

A NEW CAVE *PALLIDUPHANTES* (ARANEAE: LINYPHIIDAE) FROM MAJORCA (SPAIN)

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Abstract: *Palliduphantes vadelli* Lissner **sp. n.** is described from caves in Majorca, Spain. This species has never been described or illustrated even though data in the literature indicate it may have been collected in Majorca by biospeleologists as early as in 1970. The new species belongs to the *insignis*-group and seems closest to *P. byzantinus* (Fage, 1931), *P. carusoi* (Brignoli, 1979), and *P. culicinus* (Simon, 1884). Data on the distribution and ecology of the new species are presented.

Key words: Araneae, Linyphiidae, *Palliduphantes*, *Lepthyphantes*, taxonomy, new species, Balearic Islands, Spain.

Un nuevo *Palliduphantes* cavernícola (Araneae: Linyphiidae) de Mallorca (España)

Resumen: Se describe *Palliduphantes vadelli* Lissner **sp. n.** sobre material de cuevas de Mallorca (España). Esta especie nunca había sido descrita o ilustrada a pesar de que los datos de la literatura indican que puede haber sido recogida en Mallorca por biospeleólogos ya en 1970. La nueva especie pertenece al grupo *insignis* y parece más cercana a *P. byzantinus* (Fage, 1931), *P. carusoi* (Brignoli, 1979) y *P. culicinus* (Simon, 1884). Se presentan datos sobre la distribución y ecología de la nueva especie.

Palabras clave: Araneae, Linyphiidae, *Palliduphantes*, *Lepthyphantes*, taxonomía, especie nueva, Islas Baleares, España.

Taxonomy/Taxonomía: *Palliduphantes vadelli* **sp. n.**

Introduction

Several surveys of the fauna of Balearic caves have been carried out in the past. According to a recent review by Pons & Vadell (2011) more than 50 species of spiders have been encountered in Balearic caves. However, only a few of those are true cavernicolous species, most species are confined to the cave entrances only or are accidental intruders, the latter group being by far the largest in the list of Pons & Vadell (2011). The true cave spiders of Majorca boils down to only two species: *Centromerus ponsi* Lissner 2016, and *Meta bourneti* (Simon, 1922). An yet undescribed, troglomorphic *Dysdera* species (Bosmans & Lissner, in prep.) is a third species. *Theonoe major* Denis, 1961 and *Palliduphantes balearicus* Denis, 1961 are known only from Menorcan caves and may also be true cavernicolous species. *Palliduphantes stygius* (Simon, 1884) has been found in three Ibiza caves (Fage 1931). It has also been cited from Majorca without locality (Bristowe, 1952 in Pons & Vadell, 2011). It is a species found in a wide variety of habitats (Nentwig *et al.*, 2016) and is not to be considered a true cavernicolous species. *Leptoneta infusca* Simon, 1872 is frequently found in dark sections of Majorcan caves, but this species is also a member of the MSS fauna and can be found deep in scree, thus it is not restricted to caves. *Mysmena leucoplagiata* (Simon, 1879) seems to be a rare cave dweller in Majorca, it has only been captured in one cave (Cove des Marmol, Genova, own data), but like *Leptoneta* it is also found in scree, the two species may be found together. The nearly cosmopolitan *Eidmannella pallida* (Emerton, 1875) has seemingly been collected only in caves in Menorca and Majorca (Pons, 2004), but it is merely a troglophile, outside the Balearic Islands it is known not to be confined to caves.

During a recent survey of the spider fauna of a few Majorcan caves unidentifiable specimens belonging to *Lepthyphantes* Menge, 1866 *sensu lato* were found. The specimens were found in subdued light near the entrances, but also in

complete dark sections of caves. The available data seems to indicate that this species is restricted to caves despite no marked morphological specializations for the cave environment. The new species keys out to *Palliduphantes* using the key in Nentwig *et al.* (2016). It fits within the *insignis*-group according to the criteria of Saaristo & Tanasevitch (2001). The aim of this paper is to describe this new species.

Material and methods

Specimens were collected by hand only. Illustrations were created from photos of selected features using a Leica Wild M10 stereomicroscope fitted with Leica DFC425 digital camera connected to a computer with Leica Application Suite software v. 4.3.0, Zerene Stacker software v. 1.04 and the vector graphics editor Inkscape v. 0.48.

Palliduphantes vadelli Lissner **sp. n.**

Fig. 1-6.

TYPE MATERIAL. Holotype 2♀♀ from Spain, Majorca, Serra de na Burguesa, Cova des Pilar (39.6012N, 2.5883E), 250 m, 30.X.2014, J. Lissner leg. (CJL-9980); deposited at the Zoological Museum of Copenhagen (ZMUC); paratypes 2♂♂ 8♀♀, same locality as holotype, 10.X.2015, J. Lissner leg. (CJL-11052); deposited at ZMUC. Only the man-made mine entrance of Cova des Pilar was investigated as the natural parts are gated.

OTHER MATERIAL EXAMINED: 1♀, Majorca, Portocolom, Cova des Ases (39.4326N, 3.2720E), 20 m, 05.IV.2016, Emilie Sofie Lissner leg. (CJL-11363); 3♂ 5♀, 1 subadult ♂, Majorca, Lluc, Cova de sa Cometa des Morts (39.8283N, 2.8903E), 530 m, 04.IV.2016, J. Lissner leg. (CJL-11333).

DIAGNOSE. The male palpal organs are distinctive as is the female epigyne. The palpal organs are most easily distinguished by the forked lamella and by the presence of a suprategular apophysis in the shape of an oval, granulated plate and with one additional basal sclerite forming a stylus. The distal part of the scape of the female epigyne exhibits an characteristic U-formed bend when viewed in lateral view, not unlike that of some congeners: *Palliduphantes byzantinus* (Fage, 1931) and *P. carusoi* (Brignoli, 1979). However, in *Palliduphantes vadelli* sp. n. the side walls appear circular in ventral view, with the scape widened and rounded apically, characters not shared with congeners also having an S-shaped bend near apex of scape.

ETYMOLOGY. The species is named in honour of Mateo Vadell, Balearic Museum of Natural Sciences, a Majorcan biospeleologist and photographer dedicated to the education and exposure of the natural values of the Balearic Islands, in particular the biological heritage of caves.

DESCRIPTION MALE. Colouration: A photo of a live male is presented in fig. 1. Prosoma, chelicers and legs reddish-brown fading to yellow-brown in alcohol preserved specimens. Sternum light greyish-brown. Abdomen reddish, grey or whitish, sometimes with dark grey chevrons or transverse bars (figs. 1, 2). **Eyes:** Of normal dimensions, not showing any clear troglomorphic adaptations. All eyes ringed with black. Those of the posterior row subequal and separated by a diameter of an PME. ALE same size as posterior eyes and nearly contiguous with PLE. AME small, about half the diameter of an PME and separated by half their diameter. Clypeus high, about 3-5 times the diameter of an AME. **Chelicers:** With distinct striulation files (about 18 ridges) and the promargin is furnished with three large teeth, the proximal one smaller than the two distal or the central one smallest. **Measurements:** (n=5, ranges): total length 1.63-1.82; prosoma length 0.75-0.84 mm, width 0.64-0.71 mm; opisthosoma length 0.90-1.20 mm. TmI range 0.13-0.16 (n=5). Legs rather uniform in length, leg formula I-II-IV-III. Leg measurements (mm, specimen from Cova des Pilar):

	Fe	Pa	Ti	Mt	Ta	Total
I	1.13	0.25	1.30	1.01	0.76	4.45
II	1.05	0.23	1.01	0.94	0.63	3.86
III	0.91	0.22	0.75	0.78	0.48	3.14
IV	1.00	0.22	0.98	1.00	0.61	3.81

Spination is identical in the two sexes and no intraspecific or right/left variation is present in the material examined. Femora I with a prolateral spine, remaining femora spineless. Each patella with two dorsal spines, the distal spine much stronger than the basal. All tibia with two strong dorsal spines, lengths ca. 4 times diameter of leg, tibia I also with a pro- and a retrolateral spine at about same position as distal dorsal spine, tibia II only with the retrolateral spine in this position. Metatarsi I-III with a dorsal spine. Positions and size of most spines are visible in fig. 2. Tm IV absent. **Male palp:** Palpal tibia swollen, possessing a stronger spine than tibia (fig. 3b). Lamella forked, apical part curved (figs. 3a, 4). Terminal apophysis flattened with granulated surfaces. Additional basal sclerite stylus-like. Lateral edge of the paracymbium with a posterior tooth and a small bifurcate anterior extension (fig. 3b). The structures of the embolic division are presented in fig. 4.

DESCRIPTION FEMALE. Colouration, eyes, and chelicers, spination: As in male. The habitus of an alcohol preserved female with vague abdominal chevrons is depicted in fig. 2. **Measurements:** (n=5, ranges): total length 1.67-2.38; prosoma length 0.75-0.93 mm, width 0.62-0.76 mm; opisthosoma length 1.13-1.62 mm. Prosoma lengths of females are on the average 0.14 mm larger than those of males, but smaller females overlap in size with larger males. TmI range 0.14-0.17. n=5 Leg measurements (mm, specimen from Cova des Pilar):

	Fe	Pa	Ti	Mt	Ta	Total
I	1.25	0.27	1.27	1.15	0.73	4.67
II	1.19	0.27	1.10	1.02	0.66	4.24
III	1.02	0.23	0.86	0.86	0.53	3.50
IV	1.27	0.25	1.18	1.14	0.68	4.52

Epigyne and vulva: The epigyne is strongly projecting with scapus S-shaped in lateral view, copulatory openings situated in a pocket in a slight swelling near the tip (fig. 5a). The lateral plates curved such as the main stem of the epigyne appears subcircular in ventral view (fig. 5b). Scape is gradually widened posteriorly. The vulva are presented in posterior view for maximum visibility of structures in fig. 6.

RELATIONSHIPS. The new species seem closest to *P. byzantinus* (Fage, 1931), *P. carusoi* (Brignoli, 1979), *P. culicinus* (Simon, 1884), based on overall appearance of genitals. These species are all members of the *insignis*-group (Saaristo & Tanasevitch, 2001) characterized by the paracymbium having a prominent posterior tooth and a small spine- or fingerlike anterior extension, by curved apical part of lamella characteristic, and by a S-shaped scape as seen in lateral view. *P. balearicus* is endemic to Menorcan caves (Ribera, 1989). Like *P. vadelli* n. sp. it lacks troglomorphic adaptations but the two species do not seem closely related when comparing illustrations of genitals.

ECOLOGY. At Cova des Pilar the species was found in subdued light in moist conditions among small stones at ground level in a mine entrance presumably connected to the cave. At Cova des Ases and Cova de sa Cometa des Morts specimens were found away from the entrances in sections of complete darkness. Here specimens were collected from undersides of larger stones on the cave floor, some stones with 3-4 specimens. The specimens of Vadell *et al.* (2005) were found in very humid environment in Sala de ses Galeries and Sala de ses Rates in the natural parts of Cova des Pilar.

DISTRIBUTION. Majorca: Cova des Pilar, Cova des Ases and Cova de sa Cometa des Morts (this study). It is very likely that specimens attributed to *Lepthyphantes* sp. in previous investigations of the cave fauna of Cova des Pilar (Vadell *et al.*, 2005) and Cova de sa Cometa des Morts (Pons & Damians, 1992) also conform to this species. The males collected by Vadell *et al.* (2005) are slightly smaller (1.5 mm) than males collected in this study (1.63-1.82 mm) which may relate to their specimens being found deeper in the cave with less food availability. Orghidan *et al.* (1975) also mention unidentified *Lepthyphantes* species from various caves of Majorca: Cova de Carolina Facchi, Palma, Coves del Drac, Manacor, and Cova des Pont, Manacor. Thus the species may have been known since 1970. However, it is also possible that more than one species of *Palliduphantes* occur in Majorcan



Fig. 1-2. *Palliduphantes vadelli* sp. n.: Cova des Pilar: 1. Habitus of male. 2. Habitus of alcohol preserved female.

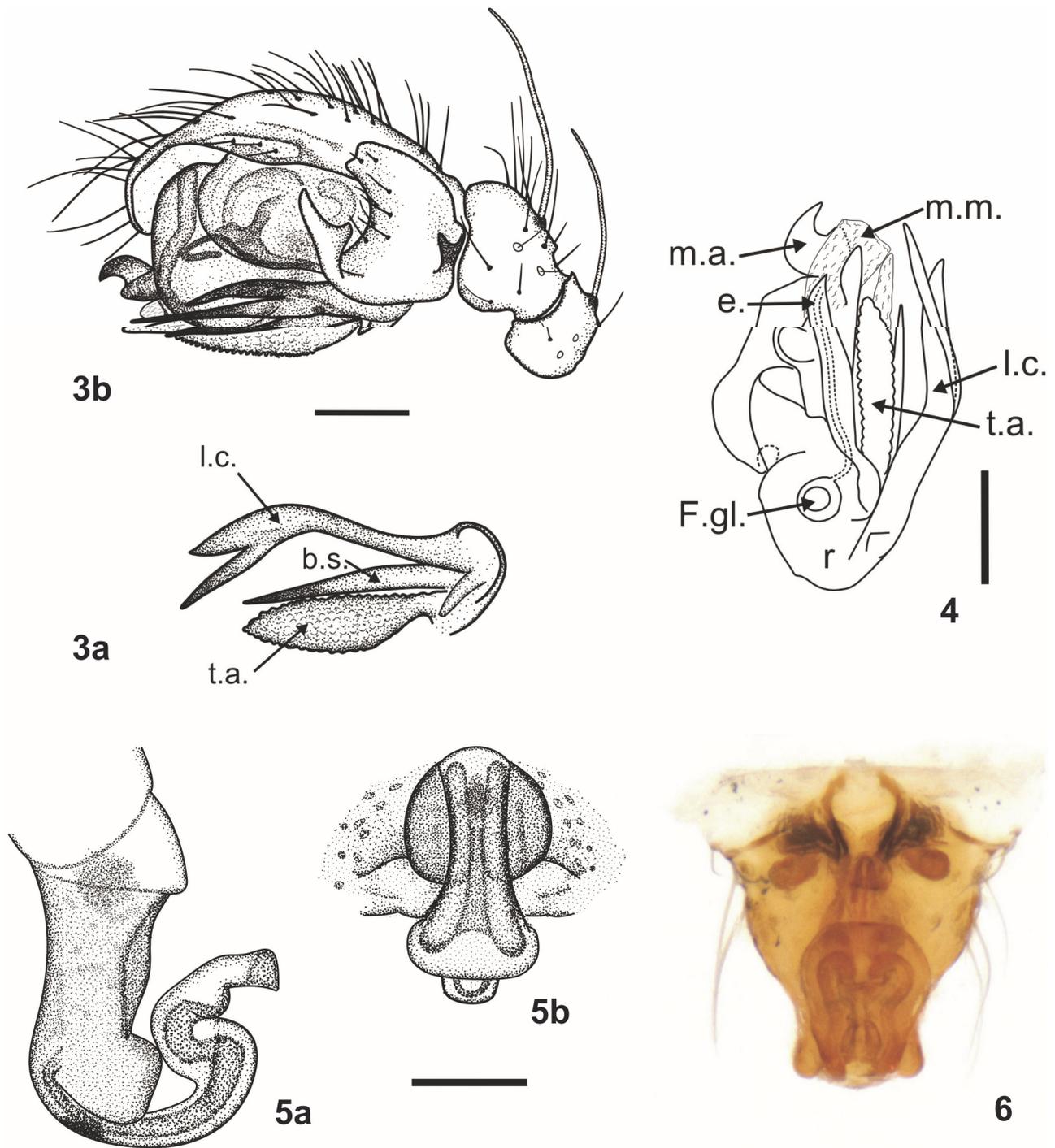


Fig. 3-6. *Palliduphantes vadelli* sp. n. **3. A)** Lamella with adjoining sclerites. Abbreviations: l.c. = lamella characteristic; b.s. = a basal stylus of supratégulum; t.a. = terminal apophysis. **B)** Male palp in retrolateral view. Scale bar 0.1 mm. **4.** Outline of embolic division in ventral view. Abbreviations: m.a. = median apophysis; m.m. = median membrane (membranous conductor); e. = embolus; F.gl. = Fickert's gland; r = radix; t.a. = terminal apophysis; l.c. = lamella characteristic. Scale bar 0.1 mm. **5. A)** Epigyne in lateral view. **B)** same in ventral view. Scale bar 0.1 mm. **6.** Photo of vulva in posterior view. Scale bar 0.1 mm.

caves. Orghidan *et al.* (1975) mention that two females collected had completely reduced eyes. All 22 specimens of *P. vadelli* sp. n. collected in this study possess eyes of normal proportions.

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