018), thus being currently the island with the lowest spider species diversity within the archipelago. However, arachnological studies on this island have been scarce, being mainly limited to taxonomic research focused on specific genera such as *Dysdera* C. L. Koch, 1837 (Arnedo et al. 2000), *Pholcus* Walckenaer, 1805 (Dimitrov & Ribera 2007), *Loxosceles* Heineken & Lowe, 1832 (Planas & Ribera 2015) or the contributions made by Wunderlich (1987, 1992, 2011). Thus, the lack of chorological studies translates into a poor understanding of the composition and distribution of species, suggesting that the current species checklist is still far from being complete, not just for Lanzarote but also for the whole archipelago. In order to contribute to the knowledge of the Canary arachnofauna, we provide here the first report of the crab spider genus *Heriaeus* Simon, 1875 (Araneae: Thomisidae) for the Canary Islands, based on specimens of *Heriaeus buffoni* (Audouin, 1826) collected on this island.

Material and methods

Specimens were collected by using non-baited pitfall traps without killing-preserving agents, subsequently preserved in 99% ethanol and examined under a Zeiss Stemi 2000 stereomicroscope. Individuals were identified to species level by examining morphological characters of the male genitalia, which is known to be a conserved character within this genus (Loerbroks 1983). In the absence of a published key of *Heriaeus* species, the following articles were consulted to compare male palps: Levy (1973), Loerbroks (1983), Utochkin (1985), Liang et al. (1991), Niekerk & Dippenaar-Schoeman (2013), Komnenov (2017) and Tang & Li (2010). Illustrations were made using the vector graphics editor Inkscape based on photos taken on a Canon EOS 750D camera. Microscopic images of the habitus and the pedipalp were taken using a DMC5400 camera with L.A.S. 4.13.0 software adapted to an Axio Imager M2 microscope (Carl Zeiss Microscopy) and stacked with Helicon Focus 8.1.0 (Helicon Soft Ltd). The map showing the distribution of the species was made using QGIS v. 3.16. Layers of the shape of the islands as well as the orthophotography of Arrecife were downloaded from GRAFCAN (2021). Two specimens were deposited in the collection of the Department of Animal Biology of the University of La Laguna (DZUL), another two in the invertebrate collection of the Instituto de Productos Naturales y Agrobiología (IPNA-CSIC) and one individual in the collection of the State Museum of Natural History Karlsruhe (SMNK-ARA).

Results

Heriaeus Simon, 1875

Heriaeus buffoni (Audouin, 1826) (Figs 2-3)

Specimens examined. Lanzarote, Punta Chica (Arrecife), 28.9747°N/-13.5296°W, 31. Mar. 2021, 1 ♂, M. Zarzosa leg., SMNK-ARA (19040); Punta Chica (Arrecife), 28.9771°N/-13.5301°W, 31. Mar. 2021, 1 ♂, M. Zarzosa leg., DZUL coll. (DZUL-35564); El Cable (Arrecife), 28.9577°N/-13.5752°W, 9. Apr. 2021, 1 ♂, M. Zarzosa leg., DZUL coll. (DZUL-35563); El Cable (Arrecife), 28.9543°N/-13.5765°W, 9. Apr. 2021, 1 ♂, M. Zarzosa leg., IPNA-CSIC coll.; Argana Baja (Arrecife), 28.9638°N/-13.5704°W, 16. Apr. 2021, 1 ♂, M. Zarzosa leg., IPNA-CSIC coll.

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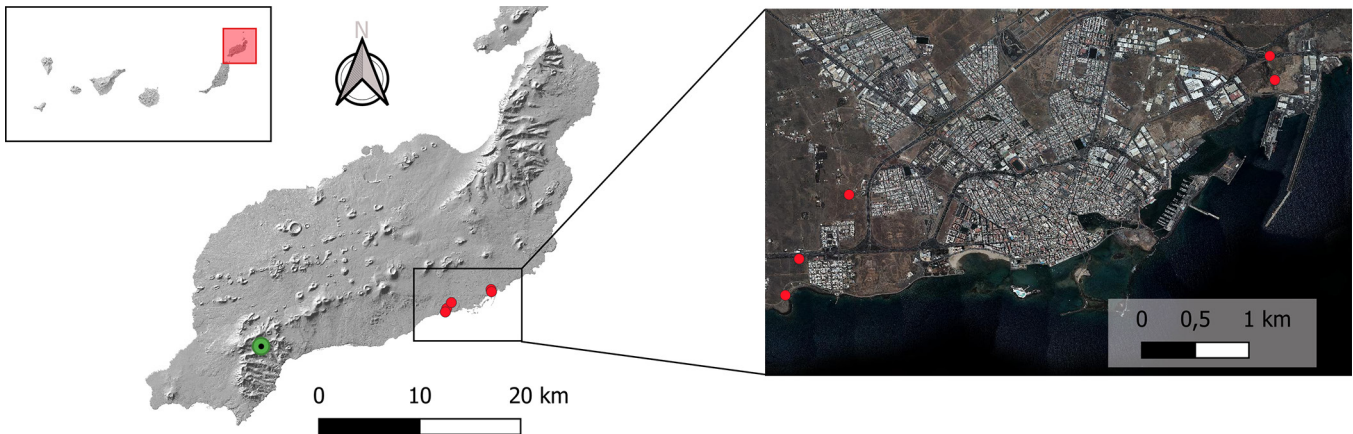
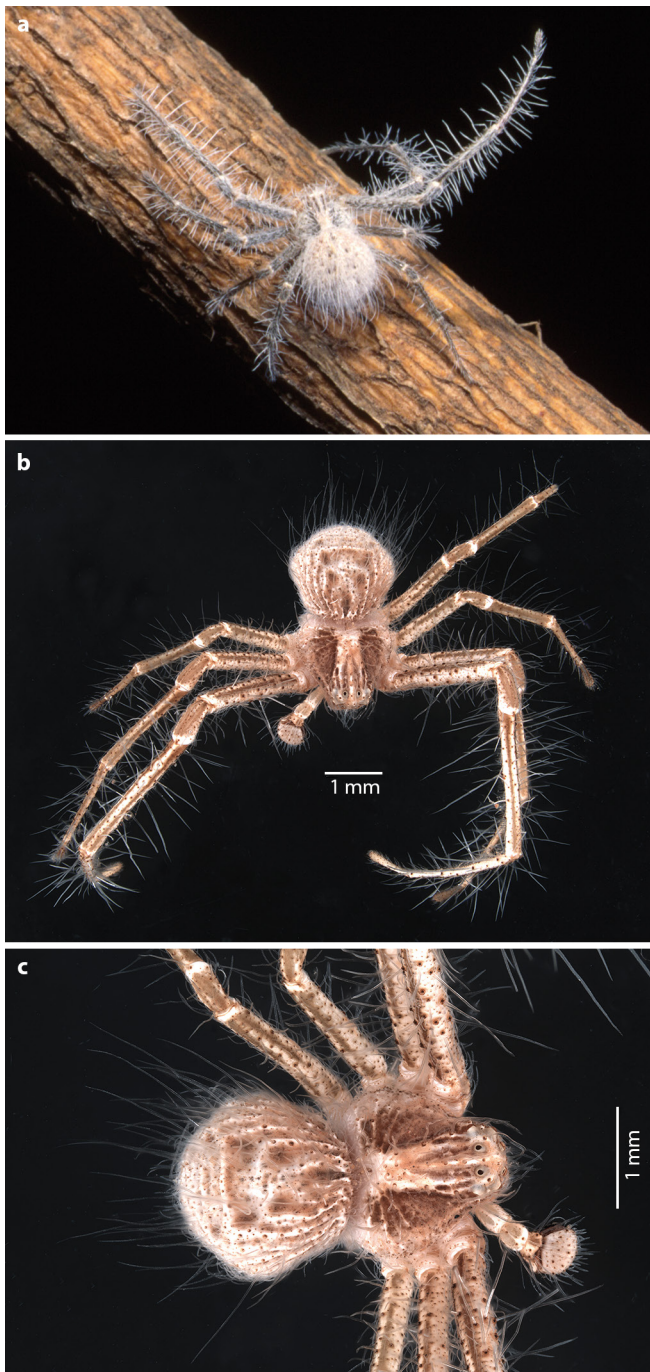


Fig. 1: Map of the island of Lanzarote showing the presence of *Heriaeus buffoni*. Red dots indicate samples from 2021 and the green dot with black core represents the potential observation in 1995, with a closer perspective of the sampling points within the municipality of Arrecife. The location of Lanzarote within the Canary Islands is marked with a red square in the inset (top left).



Further potential observations. Lanzarote: Femés (Yaiza), 28.9195°N/-13.7637°W, 22. Feb. 1995, 1 ex., P. Oromí obs. This specimen was not collected and thus, the identity at species-level cannot be determined with certainty.

Diagnosis. All examined specimens have a short and obtuse intermediate apophysis and their embolus tip is curved dorsally and pointed, thus fitting within the 'buffoni-group' after Loerbroks (1983). *Heriaeus buffoni* can be easily distinguished from *H. buffonopsis* Loerbroks, 1983 by having a larger, more massive embolus tip. *Heriaeus horridus* Tystshenko, 1965 (sub *H. sareptanus* in Loerbroks 1983) has an axe-shaped retrolateral apophysis with a step-shaped intermediate apophysis, whereas the retrolateral apophysis in *H. buffoni* is lanceolate with a strongly reduced intermediate apophysis.

Description. See Loerbroks (1983) and Levy (1985).

Distribution. Algeria, Egypt, Israel (Audouin 1826, Levy 1973, Loerbroks 1983), Turkey (Kulczyński 1903) and Morocco (Nentwig et al. 2022).

Habitat. All individuals were found in nitrophilous synanthropic shrubs near urban areas. The localities of Femés, Punta Chica and Argana are composed of nitrophilous shrubs such as *Caroxylon vermiculatum* (L.) Akhiani & Roalson, *Bassia tomentosa* (Lowe) Maire & Weiller and *Lycium intricatum* Boissier (phytocoenotic association Chenoleoideo tomentosae-Salsoletum vermiculatae) (del Arco Aguilar & Rodríguez Delgado 2018: 150). The locality of El Cable is a low scrub community settled on soils covered by a sand layer, both volcanic and organogenic, characterized by the presence of *Launaea arborescens* (Batt.) Murb., *Cenchrus ciliaris* L., *Heliotropium ramosissimum* (Lehm.) Sieber ex DC., *Lotus lancerottensis* Webb & Berthel., *Polycarpaea nivea* (Aiton) Webb and *Pleudia aegyptiaca* (L.) M. Will, N. Schmalz & Class.-Bockh. (phytocoenotic association Cenchrus ciliaris-Launaeetum arborescentis) (Arco Aguilar & Rodríguez Delgado 2018: 153).

Discussion

This record of *Heriaeus buffoni* from Lanzarote is not only the first report of the genus for the Canary Islands, but also for

Fig. 2: *Heriaeus buffoni*, habitus. **a.** living specimen of unknown stage, habitus (Photo P. Oromí); **b.** dorsal view, male (Photo T. Bauer); **c.** close-up of male, dorsal view (Photo T. Bauer)

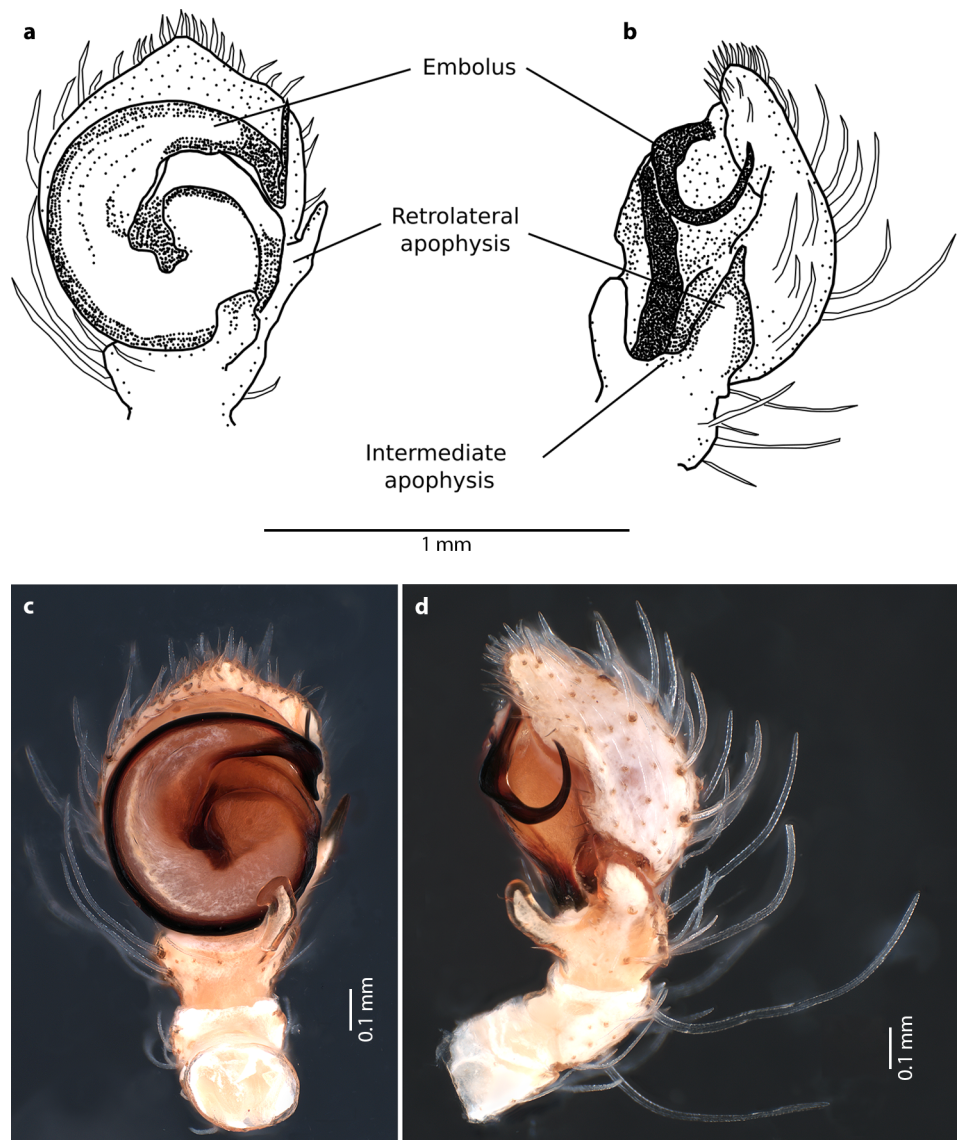


Fig. 3: *Heriaeus buffoni*, male pedipalp. **a.** drawing, ventral view; **b.** drawing, retrolateral view; **c.** photograph, ventral view; **d.** photograph, retrolateral view

any of the four Macaronesian archipelagos (Arechavaleta et al. 2005, 2010, Borges et al. 2008, 2010). The genus can be easily distinguished from any other thomisid genera currently known from Macaronesia by having the lateral eyes positioned on separate tubercles and by the densely haired body, usually covered with bristles (Levy 1985).

Heriaeus currently comprises 36 valid species inhabiting the Palearctic and Afrotropical regions (World Spider Catalog 2021). Loerbroks (1983) classified *Heriaeus* species into three main groups based on their copulatory organs, i.e. the ‘*birtus*’ (Western Palearctic including parts of North Africa), ‘*transvaalicus*’ (South Africa) and the ‘*buffoni*’-group (North Africa and Eastern Palearctic). Within the latter group, three species are currently known: *Heriaeus buffonopsis* Loerbroks, 1983 (Central Asia), *Heriaeus horridus* Tystshenko, 1965 (Russia and Central Asia) and *Heriaeus buffoni*. Regarding its ecology, Lubin et al. (2020) collected almost 300 individuals in four different locations of the central Negev Desert Highlands (Israel), a part of the Eurasian desert belt. In Israel there are also records from the Judean Desert (Levy 1985) and in Egypt it was collected in the region of Cairo (Loerbroks 1983), but without further clarification on habitat type. Specimens in Lanzarote were also collected in desert-like ecosystems, thus fitting the known habitat on the African mainland and in Israel.

In 1995 a single individual of *Heriaeus* was photographed on Lanzarote (see “results”), which suggests that the species has inhabited the Canaries for at least 26 years. However, this identification was not verified with genital characters and should be treated as a tentative observation at the species level. It was first observed in Femés, in the south of the island and recently it was collected in Arrecife, in the south-eastern part of Lanzarote. Among the collected material only males were found, thus suggesting that there is a potential sampling bias and that the potentially less active females should be collected with other methods. *Heriaeus buffoni* does occur in Morocco (Nentwig et al. 2022), which is relatively close to Lanzarote (approximately 140 km). Given the high dispersal ability of crab spiders via ballooning (Carvalho & Cardoso 2010), it is unlikely that this species has colonized the Canaries by human assistance. Instead, a potential explanation is that it has arrived recently or that it has been overlooked in past surveys. The fact that it has been collected on two localities separated by up to 20 km, may be an indication that it is more widespread along the island. The vegetation units where *H. buffoni* has been collected are characteristic for most areas of the southern and central landscape of Lanzarote, thus more sampling effort in those parts of the island might uncover additional, hitherto unknown populations of the species on

Lanzarote and help to determine its current distribution on the island.

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