2025	Heteropterus Revista de Entomología **Heteropterus Rev. Entomol.**	**25(2):** 189-205

ISSN: 1579-0681

Macrolophus helenae n. sp. from Monegros, northern Iberian Peninsula (Hemiptera: Heteroptera: Miridae)

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Abstract

A new species of the plant bug genus *Macrolophus* Fieber, 1858 (Miridae: Bryocorinae: Dicyphini), *Macrolophus helenae* **n. sp.**, is described from the semi-arid region of Monegros, northern Iberian Peninsula. It is readily distinguishable from the other species of the genus by characters of external morphology, such as the small size, the shape of the postocular black stripe and particularly the submacroptery of males. Its only known host plant is *Onopordum corymbosum* (Asteraceae), on which it occurs in high densities.

Key words: Hemiptera, Heteroptera, Miridae, Bryocorinae, Dicyphini, *Macrolophus helenae* **n. sp.**, Iberian Peninsula, taxonomy.

Resumen

Macrolophus helenae *n. sp. de Monegros, norte de la Península Ibérica* (*Hemiptera: Heteroptera: Miridae*)

Se describe una nueva especie de mírido del género *Macrolophus* Fieber, 1858 (Miridae: Bryocorinae: Dicyphini), *Macrolophus helenae* **n. sp.**, de la región subárida de Monegros, en el norte de la Península Ibérica. Se distingue fácilmente del resto de especies del género por caracteres de morfología externa, tales como su pequeño tamaño, la forma de la franja postocular negra y especialmente el submacropterismo de los machos. Su única planta hospedadora conocida es *Onopordum corymbosum* (Asteraceae), en la que se presenta en altas densidades.

Palabras clave: Hemiptera, Heteroptera, Miridae, Bryocorinae, Dicyphini, *Macrolophus helenae* **n. sp.**, Península Ibérica, taxonomía.

Laburpena

Macrolophus helenae *n. sp. Monegrosekoa, Iberiar Penintsularen iparraldea* (*Hemiptera: Heteroptera: Miridae*)

Miridoen *Macrolophus* Fieber, 1858 generoko (Miridae: Bryocorinae: Dicyphini) espezie berri bat, *Macrolophus helenae* **n. sp.**, deskribatzen da Monegrosekoa, Iberiar Penintsularen iparraldeko eskualde erdi-idorrekoa hain zuzen. Genero honetako beste espezieengandik erraz bereizten da kanpo-morfologiaren zenbait karaktereri esker, hala nola bere tamaina txikia, marra postokular beltzaren itxura eta bereziki arren submakropterismoa. *Onopordum corymbosum* (Asteraceae) da ezagutzen den landare ostalari bakarra, bertan dentsitate altuetan bizi delarik.

Gako-hitzak: Hemiptera, Heteroptera, Miridae, Bryocorinae, Dicyphini, *Macrolophus helenae* **n. sp.**, Iberiar Penintsula, taxonomia.

Introduction

The genus *Macrolophus* Fieber, 1858 (Miridae: Bryocorinae: Dicyphini) consists of about 30 species of Palaearctic, Nearctic or Neotropical distribution, as well as a single African member (Kerzhner and Josifov, 1999; Schuh, 2002-2013; Aukema, 2018). According to Cassis (1986), it probably is a polyphyletic taxon, with the species in the Western Hemisphere not appearing to be congeneric with the Palaearctic ones. Up to nine species, forming a rather homogeneous taxonomic group, are nowadays recognized in the Palaearctic Region (Aukema, 2018): *M. costalis* Fieber, 1858, *M. epilobii* V.G. Putshkov, 1978, *M. geranii* Josifov, 1961, *M. glaucescens* Fieber, 1858, *M. klotho* Linnavuori, 1992, *M. melanotoma* (A. Costa, 1853), *M. pericarti* Heiss & J. Ribes, 1998, *M. pygmaeus* (Rambur, 1839) and *M. rubi* Woodroffe, 1957.

Their taxonomic and nomenclatural history is complex (see, for example: Wagner, 1974; Putshkov, 1978; Melber *et al.*, 1991; Josifov, 1992; Rieger and Strauss, 1992; Carapezza, 1995; Grozeva *et al.*, 2007; Konstantinov and Neimorovets, 2021), resulting in difficulties for identification. Due to their agronomic importance as biocontrol agents, several research teams have been addressing considerable efforts to achieve accurate identifications, particularly focused on the separation *M. melanotoma* / *M. pygmaeus* (*e.g.* Perdikis *et al.*, 2003; Martinez-Cascales *et al.*, 2006; Jauset *et al.*, 2017).

At the end of May 2024, a single female of *Macrolophus* was collected by net sweeping of ruderal vegetation in Monegros, near Zaragoza (Aragon, northern Iberian Peninsula and Spain). Subsequent examination revealed that it did not belong to any of the known species in this genus. In 2025 more thorough field research has been carried out in the same exact location, but on earlier dates and involving «botanically attentive» samplings, plant by plant. As a result, a dense population closely associated with the thistle *Onopordum corymbosum* (Asteraceae) has been found.

Being a typical member of the Palaearctic group of *Macrolophus*, it is actually very different from all other species. Its most distinguishing characters are the small size, the submacroptery of males and the shape of the postocular black stripe. This unmistakable new species, the tenth for the Palaearctic Region, is described and illustrated below as *Macrolophus helenae* **n. sp.**, together with a comparison with the other species and a brief discussion on what is known about its biology and distribution.

Methodological remarks

The description is based on the whole type series but the complete set of morphometric characters has been measured in a limited number of males and females (12 ♂♂, 12 ♀♀ + 4 additional, submacropterous ♀♀), encompassing the smallest and largest specimens of both sexes. For most characters, the whole range is given in parentheses after the average value. When possible and/or convenient (*e.g.* characters showing sexual dimorphism), measurements are indicated separately for males and females. They are given in millimetres (mm), and in greater detail in the full description than in the diagnosis.

The specimens are mounted on a white card, several of them with the genitalic structures glued on an additional card or deposited inside a microvial which are pinned below. Labels are exactly transliterated in quotation marks, with «/» indicating separation of lines in the same label and «//» separation of labels in the same pin.

Results

***Macrolophus helenae* n. sp.** (Figs. 1-8, 10)

Type material:

HOLOTYPE:

♂ labelled «ZARAGOZA: Los Monegros: / Osera de Ebro, 30TYM0302, / 200 m, *Onopordum corymbosum*, / 18-04-2025 / S. Pagola Carte *leg.*» // «HOLOTYPE ♂ / *Macrolophus* / *helenae* **n. sp.** / Pagola-Carte, 2025», deposited in the Muséum National d'Histoire Naturelle (Paris) with number MNHN EH33057.

PARATYPES: 72 ♂♂, 117 ♀♀:

1 ♀ labelled «ZARAGOZA: Los Monegros: / Osera de Ebro, 30TYM0302, / 200 m, 21-05-2024 / S. Pagola Carte *leg.*»; 52 ♂♂, 104 ♀♀ idem as holotype; 20 ♂♂, 12 ♀♀ idem as holotype but 5-05-2025. All of them also labelled «PARATYPE ♂ [or ♀] / *Macrolophus* / *helenae* **n. sp.** / Pagola-Carte, 2025», and deposited in the following collections: 1 ♂, 2 ♀♀, Muséum National d'Histoire Naturelle, Paris, with numbers MNHN EH33058, EH33059 and EH33060; 2 ♂♂, 2 ♀♀, Museo Nacional de Ciencias Naturales,

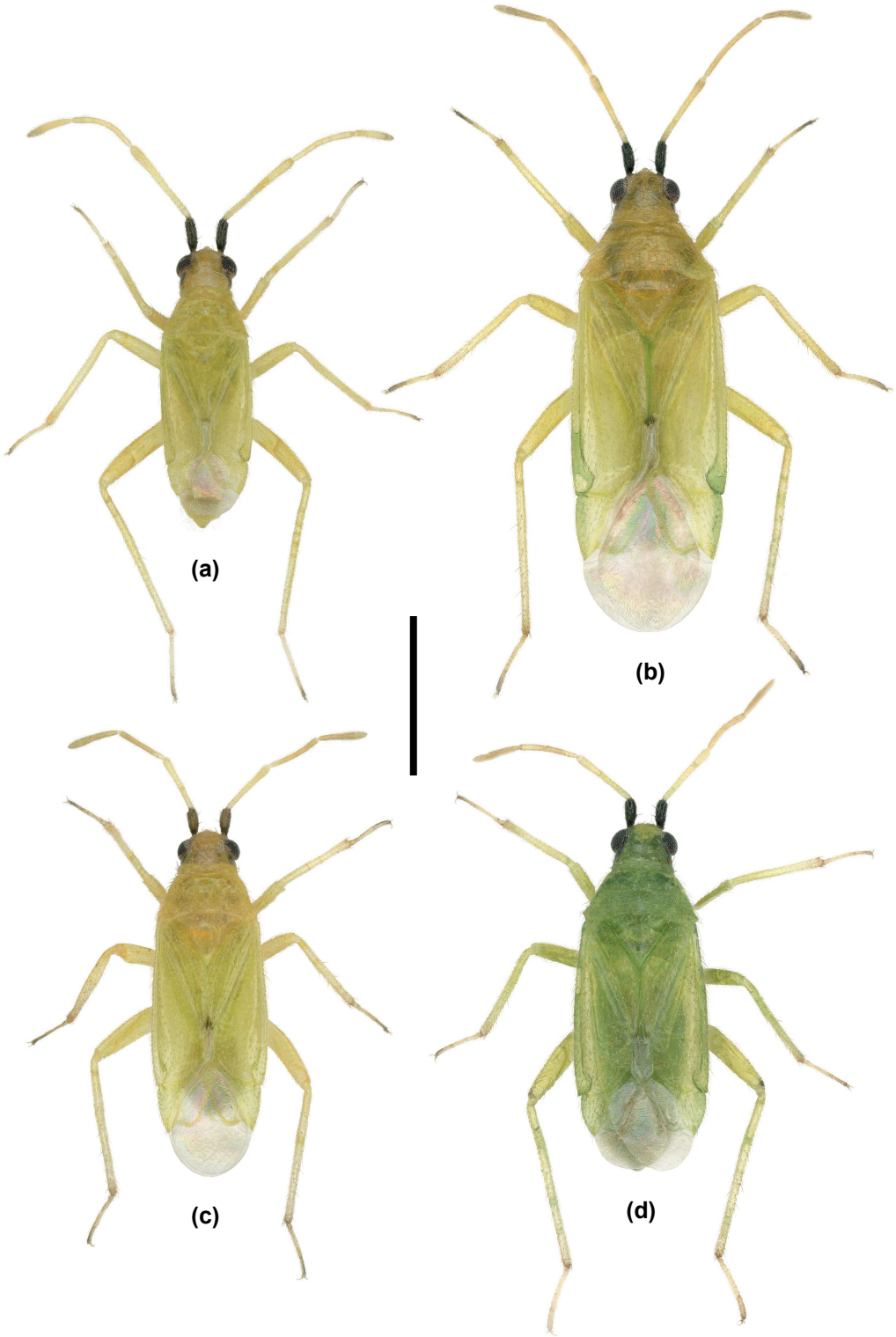

FIGURE 1. *Macrolophus helenae* **n. sp.**, habitus in dorsal view: (a) Male (holotype), submacropterous; (b)-(d) Females (paratypes): (b) Macropterous female of typical size; (c) Macropterous female of small size; (d) Slightly submacropterous female (Scale bar = 1 mm) (Photos: Jean-Claude Streito).

Madrid (MNCN); 2 ♂♂, 2 ♀♀, Museu de Ciències Naturals, Barcelona (MCNB); 2 ♂♂, 2 ♀♀, Zoologisches Museum, Universität Hamburg (ZMUH); 1 ♂, 1 ♀, coll. Aukema, Bennekom; 1 ♂, 1 ♀, coll. Carapezza, Palermo; 1 ♂, 1 ♀, coll. Günther, in Naturhistorisches Museum Mainz; 1 ♂, 1 ♀, coll. Heiss, in Tiroler Landesmuseum Ferdinandeum; 1 ♂, 1 ♀, coll. Magnien, Paris; 4 ♂♂, 4 ♀♀, coll. Matocq, Paris; 50 ♂♂, 94 ♀♀, coll. Pagola-Carte, Villabona; 1 ♂, 1 ♀, coll. Rieger, Nürtingen; 1 ♂, 1 ♀, coll. Strauss, Biberach; 4 ♂♂, 4 ♀♀, coll. Streito, Montpellier.

Diagnosis:

Submacropterous males of 1.5–1.8 mm long (dry-preserved specimens) and generally macropterous females of 2.2–3.1 mm long. Body elongate to elliptic (♂♂) or elongate to ovate (♀♀). General colour bright green (living specimens) with antennal segment I entirely black, a postocular black spot in the form of a triangle-shaped stripe tapering posteriad, and black markings on the apex of clypeus and apex of clavus. Head subquadrate in lateral view. Labium reaching or slightly surpassing metacoxae. Antennae short, about 0.85 × (♂♂) and 0.50 × (♀♀) total length, with segment II clavate and equal (♀♀) or slightly longer (♂♂) than segment III.

Description:

General habitus:

Submacropterous males (Fig. 1a) and macropterous females (Fig. 1b-c) except for about 5% of females, slightly submacropterous (Fig. 1d) (see below their few differences in the subsection «Wing polymorphism in females»). Length: ♂♂ = 1.68 (1.49–1.80) mm; ♀♀ = 2.82 (2.20–3.04) mm. Length to the apex of hemelytra[1] in ♂♂ = 1.49 (1.28–1.70) mm. Body elongate to elliptic or even spindle-shaped (♂♂) or elongate to ovate (♀♀), 3.21 (2.90–3.38) × (♂♂) and 3.48 (3.36–3.56) × (♀♀) longer than basal width of pronotum and 2.97 (2.77–3.20) × (♂♂) and 2.91 (2.75–3.01) × (♀♀) longer than maximum width. Maximum width approx. at the level of the apex of scutellum (♂♂) or at the level of the apex of clavus (♀♀). Dorsal surface smooth and shiny. General colour bright green (fading to yellow in dry-preserved specimens, particularly quickly concerning the appendages) with some black parts and markings: the antennal segment I entirely, a postocular stripe, the apex of clypeus and the apex of clavus; in addition, the apex of labium and the tarsomere III of all tarsi darkened. Dorsal vestiture consisting of rather strong, semierect to erect setae of white to brown colour (colour mostly depending on the angle of light incidence; see, for example, Figs. 4g, 5b).

Head:

Subpentagonal in dorsal view (Figs. 1, 4i), subquadrate in lateral view (Fig. 4a-d), and slightly wider than high, hot-air balloon-shaped in front view (Fig. 4g-h). Rounded anteriorly and dorsally. With well-developed postocular region, its margins in dorsal view convex to subparallel. Ground colour green. On either side, a postocular black spot (Figs. 4, 5a-b), in the form of a triangle-shaped stripe tapering posteriad, starting broad at the posterodorsal edge of eye and reaching the pronotum strongly reduced; these stripes visible in dorsal view. Vestiture consisting of abundant, semierect, (mostly) pale setae, increasingly longer dorsad and posteriad. Diatone = 0.36–0.40 mm (♂♂); 0.40–0.45 mm (♀♀). Vertex sub-flat in lateral or dorsolateral view (Fig. 4a-f). Frons evenly convex and protruded anteriad of antennal fossae ca. 1/3 of the eye length. Frons and clypeus meeting along a marked notch. Clypeus straight, subvertical in lateral view, protruded, with apex not concealed by frons in dorsal view, but only extended to basal fourth of antennal segment I; apex of clypeus black or blackish in most males and in nearly all females. Eyes distinctly removed from pronotum; black or black with maroon margins, not particularly globose in dorsal view, oblong-reniform and occupying ca. 3/4 (♂♂) or ca. 2/3 (♀♀) of the height of head in lateral view; blackberry-like in lateral view, with granular appearance and minute setae arising from between the ommatidia (Fig. 4b-e); ocular index: ♂♂ = 2.01 (1.75–2.29); ♀♀ = 2.09 (2.00–2.27). Labium slender, reaching or exceeding metacoxae; segments I, II and III subequal in length and pale greenish, segment IV slightly longer and with apical 1/3 to 1/2 infuscated.

Antennal insertion in front of eye, below its mid-height. Antennae strongly sexually dimorphic (Figs. 1,

[1] Due to the submacropterous condition of males and to the shrinking of abdomen in dry-preserved specimens, the character «Total length» is not an accurate measurement of their true length but only of the length observable in the type series (compare Fig. 1a *vs.* Fig. 2). The character «Length to the apex of hemelytra» is more accurate and can be directly compared (at least for certain purposes) with the «Total length» of females, in which, due to their macropterous condition, both measurements are equivalent.

Figure 2. *Macrolophus helenae* **n. sp.**, living male individuals on the host plant *Onopordum corymbosum* (Asteraceae).

5d-e), proportionally longer in males, as follows: (a) in both sexes: all segments terete; segment I the thickest, barrel-shaped, aprox. as long as vertex width and entirely black; segments II, III and IV pale greenish, quickly fading to yellowish or whitish in dry-preserved specimens (Figs. 2-3 *vs.* Figs. 1, 5d-e); segment III most often arched outwards; segment IV spindle-shaped and slightly thicker than segment III; all antennal segments covered in abundant, short, adpressed to semierect pale setae directed forward; inner side of segment I additionally bearing two erect or spine-like setae longer (subequal to segment width) and darker; (b) in ♂♂: length about 0.85 × total length; length of segments: I–II–III–IV = (0.19–0.23) – (0.40–0.58) – (0.34–0.51) – (0.23–0.38) mm; with segment II markedly clavate and approx. 1.25 × segment III in length; ratio segment II / diatone = 1.33 (1.10–1.53); ratio segment II / basal width of pronotum = 0.97 (0.80–1.05); ratio segment II / length of protibia = 0.87 (0.76–0.96); ratio segments II / III+IV = 0.73 (0.64–0.80); (c) in ♀♀: length about 0.50 × total length; length of segments: I–II–III–IV = (0.19–0.23) – (0.38–0.48) – (0.35–0.45) – (0.33–0.40) mm; with segment II only slightly clavate and subequal to segment III in length; ratio segment II / diatone = 1.04 (0.94–1.12); ratio segment II / basal width of pronotum = 0.56 (0.53–0.59); ratio segment II / length of protibia = 0.75 (0.69–0.79); ratio segments II / III+IV = 0.59 (0.55–0.63).

Thorax:

Entirely green, without dark markings. Vestiture consisting of abundant, semierect to erect, (mostly)

FIGURE 3. *Macrolophus helenae* **n. sp.**, living female individuals on the host plant *Onopordum corymbosum* (Asteraceae).

pale setae. Pronotum subtrapezoidal, 1.89 (1.75–2.10) × (♂♂) and 2.00 (1.86–2.14) × (♀♀) wider than long (including collar) and 1.38 (1.31–1.47) × (♂♂) and 1.87 (1.63–2.00) × (♀♀) wider than diatone; lateral margins linear; anterior margin substraight, with a small concavity medially; posterior margin broadly concave in a large portion, thus leaving mesoscutum largely exposed and posterolateral angles of pronotum forming each a winglet-like lobe; moderately declivent anteriad, in continuity with the head profile in lateral view (Fig. 5b); basal width: ♂♂ = 0.52 (0.50–0.55) mm; ♀♀ = 0.81 (0.65–0.90) mm; mesal length (including collar): ♂♂ = 0.28 (0.25–0.30) mm; ♀♀ = 0.41 (0.35–0.45) mm; collar thick (= long), about 20% of the total length of pronotum; anterior half of pronotum with calli faintly distinct, in some males almost fused with disc; a mesal, longitudinal groove along the entire pronotum (including

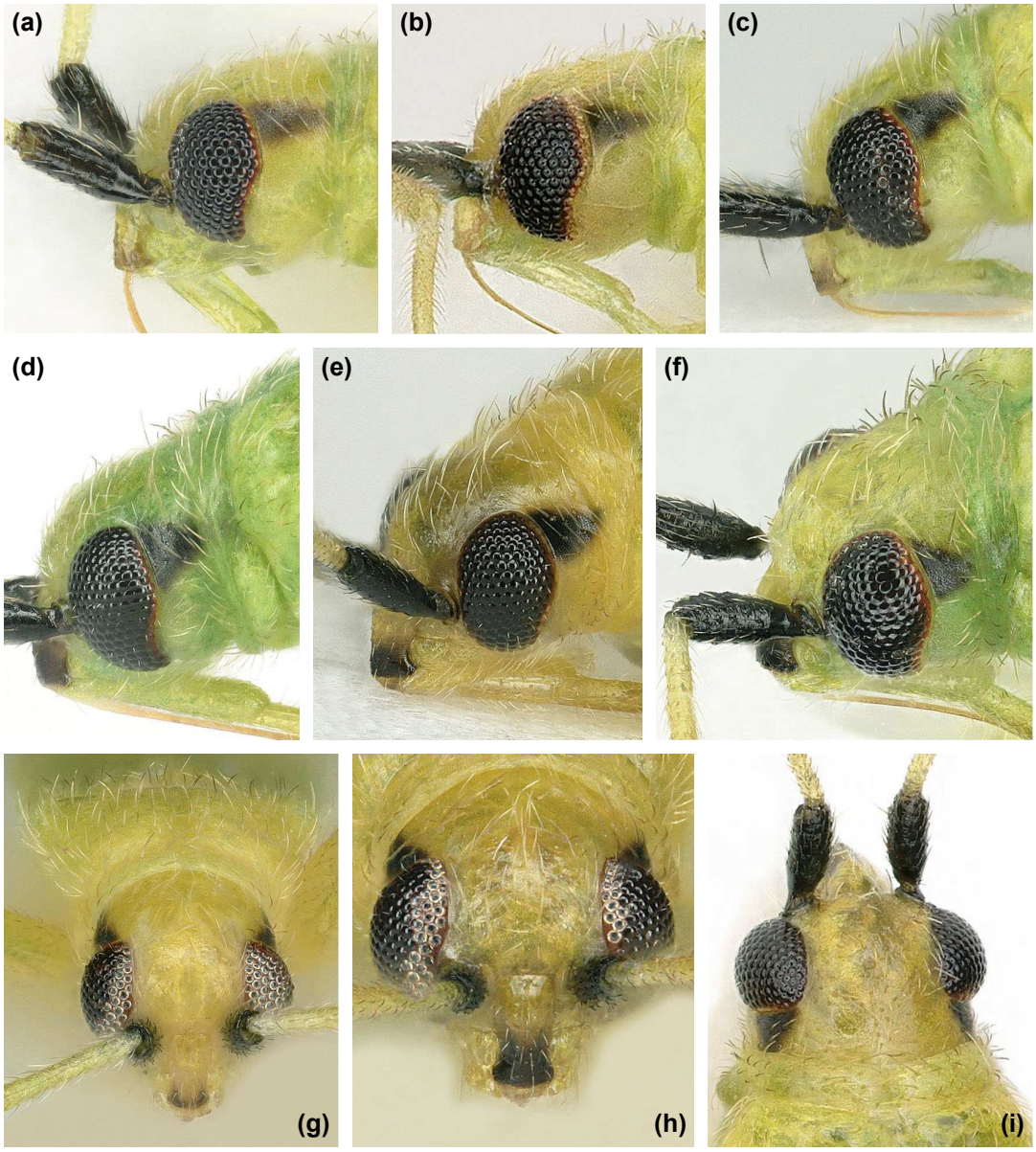

FIGURE 4. *Macrolophus helenae* **n. sp.**, details of external morphology: Head in several views and specimens: (a)-(c), (g) Males; (d)-(f), (h)-(i) Females / (a)-(d) Lateral view; (e) Anterolateral view; (f) Dorsolateral view; (g)-(h) Frontal view; (i) Subdorsal view (Photos: Jean-Claude Streito).

collar), deepest posteriorly to calli (Fig. 5a), noticeable in most specimens and particularly depressed or conspicuous in most males. Mesoscutum largely exposed, moderately swollen; a central depression between mesoscutum and scutellum (Fig. 5c). Scutellum subtriangular, slightly wider than long, apically swollen; apex of scutellum concolor, never darkened. Thoracic pleura as in Fig. 5b.

Legs:

Femora and tibiae linear and immaculate[2], pale greenish, quickly fading to yellowish or whitish in dry-preserved specimens (Figs. 2-3 *vs.* Figs. 1, 5); covered in abundant, adpressed to semierect pale setae directed apicad and generally no longer than tibial width; meso- and metatibiae (Fig. 6a) bearing pale, erect spines, equal or slightly longer than tibial width, generally in apical 2/3; and also several rows of minute, dark spinelets in apical 2/3 (mesotibiae) or along its entire length (metatibiae). All tarsi with roughly similar colouration: tarsomeres I and II pale greenish and tarsomere III apically darkened, at least dorsally. Length of metatibiae: ♂♂ = 1.01 (0.93–1.05) mm; ♀♀ = 1.12 (0.93–1.20) mm. Ratio metatibia / basal width of pronotum: ♂♂ = 1.93 (1.76–2.05); ♀♀ = 1.38 (1.28–1.50). Length of metatarsomeres (relative proportions) (Fig. 6a): I–II–III = 9 – 17 – 12, with length of II = approx. 1.5 × length of III. Claws (Fig. 6b-c) strongly curved, with basal projection sharply pointed and pseudopulvilli leaf-shaped, moderately wide and as long as the main part of the claw; a third, sharp, middle projection visible protruding from the unguitractor plate downwards.

Hemelytra:

Entirely green except for the apex of clavus black (Fig. 5c), this only slightly darkened in very few specimens, particularly males. Vestiture consisting of strong, semierect to erect setae of white to brown colour, more evenly distributed than on head and thorax and more scattered on dorsal surfaces (clavus-corium-cuneus) than along the costal margin (Fig. 5c). Completely developed in the macropterous condition of most females (but see below the subsection «Wing polymorphism in females») or reduced in the submacropterous condition of all males (Fig. 5b), this reduction mainly due to the narrowing of corium beyond clavus and the shortening of membrane. All the veins, clavus, embolium, cuneus, with every suture, commisure or fracture present in both forms. Sides moderately arcuate (♀♀) or converging posteriad (♂♂). Largely surpassing the apex of abdomen (♀♀) or leaving the abdominal segments VII-IX exposed (♂♂) (for this character, see photographs of living males in Fig. 2 rather than those of dry-preserved ones). Membrane hyaline to pale greyish, slightly darkened apically; bearing two cells in both sexes or wing conditions, these not surpassing the apex of cuneus, the minor cell very small, in some specimens almost undistinct; veins green and with rounded angles; in some females, a greenish or fuscous marking surrounding the veins.

Abdomen:

Entirely green, including genital segments. The green colour brighter in females.

Wing polymorphism in females:

Curiously, among macropterous females, most of the specimens are distributed in the upper part of the size range (2.7–3.0 mm) (Fig. 1b), and there is a minority which «jumps» to the lower part (2.2–2.4 mm) (Fig. 1c), with almost no intermediate specimens. Consequently, the average size is near 2.8 mm. Even the smallest female collected (2.2 mm) shows the typical shape and proportions of the larger macropterous females (compare Fig. 1b *vs.* 1c). On the other hand, there exists a «slightly submacropterous» form among females (Fig. 1d), with total length = 2.28 (2.11–2.45) mm, representing about 5% of all females (*versus* 100% of the «true submacropterous» form among males). In this case, their shape is obviously different: (1) with regard to the typical macropterous females, as shown by the ratio total length / pronotum width = 3.22 (3.07–3.29), which is similar to that of males due to hemelytral reduction and shape of pronotum; (2) but also in relation to the typical specimens of both sexes (submacropterous males and macropterous females), as shown by the ratio total length / maximum width = 2.73 (2.54–2.93), which is lower due to their general shape: stouter and more ovate, with the maximum width not at the level of the apex of clavus but beyond. Finally, it should be pointed out that the smallest specimens of both sexes, but particularly the submacropterous females, tend to keep the green colour brighter (and/or bright for longer) when dry-preserved (for example: Fig. 1d).

Male genitalia:

Pygophore (Fig. 7a) short, subcylindrical to troncoconical, moderately pointed ventroapically; with a very short process near base of left paramere. Right paramere as in Fig. 7b, markedly small and with two setae basally. Left paramere as in Fig. 7c, with abundant, long, coarse, erect setae, many of them exceeding the apex of apophysis; shaft of the paramere curved and externally swollen, rounded; apophysis double-curved, sigmoid in caudal view

[2] In a few specimens, some kind of dirt or clot in the joint femur/tibia generates the illusion of a black spot («knee») at the base of one or another tibia.

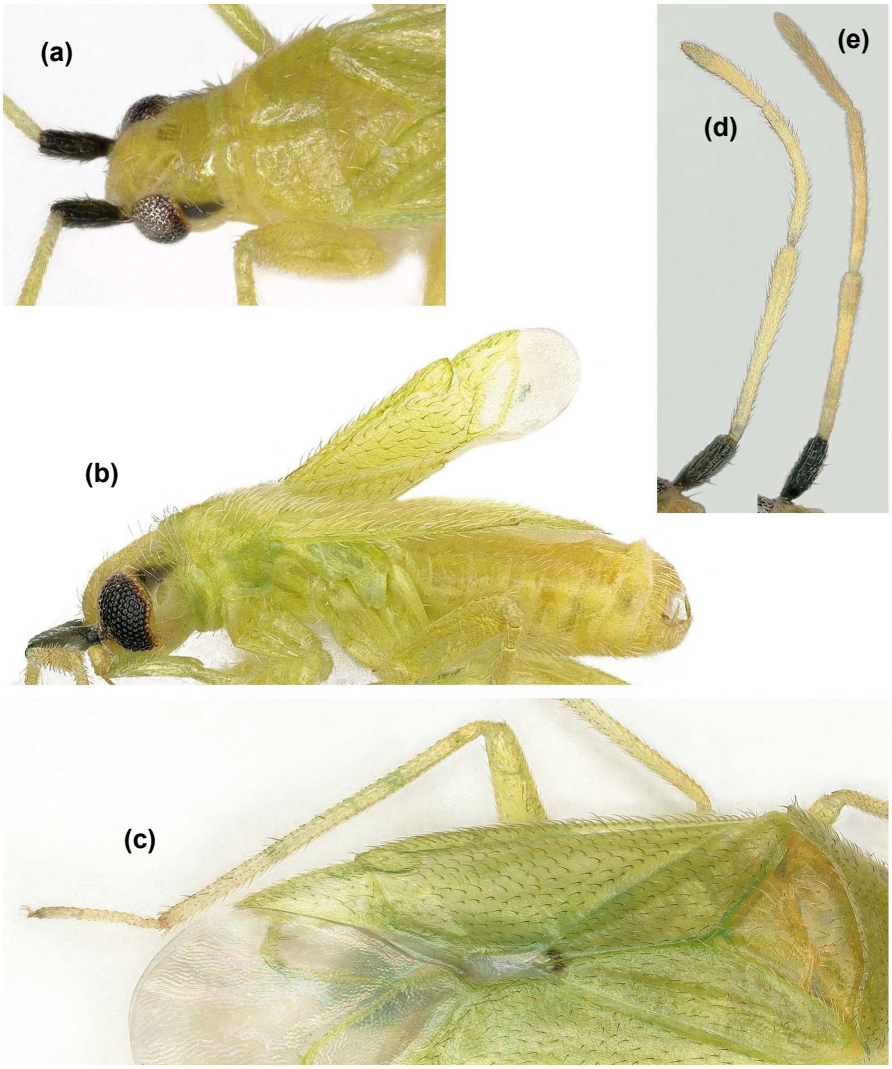

FIGURE 5. *Macrolophus helenae* **n. sp.**, details of external morphology: (a)-(b), (d) Males; (c), (e) Females / (a) Anterior part of the body oriented so that the longitudinal groove of pronotum is shown; (b) Left lateral view of a specimen with the right hemelytron spread; (c) Right dorsolateral view of hemelytra oriented so that the dorsal vestiture is best shown; (d)-(e) Left antenna (Photos: Jean-Claude Streito).

(Fig. 7a). Endosoma (Fig. 7d) very small, gently curved, with an elongate, chitinized internal structure; phallotheca provided with several longitudinal chitinized edges.

Female genitalia (Fig. 8):

Seminal reservoir (anterior region of the genital chamber) long, with two barely visible glandular patches basolaterally. Posterior region of the genital chamber rounded to subrectangular; sclerotized rings in dorsal view ovate to subtriangular, separated from each other by a distance ca. 4 × their transverse diametre and showing interindividual variability in length and degree of chitinization (compare Fig. 8a *vs.* 8b); lateral margins of the genital chamber adjacent to sclerotized rings folded upwards and concealing them partly; lateral oviducts moustache-shaped, very conspicuous; vermiform gland long, inflated at middle.

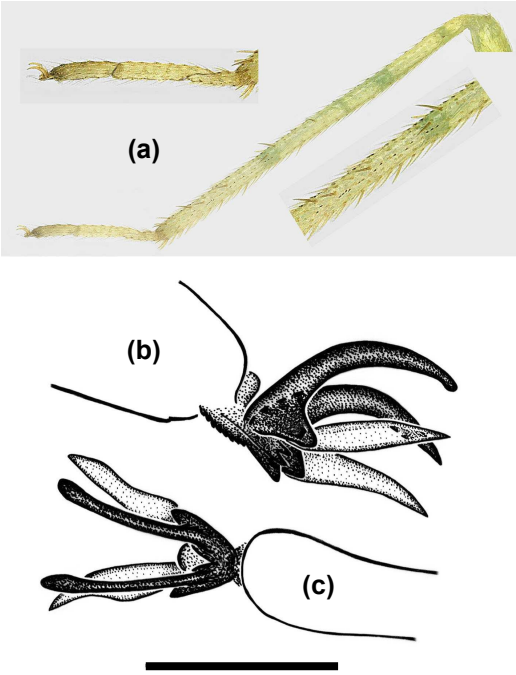

FIGURE 6. *Macrolophus helenae* **n. sp.**, details of external morphology: Metaleg (female): (a) Left metatibia and metatarsus showing length proportions of metatarsomeres and tibial spines and spinelets; (b)-(c) Right pretarsal structures showing claws in ventrolateral and subdorsal views (Scale bar = 0.05 mm) (Photos: Jean-Claude Streito).

Etymology:

The name of the new species is dedicated to Helena Agell Argilés, for being who she is, for her love and support. The first specimen of *Macrolophus helenae* **n. sp.** was found in the course of a collecting trip with her on the Monegrine lands that had brought us together some time ago... The name is a noun in genitive, invariable.

Type locality:

Spain: autonomous community of Aragon: province of Zaragoza: surroundings of Osera de Ebro (but within the municipality of Villafranca de Ebro). Additionally, this locality belongs to the natural region «Monegros» or «Los Monegros», although not to the homonymous administrative division but to the one called «Comarca Central» (which also includes the city of Zaragoza).

Distribution and biology:

Macrolophus helenae **n. sp.** is hitherto only known from the type locality in Monegros, *i.e.* the most arid region in the northern half of the Iberian Peninsula and one of the most interesting natural regions of the Iberian Peninsula and even of western Europe (see: Pedrocchi Renault, 1998; Melic and Blasco-Zumeta, 1999). It seems to be closely associated to the thistle *Onopordum corymbosum* (Asteraceae), on which a dense population has been observed between April and May (Figs. 2-3, 10).

Onopordum corymbosum is endemic to the eastern half of the Iberian Peninsula and grows on road edges, in fallow lands and within certain types of grasslands (Aizpuru *et al.*, 1999; Ortega Olivencia, 2014). It has glandular hairs (see Figs. 2-3), particularly on the underside of leaves, on bracts and on stem wings, and it emits a strong goat smell (pers. obs.).

The individuals of the new species skillfully walk among those glandular hairs (Figs. 2-3). Adult males and females are mainly observed walking up and down along the plant stem and leaves, but especially hiden inside the shelters provided by the curled parts of leaves and stem wings. As a matter of fact, they are not easy to collect due to the protection offered simultaneously by the plant spines and those curlings. On the contrary, most of the nymphs are more visible, since they mainly occur, in large groups, on the capitula of the thistles, where they spent most of the time sucking (Fig. 10e-g). In fact, phytophagy has been observed both in nymphs and adults. On the contrary, no zoophagous behaviour has been recorded until now. Concerning some of its potential predators, the plant bugs *Deraeocoris* (*Camptobrochis*) *serenus* (Douglas & Scott, 1868) and *D.* (*D.*) *ribauti* Wagner, 1943 (Miridae: Deraeocorinae) have frequently been observed on the same plants. Likewise, the abundance of Neuroptera larvae seems to be correlated with the abundance of the new species of *Macrolophus*, particularly regarding the nymphs on the capitula.

Due to the phenology of the plant and according to the collection data of the mirid, it can be assumed that *Macrolophus helenae* **n. sp.** is a univoltine spring species (but see Discussion). In fact, I have not been able to detect it later in the year (summer and autumn) neither on its known host plant nor on others. It must be pointed out that a number of thistle species can be found in the same locality and neighbouring areas, frequently growing together and simultaneously. Nevertheless, the new species always appears as strictly dependent on *Onopordum corymbosum*.

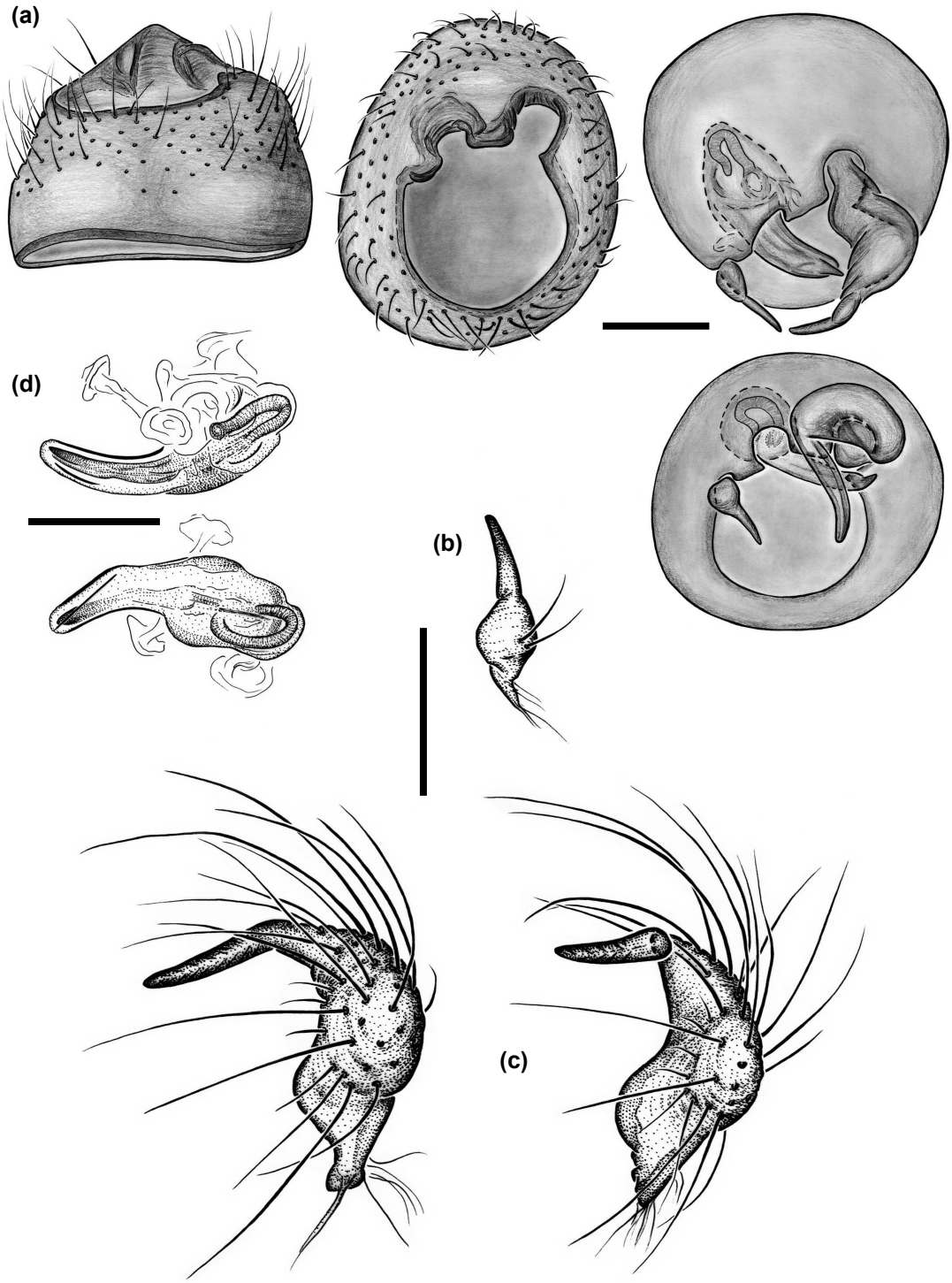

FIGURE 7. *Macrolophus helenae* **n. sp.**, male genitalia: (a) Pygophore, four views and/or specimens (parameres and endosoma removed or not, setae omitted or not); (b) Right paramere; (c) Left paramere in two views; (d) Endosoma in two views (phallotheca not removed) (Scale bars = 0.1 mm).

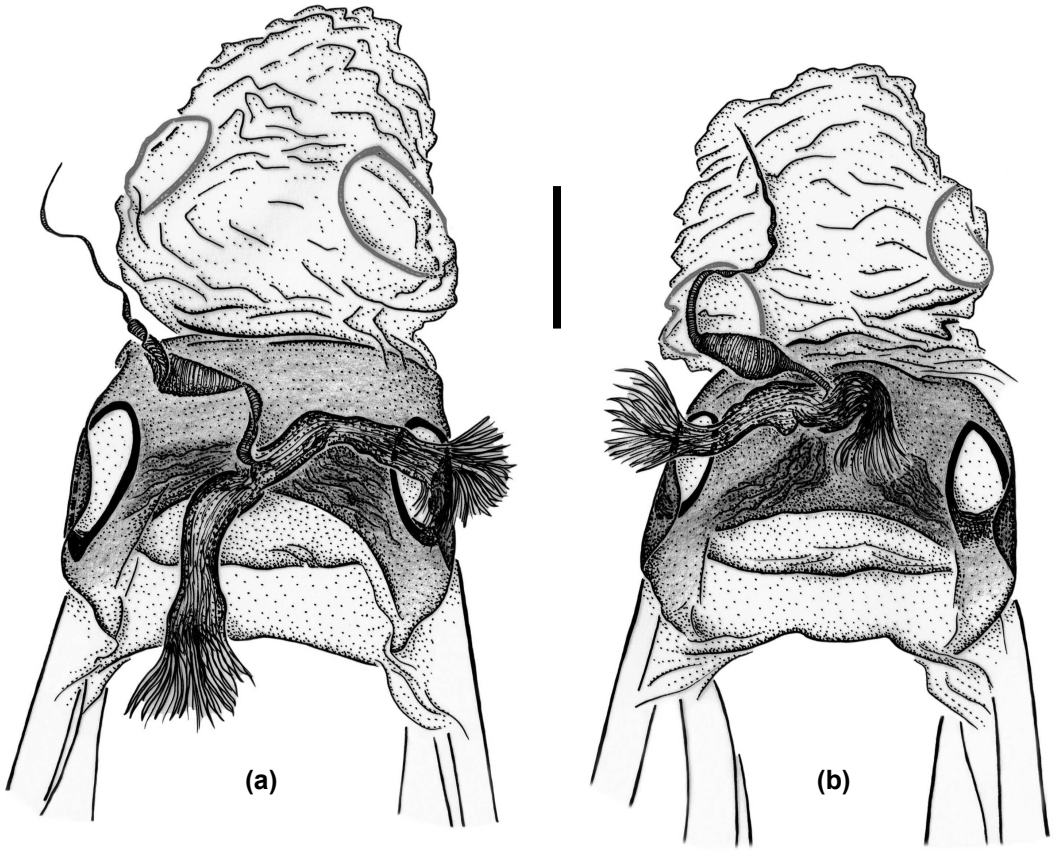

FIGURE 8. *Macrolophus helenae* **n. sp.**, female genitalia: (a)-(b) Genital chamber of two specimens (Scale bar = 0.1 mm).

Discussion

On species separation:

Macrolophus helenae **n. sp.** undoubtedly belongs to the genus *Macrolophus* Fieber, 1858 (Miridae: Bryocorinae: Dicyphini) and seems to be more closely related to the Palaearctic group of species (Aukema, 2018) than to those occurring elsewhere (Schuh, 2002-2013). Diagnoses and updated redescriptions of the genus *Macrolophus* were provided by Carvalho (1945), Wagner (1974) and Cassis (1986).

The new species is easily distinguishable from all other members of the genus by several characters of external morphology, as highlighted in the Diagnosis section. Having ruled out every extra-Palaearctic species, one by one, on the basis of obvious differences reported in the literature, the following discussion is focused on the comparison with the Palaearctic ones, in most cases by direct examination of specimens; otherwise based on the literature as well.

With the exception of *M. pericarti* Heiss & J. Ribes, 1998 (predominantly micropterous), all other species are only known by macropterous males and females. Moreover, both *M. pericarti* (endemic to the Canary Islands) and *M. klotho* Linnavuori, 1992 (endemic to Greece) are morphologically isolated by their size, structure and/or colouration; the former being remarkably small, with unusual shape of head and pronotum and without postocular black marking (Heiss and Ribes, 1998); the latter having the head and pronotum black (Linnavuori, 1992). In addition, both are distinguishable from the new species by different antennal proportions and by the apex of

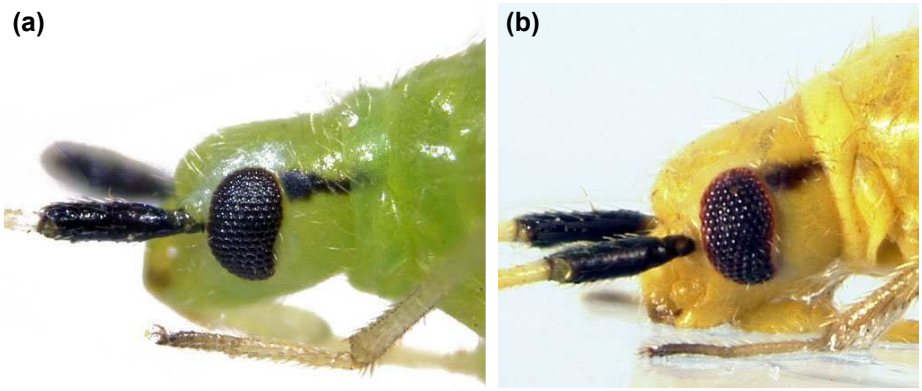

Figure 9. *Macrolophus melanotoma* (A. Costa, 1853): Head in lateral view: (a) Male from Montferrier-sur-Lez (France: Hérault); (b) Female from Gorges du Loup (France: Alpes-Maritimes) (Specimens and photos: Jean-Claude Streito).

scutellum and apex of clavus not darkened. *M. epilobii* V.G. Putshkov, 1978, known from western Asia and living on *Epilobium hirsutum* (Onagraceae), is another easily separable species, among other characters by the lack of postocular black marking and the very small eyes (Putshkov, 1978; Josifov, 1992; Konstantinov and Neimorovets, 2021). As to *M. geranii* Josifov, 1961, endemic to Bulgaria, it is very similar to *M. pygmaeus* (Rambur, 1839) (in fact, it was described with subspecific status: Josifov, 1961) but nowadays considered an independent species (Grozeva *et al.*, 2007).

The abovementioned *M. pygmaeus* together with *M. costalis* Fieber, 1858, *M. glaucescens* Fieber, 1858, *M. melanotoma* (A. Costa, 1853) and *M. rubi* Woodroffe, 1957 are the most widespread species of *Macrolophus* in Europe and the western Palaearctic Region. And they show the strongest similarity to the new species (see: Wagner and Weber, 1964; Wagner, 1974; Wachmann *et al.*, 2004; Konstantinov and Neimorovets, 2021). Nevertheless, in addition to the submacroptery of males and the small size of both males (less than 2 mm) and females (less or equal to 3 mm), a unique combination of characters distinguishes *Macrolophus helenae* **n. sp.** from them, including the short antennae (particularly in females, in which they are half the total length of the insect) with the segment II markedly clavate in males and very short in females (equal in length to segment III), the characteristic triangular shape of the postocular black spot, as well as the apex of scutellum not darkened and the apex of clavus darkened. Additional differences, as well as similarities, can be enumerated species by species as follows.

In *M. costalis* the dorsal colouration is not uniformly green and the apex of scutellum is conspicuously darkened. In *M. glaucescens* the postocular black spot is much wider and clearly different from that of the other taxa including the new species, whereas in *M. melanotoma*, *M. pygmaeus* and *M. rubi* that marking is not only narrower but also more or less linear in shape. Only in some specimens of *M. melanotoma* the margins of such black stripe are not parallel but tend to converge posteriad (Fig. 9). In all of these species except *M. pygmaeus*, the labium reaches or slightly surpasses the mesocoxae, while in *Macrolophus helenae* **n. sp.** it reaches or slightly surpasses the metacoxae. The shape of head in lateral view is also different, since it can be described as subquadrate in the new species and rather as subrectangular in the others; or at most, sharing a greater similarity to *M. melanotoma* in this respect too. All in all, *M. melanotoma* appears as the most similar species morphologically (but read below for the ecologically close *M. glaucescens*). Returning to the small size of the new species adults [1.5–1.8 mm (♂♂) and 2.2–3.1 mm (♀♀)] it is interesting to emphasize that the morphologically most similar congeners are clearly larger. Based on the measurements taken by J.-C. Streito (pers. comm.) and myself, total size (mm) is 2.6–3.4 (♂♂) and 2.9–4.0 (♀♀) in *M. melanotoma* and 3.2–3.7 (♂♂) and 3.4–4.2 (♀♀) in *M. pygmaeus*.

In general, the male and female genitalia are not considered as useful for separating Palaearctic species of *Macrolophus*, with a few exceptions such as the slight differences between *M. melanotoma* and *M. pygmaeus* illustrated by Wagner (1974) and Tamanini (1981) (but see: Jauset *et al.*, 2017). In the new species, I have not been able to find noteworthy characters but both male (Fig. 7) and female (Fig. 8) genitalia have been illustrated.

On wing polymorphism:

In some of the ancient works dealing with *Macrolophus*, the macroptery was listed among the diagnostic characters of the genus in the Palaearctic Region. For example, Wagner (1974) stated «*stets makropter*». Subsequently, Cassis (1986) added «macropterous, rarely semibrachypterous» as a result of taking into account the eastern African species *M. ethiopius* Cassis, 1986 [new name for *Macrolophidea longicornis* Poppius, 1914 due to homonymy with *Macrolophus longicornis* Knight, 1926, which in turn is a synonym of *Macrolophus tenuicornis* Blatchley, 1926], with, according to Poppius, macropterous or brachypterous males and only brachypterous females. In fact, the description of the genus *Macrolophidea* by Poppius (1914), nowadays a synonym of *Macrolophus*, was partly based on the dimorphism concerning the hemelytral development, with a very short membrane not surpassing the apex of cuneus in the brachypterous form («semibrachypterous» form according to Cassis).

Later on, Heiss and Ribes (1998) described the Canarian endemic *M. pericarti* on the basis of a series formed by abundant micropterous males and females and a very infrequent macropterous form for both sexes. The authors recognized difficulties for the generic placement of the species but finally refrained from creating a new genus for it.

With the present description, it is now more obvious that wing polymorphism should be considered as non-anecdotal among Eastern Hemisphere *Macrolophus*. A wide variety of hemelytra can be found: from the generalized macroptery of most species to the microptery of *M. pericarti*, including the brachyptery (*sensu* Poppius, 1914) / semibrachyptery (*sensu* Cassis, 1986) of *M. ethiopius* and the submacroptery found in *Macrolophus helenae* **n. sp.** Interestingly, the proportion of sexes showing wing reduction is quite different among these three species, engendering more than a few questions about their various adaptive responses to putatively different ecological pressures. An exciting field of research for anyone who wishes to explore it...

On ecology and distribution:

According to all available evidence, the new species is closely (or even strictly) associated to the thistle *Onopordum corymbosum* (Asteraceae). Nymphs and adults have been observed skillfully walking among the glandular hairs which cover large surfaces of the plant. Something not surprising given the ability of Dicyphini: Dicyphina as the best-known group of arthropods that specializes on sticky plants (Wheeler, 2001; Wheeler and Krimmel, 2015).

The widespread zoophytophagy recognized within this subtribe may be more questionable in *Macrolophus helenae* **n. sp.** Whereas phytophagy has been observed both in nymphs and adults, with nymphs tightly linked to the capitula, no predatory and/or carnivorous behaviour has been observed until now. Nevertheless, it can be hypothesised that at least adults could combine phytophagy with some kind of zoophagy.

Whereas *M. melanotoma* appears as the morphologically most similar species (read above), the strongest biological affinity seems to be with *M. glaucescens*. Its life cycle depends on another genus of thistles, *Echinops* (Asteraceae), and the development of the mirid mainly on the capitula is also shared with the new species. However, *M. glaucescens* is a bivoltine species, with the spring generation living on the leaves and the summer generation preferring the capitula (both nymphs and adults); eggs and nymphs can overwinter (Roubal, 1963; Wagner, 1974; Melber *et al.*, 1991; Wachmann *et al.*, 2004).

We have assumed (see above) that *Macrolophus helenae* **n. sp.** is a univoltine species with only the spring generation thriving simultaneously to the «green period» of its host plant. All the same, it is not unreasonable to think that a second generation may occur on another host plant with main development in autumn (rather than in summer, due to the climate of Monegros) on the basis of what is known on the life cycles of both *M. glaucescens* and *M. melanotoma*. In fact, the second generation (summer-autumn) of the latter species is also an Asteraceae specialist, not occurring on any thistle, but on *Dittrichia viscosa*. Being a typical species of coastal habitats, its first generation depends on the Fabaceae *Ononis ramosissima* (see, for the plant name: Devesa Alcaraz, 2000) [previously *Ononis natrix ramosissima* (see: Aizpuru *et al.*, 1999)]. Both plants have sticky glandular hairs and have been recognized as the main alternating host plants both in the Mediterranean (Ribes and Sauleda, 1979: Alacant; Gessé, 2011: Barcelona) and in the Cantabrian (pers. obs.: Bizkaia) coastal habitats.

FIGURE 10. *Macrolophus helenae* **n. sp.**, habitat and nymph development: (a)-(b) Landscape and ruderal vegetation in the type locality, including several species of thistles (Asteraceae); among them: (c)-(d) The host plant, *Onopordum corymbosum*, the only thistle selected by the mirid; (e)-(g) Groups of nymphs on the capitula of this plant.

Although *Macrolophus helenae* **n. sp.** has not been found later than June in 2024 and 2025, it might be possible an autumn generation on another sticky plant.

From the point of view of its distribution, the new species is likely to be widespread over a large area of Monegros or the Depression of the Ebro river, wherever the host plant *Onopordum corymbosum* grows. Interestingly, there exists a certain parallelism with another Dicyphini of recent description, *Dicyphus* (*D.*) *tumidifrons* J. Ribes, 1997, which strictly depends on *Lavatera triloba* (Malvaceae). Even if it was described from a small area of Monegros (J. Ribes, in: Ribes *et al.*, 1997), it has been subsequently found in another semi-arid region of the Iberian Peninsula (Pagola-Carte, 2024). Both Dicyphini species: (1) share the same ecosystem and similar ruderal habitats; (2) are closely associated with a single host plant; (3) show a trend towards miniaturization involving wing polymorphism. Therefore, it seems reasonable that *Macrolophus helenae* **n. sp.** could be an endemic species to Monegros or, more broadly, to the semi-arid regions of eastern Iberian Peninsula.

Acknowledgements

I am immensely grateful to Jean-Claude Streito (Montpellier) for the superb photographs of Figs. 1, 4-6, 9; and also to him and to Armand Matocq (Paris) for reviewing the manuscript.

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Received / Recibido / Hartua: 30/09/2025
Accepted / Aceptado / Onartua: 28/10/2025
Published / Publicado / Argitaratua: 31/12/2025