

2024	Heteropterus Revista de Entomología Heteropterus Rev. Entomol.	24(1): 7-16
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ISSN: 1579-0681

Loricula (Myrmedobia) hispanica Péricart, 1972 in the Pyrenees (Hemiptera: Heteroptera: Microphysidae)

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Abstract

The first records of *Loricula (Myrmedobia) hispanica* Péricart, 1972 (Hemiptera: Heteroptera: Microphysidae) subsequent to its description are presented. The species was described on the basis of a single female from Málaga, southern Iberian Peninsula. Now males and females have been found in several subalpine meadows of the central Pyrenees (Huesca). The male is described and a discussion is provided on the ascription of the specimens of both sexes to this enigmatic species, as well as on its habitat and its likely distribution.

Key words: Hemiptera, Heteroptera, Microphysidae, *Loricula (Myrmedobia) hispanica* Péricart, 1972, description of male, habitat, distribution, Pyrenees.

Resumen

Loricula (Myrmedobia) hispanica Péricart, 1972 en los Pirineos (Hemiptera: Heteroptera: Microphysidae)

Se presentan los primeros registros de *Loricula (Myrmedobia) hispanica* Péricart, 1972 (Hemiptera: Heteroptera: Microphysidae) posteriores a la descripción de la especie, la cual se basó en una única hembra de Málaga, sur de la Península Ibérica. Se han encontrado machos y hembras en varios prados subalpinos del Pirineo central (Huesca). Se describe el macho y se ofrece una discusión sobre la asignación de los ejemplares de ambos sexos a esta enigmática especie, así como sobre su hábitat y su posible distribución.

Palabras clave: Hemiptera, Heteroptera, Microphysidae, *Loricula (Myrmedobia) hispanica* Péricart, 1972, descripción del macho, hábitat, distribución, Pirineos.

Laburpena

Loricula (Myrmedobia) hispanica Péricart, 1972 Pirinioetan (Hemiptera: Heteroptera: Microphysidae)

Loricula (Myrmedobia) hispanica Péricart, 1972 (Hemiptera: Heteroptera: Microphysidae) espeziea deskribatu zenetik, haren lehenengo aipua aurkezten dira hemen. Iberiar Penintsularen hegoaldeko Málagako eme bakar batean oinarritu zen deskribapena. Orain arrak eta emeak aurkitu dira erdi Pirinioetako (Oská) zenbait larre subalpetarretan. Arra deskribatzen da eta eztabaida bat eskaintzen da bi sexuen aleak espezie enigmatiko honi esleitzeari buruz, bai eta honen habitat eta balizko banaketari buruz ere.

Gako-hitzak: Hemiptera, Heteroptera, Microphysidae, *Loricula (Myrmedobia) hispanica* Péricart, 1972, arraren deskribapena, habitata, banaketa, Pirinioak.

Introduction

Microphysidae is a compact family of very little (1.2–3.0 mm) and little-known cimicomorphan true

bugs. Four extant genera and 34 species are currently recognized in the Holarctic Region (and only an additional (African) species in the world), most of which are Palaearctic elements. Here, besides the mono-

specific genus *Ciorulla* Péricart, 1974, up to 31 species are included in the genus *Loricula* Curtis, 1833 (Aukema, 2019; Schuh and Weirauch, 2020).

Almost all members (all except one Palearctic and the two Nearctic ones) are sexually dimorphic, with males macropterous, elongate and bearing ocelli and females micropterous or brachypterous (or even coleopteroid), more rounded, physogastric and with ocelli absent or vestigial. Microphysids are predators of larvae and soft-bodied adults of small arthropods associated with lichens and mosses and are often found on the bark of lichen-bearing trees, tree-twigs or shrubs, and also sometimes in the low vegetation and leaf litter (Péricart, 1972, 1996; Henry, 2017; Yasunaga and Yamada, 2017; Schuh and Weirauch, 2020; Yasunaga *et al.*, 2020).

According to the proposal by Popov (2004), which has been followed in the Palearctic Catalogue (Aukema, 2019), the genus *Loricula* consists of three subgenera: the formerly considered as genera *Loricula* Curtis, 1833 (with 13 species) and *Myrmedobia* Baerensprung, 1857 (with 12 species) as well as the recently created *Myrmericula* Popov, 2004 (with 2 species). Although such separations may not reflect natural groupings, and even some recent authors have described new species without subgeneric ascription (Yasunaga and Yamada, 2017; Yasunaga *et al.*, 2020; Ohno *et al.*, 2023), herein I follow that classification due to its usefulness in identification of European taxa (see: Péricart, 1972; Simov, 2008).

On the Iberian Peninsula Microphysidae are represented by 9 species (Aukema, 2019; Goula *et al.*, 2020): 5 species of *Loricula s. str.* and 4 species of *L. (Myrmedobia)*, including two endemic ones: *L. (M.) hispanica* Péricart, 1972 and *L. (M.) blascoi* Ribes & Péricart, 1996 (see, respectively, the only sources of information about them: Péricart, 1972; Ribes and Péricart, 1996, 2002).

L. (M.) hispanica is one of those enigmatic species known by scarce records unlinked to any biological information. Moreover, in this particular case its holotype remains as the only recorded specimen since the description of the species. Péricart described it on the basis of a female collected by Nils Gyllensvärd in southernmost Iberian Peninsula (Spain: Málaga: Estepona; 3/05/1955) which had been previously misidentified as *Loricula ruficeps* (Reuter, 1884) by the Swedish entomologist (Gyllensvärd, 1967). The discovery in the Pyrenees of further females of *L. (M.) hispanica* and of several males not ascribable to any known species and occurring in similar habitats as females has led me to prepare the present con-

tribution. In the «Results and discussion» section the description of the hitherto unknown male will be presented together with a discussion on distribution and biology in a chronological account of events.

Results and discussion

1. The discovery of the species (females) in the Pyrenees

At the end of July 2016 (see «6. Material studied») a tiny (about 1.2 mm long) microphysid female was observed walking on the surface of a rocky outcrop covered with mosses and lichens among subalpine meadows above the treeline, at 2175 m of altitude (Fig. 3a-c). Despite intensive search for further females or males, it was the only specimen that could be collected.

By using Péricart's (1972) monograph, the identification was quite straightforward: this female from the Pyrenees was similar to *Loricula (Myrmedobia) hispanica* Péricart, 1972, precisely described in that monograph on the basis of a single female (see Introduction). The holotype is deposited in the Swedish Museum of Natural History and nowadays it can be «consulted» through photographs online (http://www2.nrm.se/en/het_nrm/h/myrmedobia_hispanica.html).

Given the strong disjunction, both geographically (straight line distance: 800 km; see the map of Fig. 4) and biogeographically for an endemic species (Mediterranean and Eurosiberian regions involved), I considered it as an interesting discovery. However, I decided to gather further data and try to find male specimens before publication. It was not until the end of July 2021 that I was fortunate to find an additional female in a very similar habitat of a locality near the previous one (13.5 km to the northwest), at 2200 m of altitude and, again, above the treeline (Fig. 3d-e).

The two Pyrenean females are practically identical (Fig. 1a-b) and perfectly ascribable to *L. (M.) hispanica*. The only noteworthy morphological difference between them and the Andalusian holotype concerns the more or less reddish colouration. Instead of reddish brown (*brun rougeâtre*), they are mainly dark with the head red (specimen from Yésero; Fig. 1b) or reddish (specimen from Panticosa; Fig. 1a) and the pronotum reddish (Yésero) or dark with anterior part slightly reddish (Panticosa). The colour pattern of

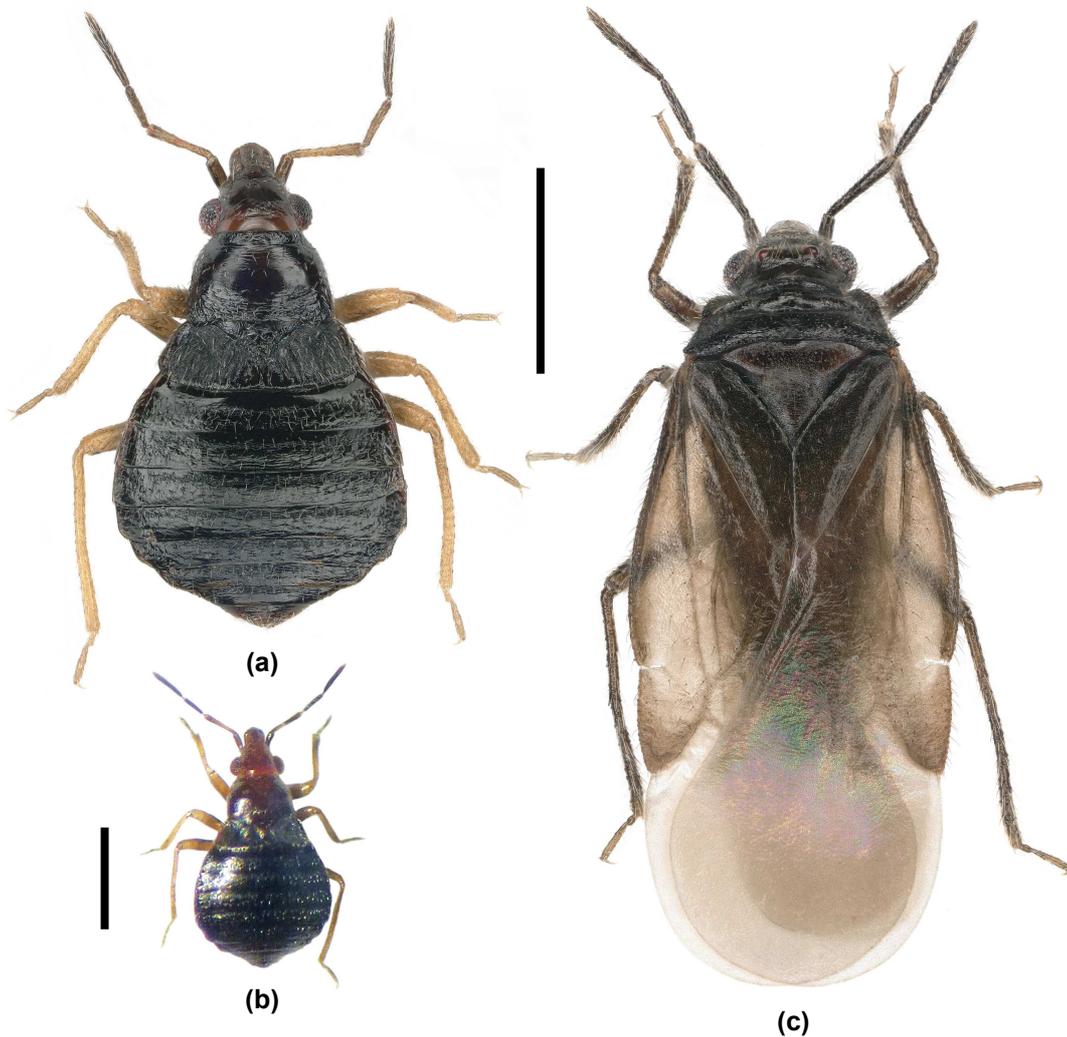


FIGURE 1. *Loricula (M.) hispanica* Péricart, 1972: Habitus: (a) Female from Panticosa; (b) Female from Yésero; (c) Male from Jaca (Scale bars = 0.5 mm) (Photos (a), (c): Jean-Claude Streito).

antennae is similar but in a darker version. Morphometrically they are similar, having been impossible to find any difference that cannot fall within the interindividual variability. It can be assumed that chromatic differences are also due to variability (maybe also in connection with environmental factors such as the altitude and/or insolation) as well as to the maturity condition of each specimen at the collecting moment.

L. (M.) inconspicua (Douglas & Scott, 1871) is the only species whose females could be mistaken with those of *L. (M.) hispanica*. In both species the hemelytra are very short, concealing only the first tergite, and the pronotum is convex, without explanations and strongly rounded laterally. In addition, the pubescence is rather short except on tibiae and antennae. However, *L. (M.) inconspicua* is a bigger species (females: 1.25–1.40 mm) and its biology is completely dif-

ferent, living on sandy dunes along the sea coasts of western Europe (Péricart, 1972; Matocq and Péricart, 1991; Aukema, 2019)⁽¹⁾.

2. Males of *Loricula* that could not be identified

At the end of July and the beginning of August of the years 2022 and 2023 (see «6. Material studied») a few microphysid males of small size (about 1.9 mm; Fig. 1c) were collected by sweeping subalpine meadows (1800-2100 m of altitude), again above the treeline, in a single locality of central Pyrenees (Fig. 3f-h) not far from the females' ones: 31.5 and 22 km to the west.

The identification of these male specimens turned out to be more than a challenging task following Péricart's (1972) keys and subsequent publications on Palaearctic Microphysidae (Ribes and Péricart, 1996, 2002; Vinokurov and Kanyukova, 1995; Simov, 2008; Yasunaga and Yamada, 2017; Yasunaga *et al.*, 2020; Ohno *et al.*, 2023). In fact, they could not be identified.

On the one hand, the anterolaterally flattened edges of the pronotum distinguish these males from those of the species in the groups of *L. (M.) coleoprata* and *L. (M.) inconspicua*. On the other hand, by its small size they are separated from most species of the

L. (M.) exilis group, which are generally longer than 1.9 mm. Interestingly, two species of the latter group show a boreo-alpine distribution, reaching the Pyrenees to the south: *L. (M.) distinguenda* Reuter, 1884 and *L. (M.) exilis* (Fallén, 1807). Nevertheless, both inhabit mountain conifer forests and show a different combination of morphological characters (Péricart, 1972). To the same group also belong *L. (M.) pubescens* Reuter, 1884, a rarely collected Caucasian species, and *L. (M.) josifovi* Simov, 2008, only known from eastern Bulgaria, where it inhabits wet grassland communities in oak forest near Ropotamo river, only 5 km away from its mouth to the Black Sea (Simov, 2008). The male specimens collected in the Pyrenees can be distinguished from all those four species as will be discussed in the comparative diagnosis following the description («5. Taxonomic discussion»).

All in all, I have decided to propose what seems to me to be the most parsimonious solution to the problem of Pyrenean subalpine *Loricula*: I hypothesize that these unidentified males (Fig. 1c) do not represent a new species but belong to *L. (M.) hispanica*, so «pairing» with the females found in the same habitat and circumstances (Fig. 1a-b) and revealing the hitherto unknown male of this enigmatic species.

3. Support from biological data

Most microphysid species are inhabitants of forests or even dependent on trees, where they are usually found associated with the lichens or mosses growing on their trunks and twigs. Among the European members of *Loricula* (*Myrmedobia*) some exceptions are known: besides the already mentioned *L. (M.) inconspicua* (sandy dunes), *L. (M.) jakovlevi* Péricart, 1969 lives associated to steppe shrubs of *Peganum* (Nitrariaceae) (Péricart, 1969, 1972).

The complete absence of trees in the subalpine meadows of the three Pyrenean localities with records (Fig. 3) undoubtedly determine the macrohabitat of the microphysid species to which the specimens belong. The occurrence of the females (micropterous) on rocky outcrops immersed in those meadows could indicate the precise microhabitat for reproduction and nymphal development, whereas the males (macropterous) collected by sweeping of the herbaceous plants may represent the dispersal stage of the species. Although a simultaneous capture of females (rocks) and males (surrounding meadows) has not been possible until now, it is interesting to

⁽¹⁾ *L. (M.) inconspicua* occurs in France, Great Britain, Ireland and Italy according to Aukema (2019). However, the Italian records compiled by Péricart (1972) are said to be «*loin de l'influence maritime*» typical of the species' habitat. In fact, they come from the Alps (Val d'Aosta: Champoluc) and northern Apennines (Emilia: Alpe di Succiso), all being females collected in July and August (Mancini, 1952). Similarly, one Austrian female collected by Ernst Heiss (Oberburgl, at 2000 m, 16/07/1962) and which was determined with doubts by Péricart and published by Heiss (1977), has lead Rabitsch (2004) to consider this species as «to be confirmed yet for Austria» and thus removed from the Palaearctic Catalogue (compare: Péricart, 1996 with: Aukema *et al.*, 2013; Aukema, 2019). I suspect that all these Alpine-Apenninic records of females could belong to *L. (M.) hispanica*, similarly to the Pyrenean ones. Moreover, it is likely that some males collected in the Alps and the Apennines in the same habitats have been repeatedly misidentified as belonging to other species. Although clarifying the identity of those specimens is out of the scope of the present paper, I hope that my contribution from the Pyrenees can help in such direction under the hypothesis of a single «Pyrenean-Alpine» species, including its occurrence in other mountain ranges of southern Europe such as Iberian and Italian ones.

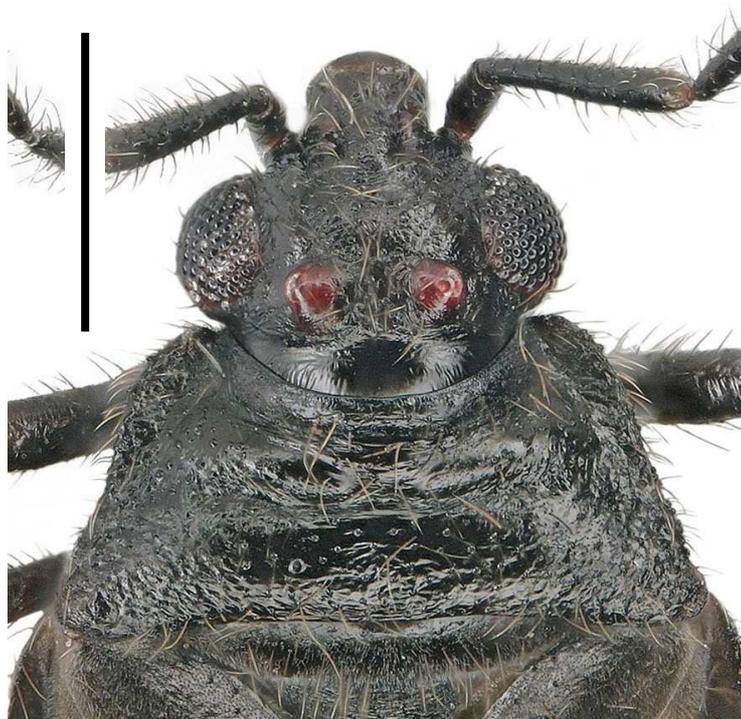


FIGURE 2. *Loricula (M.) hispanica* Péricart, 1972: Pronotum, in exact dorsal view, of the same male as in Fig. 1c (Scale bar = 0.25 mm) (Photo: Jean-Claude Streito).

point out that a great amount of rocks with mosses and lichens were also interspersed in males' meadows (see Fig. 3f-h).

Together with the evidences from the morphology-based taxonomy, I consider my ecological observations in the field as a crucial support for assuming one single taxon, *i.e.* *L. (M.) hispanica*, as the species living in those (macro/micro)habitats of the central Pyrenees. It may seem strange such a distributional «jump» of *L. (M.) hispanica* (about 800 km in a straight line; see Fig. 4) from the type locality (Spain: Andalusia: Málaga: Estepona) to the Spanish Pyrenees of Aragon: Huesca. However, it would be more bizarre to think that the heteroptero fauna of the intermediate Iberian mountain ranges have been properly studied. In fact, *L. (M.) hispanica* might occur in a less disjunctive way than currently known. On the other hand, nothing is known about the exact collecting site by Gyllensvärd in 1955 (holotype) but it must be remembered that the province of Málaga

is quite mountainous, with altitudes reaching 2000 m. Specifically, the highest point of Sierra Bermeja mountain range (Los Reales, 1451 m) belongs to the municipality of Estepona, and almost every winter is covered with snow.

In the author's opinion, the Mediterranean element is combined in the southern slopes of the Pyrenees with montane and boreo-alpine species of the Euro-siberian region in an interesting and little-known way. Concerning *L. (M.) hispanica*, one is tempted to encourage entomologists to look for the species in similar habitats not only of the French and Spanish Pyrenees but also of other Iberian (or even continental French) mountain ranges.

4. Description of the male

The following is a brief description of the male inspired by the style and characters provided by Péricart (1972) and Simov (2008), in order to make

comparisons easier. Similarly to them, the genitalia has not been examined. Measurements are based on all four available males and are given in millimetres (mm). For most morphometric characters, the whole range is given in parentheses after the average value.

Macropterous (Fig. 1c). Body length = 1.94 (1.88–1.99). Elongate to ovate, 2.39 (2.33–2.50) × longer than wide, with maximum width approximately at 1/3 of the length of hemelytron and at 1/2 of the length of corium + cuneus. General colouration black, hemelytra with corium somewhat translucent and membrane smoky, all legs also black. Pubescence apparent, with rather long setae on head, pronotum, hemelytra, antennae and legs; tibial setae longer.

Head as in Fig. 2. Black, covered with abundant, mostly pale setae. Ocelli maroon to red, big and protruding. Width of head = 0.6 × posterior width of pronotum. Preocular part slightly shorter than eye length. Eyes dark, with minute setae arising from between the ommatidia. Ocular index = 2.16 (2.00–2.50). Antennae black, bearing abundant setae, longer than the diameter of segments. Proportions of antennal segments I–II–III–IV = 3.5–9–7–10 (true length in mm = 0.09–0.22–0.17–0.25). Ratio antennal segment II / vertex = 1.30 (1.13–1.38). Ratio antennal segment II / diatone = 0.67 (0.63–0.69).

Pronotum as in Fig. 2. Black and entirely shiny, covered with abundant, mostly pale setae. Wrinkled surface peripherally, particularly on the posterior angles, with bulb-like cuticular projections mostly visible along the lateral margins; transversal striae present medially on the collar, between the callosities and on the posterior margin. Anterior and posterior angles rounded. Collar distinct, placed between the anterior pronotal angles. With flattened lateral edging, mostly in the anterior half. A distinct transverse impression at half the length of pronotum. Anteriorly to it, a pair of conspicuous callosities not reaching the lateral margins. Posteriorly to it, a smooth area of similar width. Strongly declivent anteriorly, in dorsal view of the insect (Fig. 1c) appearing shorter (more transverse) than its true shape. In exact dorsal view (Fig. 2), 2.75 (2.69–2.81) × as wide as long, roughly trapezoidal with a largely arcuate anterior margin (and/or anteriorly prolonged anterior angles), lateral margins nearly straight and posterior margin 1.5–1.8 × wider than anterior one (wide range derived from ambiguous measurements due to rounded anterior angles).

Mesoscutum and scutellum black and with similar pubescence. Mesoscutum rather smooth and shiny, but less than pronotum; protruding. Scutellum

almost flat due to minute wrinkles and/or striae. Ratio length of mesoscutum + scutellum / length of claval suture = 0.85 (0.75–0.92).

Hemelytra black with coria somewhat translucent, covered with abundant, mostly pale setae. Setae approximately as long as those of antennae but shorter than those of tibiae. External margin of exocorium with bulb-like cuticular projections. External margins of hemelytra markedly convex anteriorly to cuneal fracture. Exocorium wider than the width of endocorium. Length of cuneus 0.19 (0.18–0.20) × length of hemelytron and 0.40 (0.38–0.41) × length of corium. Membrane smoky, greyish, more or less darkened depending on individuals, with one cell and branching veins as in related species.

Variability concerning macropterism: both males collected in 2023 are slightly longer (1.98–1.99) than those collected in 2022 (1.88–1.93), seemingly because of their longer membrane (one specimen) or longer membrane + cuneus (the other specimen).

Legs black, at most the tibiae very slightly paler. Metatibiae curved, about 0.6 mm long, nearly as long as the posterior margin of pronotum.

5. Taxonomic discussion

For a comparative diagnosis of the males, it should be firstly noted that *L. (M.) hispanica* is a *Loricula (Myrmedobia)* belonging to the group of *L. (M.) exilis*, i.e. with flattened lateral edging of the pronotum and with collar placed between the anterior rounded pronotal angles. It is distinguishable from the other species as follows (see: Péricart, 1972; Simov, 2008):

L. (M.) distinguenda is larger (2.0–2.3 mm long) and its pronotum is completely different: it is flat with the exception of the collar and has a noticeably different shape: more strongly trapezoidal, with anterior rounded pronotal angles smaller and flattened lateral edging circumscribed to the most anterior region; the collar and transverse impression are much less conspicuous.

L. (M.) pubescens is also a bigger (2.1–2.2 mm long) and easily distinguishable species, particularly by its dense and long pubescence. In addition, the collar and transverse impression of pronotum are also less conspicuous.

L. (M.) exilis and *L. (M.) josifovi* are the species with males more similar to those of *L. (M.) hispanica*. However, both obvious and subtle differences exist among these three species. *L. (M.) exilis* is bigger

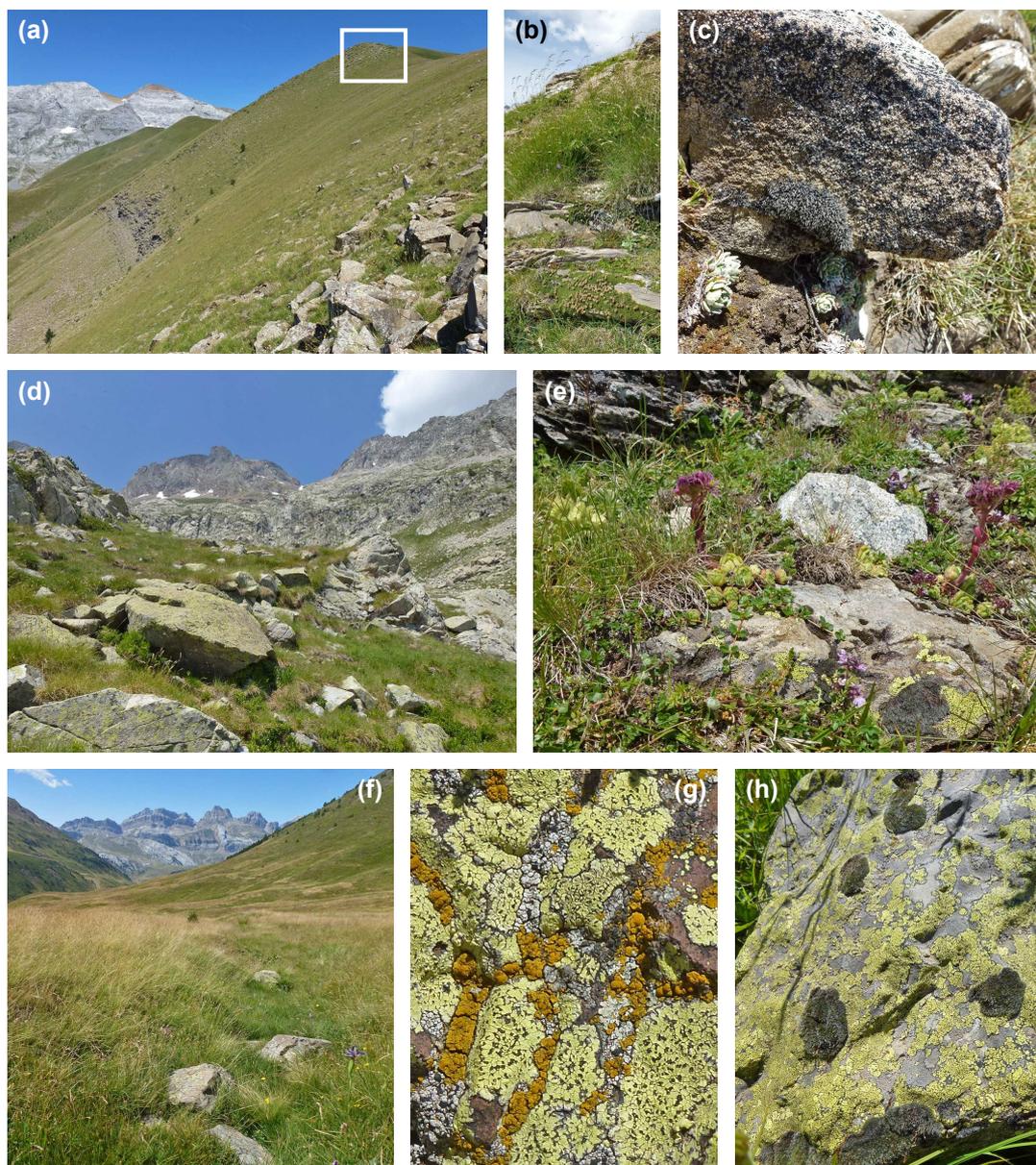


FIGURE 3. *Loricula (M.) hispanica* Péricart, 1972: Habitat: (a)-(c) Huesca: Yésero (one female on the rock surface): (a) Locality; (b) Detail of habitat; (c) Detail of microhabitat; (d)-(e) Huesca: Panticosa (one female on the rock surface): (d) Locality; (e) Detail of habitat; (f)-(h) Huesca: Jaca (four males by sweeping of the meadow): (f) Locality and habitat; (g)-(h) Detail of rocks interspersed in the meadow.

(2.0–2.4 mm long) and the flattened lateral edging of its pronotum is wider. It shows a greater ocular index (2.6–3.3) and the ratio antennal segment II / vertex is slightly lower (1.2).

L. (M.) josifovi is the only species of the group with similar size (1.8–1.95 mm long) but its pronotum is mat except for callosities and shows some distinct morphometric values: pronotum 1.85–2.1 × wider



FIGURE 4. *Loricula (M.) hispanica* Péricart, 1972: Map showing the distance between the Andalusian locality of the holotype in the province of Málaga (south) and the Pyrenean localities in the province of Huesca (north) (Map modified from GoogleEarth).

than long, ratio antennal segment II / vertex = 1.46 and ratio antennal segment II / diatone = 0.76–0.78.

Two consequences are derived from pairing the hitherto unknown males with the females of *L. (M.) hispanica*. On the one hand, it must be acknowledged that, in the absence of females and ecological evidence, we would have erroneously identified these males as *L. (M.) exilis* with doubts due to their small size and subtle differences.

On the other hand, the species groups defined by Péricart (1972) have to be modified since the males of *L. (M.) hispanica* are most similar to those of *L. (M.) exilis* (and so belong to the *exilis*-group) and its females are most similar to those of *L. (M.) inconspicua* (and so belong to the *inconspicua*-group). An additional, fourth group could be established for *L. (M.) hispanica*, assuming that such a combination of characters simply reflects both the artificiality of the mentioned grouping and the microhabitat adaptations underlying the more or less convergent morphological traits among species.

6. Material studied

1 ♀, HUESCA: Yésero: Toronzué, 2175 m, 30TYN22, 27/07/2016.

1 ♀, HUESCA: Panticosa: Balneario: Barranco de Arnales, 2200 m, 30TYN23, 22/07/2021.

2 ♂♂, HUESCA: Jaca: Astún-Ibón de Escalar, 1800–2100 m, 30TYN04, 21/07/2022.

2 ♂♂, HUESCA: Jaca: Astún-Ibón de Escalar, 1800–2100 m, 30TYN04, 2/08/2023.

All specimens: S. Pagola-Carte *leg., det. et coll.*

7. Conclusion

We have achieved our first objective of revealing the existence of an interesting species of Microphysidae in the subalpine stage of the central Pyrenees (province of Huesca), contributing to the knowledge on its habitat and distribution. Secondly, we have hypothesized its belonging to *Loricula (Myrmedobia) hispanica* Péricart, 1972, hitherto only known from the female holotype collected almost 70 years ago in the southernmost part of Spain and the Iberian Peninsula (province of Málaga).

Our Pyrenean females are straightforwardly identified to *L. (M.) hispanica*. Our Pyrenean males, collected in similar habitats to those of females, were impossible to ascribe to any of the species with known males, so we have proposed its belonging to *L. (M.) hispanica* and we have provided a description of males which complement the original description of the female by Péricart (1972). Unfortunately we have not been able to collect both sexes *in copula*.

If we are right in this hypothesis, we would have also confirmed another assumption, that of Péricart, whose great knowledge led him to describe the species (on the basis of a single female) in spite of some doubts remaining («*Il n'est pas impossible que cette forme soit une sous-espèce d'inconspicua mais la connaissance des répartitions est insuffisante pour préciser ce point*»).

If, on the contrary, we are wrong, two possibilities exist:

- (1) That the Pyrenean females belong to *L. (M.) inconspicua*, greatly enlarging the habitat preferences of this other species, and that the Pyrenean males represent a new species occurring in the same habitats simultaneously.
- (2) That both the females and the males from the Pyrenees belong to an undescribed species, maybe endemic to the Pyrenean chain, and whose females are identical to the holotype of *L. (M.) hispanica*.

In view of those convoluted possibilities, Ockham's razor tells us that most probably we are right assuming a single, montane to subalpine species, namely *L. (M.) hispanica*, which probably occurs in several mountain ranges of the Iberian Peninsula (and perhaps also other southwestern European regions) and which is not dependent on forests or trees but on the microhabitats associated to the mosses and/or lichens growing on rock surfaces. It would be highly interesting to find males together with females of this species in its Andalusian type locality.

Acknowledgements

I am indebted to the following colleagues and friends for their help and advice during the preparation of this paper. Alphabetically: Petr Kment (Praha) for the bibliographic support, Armand Matocq (Paris) for the access to his collection, Jean-Claude Streito (Montpellier) for the photographs of Figs. 1a, c, 2, and Tomohide Yasunaga (Nagasaki) for reviewing the manuscript.

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Received / Recibido / Hartua: 22/04/2024

Accepted / Aceptado / Onartua: 29/04/2024

Published / Publicado / Argitaratua: 30/06/2024