zoosystema

2026 • 48 • 3

Revealing new species within a species complex of *Nemesia* Audouin, 1826 (Araneae, Mygalomorphae) trapdoor spiders from Andalusia (Spain)

Cristian PERTEGAL & Rafael MOLERO-BALTANÁS

art. 48 (3) — Published on 10 February 2025
www.zoosystema.com

PUBLICATIONS SCIENTIFIQUES

MUSÉUM NAL HIST NATURELLE

Couverture / *Cover* :
Habitus female of *Nemesia shenlongi* Pertegal, García, Molero-Baltanás & Knapp, 2022.

Zoosystema est indexé dans / Zoosystema *is indexed in:*
– Science Citation Index Expanded (SciSearch®)
– ISI Alerting Services®
– Current Contents® / Agriculture, Biology, and Environmental Sciences®
– Scopus®

Zoosystema est distribué en version électronique par / Zoosystema *is distributed electronically by:*
– BioOne® (http://www.bioone.org)

Les articles ainsi que les nouveautés nomenclaturales publiés dans *Zoosystema* sont référencés par / *Articles and nomenclatural novelties published in* Zoosystema *are referenced by:*
– ZooBank® (http://zoobank.org)

Zoosystema est une revue en flux continu publiée par les Publications scientifiques du Muséum, Paris / **Zoosystema** *is a fast track journal published by the Museum Science Press, Paris*

Les Publications scientifiques du Muséum publient aussi / *The Museum Science Press also publish:*
Adansonia, *Geodiversitas*, *Anthropozoologica*, *European Journal of Taxonomy*, *Naturae*, ***Cryptogamie*** **sous-sections** *Algologie*, *Bryologie*, *Mycologie*, *Comptes Rendus Palevol*.

Diffusion – Publications scientifiques Muséum national d'Histoire naturelle
CP 41 – 57 rue Cuvier F-75231 Paris cedex 05 (France)
Tél. : 33 (0)1 40 79 48 05 / Fax : 33 (0)1 40 79 38 40
diff.pub@mnhn.fr / https://sciencepress.mnhn.fr

ISSN (imprimé / *print*) : 1280-9551/ ISSN (électronique / *electronic*) : 1638-9387

Revealing new species within a species complex of *Nemesia* Audouin, 1826 (Araneae, Mygalomorphae) trapdoor spiders from Andalusia (Spain)

Cristian PERTEGAL
Departamento de Biodiversidad, Ecología y Evolución, Planta 10, Despacho 10, Facultad de CC Biológicas, Universidad Complutense de Madrid, C. de José Antonio Novais, 12, 28040, Madrid (Spain);
and Departamento de Ecología Evolutiva y de la Conducta. Estación Experimental de Zonas Áridas, Ctra. de Sacramento s/n, La Cañada de San Urbano, 04120, Almería (Spain);
and Departamento de Zoología, Universidad de Córdoba, Edificio C–1, Campus de Rabanales, 14071–Córdoba (Spain)
cristianpertegal@hotmail.es (corresponding author)

Rafael MOLERO-BALTANÁS
Departamento de Zoología, Universidad de Córdoba, Edificio C–1, Campus de Rabanales, 14071–Córdoba (Spain)

Submitted on 19 September 2024 | Accepted on 26 May 2025 | Published on 10 February 2026

urn:lsid:zoobank.org:pub:CB234767-236C-4BA5-B012-03B7CF35E651

Pertegal C. & Molero-Baltanás R. 2026. — Revealing new species within a species complex of *Nemesia* Audouin, 1826 (Araneae, Mygalomorphae) trapdoor spiders from Andalusia (Spain). *Zoosystema* 48 (3): 55-73. https://doi.org/10.5252/zoosystema2026v48a3. http://zoosystema.com/48/3

ABSTRACT
Four new species of the *Nemesia dorthesi* group, morphologically similar to *Nemesia shenlongi* Pertegal, García, Molero-Baltanás & Knapp, 2022 from Andalusia (Spain) are described based on various aspects such as morphology, burrow architecture, behaviour and habitus: *Nemesia eira* n. sp. from Cádiz province, *N. gajui* n. sp. from Córdoba municipality, *N. socohina* n. sp. from Guadalcázar, Córdoba, and *N. ripolli* n. sp. from Cártama, Málaga. In addition to the traditional diagnostic characters, this study discusses the dispersion ability, distribution, as well as the taxonomic status of the nominal species *N. ariasi* Simon, 1914 from Morocco and *N. macrocephala occidentalis* Frade & Bacelar, 1931 from Guadalajara and Valencia, Spain.

KEY WORDS
Biodiversity, burrows, Iberian Peninsula, Nemesiidae, new species.

RÉSUMÉ
Découverte de nouvelles espèces au sein d'un complexe d'espèces de Nemesia *Audouin, 1826 (Araneae, Mygalomorphae), araignées à trappe d'Andalousie (Espagne).*
Quatre nouvelles espèces du groupe *Nemesia dorthesi*, morphologiquement similaires à *Nemesia shenlongi* Pertegal, García, Molero-Baltanás & Knapp, 2022, d'Andalousie (Espagne), sont décrites sur la base de divers aspects tels que la morphologie, l'architecture des terriers, le comportement et l'habitus : *Nemesia eira* n. sp. de la province de Cadix, *N. gajui* n. sp. de la municipalité de Cordoue, *N. socohina* n. sp. de Guadalcázar, Cordoue, et *N. ripolli* n. sp. de Cártama, Málaga. Outre les caractères diagnostiques traditionnels, cette étude analyse la capacité de dispersion, la distribution, ainsi que le statut taxonomique des espèces nominales *N. ariasi* Simon, 1914 du Maroc et *N. macrocephala occidentalis* Frade & Bacelar, 1931 de Guadalajara et Valence, Espagne.

MOTS CLÉS
Biodiversité, terriers, péninsule ibérique, Nemesiidae, nouvelles espèces.

INTRODUCTION

Trapdoor spiders comprise numerous species from different families of mygalomorph spiders that inhabit burrows with a lid at the entrance (Moggridge 1873, 1874; Jocqué & Dippenaar-Schoeman 2006). This lid helps the spider stay safe from predators and to ambush potential prey (Buchli 1969).

The genus *Nemesia* Audouin, 1826 belongs to the family Nemesiidae Simon, 1892, and includes 79 accepted species (World Spider Catalog 2025), mainly distributed across the Mediterranean Basin (Decae 2012). This genus exhibits a remarkable diversity of burrow construction strategies, featuring unique trapdoor shapes and other burrow structures to avoid the attack of predators (Pertegal & Molero-Baltanás 2022; Pertegal *et al.* 2022; Pertegal & Rodriguez-Castilla 2024), such as those from parasitic wasps like pompilids (Calvo & Pagán 2022). Examples of these defense strategies include the internal opercula in the burrow of *N. eleanora* (O. Pickard-Cambridge, 1873), described by Moggridge (1874) as structures used to close a branch of the burrow, the plug of *N. fagei* (Frade & Bacelar, 1931) and the silk covering of the entrance of *N. amicitia* (Pertegal & Molero-Baltanas, 2022), which the spider collapses by pulling the silk from inside the burrow. On other hand, the morphology of *Nemesia* species is often highly conserved across different species, making taxonomic studies particularly challenging (Decae 2012; Pertegal & Rodríguez-Castilla 2024). Furthermore, most species are imprecisely defined and ambiguously described, with some known from only one sex or even a single specimen, likely due to their cryptic lifestyle. In some cases, the type material has been lost, further complicating identification.

Recently, some species groups have been proposed, primarily based on morphological characteristics and the presence or absence of dots (maculae) on the posterior lateral spinnerets, such as the *Nemesia maculatipes* group (Decae & Di Franco, 2005) and the *Nemesia appenninica* group (Decae, Pantini & Isaia, 2015). Among these, the *Nemesia dorthesi* group shares a general morphology: filiform posterior median spinnerets, bag-shaped spermathecae in females, and globose palpal bulbs in males (Zonstein 2019; Pertegal & Pinilla-Rosa 2023); and a common trapdoor type: thin and flexible lid; though the internal burrow structure varies among species (Calvo & Pagán 2022; Pertegal & Pinilla-Rosa 2023). This group comprises so far six species: *N. dorthesi* Thorell, 1875, *N. entinae* Calvo & Pagán, 2022, *N. hesperides* Pertegal & Pinilla-Rosa, 2023, *N. santeugenia* Decae, 2005, *N. santeulalia* Decae, 2005 and *N. shenlongi* Pertegal, Sánchez García, Molero-Baltanás & Knapp, 2022.

Currently, two types of palpal bulbs are distinguished in males of this species group. The first type features a wide proximal embolus, curved in the middle section, with a conical-shape tip. The second type has a cylindrical proximal and middle embolus section with a duck-billed tip (Fig. 1C). Species with the first bulb type include *N. dorthesi*, *N. entinae*, *N. hesperides* and *N. santeulalia*, while only *N. shenlongi* has the second type. Females of all species in the group generally share bag-shaped spermathecae with some variations in form, which can sometimes be subtle.

The present study focuses on describing four new species within the *N. dorthesi* group, closely related to *N. shenlongi*, because they have the aforementioned second palpal bulb type. Besides morphological description, it also provides insights into their behaviour and burrow structure. In particular, it examines burrow characteristics, which enhance the understanding of this group and aid in the challenging task of species identification.

MATERIAL AND METHODS

Specimens

Samples for this study were collected from different localities in the provinces of Cádiz, Córdoba and Málaga, in southern Spain (Fig. 2; Table 1). Different methods were used to obtain mature specimens. Females and immature individuals were captured by directly searching for their burrows. After rainfall, burrow entrances become more visible as the damp soil facilitates deeper digging by the spiders. Debris from burrow renovation accumulates near the entrance, making it easier to locate (Fig. 3). Males were mainly obtained using pitfall traps, while some immature specimens were kept in captivity until they reached maturity. Pitfall traps without preservation medium were installed near previously found females to capture live specimens for *in vivo* habitus photography.

Morphological study

All specimens were frozen and preserved in 70% alcohol, except for the left leg II of some specimens, which was preserved in 96% alcohol for future DNA analysis.

Morphological characters were examined following descriptions from previous literature (Luis de la Iglesia 2019; Pertegal *et al.* 2022; Calvo & Pagán 2022), focusing on well-preserved adult specimens. Females were dissected to observe and photograph their internal copulatory organs using microdissection scissors and a hypodermic needle. Measurements were taken in millimetres with Hayear 5130 and E3ISPM 20000 cameras coupled to a Euromex SB. 1903–P stereomicroscope. Microphotographs were generated using the stacking method with the Toupview software. Leg spination formula follows Pertegal *et al.* (2022): for each segment, the number of spines on the left side separated by a colon from the number of spines on the right, followed by the variability indicated in brackets.

Abbreviations

Collections

Coll. CPP	Collection Cristian Pertegal Pérez, Córdoba;
MNCN	Museo Nacional de Ciencias Naturales, Madrid;
UCO	Department of Zoology of Córdoba University, Córdoba.

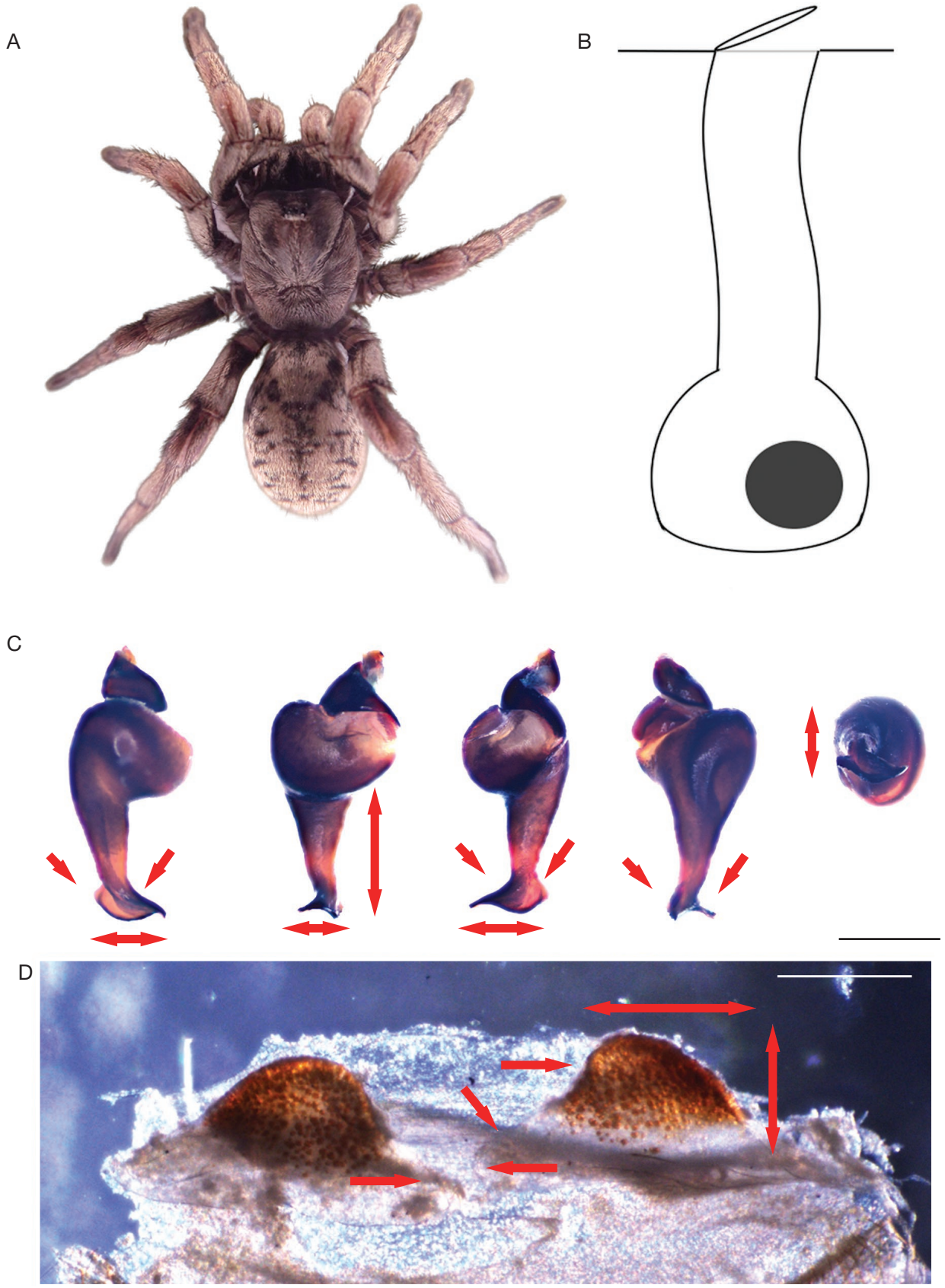

Fig. 1. — *Nemesia shenlongi* Pertegal, García, Molero-Baltanás & Knapp, 2022: **A**, alive female; **B**, burrow; **C**, retroventral, ventral, dorsal, retrodorsal and frontal aspects of bulb; **D**, spermathecae. **Arrows** indicate the areas with differences in shape and proportions in copulatory organs. Scale bars: A, 5 mm; C, D, 0.5 mm.

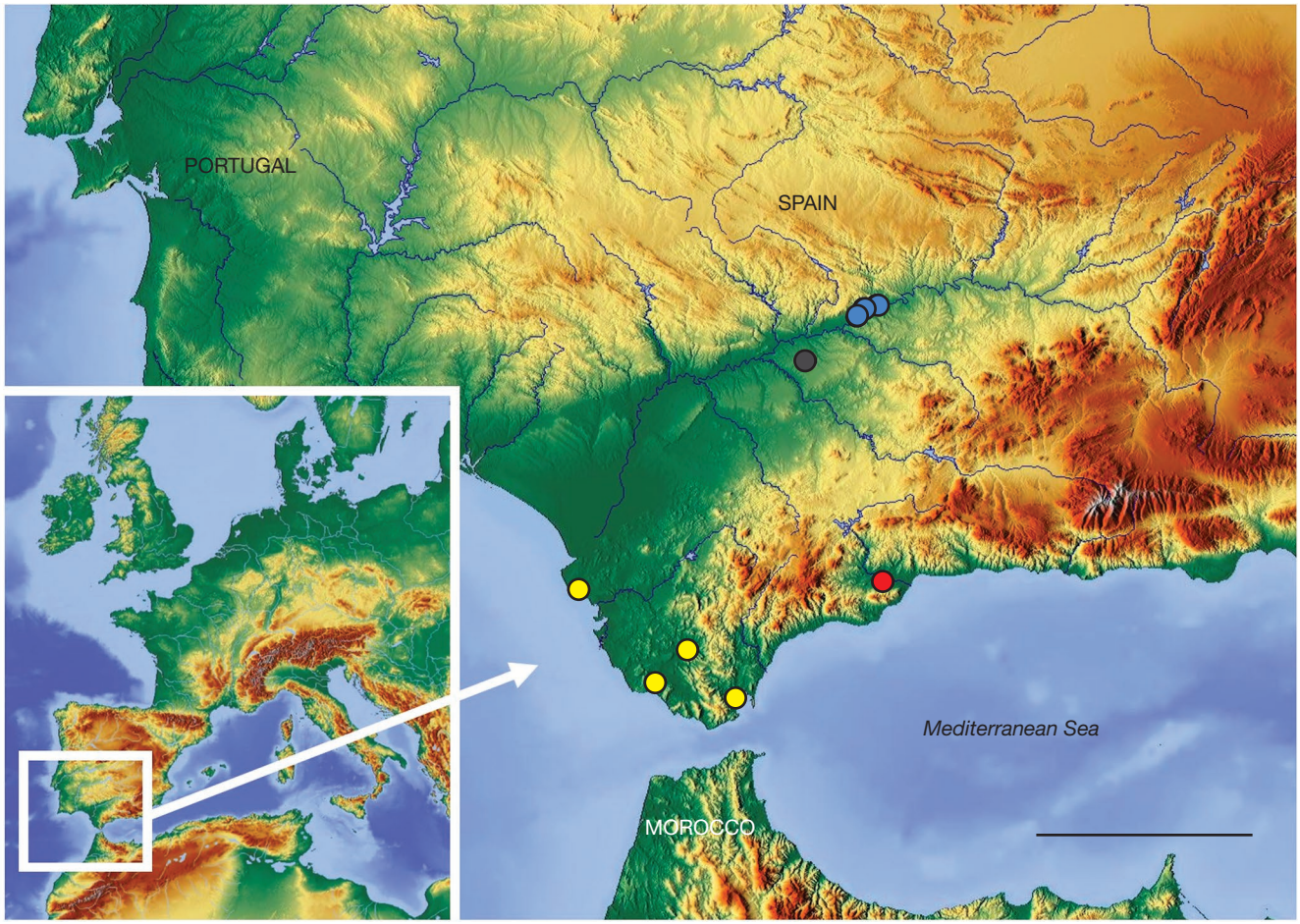

FIG. 2. — Map of Europe and the western part of Andalusia showing the locations where specimens of *Nemesia* studied for this work were collected. **Yellow dots** correspond to samples in Cádiz province, **red dot** to samples from Málaga, **black dot** to Guadalcázar (Córdoba province), and **blue dots** to diverse localities around Córdoba city.

TABLE 1. — Locations.

Dot colour	Location	Province	Long, Lat	Altitud (m)
Yellow	Cañada de los Ratones, Alcalá de los Gazules	Cádiz	36°24'5"N, 5°44'14"W	53
Yellow	Pinar del Rey, San Roque	Cádiz	36°15'0"N, 5°23'39"W	54
Yellow	La Muela, Conil de la Frontera	Cádiz	36°16'4"N, 6°0'59"W	111
Yellow	Aguadulce, Rota	Cádiz	36°40'3"N, 6°24'11"W	7
Gold	Alcolea	Córdoba	37°56'37"N, 4°41'37"W	172
Gold	El Patriarca, Córdoba	Córdoba	37°54'30"N, 4°48'34"W	198
Gold	Cortijo el Alcaide, Córdoba	Córdoba	37°51'9"N, 4°49'26"W	78
Dark grey	Guadalcázar	Córdoba	37°44'2"N, 4°57'32"W	170
Grey	Parque Arroyo, Cártama	Málaga	36°42'12"N, 4°42'27"W	126

Morphology

AER anterior eye row, width;
ALE largest diameter of anterior lateral eye;
AME largest diameter of anterior median eye;
BL body, length;
Bu bulb, length;
Ca caput, length;
Ch caput, height;
CL carapace, length;
Cly clypeus, length;
CW carapace, width;
Cy cymbium, length;
El eye length;
Em embolus, length;
Ew1 embolus width 1;
Ew2 embolus width 2;

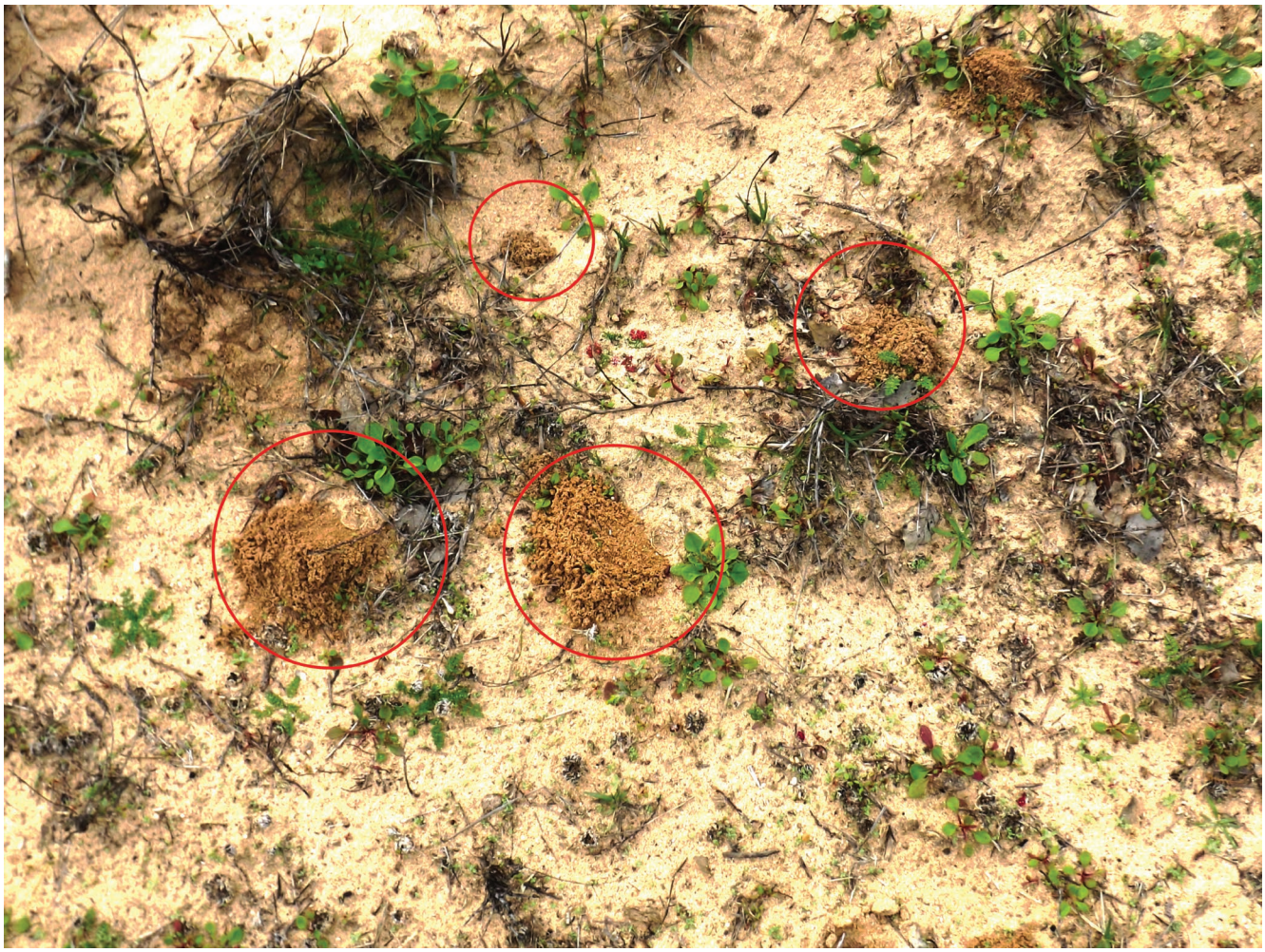

FIG. 3. — Debris accumulations around the entrance of burrows.

Ew3	embolus width 3;
Fe	femur, length;
Ll	labium, length;
Lw	labium, width;
Me	metatarsus, length;
Ml	maxillae, length;
MTF4 ratio	relative lengths of metatarsus, tibia and femur of leg IV;
Mw	maxillae, width;
Pa	patella, length;
PER	posterior eye row, width;
PLE	largest diameter of posterior lateral eye;
PLS	posterior lateral spinnerets;
PME	largest diameter of posterior median eye;
PMS	posterior median spinnerets.
POP	pattern of the deep black pigmentation on the ocular process;
PSP	prolateral spines of patella;
RSP	retrolateral spines of patella;
Sl	sternum, length;
Sw	sternum, width;
Ta	tarsus, length;
Th	thorax, height;
Ti	tibia, length;
Tiw	tibia of the palp, width.

RESULTS

Family NEMESIIDAE Simon, 1892
Genus *Nemesia* Audouin, 1826

Nemesia eira n. sp.
(Figs 4A; 5A; 6A, B; 7A, B; 8A, C)

urn:lsid:zoobank.org:act:6A71B871-850B-4EB4-993D-33295DE34830

TYPE MATERIAL. — **Holotype. Spain** • ♂; La Cañada de Los Ratones, Alcalá de los Gazules, Cádiz; 36°24'5"N, 5°44'14"W; Alt.: 53 m; 9.X.2019; MNCN 20.02/41854.
Paratypes. Spain •, ♀; La Cañada de Los Ratones, Alcalá de los Gazules; Cádiz; 36°24'5"N, 5°44'14"W; Alt.: 53 m; 23.XI.2019; UCO–052b • ♀; La Cañada de Los Ratones, Alcalá de los Gazules, Cádiz; 36°24'5"N, 5°44'14"W; Alt.: 53 m; 30.IV.2018; MNCN 20.02/41855 • ♀; La Cañada de Los Ratones, Alcalá de los Gazules, Cádiz; 36°24'5"N, 5°44'14"W; Alt.: 53 m; 3.XI.2018; UCO–033b • ♀; La Cañada de Los Ratones, Alcalá de los Gazules, Cádiz; 36°24'5"N, 5°44'14"W; Alt.: 53 m; 20.IV.2019; UCO–075d.

ADDITIONAL MATERIAL EXAMINED. — **Spain** • ♂; La Cañada de Los Ratones, Alcalá de los Gazules, Cádiz; 36°24'5"N, 5°44'14"W; Alt.: 53 m; 23.IX.2019; Coll. CPP-0001 • ♀; La Cañada de Los Ratones, Alcalá de los Gazules, Cádiz; 36°24'5"N, 5°44'14"W; Alt.: 53 m; 19.X.2019; Coll. CPP-0003• ♀; La Cañada de Los Ratones, Alcalá de los Gazules, Cádiz; 36°24'5"N, 5°44'14"W; Alt.: 53 m; 23.I.2022; Coll. CPP-0195 • ♀; Pinar del Rey, San Roque, Cádiz; 36°15'0"N, 5°23'39"W; Alt.: 54 m; XII.2018; Coll. CPP-0010 • ♀; Pinar del Rey, San Roque, Cádiz; 36°15'0"N, 5°23'39"W; Alt.: 54 m; 15.XII.2019; Coll. CPP-0006 • ♀; Pinar del Rey, San Roque, Cádiz; 36°15'0"N, 5°23'39"W; Alt.: 54 m; 15.XII.2019; Coll. CPP-0007 • ♀; Conil de la Frontera, Cádiz; 36°16'10"N, 6°0'45"W; Alt.: 111 m; 11.XII.2021; Coll. CPP-0193 • ♂; Aguadulce, Rota, Cádiz; 36°40'3"N, 6°24'11"W; Alt.: 7 m; 24.X.2023; Coll. CPP-0531.

ETYMOLOGY. — "*eira*" is a noun in apposition and corresponds to the acronym formed by the initials of the full name of Ester Irene Reina Alfonso. This species is named in her honour, in recognition of her wholehearted companionship to the first author.

DIAGNOSIS. — The palpal bulbs of males resemble those of *N. shenlongi*, although the tip is proportionally thinner and more elongated (Fig. 4A). Females of *N. eira* n. sp. have larger spermathecal receptacles than those of *N. shenlongi*, with a narrower distance between the spermathecae (Fig. 5A). The *in vivo* colour of females and immature specimens of *N. eira* n. sp. is yellowish orange, characterised by a distinctive dark mark between the posterior edge of carapace and the fovea (Fig. 6A; 7A). Males are orange to slightly greyish, displaying the same mark on the prosoma (Fig. 7B). Additionally, the shape of sternal sigillae differs between these species: in *N. shenlongi* they are circular (Pertegal *et al.* 2022. Fig. 4C), whereas in *N. eira* n. sp., they are ovoid (Fig. 6B). The distinctive colouration and markings on the carapace are characteristic in *N. eira* n. sp., enabling its differentiation from both the previously described species and those presented below. *Nemesia eira* n. sp. shares its distribution in some areas with *N. amicitia* (Pertegal & Molero-Baltanás, 2022), which can be distinguished from the new species by its compact, spherical bulbs with a curved and narrowed embolus in males, and by the funnel-shaped spermathecae with slightly curved tubes in females. *Nemesia amicitia* is smaller and darker in colour than *N. eira* n. sp., and their trapdoor types also differ. *Nemesia amicitia* constructs a rigid, horizontal wafer-type trapdoor that rests against the inner edge of a curb made of particles and silk surrounding the entrance, whereas the trapdoor built by *N. eira* n. sp. consists of a thin and flexible lid.

DESCRIPTION

Holotype: MNCN 20.02/41854 Male

General appearance. Brownish-orange prosoma with dark mark on the posterior area. Opisthosoma orange with slightly dark cardiac mark (Fig. 7B).

Prosoma. Dark clypeus with five bristles and white pubescence. POP black, connecting all eyes. Caput low. Crest zone orange with seven short bristles. Shallow fovea. Chelicerae dark brown with whitish pubescence. Cheliceral rastellum with six strong bristles (sometimes seven or eight). Fang ridge smooth. Cheliceral furrow teeth with six marginal denticles. Sternum yellowish with poorly visible ovoid sigillae; the first two pairs of sigillae marginal, the third pair submarginal. Maxillae yellowish with two to three spiny cuspules, but other males with four. Labium and coxae yellow.

Palp and legs I-IV. Cymbium dorsal patch with 20-23 spines on the holotype. Bulb globular, embolus with elongated duckbill-shaped end (Fig. 3A). Palp tibia ratio 2.33±0.18. Apical dorsal patch of tibia of palp with nine spines. Clasper hook slightly curved. Clasper field with scopula. Metatarsus I slightly curved. Femora of palp and legs brownish, remaining segments yellow. Scopula from the distal zone of tibiae to tarsi on legs I and II and only on the tarsi on the posterior pair of legs. MTF4 ratio: tibia > metatarsus > femur.

Spines, Palp. Cy= 23:20 (16-17:18-19), Pach= 9:9 (12-15:10-13); prolateral side, Pa: 2:2 (1:1); Leg I: prolateral side, Pa= 2:2, Ti= 4:3 (3:3), Met= 3:2 (1-3:2-3); retrolateral side, Pa= 1:1, Ti= 3:3, Met= 3:2 (1:2); Leg II: prolateral side, Pa= 2:2, Tib= 4:3, Met= 3:3; retrolateral side, Pa= 1:1 (0:0), Tib= 3:3 (2:3), Met= 3:2 (3:3); Leg III: prolateral side, Pat= 2:2, Tib= 3:4 (4:3), Met= 3:3; retrolateral side, Pa= 1:1, Tib= 3:3, Met= 3:3; Leg IV, prolateral side, Pa= 3:3 (2:2); Tib= 6.8 (5-6:6-7); Met= 3.4 (4:3); retrolateral side, Pat= 1:1; Tib= 4.4; Met= 5.5 (4-6:4).

Opisthosoma. Epiandrous fusillae: 49; sub-pentagonal epiandric area: 0.82 mm²; density: 59.76 epiandrous fusillae/mm². Other males, epiandrous fusillae: 45±3; epiandric area: 0.65±0.14 mm²; density: 70.82±9.83 epiandrous fusillae/mm². Spinnerets: PLS: proximal segment as long as middle and distal segments together. PMS cone-shaped.

Measurements (n = 3). Bl= 16.85 (10.12-16.85); Prosoma. Ca= 4.47 (3.96-4.47); CL= 7.63 (6.8-7.63); CW= 5.91 (5.49-5.91); Ch= 1.99 (1.59-2.32); Th= 1.52 (1.23-2.2); Cly2= 0.21 (0.11-0.21); AER= 1.1 (1.05-1.13); PER= 1.18 (1.13-1.19); ALE= 0.32 (0.29-0.32); PLE= 0.29 (0.24-0.29); AME= 0.24 (0.2-0.33); PME= 0.24 (0.23-0.24); l= 0.58 (0.58-0.63); mal= 2.07 (2.07-2.11); maw= 1.09 (1.09-1.21); lal= 0.61 (0.57-0.61); law= 1.02 (0.81-1.02); stl= 3.6 (3.23-3.6); stw= 2.87 (2.57-2.87); Palp: E1= 0.6 (0.52-0.6); E2= 0.2 (0.17-0.2); E3= 0.51 (0.39-0.51); Bu= 1.68 (1.54-1.68); Em= 0.76 (0.76-0.83); Tiw= 1.37 (1.11-1.37); Cyl= 1.37 (1.28-1.42); Til= 2.93 (2.63-2.93); Pal= 1.81 (1.65-1.82); Fel= 3.64 (3.05-3.64); TOTAL= 9.75 (8.61-9.75); Leg I: Tal= 3.15 (3.15-3.32); Mel= 4.57 (4.07-4.57); Til= 4.21 (4.13-4.21); Pal= 3.79 (3.19-3.79); Fel= 6.33 (5.47-6.33); TOTAL= 22.05 (20.18-22.05); Leg II: Tal= 2.81 (2.78-2.81); Mel= 4.18 (4.01-4.18); Til= 3.78 (3.78-3.97); Pal= 3.36 (2.93-3.36); Fel= 5.92 (5.31-5.92); TOTAL= 20.05 (19.02-20.05); Leg III: Tal= 3.28 (2.95-3.28); Mel= 4.81 (4.76-4.97); Til= 3.76 (3.41-3.76); Pal= 2.72 (2.39-2.72); Fel= 5.16 (4.3-5.16); TOTAL= 19.73 (17.86-19.73); Leg IV: Tal= 3.31 (3.16-3.31); Mel= 7.02 (6.54-7.02); Til= 7.15 (6.66-7.15); Pal= 3.81 (3.21-3.81); Fel= 6.6 (5.78-6.6); TOTAL= 27.89 (25.46-27.89).

Paratype: MNCN 20.02/41855 Female

General appearance. Orange prosoma with dark mark between fovea and posterior area. Opisthosoma greyish-orange with slightly dark cardiac mark and four chevrons (Fig. 7A).

Prosoma. Dark clypeus with five bristles. POP in three groups covering lateral and middle eyes (Fig. 6A). Caput slightly elevated. Crest zone orange with seven bristles. Shallow fovea.

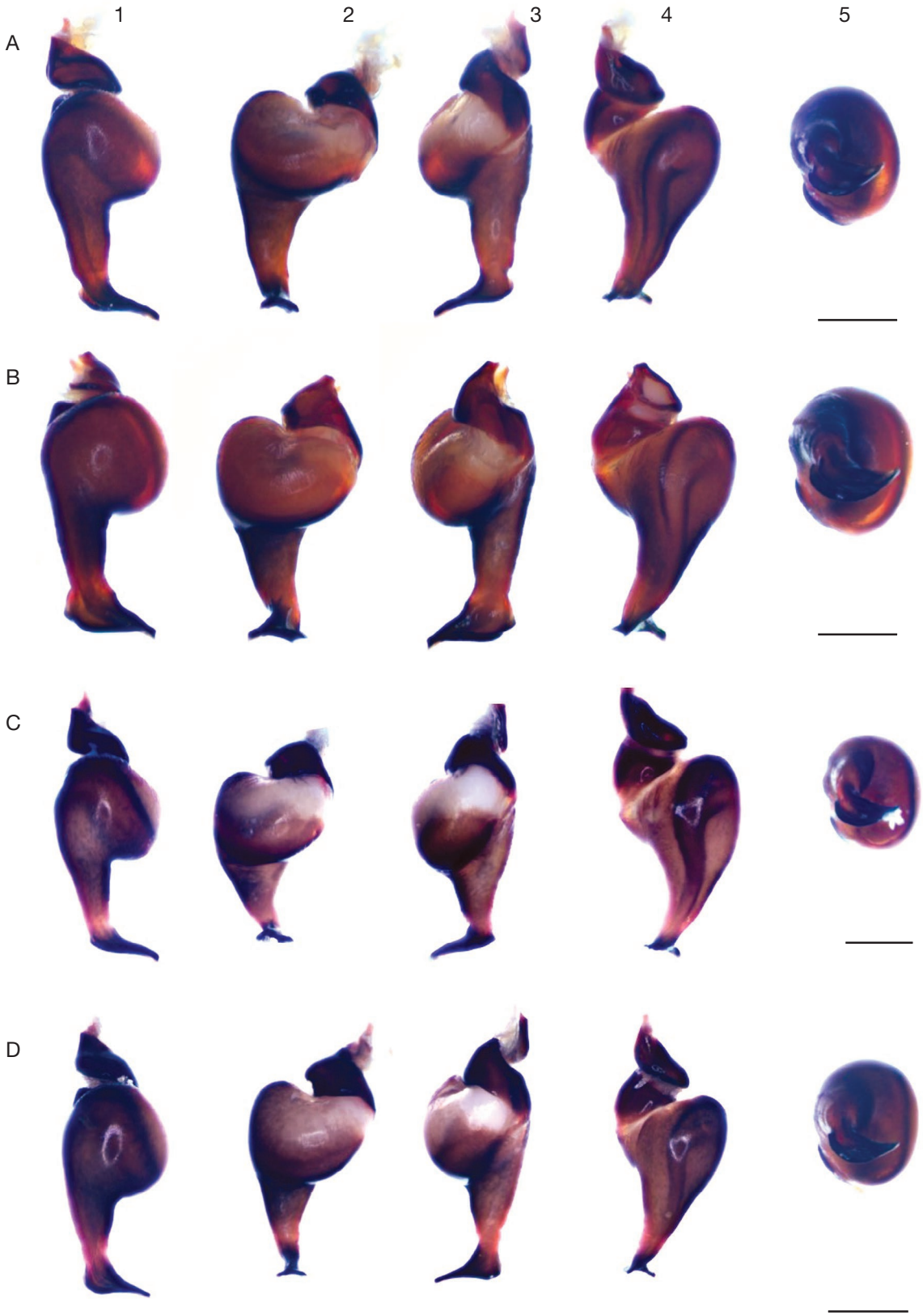

Fig. 4. — Bulbs of the four different species described in this work: **A**, *Nemesia eira* n. sp.; **B**, *Nemesia gajui* n. sp.; **C**, *Nemesia socohina* n. sp.; **D**, *Nemesia ripolli* n. sp.; in retroventral (**1**), ventral (**2**), dorsal (**3**), retrodorsal (**4**) and frontal (**5**) views. Scale bars: 0.5 mm.

Chelicerae dark brown (Fig. 6A). Cheliceral rastellum with six strong bristles (sometimes seven or eight). Fang ridge smooth. Cheliceral furrow teeth with seven to nine marginal denticles. Sternum yellowish with brown ovoid sigillae arranged as in holotype (Fig. 6B). Maxillae yellowish with six finger-shaped cuspules,7-12 in other specimens. Labium and coxae yellow (Fig. 6B).

Palp and legs I-IV. Yellow with tarsi and metatarsi darkened by scopulae. MTF4 ratio: tibia > femur > metatarsus, usually tibia > metatarsus > femur.

Spines, Palp. Prolateral side, Pat= 2:2, Tib= 4:3 (2:2); retrolateral side, Tib= 1:1 (2:1); Leg I: prolateral side, Pa= 2:3, Tib: 3:3 (2:2); Leg II: prolateral side, Pa= 2:2, Tib= 3:3 (1-2:2), Met= 1:1 (2:1); Leg III: prolateral side, Pa= 2:1 (2:1), Tib= 2:2 (2:3), Met= 3:3 (2:2); retrolateral side, Tib= 2:4 (2-3:2-3), Met= 3:4 (3:3); Leg IV: prolateral side, Met= 2:2 (1:2); retrolateral side, Tib= 2:2 (2:3), Met= 3:3 (2:3).

Opisthosoma. Spinnerets: PLS: proximal segment as long as middle and distal segments together. Maculae absent. PMS: digitiform. Spermatheca: elongated, bag-shaped, with receptacles close together at their bases (Fig. 4A).

Measurements (n = 10). Bl= 19.58 (16.37-19.58); Prosoma. Ca= 5.59 (4.53-5.59); CL= 9.62 (7.19-9.62); CW= 7.11 (5.8-7.36); Ch= 3.45 (2.4-3.45); Th= 2.19 (1.19-2.2); Cly2= 0.26 (0.26-0.4); AER= 1.4 (1.17-1.53); PER= 1.54 (1.26-1.62); ALE= 0.36 (0-0.4); PLE= 0.39 (0.31-0.44); AME= 0.23 (0.18-0.23); PME= 0.24 (0.11-1.56); l= 0.66 (0.63-0.75); mal= 3.15 (2.62-3.19); maw= 1.81 (1.47-1.85); lal= 0.86 (0.73-1.02); law= 1.58 (1.29-1.7); stl= 4.77 (3.81-4.77); stw= 3.45 (0.53-4); Palp: Tal= 2.91 (2.49-3.09); Til= 2.93 (2.77-3.22); Pal= 2.53 (2.23-2.78); Fel= 4.66 (4.02-5.13); TOTAL= 13.03 (11.75-13.89); Leg I: Tal= 2.17 (1.77-2.47); Mel= 3.16 (2.97-3.74); Til= 3.84 (3.75-4.42); Pal= 4.12 (3.55-4.44); Fel= 6.67 (5.32-6.84); TOTAL= 19.96 (17.88-21.38); Leg II: Tal= 2.16 (1.69-2.16); Mel= 2.72 (2.52-3.67); Til= 3.64 (3.05-3.99); Pal= 3.52 (3.24-3.94); Fel= 5.73 (4.94-6.02); TOTAL= 17.77 (15.79-19.4); Leg III: Tal= 2.18 (1.77-2.59); Mel= 3.55 (2.81-3.71); Til= 2.95 (2.47-3.02); Pal= 3.1 (2.51-3.23); Fel= 4.75 (3.77-4.96); TOTAL= 16.53 (13.77-16.95); Leg IV: Tal= 2.98 (2.06-2.98); Mel= 5.28 (4.36-5.7); Til= 7.1 (6.28-7.25); Pal= 4.6 (3.61-4.75); Fel= 6.18 (5.53-6.42); TOTAL= 26.14 (22.79-26.52).

Intraspecific variations

It is occasionally possible to find some specimens exhibiting a slightly pinkish or greyish hue, with a darker cardiac mark and some lines on opisthosoma.

Natural History

Nemesia eira n. sp. was found in two distinct humid lowlands areas of Cádiz province. The first is a mixed forest in Pinar del Rey, San Roque, comprising cork trees, wild olive trees, pines, and various shrub species growing on sandy soil. This habitat is shared with other mygalomorph spiders, such as *N. amicitia*, other *Nemesia* species, *Iberesia* Decae & Cardoso, 2006, *Ummidia* Thorell, 1875, *Macrothele calpeina* (Walckenaer, 1805) and *Ischnocolus valentinus* (Dufour, 1820). The second is a humid "dehesa" ecosystem, characterised by mastic trees, holm oaks, cork oaks, wild olive trees, and herbaceous cover on a mixed clay and sandstone soil. This habitat hosts all the aforementioned spider species except *I. valentinus* and *N. amicitia*.

Burrows of *N. eira* n. sp. were found on flat or gently sloping soils, usually with a depth of 20 –25 cm, although some burrows as deep as 40 cm were found. The spiders build a blind-ending branch approximately 4 cm from the entrance, with both the entrance and the branch covered with silk (Fig. 8A, C). When disturbed, the spider collapses the entrance like an inverted sock by pulling on the silk covering the first section of the burrow.

Mature males are active in October and leave their burrows before heavy rainfall in search of females for mating. Females make an egg sac and deposit it at the end of the burrow, where approximately 40 offspring hatch. Once the offsprings have grown sufficiently, they leave the protection of the mother after rainfall and dig their own burrow a few centimetres from the entrance of the maternal burrow.

The population in Pinar del Rey was observed in the wild on multiple nights between summers of 2020 and 2021. These spiders can actively hunt during the deepest hour of the nights. Specimens have been seen running into their burrow with prey, only to reappear within one or two minutes, positioning themselves at the entrance, ready to catch more. This behaviour could suggest that the spiders hunt as much as possible during the night, accumulate their prey inside their burrows, and feed on what they have captured in the last night throughout the day. It also differs from that observed in *N. amicitia* specimens in Pinar del Rey, which capture a single prey and hide, after which they are not seen again for the remainder night.

Nemesia gajui n. sp.
(Figs 4B; 5B; 6C, D; 7C, D; 8D)

urn:lsid:zoobank.org:act:5005DA12-6D4A-4E4B-808C-663824636C4E

Type material. — **Holotype. Spain** • ♂; Cortijo el Alcaide, Córdoba; 37°51'9"N, 4°49'26"W; Alt.: 78 m; 23.XI.2022; MNCN 20.02/41856. **Paratype. Spain** • ♀; Cortijo el Alcaide, Córdoba; 37°51'9"N, 4°49'26"W; Alt.: 78 m; 22.XI.2020; MNCN 20.02/41857.

Additional material examined. — **Spain** • ♀; Alcolea, Córdoba; 37.943846, -4.693745; Alt.: 172 m; 27.III.2022; Coll. CPP-0208 • ♀; Alcolea, Córdoba; 37°56'37"N, 4°41'37"W; Alt.: 172 m; 27.III.2022; Coll. CPP-0293 • ♀; Cortijo el Alcaide, Córdoba; 37°51'9"N, 4°49'26"W; Alt.: 78 m; 5.IV.2022; Coll. CPP-0205 • ♀; Cortijo el Alcaide, Córdoba; 37°51'9"N, 4°49'26"W; Alt.: 78 m; 05.IV.2022; Coll. CPP-0302 • ♂; Cortijo el Alcaide, Córdoba; 37°51'9"N, 4°49'26"W; Alt.: 78 m; 19.XI.2022; Coll. CPP-0357 • ♂; Cortijo el Alcaide, Córdoba; 37°51'9"N, 4°49'26"W; Alt.: 78 m; 9.XI.2022; Coll. CPP-0356 • ♂; Cortijo el Alcaide, Córdoba; 37°51'9"N, 4°49'26"W; Alt.: 78 m; 19.XI.2022; Coll. CPP-0358.

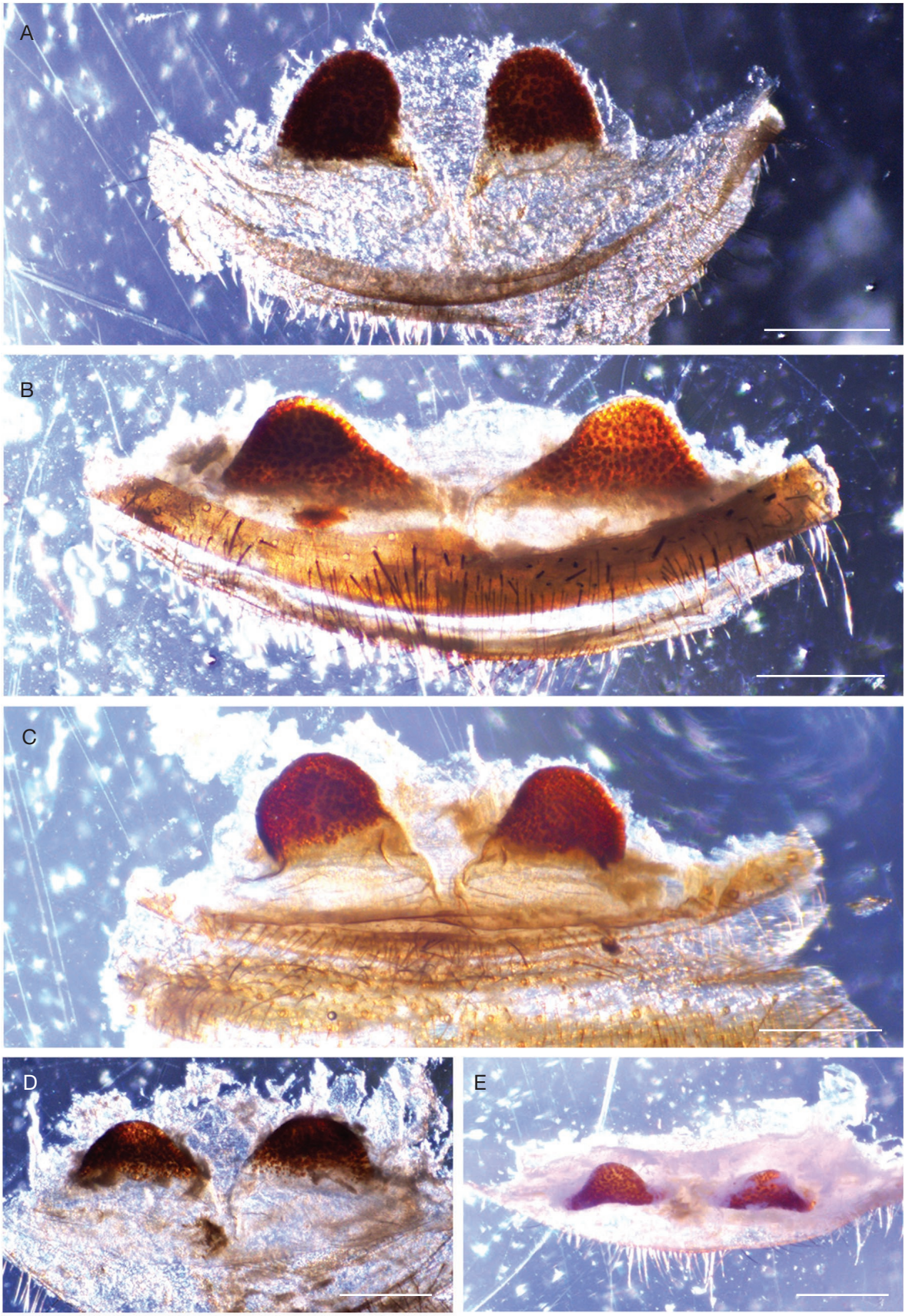

FIG. 5. — Spermathecae, in ventral view of the four different species described in this work: **A**, *Nemesia eira* n. sp.; **B**, *Nemesia gajui* n. sp.; **C**, *Nemesia socohina* n. sp.; **D**, *Nemesia ripolli* n. sp.; **E**, *Nemesia ripolli* n. sp. frontal view. Scale bars: 0.5 mm.

ETYMOLOGY. — The name of this species is in honour of Dr Miquel Gaju, Professor of Zoology in the University of Córdoba and mentor of both authors of the present work.

DIAGNOSIS. — Bulb of *N. gajui* n. sp. is slightly wider than that of *N. shenlongi* and *N. eira* n. sp. The tip of the embolus differs among the three species: in *N. gajui* n. sp. it is wider and somewhat straight, with a small arrowhead-like tip (Fig. 4B1); in *N. shenlongi*, it has an intermediate width and is curved, resembling a curved nail at the tip (Fig. 1C1), whereas in *N. eira* n. sp, the end of the embolus is more elongated, with a blunt tip (Fig. 4A1). The spermathecae of *N. gajui* n. sp. resemble those of *N. shenlongi*, but the ends of the receptacles diverge in *N. gajui* n. sp. (Fig. 5B). The third pair of sternum sigillae in *N. gajui* n. sp. are elongated and brown (Fig. 6B), in contrast to those of *N. eira* n. sp, which are orange and ovoid.

DESCRIPTION

Holotype: MNCN 20.02/41856 Male

General appearance. Cream colour when alive with dark medal-shaped mark on middle of prosoma and dark dots on opisthosoma. In alcohol, brownish prosoma with whitish pubescence and opisthosoma brown with undefined dorsal cardiac mark and four to five chevrons (Fig. 7C).

Prosoma. Clypeus with transversal light brown line, five bristles, and white pubescence. POP black, covering all eyes. Caput low. Crest zone brownish with eight short bristles. Chelicerae dark brown with two dorsal stripes of whitish pubescence. Cheliceral rastellum with five strong bristles (sometimes four). Fang ridge smooth. Cheliceral furrow teeth with six marginal denticles. Sternum brown with elongated dark brown or black sigillae, first two pairs of sigillae marginal, and third pair submarginal. Maxillae same colour as sigillae with three to six cuspules other males with four to seven. Labium and coxae dark brown or black.

Palp and legs I-IV. Cymbium dorsal patch with 14-17 spines. Bulb globular, embolus with wide duckbill-shaped end (Fig. 4B). Palp tibia ratio 2.09±0.14. Apical dorsal patch of tibia of palp with 12-15 spines. Clasper hook slightly curved. Clasper field with scopula. Metatarsus I curved. Femora of palp and legs dark brown, remaining segments brown. Retrolateral maculae on femora and patellae of anterior legs, prolateral side of femora of posterior legs. Scopula on all ventral sides of first two pairs of legs. MTF4 ratio: tibia > femur > metatarsus, but in two specimens, tibia > metatarsus > femur.

Spines, Palp. Cym= 14:17 (12-18:14-16-17), Patch= 12:15 (11-13-17:10-13-16); prolateral side, Pa= 1:1, Ti= 0:0 (1:1); Leg I: prolateral side, Pa= 2:2, Ti= 3:3 (4:3), Met= 3:3 (2:2); retrolateral side, Pa= 1:1 (12), Ti= 3:3, Met= 3:2 (2:2-3); Leg II: prolateral side, Pa= 2:2, Ti= 3:3, Met= 3:3; retrolateral side, Pa= 1:1 (0:1), Ti= 3:3, Met= 2:2 (3:3); Leg III: prolateral side, Pa= 2:2, Ti= 4:4 (3:3), Met= 3:3; retrolateral side, Pa= 1:1 (2-3:2), Ti= 3:3 (4-6-7:4-5-6-7), Met= 3:3; Leg IV: prolateral side, Pa= 2:2 (1:1), Ti= 6:5 (5:5), Met= 3:3 retrolateral side, Pa= 1:1 (0:1), Ti= 5:5 (3-4:3), Met= 3:3.

Opisthosoma. Epiandrous fusillae: 56 rectangular; epiandrous area: 0.77 mm^2; density: 75.61 epiandrous fusillae/mm^2. In remaining males, epiandrous fusillae: 50±9; epiandrous area: 0.66±0.09 mm^2; density: 75.61±13.35 epiandrous fusillae/mm^2. Spinnerets: PLS: proximal segment as long as middle and distal segments together. PMS cone-shaped.

Measurements (n = 4). Bl= 15.67 (12.91-16.29); Prosoma. Ca= 4 (3.73-4.22); CL= 6.89 (5.99-6.89); CW= 5.53 (5.36-5.84); Ch= 2.21 (1.93-2.47); Th= 1.84 (1.37-2.15); Cly= 0.2 (0.14-0.2); AER= 1.11 (1.11-1.2); PER= 1.27 (1.26-1.29); ALE= 0.28 (0.27-0.32); PLE= 0.27 (0.25-0.28); AME= 0.2 (0.19-0.22); PME= 0.19 (0.16-0.2); w= 0.62 (0.58-0.62); mal= 2.29 (2.15-2.38); maw= 1.25 (1.16-1.39); lal= 0.57 (0.57-0.71); law= 1.24 (1.1-1.26); stl= 3.33 (3.21-3.55); stw= 2.67 (2.52-2.71); Palp: E1= 0.57 (0.54-0.59); E2= 0.21 (0.2-0.23); E3= 0.47 (0.42-0.47); Bu= 1.44 (1.44-1.62); Em= 0.72 (0.72-0.81); Se= 2.21 (1.93-2.21); Tiw= 1.22 (1.22-1.5); Cyl= 1.31 (1.24-1.47); Til= 2.7 (2.7-2.92); Pal= 1.9 (1.78-2); Fel= 3.67 (3.52-3.75); TOTAL= 9.58 (9.51-9.99); Leg I: TiIw= 1.41 (1.24-1.52); Tal= 2.42 (2.42-2.69); Mel= 3.8 (3.4-3.94); Til= 3.93 (3.64-3.93); Pal= 3.09 (2.75-3.46); Fel= 5.18 (4.66-5.98); TOTAL= 18.42 (14.45-19.73); Leg II: Tal= 2.34 (2.32-2.42); Mel= 3.65 (3.47-3.88); Til= 3.58 (3.38-3.65); Pal= 2.83 (2.79-2.97); Fel= 5.13 (5.13-5.61); TOTAL= 17.53 (17.16-18.52); Leg III: Tal= 2.48 (2.48-2.81); Mel= 4.3 (4.18-4.54); Til= 3.16 (3.01-3.32); Pal= 2.34 (1.87-2.6); Fel= 4.43 (3.92-4.71); TOTAL= 16.71 (15.57-17.89); Leg IV: Tal= 2.77 (2.77-2.98); Mel= 5.5 (5.33-6.25); Til= 6.4 (6.29-6.8); Pal= 3.39 (3.08-3.72); Fel= 5.59 (5.28-6.25); TOTAL= 23.65 (22.96-25.55).

Paratype: MNCN 20.02/41857 Female

General appearance. Cream colour when alive with dark dots on opisthosoma. Brownish prosoma with central dark medal-shaped mark, covered by whitish pubescence. Opisthosoma brown with undefined dark drawn formed by dots (Fig. 7B).

Prosoma. Clypeus light brown with seven bristles. POP black, covering all eyes (Fig. 5C). Caput slightly elevated. Crest zone light brown with nine bristles. Chelicerae as in holotype. Cheliceral rastellum with five strong bristles, sometimes six. Fang ridge smooth. Cheliceral furrow teeth with six promarginal denticles, five in some specimens. Sternum yellowish-brown with elongated dark brown sigillae, first two pairs of sigillae marginal, the third pair submarginal. Maxillae showing the same colour as sigillae with three to eight cuspules, but others with five to nine. Labium and coxae as for male (Fig. 5D).

Palp and legs I-IV. Dark brown in proximal segments and light brown in distal segments, with sides of tarsi and metatarsi darkened by scopulae. Maculae only on femora, on prolateral and retrolateral sides of all legs. MTF4 ratio: tibia > femur > metatarsus.

Spines, Palp. Prolateral side, Pa= 2:3 (1-2-3:1-2), Ti= 2:2 (2:3); retrolateral side, Ti= 1:1; Leg I: prolateral side, Pa= 2:2,

Fig. 6. — Carapace and sternum of females of the four different species described in this work: **A**, **B**, *Nemesia eira* n. sp.; **C**, **D**, *Nemesia gajui* n. sp.; **E**, **F**, *Nemesia socohina* n. sp.; **G**, **H**, *Nemesia ripolli* n. sp. Scale bars: 1 mm.

Ti= 3:3; Leg II: prolateral side, Pa= 2:2, Ti= 3:3, Met= 1.1 (0:0); Leg III: prolateral side, Pa= 0:0 (2:2), Ti= 2:1 (2:2), Met= 2:2; retrolateral side, Ti= 3:2 (2:2), Met= 3:3; Leg IV: prolateral side, Met= 1:0 (0-1:0-1); retrolateral side, Ti= 2:2, Met= 3:2 (2:3).

Opisthosoma. Spinnerets: PLS: proximal segment as long as middle and distal segments together. PMS: digitiform. Spermathecae: short, mound-shaped with divergent ends of receptacles (Fig. 4B).

Measurements (n = 5). Bl= 19.96 (9.1-19.96); Prosoma. Ca= 4.89 (4.17-5.58); CL= 8.13 (6.69-9.01); CW= 6.86 (5.28-7.6); Ch= 3.93 (3-4.23); Th= 2.84 (2.19-3.03); Cly= 0.36 (0.13-0.36); AER= 1.42 (1.3-1.61); PER= 1.44 (1.39-1.68); ALE= 0.37 (0.33-0.42); PLE= 0.37 (0.32-0.4); AME= 0.17 (0.17-0.27); PME= 0.25 (0.22-0.25); w= 0.68 (0.65-0.76); mal= 3.25 (2.62-3.25); maw= 1.84 (1.46-2.06); lal= 0.85 (0.65-1.39); law= 1.45 (1.17-1.82); stl= 4.22 (3.63-5.1); stw= 3.27 (2.78-3.82); Palp: Tal= 2.64 (2.01-2.99); Til= 2.69 (2.18-3.54); Pal= 2.28 (1.78-2.56); Fel= 4.47 (3.68-4.77); TOTAL= 12.08 (10.1-13.36); Leg I: Tal= 1.99 (1.64-1.99); Mel= 3.39 (2.53-3.39); Til= 3.9 (3.02-4.09); Pal= 3.7 (3.01-3.99); Fel= 5.91 (4.9-6.48); TOTAL= 18.89 (15.57-19.39); Leg II: Tal= 1.7 (1.64-2.05); Mel= 3.05 (2.47-3.05); Til= 3.61 (2.63-3.62); Pal= 3.47 (2.77-3.84); Fel= 5.22 (4.45-5.63); TOTAL= 17.05 (14.21-18.13); Leg III: Tal= 2.43 (1.33-2.43); Mel= 2.99 (2.53-3.94); Til= 2.33 (2.08-2.8); Pal= 3.04 (2.32-3.08); Fel= 4.02 (3.51-4.55); TOTAL= 14.81 (12.06-16.47); Leg IV: Tal= 2.2 (1.71-2.47); Mel= 4.96 (3.78-5.32); Til= 7.08 (5.95-7.52); Pal= 4.12 (3.51-4.4); Fel= 5.68 (4.62-6.03); TOTAL= 24.04 (19.79-25.74).

Intraspecific variations

The populations from El Patriarca and El Alcaide have darker marks on the prosoma and opisthosoma compared to the population from Alcolea. Additionally, the eye group seems to be wider in spiders from El Alcaide than in those from the other two locations.

Natural History

Two of the three areas where the species was found – Alcolea and El Patriarca, within the municipality of Córdoba – can be described as open "dehesa" with holm oaks, mastics, and wild olive trees, featuring a dense yet low-growing herbaceous layer on loamy soil. The third location – El Alcaide – is a soil accumulation at the abutment of the railway bridge that crosses the Guadalquivir River, situated in a neighbourhood on the outskirts of Córdoba.

The burrow of this species is a simple gallery 20-25 cm deep. Two juveniles were captured and kept in captivity to obtain mature males; the first died, while the second, excavated on 1 November 2023, had reached adulthood. The other males were captured using traps at the end of November after a heavy rain. Apart from the burrow structure and the absence of active hunting behaviour, all other aspects of biology of this species are similar to those of *N. eira* n. sp.

Nemesia socohina n. sp.
(Figs 4C; 5C; 6E, F; 7E, F; 8B, E)

urn:lsid:zoobank.org:act:34031BC0-3CD9-4EE6-A1A6-BC79ADEAF58B

Type material. — **Holotype. Spain** • ♂; Guadalcázar, Córdoba; 37°44'2"N, 4°57'32"W; Alt.: 170 m, 12.III.2022; MNCN 20.02/41858.
Paratype. Spain • ♀; Guadalcázar, Córdoba; 37°44'2"N, 4°57'32"W; Alt.: 170 m; 27.VI.2021; MNCN 20.02/41859.

Additional material examined. — **Spain** • ♀; Guadalcázar, Córdoba; 2.V.2021; Coll. CPP-0122 • ♀; Guadalcázar, Córdoba; 37°44'2"N, 4°57'32"W; Alt.: 170 m; 27.VI.2021; Coll. CPP-0129 • ♀; Guadalcázar, Córdoba; 37°44'2"N, 4°57'32"W; Alt.: 170 m; 2.V.2021; Coll. CPP-0141 • ♀; Guadalcázar, Córdoba; 37°44'2"N, 4°57'32"W; Alt.: 170 m; 12.III.2022; Coll. CPP-0291 • ♂; Guadalcázar, Córdoba; 37°44'2"N, 4°57'32"W; Alt.: 170 m; 18.X.2022; Coll. CPP-0333 • ♂; Guadalcázar, 12.III.2022; Coll. CPP-0386 • ♂; Guadalcázar, Córdoba; 37°44'2"N, 4°57'32"W; Alt.: 170 m; 12.III.2022; Coll. CPP-0387 • ♂; Guadalcázar, Córdoba; 37°44'2"N, 4°57'32"W; Alt.: 170 m; 12.III.2022; Coll. CPP-0388 • ♂; Guadalcázar, Córdoba; 37°44'2"N, 4°57'32"W; Alt.: 170 m; 12.III.2022; Coll. CPP-0390.

Etymology. — The word "socohina" is a name in apposition that comes from the abbreviation of "Sociedad Cordobesa de Historia Natural". This species was found in the course of a bioblitz carried out in Guadalcázar (Córdoba province), with the intention of promoting the natural value of this area and preventing the construction of a thermosolar plant.

Diagnosis. — Males of *N. socohina* n. sp. bear bulbs that resemble those of *N. eira* n. sp., but with a longer distal part (Fig. 4D1), as well as being narrower and more conical (Fig. 4D2) in comparison to the bulbs of *N. gajui* n. sp. Females of *N. socohina* n. sp. have large spermathecae, similar to those of *N. eira* n. sp., but with notable differences. These include the presence of a division between the medial and distal part of receptacles and the distribution of soft tissue, which covers the whole receptacle in *N. socohina* n. sp. but not the interior area of the proximal and medial part in *N. eira* n. sp. In addition, the general distribution of patellar spines in females is different to that observed in other species: *N. socohina* n. sp. lacks spines on patellae III, which are present in all the related species treated herein. Other differences between *N. socohina* n. sp. and *N. eira* n. sp. include overall colouration – dark brown or black in *N.sochohina* n. sp. and yellowish in *N. eira* n. sp. – as well as burrow structure. Straight vertical entrance with a wide bottom fitted burrow with a long and skinny side blind-ending branch (Fig. 8B, E), whereas *N. eira* n. sp. digs a typical branched burrow (Fig. 8A, C).

Description

Holotype: MNCN 20.02/41858 Male

General appearance. Live specimens beige with a poorly visible dark medal-shaped mark on middle of prosoma (Fig. 7f). Preserved specimens with brownish prosoma covered by whitish pubescence and central mark more visible. Opisthosoma pale brown with dorsal cardiac mark and four chevrons.

Prosoma. Clypeus black with white pubescence and six bristles. POP black, covering whole eye group. Caput low. Crest zone brown with three bristles. Chelicerae dark brown with two dorsal stripes of whitish pubescence. Cheliceral rastellum with four strong bristles (sometimes five). Fang keel smooth. Cheliceral furrow with six promarginal denticles. Sternum

FIG. 7. — Living colour of females (left) and males (right): **A**, **B**, *Nemesia eira* n. sp.; **C**, **D**, *Nemesia gajui* n. sp.; **E**, **F**, *Nemesia socohina* n. sp.; **G**, **H**, *Nemesia ripolli* n. sp. Scale bars: 5 mm. Photo: B, Antonio Pizarro.

brown with ovoid dark brown or black sigillae, arranged as described for previous species. Maxillae, labium and coxae dark brown or black.

Palp and legs I-IV. Cymbium dorsal patch with 23-25 spines. Bulb globular, embolus slim and elongated with a duckbill-shaped end (Fig. 4C). Palp tibia ratio 2.14±0.17. Apical dorsal patch with 7-11 spines. Clasper hook slightly curved. Clasper field with scopula. Metatarsus I straight. Femora of palp and legs dark, dark brown to grey, with white pubescence, and distal segments brownish yellow. Prolateral side of femora of anterior legs and retrolateral side of femora of posterior legs with maculae. Scopula on metatarsi and tarsi of first two pairs of legs. MTF4 ratio: tibia > metatarsus > femur, but in some specimens, tibia > metatarsus > femur.

Spines, Palp. Cym= 23:25 (18-23-26-27-30-33:21-23-25-30-35), Patch= 11:7 (8-9-10-11:7-8-9-11-19); prolateral side, Pa= 1:1 (1:2); Leg I: prolateral side, Pa= 2:2, Ti= 3:2 (1-2:2), Met= 0:1 (1-2:1); retrolateral side Pa= 1:1 (0-1:0-2), Ti= 1:2 (2-3:1-3), Met= 0:1 (0:0); Leg II: prolateral side, P= 2:2 (1:1), Ti= 3:3 (2:2), Met= 3:1 (1-2:1); retrolateral side, Ti= 3:3 (1-2:1-2), Met= 1:1 (0-2:1); Leg III: prolateral side, Pa= 2:2, Ti= 3:3 (3:2-4), Met= 4:3 (3-4:2-3-4), Ta= 0:0 (1:0); retrolateral side, Pa= 1:1, Ti= 3:3 (2:2), Met= 3:3; Leg IV: prolateral side, Pa= 2:2 (1:2), Ti= 6:6 (4-5-7:4-5-7), Met= 3:3 (4:3); retrolateral side, Pa= 1:3 (1:1), Ti= 4:4 (3:3), Met= 3:3.

Opisthosoma. Epiandrous fusillae: 38 trapezoidal; epiandrous area of 0.5 mm^2; density: 76 epiandrous fusillae/mm^2. In other males, epiandrous fusillae: 41±4; epiandrous area: 0.51±0.09 mm^2; density: 81.17±11.45 epiandrous fusillae/mm^2. Spinnerets: PLS: proximal segment as long as middle and distal segments together. PMS cone-shaped.

Measurements (n = 6). Bl= 12.39 (10.6-12.87); Prosoma. Ca= 3.52 (3.23-3.67); CL= 6.13 (5.45-6.31); CW= 4.85 (4.46-5.01); Ch= 1.66 (1.62-2.05); Th= 1.4 (1.29-1.89); Cly= 0.11 (0.11-0.17); AER= 1.06 (1.05-1.12); PER= 1.09 (1.09-1.17); ALE= 0.33 (0.32-0.36); PLE= 0.26 (0.23-0.29); AME= 0.18 (0.13-0.2); PME= 0.2 (0.18-0.25); w= 0.59 (0.53-0.62); mal= 1.79 (1.72-1.91); maw= 1.02 (0.9-1.08); lal= 0.37 (0.35-0.49); law= 0.98 (0.87-1); stl= 2.93 (2.8-3.1); stw= 2.26 (2.2-2.47); Palp: E1= 0.48 (0.36-0.49); E2= 0.17 (0.15-0.19); E3= 0.33 (0.3-0.38); Bu= 1.3 (1.28-1.45); Em= 0.7 (0.62-0.7)M Tiw= 1.08 (1.04-1.21); Cyl= 1.1 (0.98-1.33); Til= 2.33 (2.11-2.62); Pal= 1.66 (1.47-1.76); Fel= 2.87 (2.79-3.19); TOTAL= 7.96 (7.42-8.9); Leg I: TiIw= (0-0); Tal= 2.32 (2.18-2.6); Mel= 3.38 (3.12-3.55); Til= 3.46 (2.1-3.6); Pal= 2.99 (2.67-3.06); Fel= 5.01 (4.43-5.35); TOTAL= 17.16 (14.5-17.97); Leg II: Tal= 2.13 (2.1-2.39); Mel= 3.33 (2.84-3.35); Til= 3.07 (3-3.35); Pal= 2.65 (2.3-2.82); Fel= 4.77 (4.06-4.8); TOTAL= 15.95 (14.31-16.58); Leg III: Tal= 2.24 (2.24-2.56); Mel= 4.11 (3.6-4.17); Til= 3.23 (2.7-3.32); Pal= 2.04 (1.82-2.35); Fel= 4.04 (3.8-4.38); TOTAL= 15.66 (14.37-16.49); Leg IV: Tal= 2.79 (2.56-2.96); Mel= 5.28 (4.88-5.35); Til= 5.39 (5.14-5.8); Pal= 2.89 (2.52-3.14); Fel= 5.2 (4.81-5.44); TOTAL= 21.55 (19.91-22.54).

Paratype: MNCN 20.02/41859 Female

General appearance. Live specimens dark brown or grey with dark medal-shaped mark on prosoma and a brown opisthosoma with indistinguishable dark dorsal pattern (Fig. 7E). Dark pattern on body more visible when preserved in alcohol.

Prosoma. Clypeus brown with six bristles. POP in three dots over lateral and middle eyes. Caput elevated. Crest zone dark brown with seven bristles. Chelicerae dark brown with two stripes of sparse white pilosity. Cheliceral rastellum with six strong bristles (four in another specimen). Fang ridge smooth. Cheliceral furrow teeth with six promarginal denticles, five in some specimens. Sternum yellowish-brown with ovoid dark brown sigillae, arranged as described before. Maxillae yellowish-brown bearing three and four cuspules, two to five in other specimens. Labium and coxae yellowish-brown (Fig. 6D).

Palp and legs I-IV. Brown and ventrally covered by scopulae. MTF4 ratio: tibia > femur > metatarsus.

Spines. Palp: prolateral side, Pa= 1:2 (2:1), Ti= 2:1 (2:2); Leg I: prolateral side, Pa= 1:1, Ti= 0:0 (1-2:1-2); Leg II: prolateral side, Pa= 2:1 (2:2), Ti= 1:2 (2:2); Leg III: prolateral side, Met= 3:2 (2:2-3); retrolateral side, Ti= 2:2, Met= 3:3 (0:0); Leg IV: prolateral side, Met= 0:1 (1-2:1-2); retrolateral side, Ti= 2:2, Met= 3:3.

Opisthosoma. Spinnerets: PLS: proximal segment as long as middle and distal segments together. PMS: digitiform. Spermatheca: elongated, bag-shaped with a middle division. (Fig. 5C).

Measurements (n = 5). Bl= 22 (16.7-22); Prosoma. Ca= 4.65 (4.56-5.01); CL= 7.98 (7.6-8.08); CW= 6.24 (5.88-6.85); Ch= 2.86 (2.68-3.24); Th= 1.78 (1.4-2.16); Cly= 0.27 (0.23-0.38); AER= 1.45 (1.31-1.45); PER= 1.46 (1.34-1.49); ALE= 0.41 (0.36-0.41); PLE= 0.34 (0.3-0.4); AME= 0.21 (0.19-0.24); PME= 0.25 (0.22-0.27); w= 0.76 (0.67-0.77); mal= 2.86 (2.64-3.05); maw= 1.73 (1.65-1.73); lal= 0.84 (0.76-0.89); law= 1.42 (1.36-1.56); stl= 4.37 (4.23-4.58); stw= 3.39 (3.16-3.39); Tal= 2.58 (2.47-2.75); Palp: Til= 2.53 (2.4-2.75); Pal= 2.41 (2.21-2.41); Fel= 4.17 (3.42-4.17); TOTAL= 11.69 (10.5-11.71); Leg I: Tal= 1.73 (1.63-1.93); Mel= 2.86 (2.75-3.09); Til= 3.62 (2.64-3.65); Pal= 3.73 (3.41-3.73); Fel= 5.48 (4.9-5.71); TOTAL= 17.42 (15.92-17.9); Leg II: Tal= 1.74 (1.66-2.02); Mel= 2.76 (2.36-2.92); Til= 2.92 (2.92-3.26); Pal= 3.43 (2.96-3.43); Fel= 4.92 (4.25-5.19); TOTAL= 15.77 (14.62-16.2); Leg III: Tal= 1.94 (1.8-1.94); Mel= 2.7 (2.7-3.23); Til= 2.29 (2.28-2.64); Pal= 3.14 (2.76-3.14); Fel= 4.35 (3.81-4.35); TOTAL= 14.42 (13.62-14.91); Leg IV: Tal= 2.12 (2.09-2.33); Mel= 4.84 (4.39-4.86); Til= 5.77 (5.36-5.97); Pal= 3.57 (3.57-4.23); Fel= 5.4 (4.84-5.56); TOTAL= 21.7 (20.49-22.34).

Natural History

The species was found on the slopes of a private property in Guadalcázar (Córdoba province), with a habitat similar to that of the two new species described above. In this environment, these spiders dig a distinctive burrow that, to date, had not been described for any species of *Nemesia*. The burrow consists of two interconnected galleries that meet at the deepest point in a spacious chamber. One gallery extends to the surface, forming the entrance, while the other is a blind-ending branch that gradually narrows towards its end. This chamber serves as a site for the spider to accumulate prey remains and moulting. This species blocks the entrance of its burrow using the trapdoor and the silk covering of the initial section of the burrow, similar to *N. eira* n. sp. and *N. gajui* n. sp.

Seven sub-adult specimens and one adult female were kept in captivity. Of these, five sub-adults matured in October of 2022, after which the female was sacrificed. The remaining two specimens were kept in captivity for further studies. In addition, pitfall traps were placed in the area where the spiders were found, resulting in the capture of three additional specimens. Two were subsequently released, and the third was used for this study. In total, six mature males were examined. This species begins its mating season with the first rainfall in October, at which point mature males emerge from their burrows and roam in search of females. The adult female kept in captivity produced two egg sacs: the first in March, shortly after its capture, and the second within the terrarium at the end of summer.

Nemesia ripolli n. sp.
(Figs 4D; 5D; 6G, H; 7G, H; 8C)

urn:lsid:zoobank.org:act:C9E3F746-DF16-4098-97AE-9B94FBE902FF

Type material. — **Holotype. Spain** • ♂; Parque Arroyo, Cártama, Málaga; 36°42'13"N, 4°42'29"W; Alt.: 126 m; 21.XI.2022; MNCN 20.02/41860.
Paratype. **Spain** • ♀; Parque Arroyo, Cártama, Málaga; 36°42'13"N, 4°42'29"W; Alt.: 126 m; 3.XII.2022; MNCN 20.02/41861.

Additional material examined. — **Spain** • ♂; Parque Arroyo, Cártama, Málaga; 36°42'13"N, 4°42'29"W; Alt.: 126 m; 25.XI.2022; Coll. CPP-0407 • ♂; Parque Arroyo, Cártama, Málaga; 36°42'13"N, 4°42'29"W; Alt.: 126 m; 3.XII.2022; Coll. CPP-0403 • ♀; Parque Arroyo, Cártama, Málaga; 36°42'13"N, 4°42'29"W; Alt.: 126 m; 3.XII.2022; Coll. CPP-0408.

Etymology. — The species epithet is a patronym for Javier Ripoll who discovered and collected the mature male specimens of this species with pitfalls in his private property.

Diagnosis. — The distal section of the embolus in *N. ripolli* n. sp. closely resembles that of *N. gajui* n. sp. although it is slightly more slender and narrower. The spermathecae of *N. ripolli* n. sp. are similar to those of *N. uncinata* (Bacelar, 1933), when observed exclusively in ventral view (Fig. 5D), however, the spermathecae of this new species has the end curved (Fig. 5E). The burrow of *N. ripolli* n. sp. is very similar to that of *N. eira* n. sp., but specimens of these two species are easily distinguishable. Morphologically, the bulb of *N. ripolli* n. sp. is wider and shorter in the distal section of the embolus compared to *N. eira* n. sp., and its middle section is more conical, whereas in *N. eira* n. sp, it is more cylindrical. The spermathecae also differ: in *N. eira* n. sp. the receptacles are wider, longer and flat with a rounded tip, while in *N. ripolli* n. sp., they are bent with more acutely end. The live colouration is usually grey in *N. ripolli* n. sp. and usually yellowish or orange in *N. eira* n.sp.

Description

Holotype: MNCN 20.02/41860 Male

General appearance. Live specimen grey with dark medal-shaped mark on prosoma opisthosoma cream-coloured with brown cardiac mark and six chevrons (Fig. 7G). In alcohol, brownish-orange with dark marking in central area of prosoma and whitish pubescence. Opisthosoma brownish-yellow.

Prosoma. Clypeus black with light orange line, five bristles, and white pubescence. POP compact. Caput slightly elevated. Crest zone brownish with seven bristles. Chelicerae dark brown, covered by white pubescence distributed in three stripes. Cheliceral rastellum with five strong bristles (other specimens have four or six bristles). Fang ridge smooth. Cheliceral furrow with six promarginal denticles. Sternum yellow with oval brown sigillae. Maxillae dark brown with three spine-shaped cuspules. Labium and coxae dark brown.

Palp and legs I-IV. Cymbium dorsal patch with 14-13 spines. Bulb globular with slender, short, duckbill-shaped embolus (Fig. 4D). Palp tibia ratio 2.27±0.03. Apical dorsal patch of tibia of palp with 15-16 spines. Clasper hook slightly curved. Clasper field with scopula. Metatarsus I slightly curved. Palp dark brown on femora and brown on remaining segments. Legs dark brown on femora and brown on rest of segments, with scopulae on ventral area of all segments, retrolateral maculae on patellae and femora I and II, ventrally almost black, more conspicuous on tibiae III and IV. MTF4 ratio: tibia > metatarsus > femur.

Spines, Palp. Cym= 14:13 (19-21:16-19), Patch= 15:16 (12-13:13-14); prolateral side Pa= 1:1 (2:2), Ti= 1:1; Leg I: prolateral side, Pa= 2:2, Ti= 4:4 (3:3), Met= 3:3 (2-3:3); retrolateral side, Pa= 1:1 (2:1), Ti= 3:4 (3:3), Met= 3:3 (2:3-4); Leg II: prolateral side, Pa= 2:2, Ti= 3:3, Met= 3:3; retrolateral side, Pa= 1:1, Ti= 3:3, Met= 3:3 (2:2); Leg III: prolateral side, Pa= 2:2, Ti= 3:3, Met= 3:3; retrolateral side, Pa= 1:1 (1:2), Ti= 3:5 (3:3-4), Met= 3:3; Leg IV: prolateral side, Pa= 4:4 (2-3:2-3), Ti= 7:6 (3-4:3-4), Met= 5:4 (3:3); retrolateral side, Pa= 1:1, Ti= 4:4, Met= 5:4 (3:3).

Opisthosoma. Epiandrous fusillae: 43 triangular; epiandric area: 0.38 mm^2; density: 113 epiandrous fusillae/mm^2. In remaining males, epiandrous fusillae: 40±3; epiandric area: 0.39±0.01 mm^2; density: 101.13±11.49 epiandrous fusillae/mm^2. Spinnerets: PLS: proximal segment as long as middle and distal segments together. PMS cone-shaped.

Measurements (n = 3). Bl= 11.07 (11.01-12.41); Prosoma. Ca= 3.56 (3.56-3.61); CL= 5.77 (5.7-5.97); CW= 4.78 (4.68-4.78); Ch= 1.82 (1.82-1.95); Th= 1.49 (1.49-1.66); Cly= 0.15 (0.15-0.19); AER= 0.95 (0.89-1.03); PER= 0.97

(0.92-1.12); ALE= 0.25 (0.23-0.28); PLE= 0.19 (0.19-0.23); AME= 0.21 (0.2-0.21); PME= 0.17 (0.17-0.19); w= 0.52 (0.47-0.58); mal= 1.78 (1.78-1.88); maw= 1.12 (0.97-1.12); lal= 0.4 (0.4-0.51); law= 0.91 (0.91-0.98); stl= 2.85 (2.8-2.98); stw= 2.22 (2.22-2.24); Palp: E1= 0.41 (0.41-0.47); E2= 0.14 (0.14-0.16); E3= 0.39 (0.36-0.43); Bu= 1.41 (1.27-1.41); Em= 0.72 (0.64-0.72); Tiw= 1.06 (1.06-1.13); Cyl= 1.1 (1.06-1.23); Til= 2.41 (2.41-2.61); Pal= 1.57 (1.45-1.66); Fel= 2.96 (2.96-3.11); TOTAL= 8.04 (7.99-8.61); Leg I: Tal= 2.44 (2.44-2.66); Mel= 3.64 (3.63-3.98); Til= 3.79 (3.74-3.82); Pal= 2.87 (2.82-3.17); Fel= 5.07 (5.07-5.29); TOTAL= 17.81 (17.81-18.92); Leg II: Tal= 2.34 (2.3-2.44); Mel= 3.62 (3.62-4.01); Til= 3.54 (3.54-3.67); Pal= 2.64 (2.41-2.64); Fel= 4.88 (4.66-4.92); TOTAL= 17.02 (16.74-17.56); Leg III: Tal= 2.55 (2.55-2.85); Mel= 4.35 (3.92-4.35); Til= 3.24 (3.24-3.38); Pal= 2.4 (2.05-2.4); Fel= 4.29 (3.87-4.3); TOTAL= 16.83 (16.07-16.83); Leg IV: Tal= 2.66 (2.66-2.74); Mel= 5.47 (5.46-5.95); Til= 5.63 (5.63-6.12); Pal= 3.02 (3.02-3.22); Fel= 5.46 (5.32-5.46); TOTAL= 22.24 (22.24-23.26).

Paratype: MNCN 20.02/41861 Female

General appearance. Grey due to white pubescence on prosoma, with poorly visible dorsal dark median shape mark opisthosoma cream-coloured with dark cardiac mark and five chevrons (Fig. 7G). Preserved specimens brownish with more visible dark areas, including edge of prosoma (Fig. 6G).

Prosoma. Clypeus brown with seven bristles. POP covering whole eye group (Fig. 6G). Caput slightly elevated. Crest zone brown with nine bristles. Chelicerae black and covered by two stripes of low-density white pubescence. Cheliceral rastellum with five strong bristles. Fang ridge smooth. Cheliceral furrow teeth with six marginal denticles, five in some specimens. Sternum yellow, sigillae oval and brown. Maxillae brown with 7-12 cuspules in two irregular rows. Labium and coxae brown (Fig. 6H).

Palp and legs, I-IV. Palp dark brown femora and brown on other segments, and dark brown legs femora and remaining segments brown. Scopulae from tarsi to femora. Retrolateral maculae on patellae and femora I and II, and prolateral maculae on patellae and femora III and IV. Dark ventral area, more conspicuous on tibiae IV. MTF4 ratio: tibia > femur > metatarsus.

Spines. Palp: prolateral side, Pa= 2:2, Ti= 1:2 (2:2); retrolateral side, Ti= 1:2 (1:1); Leg I: prolateral side, Pa= 2:2, Ti= 2:2; Leg II: prolateral side, Pa= 2:2, Ti= 2:3, Met= 1:1; Leg III: prolateral side, Pa= 2:2, Ti= 2:2, Met= 3:3; retrolateral side, Ti= 2:2, Met= 3:3; Leg IV: prolateral side, Met= 2:1 (2:2); retrolateral side, Ti= 2:2, Met= 4:3 (3:3).

Opisthosoma. Spinnerets: PLS: proximal segment as long as middle and distal segments together. PMS: digitiform. Spermatheca: short, mound-shaped with a division in middle and bent end (Fig. 4D, E).

Measurements (n = 2). Bl= 18.83 (17.59); Prosoma. Ca= 4.74 (4.4); CL= 7.8 (7.07); CW= 6.01 (5.8); Ch= 3.25 (2.98); Th= 2.04 (2.18); Cly= 0.2 (0.22); AER= 1.34 (1.22); PER= 1.32 (1.24); ALE= 0.33 (0.33); PLE= 0.32 (0.3); AME= 0.2 (0.2); PME= 0.25 (0.19); w= 0.7 (0.62); mal= 2.95 (2.77); maw= 1.65 (1.56); lal= 0.78 (0.68); law= 1.52 (1.44); stl= 4.03 (3.72); stw= 3.22 (3.00); Palp: Tal= 2.68 (2.32); Til= 2.69 (2.45); Pal= 2.32 (1.97); Fel= 4.15 (3.23); TOTAL= 11.84 (9.97); Leg I: Tal= 2.09 (1.84); Mel= 3.15 (2.67); Til= 4.01 (3.45); Pal= 3.59 (3.22); Fel= 5.44 (4.98); TOTAL= 18.28 (16.16); Leg II: Tal= 1.96 (1.88); Mel= 3.08 (2.38); Til= 3.52 (3.19); Pal= 3.54 (2.81); Fel= 5.17 (4.18); Leg III: TOTAL= 17.27 (14.44); Tal= 2.23 (2.09); Mel= 3.38 (2.97); Til= 2.58 (2.34); Pal= 2.85 (3.37); Fel= 4.13 (3.7); TOTAL= 15.17 (14.47); Leg IV: Tal= 2.37 (1.97); Mel= 2.98 (4.25); Til= 6.47 (5.86); Pal= 3.91 (3.57); Fel= 5.62 (4.93); TOTAL= 21.35 (20.58).

Natural History

Specimens of this species were collected from a private property known as "Parque Arroyo" in Cártama (Málaga province). The burrow follows the same structure described for *N. eira* n. sp. Males were captured from the end of November to the beginning of December.

DISCUSSION

The diversity and scientific knowledge of the diversity and biology of Iberian *Nemesia* species have significantly expanded in recent years, primarily due to the dedicated efforts of researchers seeking to comprehensively describe various aspects of these trapdoor spiders (Decae 2005; Calvo & Pagán 2022; Pertegal *et al.* 2022; Pertegal & Pinilla-Rosa 2023). Species belonging to the *N. dorthesi* group are characterised by their morphology and their distinctive trapdoor design, featuring a thin and flexible lid. However, burrow structures can be shared among certain species or exhibit entirely unique features. For instance, *N. santeulalia* and *N. entinae* construct branched burrows with a single entrance, contrasting with the specialised burrows of *N. shenlongi* – which features a volumetric flask-shaped structure with a handmade spherical plug (Fig. 2B) – and *N. socohina* n. sp., which presents a design reminiscent of a Spanish wine jar (Fig. 7E). These observations suggest that burrow structures may serve as distinctive characteristics for species differentiation. However, accurate species identification must also rely on the morphological features of the specimens inhabiting the burrows.

Over time, various factors have led to significant taxonomic misidentifications of *N. dorthesi* and related species. *Nemesia dorthesi* was originally described based on a single mature male specimen collected from Torrevieja, Alicante (Spain). The vague characterisation of the species, the historical lack of spermathecal studies in other related species, morphological similarities between closely related taxa, and insufficient data on burrow structures have collectively resulted in several species and populations being placed in ambiguous taxonomic situations. Recent studies by Calvo & Pagán (2022), which

FIG. 8. — Burrow of different species: **A**, burrow of *N. eira* n. sp.; **B**, burrow of *N. socohina* n. sp.; **C**, Scheme of burrow of *N. eira* n. sp. and *N. ripolli* n. sp.; **D**, scheme of burrow of *N. gajui* n. sp.; **E**, scheme of burrow of *N. socohina* n. sp.

documented the copulatory organs, external morphological characteristics, and burrow architecture of *N. dorthesi* based on topotypical specimens, have significantly clarified this confusion.

The geographical origins of samples play a crucial role in species identification, which requires meticulous attention to all morphological details (Pertegal & Rodríguez-Castilla 2024). One pertinent case is that of *Nemesia ariasi* (Simon, 1914), which was described based on a single male collected in Morocco and later synonymized with *N. dorthesi* by Denis (1960). This species was never formally described by its original author, Eugène Simon, who only mentioned it in a footnote in his 1914 work. Nevertheless, the holotype was revised by Frade & Bacelar (1931b) and Zonstein (2019), who provided a morphological description and illustrations of the copulatory bulb. Upon examination, the copulatory bulb of the Moroccan specimen differs significantly from those of *N. dorthesi* from Torrevieja. The middle section of the embolus in *N. dorthesi* is more conical, with a cylindrical, thinner distal section bearing a denticle at the curve and an arrowhead-shaped tip. In contrast, the embolus of *N. ariasi* exhibits a continuously narrower form, with a slightly wide embolus and arrowhead-shaped tip compared, as photographed by Zonstein (2017). This morphological distinction supports the revalidation of *N. ariasi* as a distinct and valid species.

Zonstein's (2019) redescription of *N. dorthesi*, based on the holotype of *N. ariasi*, from Morocoo, and females from Algeria, is likewise invalid due to morphological differences of Algerian spiders with topotypical specimens. Algerian females have spermathecae with wider, sparsely glandular receptacles, while Spanish females have densely glandular spermathecae with narrower receptacles (Calvo & Pagán 2022). Thus, the Algerian population belongs to an overlooked and undescribed species distinct from *N. dorthesi*.

The case of *Nemesia macrocephala occidentalis* (Frade & Bacelar, 1931) highlights the consequences of incomplete descriptions and the lack of copulatory organ studies. The original specimens were collected in Guadalajara, Spain, and were misidentified as *Nemesia macrocephala* (Ausserer, 1871), species from Sicily, Italy. A comparative study of spermathecae conducted by Blasco-Feliu (1986) based on specimens from Valencia, not Guadalajara, actually belong to *N. arias*i, based on the morphology of their spermathecae. It is now known that the spermathecae of *N. ariasi* illustrated by Blasco-Feliu closely resemble those of *N. dorthesi*, which may represent the most accurate identification. While *N. macrocephala* from Sicily exhibits tubular, column-shaped spermathecae, those of *N. macrocephala occidentalis* are bag-shaped. Consequently, *N. macrocephala occidentalis* should be considered a *nomen nudum*.

The morphology of spiders is influenced by the distinct lifestyles of males and females. While mature males exhibit relatively homogeneous morphological traits adapted for seeking and mating – characterized by slender bodies, long legs, and small size suited for wandering in search of females (Moya-Laraño *et al.* 2002; Foellmer & Moya-Laraño 2007) –, female bodies may be more varied due to adaptations related to hunting strategies or burrow shapes, as might occur in *Nemesia* (Pertegal & Rodríguez-Castilla 2024). Consequently, the reliance on partial species descriptions – primarily based on the relatively uniform morphology of mature males – without considering other informative traits, such as burrow structure and behaviour, has contributed to significant taxonomic challenges in the classification of *Nemesia* species.

CONCLUSIONS

Morphological studies alone might not be enough for accurately defining *Nemesia* species. Their exclusive use can lead to misidentifications when additional data, such as trapdoor type and internal burrow structures, are absent or overlooked (Pertegal & Rodríguez-Castilla 2024). These challenges arise from the description of species based solely on a single sex, without incorporating essential behavioural, habitat, and geographical data (Mora 2015; Pertegal & Rodríguez-Castilla 2024). Failure to incorporate these data increases the likelihood of errors, especially in large-scale studies involving species distribution and molecular analyses (Pertegal & Molero-Baltanás 2022). Such errors may hinder conservation efforts if any species or their habitats are deemed worthy of protection in the future. In *Nemesia*, features of the burrows can be instrumental in distinguishing closely related species within the species complex, offering additional evidence alongside traditionally used traits such as the copulatory bulb, as well as the shape and colour of the habitus (Mora 2015; Pertegal & Molero-Baltanás 2022).

Acknowledgements
We want to acknowledge Antonio Pizarro, Javier Ripoll, Rafael Tamajón, Rocío Moreno, Rafael Pulido, Mónica López, Stephen Knapp, Ginés Rodiguez and the Sociedad Cordobesa de Historia Natural for providing specimens and/or sharing fieldwork days collecting spiders. We also thank the Consejería de Medio Ambiente (Environmental regional Ministry of Andalucía, Spain), concretely to the administrative units in Córdoba and Cádiz provinces, for the authorization to collect specimens, and Marta Calvo, José Antonio Luis de la Iglesia, and Arthur Decae for their kind assistance. Without forgetting the contribution of the reviewers to the significant improvement of the article, Dr Robert Raven and the anonymous reviewer. Finally, the first author is especially grateful to his family – his parents Ana María and Jesús, and his siblings David and Víctor – for their support.

REFERENCES

Blasco-Feliu A. 1986. — Les spermathèques des *Nemesia* (Araneae, Ctenizidae) valeur taxonomique de ce caractère. *Bulletin du Muséum national d'Histoire naturelle de Paris* (4) 8(A1): 343-350. https://www.biodiversitylibrary.org/page/58457261

Buchli H. 1969. — Hunting behavior in the Ctenizidae. *Integrative and Comparative Biology* 9: 175-193. https://doi.org/10.1093/icb/9.1.175

CALVO M. & PAGÁN M. 2022. — *Nemesia entinae* sp. n. descripción de una nueva especie de *Nemesia* Audouin, 1826 (Araneae, Mygalomorphae, NemesiidaeE) de la Península Ibérica. *Revista Ibérica de Aracnología* 41: 41-50.

DECAE A. 2005. — Trapdoor spiders of genus *Nemesia* Audouin, 1826 on Majorca and Ibiza: taxonomy, distribution and behaviour (Araneae, Mygalomorphae, Nemesiidae). *Bulletin of the British Arachnological Society* 13: 145-168.

DECAE A. 2012. — Geography-related sub-generic diversity within the Mediterranean trapdoor spider genus *Nemesia* (Araneae, Mygalomorphae, Nemesiidae). *Arachnologische Mitteilungen* 43: 24-28. https://doi.org/10.5431/aramit4304

DECAE A. E. & DI FRANCO F. 2005. — *Nemisia sanzoi* Fage, 1917 (Araneae, Nemesiidae): first description of the male and some additional information on the female, distribution and biology of the species. *Bulletin of the British Arachnological Society* 13: 133-137.

DECAE A., PANTINI P. & ISAIA M. 2015. — A new species-complex within the trapdoor spider genus *Nemesia* Audouin 1826 distributed in northern and central Italy, with descriptions of three new species (Araneae, Mygalomorphae, Nemesiidae). *Zootaxa* 4059 (3): 525-540. https://doi.org/10.11646/zootaxa.4059.3.5

DENIS J. 1960. — Notes d'aranéologie marocaine. VIII. Un barychélide nouveau du Maroc. *Bulletin de la Société des Sciences naturelles du Maroc* 39: 185-189.

FOELLMER M. & MOYA-LARAÑO J. 2007. — *Sex, Size and Gender Roles: Evolutionary Studies of Sexual Size Dimorphism.* Chapter 7: Sexual size dimorphism in spiders: Patterns and processes. https://doi.org/10.1093/acprof:oso/9780199208784.003.0008

FRADE M. A. & BACELAR A. 1931a. — Remarques sur trois araignées théraphoses de Sicile et du nord d'Afrique. *Bulletin du Muséum national d'Histoire naturelle de Paris* (2) 3: 125-130. https://www.biodiversitylibrary.org/page/55340805

FRADE M. A. & BACELAR A. 1931b. — Révision des *Nemesia* de la faune ibérique et description d'espèces nouvelles de ce genre. *Bulletin du Muséum national d'Histoire naturelle de Paris* (2) 3: 222-238. https://www.biodiversitylibrary.org/page/55341123

JOCQUÉ R. & DIPPENAAR-SCHOEMAN A. 2006. — Spider Families of the World. Musée Royal de L'Afrique Centrale. ARC-PPRI, 336 p.

LUIS DE LA IGLESIA J. A. 2019. — A new Iberian trapdoor spider, *Iberesia valdemoria* n. sp. and the first records of *I. brauni* and *I. barbara* in the Iberian Peninsula (Araneae: Nemesiidae). *Arachnology* 18: 156-171. https://doi.org/10.13156/arac.2018.18.2.156

MOGGRIDGE J. T. 1873. — *Harvesting Ants and Trap-door Spiders*. L. Reeve & Co., London. https://doi.org/10.5962/bhl.title.6861

MOGGRIDGE J. T. 1874. — *Supplement to Harvesting Ants and Trap-door Spiders*. L. Reeve & Co., London. https://doi.org/10.5962/bhl.title.6558

MORA E. C. 2015. — Evolutionary history and drivers of diversification of the Mediterranean Nemesiidae (Araneae, Mygalomorphae). PhD Thesis, Universidad de Barcelona, 370 p.

MOYA-LARAÑO J., HALAJ J. & WISE D. H. 2002 — Climbing to reach females: Romeo should be small. *Evolution* 56 (2): 420-5. https://doi.org/10.1111/j.0014-3820.2002.tb01351.x

PERTEGAL C. & RODRÍGUEZ-CASTILLA G. 2024. — The role of the burrow structure in the characterisation of trap door spiders *Nemesia* Audouin, 1826 (Araneae, Mygalomorphae). *Graellsia* 80 (1-2): e755. https://doi.org/10.3989/graellsia.2024.v80.755

PERTEGAL C. & MOLERO-BALTANÁS R. 2022. — Description of a new trapdoor spider species, *Nemesia amicitia* spec. nov., from southern Spain, and new information on *Nemesia uncinata* (Araneae: Mygalomorphae: Nemesiidae). *Arachnologische Mitteilungen: Arachnology Letters* 64: 1-13. https://doi.org/10.30963/aramit6401

PERTEGAL C. & PINILLA-ROSA M. 2023. — Una nueva araña trampera, *Nemesia hesperides* n. sp. (Araneae: Mygalomorphae: Nemesiidae), de un jardín doméstico. *Graellsia* 79 (2): e202. https://doi.org/10.3989/graellsia.2023.v79.387

PERTEGAL C., SÁNCHEZ-GARCÍA I., MOLERO-BALTANÁS R. & KNAPP S. 2022. — Description of a new trapdoor spider species from southern Spain that exhibits an as yet unknown defence strategy (Araneae: Mygalomorphae: Nemesiidae). *Bonn Zoological Bulletin* 71 (2): 109-118. https://doi.org/10.20363/BZB-2022.71.2.109

SIMON E. 1914. — *Les arachnides de France. Synopsis générale et catalogue des espèces françaises de l'ordre des Araneae*. Tome VI. 1re partie. Roret, Paris: 1-308.

THORELL T. 1875. — *Diagnoses Aranearum Europaearum aliquot novarum. Tijdschrift voor Entomologie* 18: 81-108.

WORLD SPIDER CATALOG. 2025. — World Spider Catalog. Version 25.0. Natural History Museum Bern, online at http://wsc.nmbe.ch, accessed on {10/02/2025}. https://doi.org/10.24436/2

ZONSTEIN S. 2017. — Notes on *Nemesia* and *Iberesia* in the J. Murphy spider collection of the Manchester Museum (Araneae: Nemesiidae). *Israel Journal of Entomology* 47: 141-158. https://zenodo.org/badge/DOI/10.5281/zenodo.1068674.svg

ZONSTEIN S. 2019. — New data on the spider genus *Nemesia* in Algeria (Araneae: Nemesiidae). *Israel Journal of Entomology* 49 (1): 69-130. https://zenodo.org/badge/DOI/10.5281/zenodo.3592368.svg

Submitted on 19 September 2024;
accepted on 26 May 2025;
published on 10 February 2026.