

New Iberian records of interesting Miridae (Hemiptera: Heteroptera) with notes on their biology. Part 3

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Abstract

New Iberian records of 11 interesting species or subspecies of Miridae (Hemiptera: Heteroptera) are presented and information on their biology is provided for some of them, in addition to faunistic and morphological data. The following findings are remarkable: (1) Species not previously recorded from Spain, Portugal, the Iberian Peninsula or even Europe: *Dicyphus (Brachyceroea) heissi* J. Ribes & Baena, 2006 (Portugal), *Phytocoris (Compsoceroecoris) degregorioi* J. Ribes & E. Ribes, 2002 (Iberian Peninsula), *Orthotylus (Pachylops) adenocarpus maroccanus* Wagner, 1958 (Spain, Iberian Peninsula and Europe), *Zanchius breviceps* (Wagner, 1951) (Spain and Iberian Peninsula); (2) Species for which the known Iberian distribution is enlarged, including a further relict population of *Stenodema (Stenodema) sericans* (Fieber, 1861) in the «Basque Mountains»; (3) Species for which new data on biology, external morphology and/or genitalia are provided, among them highlighting the discussion on *Heterocordylus (Heterocordylus) montanus* Lindberg, 1934.

Key words: Hemiptera, Heteroptera, Miridae, Iberian Peninsula, faunistics, biology, genitalia.

Resumen

Nuevos registros ibéricos de interesantes Miridae (Hemiptera: Heteroptera) con anotaciones sobre su biología. Parte 3

Se presentan nuevos registros ibéricos de 11 especies o subespecies de miridos interesantes (Hemiptera: Heteroptera) y se aporta información sobre la biología de algunas de ellas, además de datos faunísticos y morfológicos. Son destacables los siguientes hallazgos: (1) Especies no citadas anteriormente de España, Portugal, la Península Ibérica o incluso Europa: *Dicyphus (Brachyceroea) heissi* J. Ribes & Baena, 2006 (Portugal), *Phytocoris (Compsoceroecoris) degregorioi* J. Ribes & E. Ribes, 2002 (Península Ibérica), *Orthotylus (Pachylops) adenocarpus maroccanus* Wagner, 1958 (España, Península Ibérica y Europa), *Zanchius breviceps* (Wagner, 1951) (España y Península Ibérica); (2) Especies para las que se amplía la distribución conocida, incluyendo una nueva población relictica de *Stenodema (Stenodema) sericans* (Fieber, 1861) en los «Montes Vascos»; (3) Especies para las que se aportan nuevos datos sobre biología, morfología externa y/o genitalia, sobresaliendo entre ellas la discusión acerca de *Heterocordylus (Heterocordylus) montanus* Lindberg, 1934.

Palabras clave: Hemiptera, Heteroptera, Miridae, Península Ibérica, faunística, biología, genitalia.

Laburpena

Zenbait Miridae (Hemiptera: Heteroptera) interesgarriten aipu iberiar berriak eta haien biologiari buruzko datuak. 3. zatia

Miridoen (Hemiptera: Heteroptera) 11 espezie edo subespezie interesgarriten iberiar erregistro berriak aurkeztzen dira eta, datu faunistikoak eta morfologikoak ez ezik, beren biologiari buruzko informazioa ere ematen da haietako batzuentzat. Nabarmentzekoak dira ondorengo aurkikuntzak: (1) Espainian, Portugalen, Iberiar Penintsulan, edota Europan ere, lehendik aipatuta ez zeuden espezieak: *Dicyphus (Brachyceroea) heissi* J. Ribes & Baena, 2006 (Portugal), *Phytocoris (Compsoceroecoris) degregorioi* J. Ribes & E. Ribes, 2002 (Iberiar Penintsula), *Orthotylus (Pachylops) adenocarpus maroccanus* Wagner, 1958 (Espainia, Iberiar Penintsula eta Europa), *Zanchius breviceps* (Wagner, 1951) (Espainia eta Iberiar Penintsula); (2) Iberiar banaketa ezaguna zabaltzen deneko espezieak, besteak beste *Stenodema (Stenodema)*

sericans (Fieber, 1861)-en populazio erliktiko berri bat «Euskal Mendietan»; (3) Biologiari, kanpo-morfologiari eta/edo genitaliari buruzko datu berriak ematen direneko espezieak, haien artean *Heterocordylus* (*Heterocordylus*) *montanus* Lindberg, 1934 delakoaren gaineko eztabaida nabarmenduz.

Gako-hitzak: Hemiptera, Heteroptera, Miridae, Iberiar Penintsula, faunistika, biologia, genitalia.

Introduction

The ongoing research on Iberian Miridae (Hemiptera: Heteroptera) continues to reveal more and more interesting findings worthy of publication. Following the same structure of previous contributions in this series (Pagola-Carte, 2015, 2018a), three types of information will be provided about 11 species of mirids (in fact, 10 species + 1 subspecies):

- (1) Faunistic data. Many of these species are interesting from a faunistic point of view: new records for the Iberian Peninsula or Spain or Portugal, rarely collected taxa, relict species of boreo-montane distribution, species of likely recent spreading, etc.
- (2) Morphology. For several species, new data on external morphology and/or previously unillustrated genitalic structures are presented. Habitus photographs of several insufficiently known species are also shown.
- (3) Biological aspects. All 11 species were recorded together with some basic information on their biology. For some of them, this information consists of new or relevant data on host plants, phenology or habitat type.

All the species considered are listed below in this page accompanied by the indications «[M]» and/or «[B]» if relevant information is given on their morphology and/or biology, in addition to the faunistic records themselves. In the «Results and discussion» section they are arranged in the same order, without mention to their classification by subfamilies and tribes.

Three of those species were also the focus of a previous paper (Pagola-Carte, 2018a). Now I go over them to provide further insight on the basis of new data or deeper studies.

Unless otherwise stated, the specimens were collected and identified by the author. Captures (*leg.*), determinations (*det.*) and collections (*coll.*) of other colleagues are explicitly mentioned if applicable. In the «Material studied» section of each species, names of the provinces are written in capital letters and UTM coordinates are expressed as 10×10 km grid cells. Records are arranged chronologically for each province, and provinces alphabetically. Names of the municipalities are written just after the province names. The nomenclature and identification of plants are mainly based on Aizpuru *et al.* (1999) and Blanca *et al.* (2011).

BRYOCORINAE: DICYPHINI

Dicyphus (*Brachyceroea*) *heissi* J. Ribes & Baena, 2006 [M] [B]

MIRINAE: MIRINI

Phytocoris (*Compsocercoris*) *degregorioi* J. Ribes & E. Ribes, 2002 [M] [B]

MIRINAE: STENODEMINI

Stenodema (*Stenodema*) *sericans* (Fieber, 1861) [M]

ORTHOTYLINAE: ORTHOTYLINI

Heterocordylus (*Heterocordylus*) *italicus* Kerzhner & Schuh, 1995

Heterocordylus (*Heterocordylus*) *montanus* Lindberg, 1934 [M] [B]

Orthotylus (*Pachylops*) *adenocarpus maroccanus* Wagner, 1958 [M] [B]

Zanchius breviceps (Wagner, 1951) [M]

PHYLINAE: PHYLINI

Chlamydatus (*Eurymerocoris*) *evanescens* (Boheman, 1852) [M] [B]

Macrotylus (*Alloeonychia*) *ribesi* Carapezza, 1994 [B]

Psallus (*Psallus*) *anashanti* Pagola-Carte, 2017

Psallus (*Psallus*) *vicinus* Reuter, 1899 [M] [B]

Results and discussion

Dicyphus (Brachyceroea) heissi J. Ribes & Baena, 2006

MATERIAL STUDIED: ALGARVE: Vila Real de Santo António: Monte Gordo; 37.1785°N 7.4485°W; 9/04/2019; 10 ♂♂, 6 ♀♀; B. Aukema *leg. & det.*; coll. Aukema. (Of them, 1 ♂, 1 ♀, coll. Pagola-Carte.). ALGARVE: Vila Real de Santo António: Monte Gordo, dunes; 37.1801°N 7.4410°W; 25/08/2019; 25 ♂♂, 18 ♀♀; B. Aukema *leg. & det.*, coll. Aukema. (Of them, 1 ♂, 1 ♀, coll. Pagola-Carte.). ALGARVE: Vila Real de Santo António: Aldeia Nova; 37.1860°N 7.4597°W; 31/08/2019; 24 ♂♂, 7 ♀♀; B. Aukema *leg. & det.*; coll. Aukema. (Of them, 1 ♂, 1 ♀, coll. Pagola-Carte.). ARABA: Zuia: Zarate; 660 m; 30°TWN15; 7/06/2019; 1 ♂, 1 ♀; 12/06/2019; 35 ♂♂, 18 ♀♀. (Of them, 1 ♂, 1 ♀, coll. Aukema, 1 ♂, 1 ♀, coll. Carapezza, 1 ♂, 1 ♀, coll. Günther, 1 ♂, 1 ♀, coll. Heckmann, 2 ♂♂, 2 ♀♀, coll. Matocq, 1 ♂, 1 ♀, coll. Rieger.). CUENCA: Belmontejo; 30°SWK50; 22/09/1985; 1 ♀; U. Koschwitz *leg.*; coll. Günther > coll. Pagola-Carte.

After its description, based on a limited number of specimens from Madrid and Cordova (Iberian Peninsula) and Tenerife (Canary Islands) (Ribes and Baena, 2006), this species has been recorded once more, in northern Burgos, as a single male feeding on *Digitalis parviflora* (Scrophulariaceae) (Pagola-Carte, 2018a).

New data are herein presented, which suggest a widespread Iberian distribution on the basis of abundant material collected in northern (Araba), central (Cuenca) and southern (Algarve) peninsular regions. Several plants are added to the hitherto practically unknown host preferences of the species, indicating that it could be related to a wide spectrum of plants.

The specimens from Algarve represent the first record for Portugal. They were collected by Berend Aukema on Caryophyllaceae plants at three localities, twice (April and August) on *Silene nicaeensis* (Fig. 1b) growing on sand near the coast, and also in *Pinus* forest, and a third time (August) on *Spergularia* sp. in dried out salt vegetation amidst plants of a *Frankenia* species with *Henestaris laticeps laticeps* (Curtis, 1836). Both in April and August, males, females and nymphs were abundant, so that at least two generations should be involved.

In Araba, dozens of adults but no nymphs were found in the month of June, on *Parentucellia viscosa* (Scrophulariaceae) growing in a rich meadow dom-

inated by *Leucanthemum* daisies (Fig. 1c). Although rigorous observations were not accomplished, both males and females seemed to be feeding on vegetal tissues of the plant instead of predating on the small arthropods trapped by its sticky glandular hairs (Fig. 1d) or on other smaller phytophagous insects also present, such as some Aphididae. Having recorded it in June, we cannot ascertain whether the species is univoltine in northern Iberian Peninsula or this population represents the first generation within a life cycle similar to that in Algarve but delayed with respect to it.

When long series of specimens have been collected, males were more abundant than females in a roughly 2:1 proportion. Concerning the host plants, it should be noted that both *Parentucellia viscosa* and *Silene nicaeensis* grow on habitats with more or less sandy soils, this fact opening the door to the hypothesis of any kind of (micro)habitat preference of *D. (B.) heissi* in addition to strictly vegetal preferences.

As to the specimen from Cuenca, which was probably collected at light trap, its dorsal colouration is markedly different to the preceeding ones, with pale pronotum except for the dark calli, and an orangish tinge on hemelytra. Nevertheless, it lies within the described range of variability for the species (Ribes and Baena, 2006). Perhaps the emphasis should be put on the fact that most, if not all, the remaining specimens examined belong to the darker forms (Fig. 1a).

Morphological variability not only affects the general colour but also the total size of individuals. The specimens collected in April are bigger than those collected in August, possibly due to more benign temperature and/or food conditions, and suggesting, even more clearly, the separation of generations. In the case of Araba, total length (mm) is 3.55(3.1–3.8) (♂♂) and 3.65(3.3–4.0) (♀♀), representing values between the summer ones (3.0–3.5) and the spring ones (3.5–4.0) in Algarve.

Finally, in light of the abundant collectings of this recently described and hitherto «rare» species, it could reasonably be argued that *D. (B.) heissi* is geographically spreading from a previously more restricted distribution area. However, in this case I assume that «insects regarded as rare can prove numerous when their habits are revealed, which often is true for poorly known herbivores once their specific host-plant relationships are determined» (literally from: Wheeler, 2015).

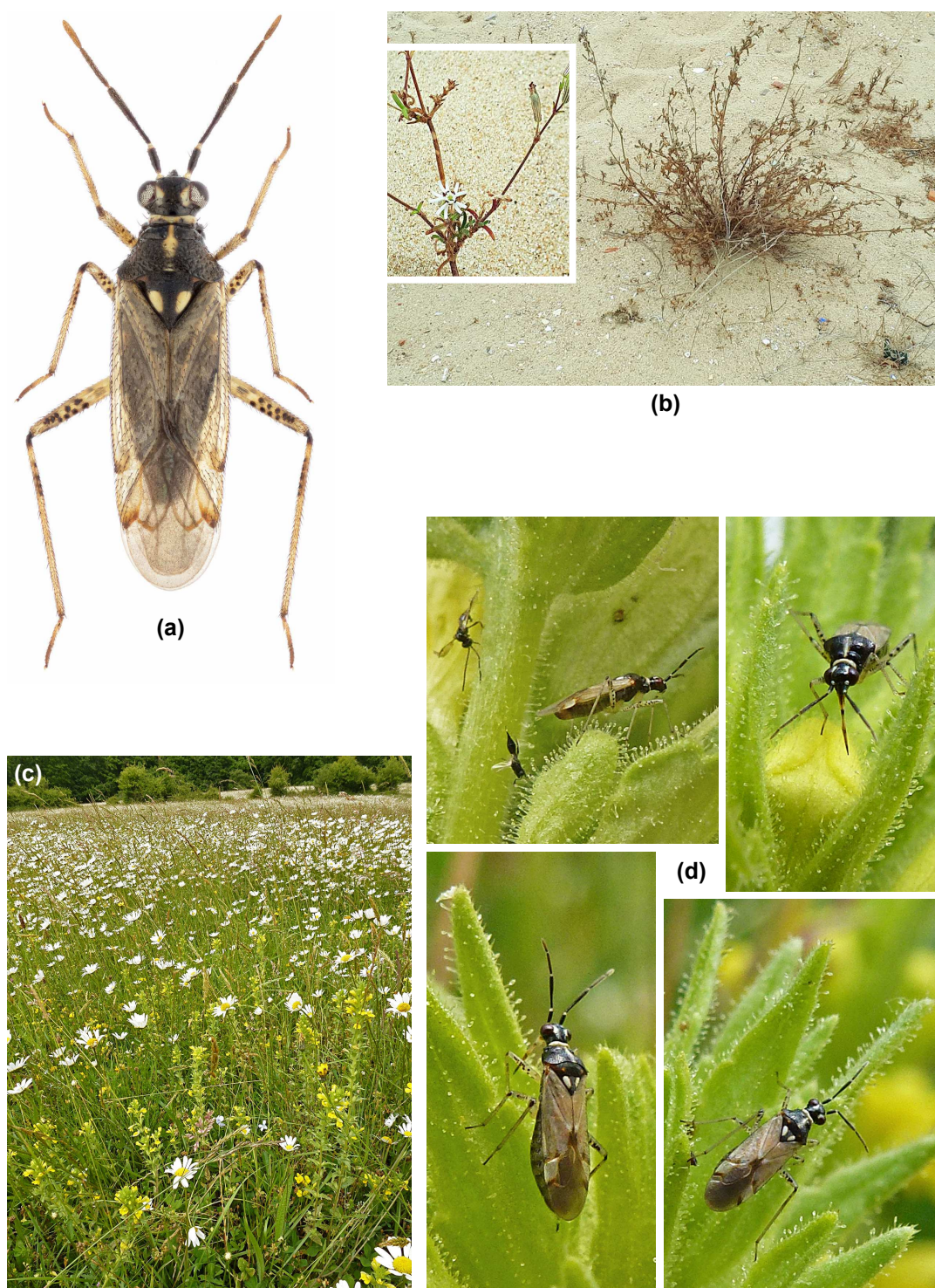


FIGURE 1. *Dicyphus (Brachyceroea) heissi* J. Ribes & Baena, 2006: (a) Habitus of a male from Monte Gordo (Algarve); (b) Habitat with *Silene nicaeensis* (Caryophyllaceae), one of the host plants in Monte Gordo (Algarve); (c) Habitat with *Parentucellia viscosa* (Scrophulariaceae), the host plant in Zuia (Araba); (d) Several specimens seemingly feeding on *Parentucellia viscosa*. [(a) Photo by Theodoor Heijerman; (b) Photos by Berend Aukema.]

***Phytocoris (Compsocorcoris) degregorioi* J. Ribes & E. Ribes, 2002**

MATERIAL STUDIED: ILLES BALEARS: Formentera: San Fernando [Sant Ferran]; 31SCC68; 14/12/1988; 1 ♂; M. Boness *leg.*; Pagola-Carte *det.*; coll. Günther. ILLES BALEARS: Formentera: Es Caló (camí de Sa Pujada); 5 m; 31SCC78; 14-16/04/2017; 2 ♂♂; J.J. Pérez De-Gregorio & M. Bravo *leg.* TARRAGONA: Cornudella de Montsant (Priorat): Sant Joan Codolar; 750 m; 31TCF27; 28/04/2005; 1 ♂; F. Vallhonrat *leg.*

Ribes and Ribes (2002) described this species on the basis of a single male collected at light trap (31/03/2002) by the Catalan lepidopterist J.J. Pérez De-Gregorio, to whom the specific name was dedicated. No other record of the species has been published since. Here are now reported additional captures of four specimens, all of them males attracted to light and similarly collected by lepidopterists.

Two of them were collected by Pérez De-Gregorio himself, exactly at the type locality 15 years after the first capture and the description. The record of another of the specimens in Formentera is due to Martin Boness, who collected it 14 years before the description and about 7 km far from the type locality. More interestingly, Francesc Vallhonrat's capture of 2005 in Priorat represents the first record of this enigmatic species for the Iberian Peninsula. Again, a male was attracted to light in the context of a lepidopterological research, in this case focused on the natural park of Serra de Montsant. The accurate labelling of the specimen is out of any doubt (F. Vallhonrat, pers. comm.), so that the species should no longer be considered as endemic to Balear or Pityusic Islands.

The external morphology and male genitalia of all four specimens fully agree with the original description. It is worth of mention the apical portion of the pygophore, which is remarkably pointed. Although correctly illustrated by Ribes and Ribes (2002: page 107: fig. 3), this character was not explicitly mentioned in their text.

At least males of *Ph. (C.) degregorioi* are undoubtedly attracted to light and the species seems to inhabit a mosaic of pine forest and brushwood, including *Pinus halepensis*, *Juniperus oxycedrus*, *J. phoenicea* and other (more or less woody) bushes of the Mediterranean shrubland. Nevertheless, no information is still available about its host plant(s) and the female is unknown.

***Stenodema (Stenodema) sericans* (Fieber, 1861)**

MATERIAL STUDIED: BIZKAIA: Mañaria: Errialtabaso (Urkiola); 940 m; 30TWN27; 3/08/2019; 4 ♂♂, 5 ♀♀.

In a previous paper, I provided the first Iberian record of this *Stenodemini* out of the Pyrenees (Pagola-Carte, 2018a), in the Gorbeia Massif of the so-called «Basque Mountains». Herein, a further record is presented from Urkiola Massif, similarly located in the province of Bizkaia. This second population was discovered when sweeping grasses in a highly similar, twofold habitat: a limestone crest with a mosaic of exposed (sunny) grassland including *Melica ciliata ciliata* + sheltered (shady) undergrowth of beech forest with other Poaceae (Fig. 2). Again, it must be emphasized that both populations (Gorbeia and Urkiola)

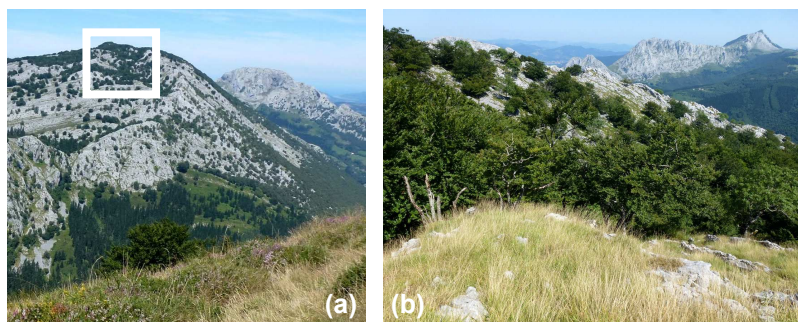


FIGURE 2. *Stenodema (Stenodema) sericans* (Fieber, 1861): (a) Location of the relict population at the summit of the mountain Errialtabaso in Urkiola Massif (Bizkaia); (b) Habitat, consisting of a mosaic of exposed (sunny) grassland including *Melica ciliata ciliata* and sheltered (shady) undergrowth of beech forest with other Poaceae.

have been detected at the mountain summit, evoking the current patchy distribution of a glacial relict species. Even if its occurrence in similar habitats of northern Iberian Peninsula can be suspected, all these populations are likely to be suffering a certain degree of genetic isolation associated to such distribution of «*cul-de-sac*» type.

Although in central Europe the species occurs in mountain systems of lower elevation (e.g. Heckmann and Rieger, 2001), in the Pyrenees it is a typical inhabitant of subalpine grasslands, frequently sharing the habitat with *Stenodema* (*S.*) *virens* (Linnaeus, 1767), another mountain species never recorded in the «Basque Mountains». *S.* (*S.*) *sericans* in Bizkaia occurs at altitudes of about 1000 m, whereas in the Pyrenees most of the records are at about 2000 m (Ribes, 1984; Ribes and Goula, 1997; Ribes *et al.*, 2004; author's unpublished data from Huesca).

Both external and genitalic morphology are identical in all populations studied from Bizkaia and the Pyrenees, with very little variability beyond that due to sexual dimorphism (see Table 1), and they are in accordance with available descriptions of the species (see, for example: Wagner and Weber, 1964; Wagner, 1974a). It is interesting to note, however, some differences with respect to Wagner's texts, particularly concerning the length of antennal segment I, which is shorter in Iberian populations (similarly shorter in those from Bizkaia and the Pyrenees) resulting in lower values of the ratio «antennal segment I / head width»: 1.28 (♂♂) and 1.13 (♀♀) *versus* 1.50 (♂♂) and 1.25 (♀♀)

given by Wagner. Moreover, photographs illustrating both segment I and head are shown in a recent paper by Taszakowski and Pasińska (2017: page 8: fig. 4) for Pieniny Mountains in southern Poland, and they do not differ from Wagner's drawings (1974a: page 114: fig. 89). In addition, Iberian specimens seem to be slightly less elongate, as revealed by a smaller ratio «total length / total width» (3.91–4.56 *versus* 4.6–4.7 given by Wagner), and females somewhat larger in average, as indicated by total length measurements (8.6–9.2 mm *versus* 8.4–8.8 mm). Whether all these differences represent any kind of divergence among northern and southern European populations within a species with a reputedly interesting Quaternary history, is beyond the scope and possibilities of my research.

Heterocordylus (*Heterocordylus*) *italicus* Kerzhner & Schuh, 1995

MATERIAL STUDIED: ARABA: Arraia-Maeztu: La Mina mendatea (Korres); 820 m; 30TWN42; 4/06/2004; 1 ♀; I. Zabalegui *leg.* ARABA: Amurrio: Delika; 350 m; 30TWN05; 14/06/2004; 1 ♂. ARABA: Arraia-Maeztu: Arratu (Korres); 750 m; 30TWN42; 18/06/2004; 1 ♀. ARABA: Arraia-Maeztu: Larraneta (Apinaiz); 725 m; 30TWN42; 18/06/2004; 2 ♂♂, 2 ♀♀. ARABA: Gobiaran: Lahoz; 900 m; 30TVN84; 27/05/2005; 1 ♀; I. Zabalegui *leg.* ARABA: Gobiaran: Villamardones; 875 m; 30TVN84; 5/07/2005; 4 ♀♀. ARABA: Iruraitz-Gauna: Gazeo: Laku; 600 m; 30TWN44; 8/06/2007; 1 ♂. ARABA: Asparren: Araia-Zalduondo; 650 m; 30TWN55; 21/06/2008; 1 ♂, 1 ♀. BURGOS: Berberana:

	♂♂	♀♀
Total length (mm)	7.99 (7.50–8.20)	8.87 (8.60–9.20)
Total width (mm)	1.87 (1.80–1.98)	2.20 (2.13–2.28)
Total length / Total width	4.26 (4.05–4.56)	4.03 (3.91–4.13)
Total length / Pronotum width	4.92 (4.84–5.05)	4.65 (4.46–4.78)
Ocular index	2.04 (1.82–2.16)	2.22 (2.09–2.63)
Antennal segment I / Head	1.28 (1.25–1.31)	1.13 (1.09–1.16)
Antennal segment II / Pronotum	1.89 (1.82–1.95)	1.39 (1.32–1.44)
Antennal segment III / Pronotum	1.15 (1.04–1.23)	0.94 (0.90–1.00)
Antennal segments II / I	2.36 (2.26–2.42)	2.11 (2.04–2.18)
Antennal segments II / III+IV	0.93 (0.88–1.00)	0.81 (0.76–0.84)

TABLE 1. *Stenodema* (*Stenodema*) *sericans* (Fieber, 1861): Summary of morphometric characters based on 10 males and 7 females from the Pyrenees and the «Basque Mountains». Remarkable differences with respect to Wagner and Weber (1964) and Wagner (1974a) are indicated in bold letters.

Monte Santiago; 900 m; 30TWN05; 13/07/2002; 2 ♂♂, 2 ♀♀. GIPUZKOA: Alkiza: Almitxuri; 470-489 m; 30TWN78; 4/06/2019; 4 ♂♂, 2 ♀♀. NAFARROA: Erromantzatu: Isu-Biotzari; 720 m; 30TXN52; 23/05/2003; 1 ♂.

Iberian records of this orthotyline are scarce and only concern, with certainty, to Catalonia. Ribes (1978) found it in Clot d'Espolla (Gironès) at the time when it was only known from the type locality near Rome, Italy. The species was described by Wagner (1953) as *H. (H.) flavipes* (a junior homonym of *Heterocordylus flavipes* Nitobe, 1906; see Kerzhner and Schuh, 1995) and under that name was recorded by Ribes (1978). Later on, it has been collected in a few other localities, as reported and/or compiled by Goula and Ribes (1995), Ribes and Ribes (2000) and Ribes *et al.* (2004). Concerning global distribution, apart from Italy and Spain (Kerzhner and Josifov, 1999; Aukema, 2019), recently it has also been recorded from France by Mazuy and Matocq (2016), who discuss about its separation from the sister species *H. (H.) tumidicornis* (Herrich-Schaeffer, 1835). Furthermore, unpublished data from Croatia have been provided to me by Christian Rieger and Gerhard Strauss, so that including them in Appendix 1 they are now published for the first time; at least some of them were collected on *Prunus spinosa*.

In the peninsular Basque Country, we had erroneously recorded *H. (H.) tumidicornis* in the province of Araba, municipalities of Arraia-Maeztu (Pagola-Carte *et al.*, 2006) and Iruraitz-Gauna (Pagola-Carte, 2011). A careful reexamination of the male genitalia of those specimens and others from the provinces of Araba, Burgos, Gipuzkoa and Nafarroa, in the light of ancient and recent descriptions and illustrations (Wagner, 1953, 1974b; Mazuy and Matocq, 2016) and also thanks to the comparison with French specimens kindly sent by Armand Matocq, now allows me to ascribe all of them to *H. (H.) italicus*. It is interesting to remark that the ratio «width / length of pronotum» is near 2 in both sexes, quite different to that stated in Wagner's identification keys. All the specimens were collected beating bushes of *Prunus spinosa* (Rosaceae) between end of May and mid-July. One would not hesitate to consider *H. (H.) italicus* a rather widespread and common species in northern Iberian Peninsula.

On the other hand, *H. (H.) tumidicornis* is usually accepted as the most widespread of both sister species across the continent, having been catalogued from more than 30 European and Asian countries including France, Italy and Spain (Aukema, 2019). Concerning France, Mazuy and Matocq (2016) not only provided

the first record of *H. (H.) italicus* but also warned about probable erroneous identifications of previous records of *H. (H.) tumidicornis*. They said: «*La répartition de ces deux espèces en France demande donc à être précisée ; il n'est pas certain qu'H. tumidicornis soit le plus répandu ou le plus commun.*» A similar situation can be assumed for Spain. In fact, Iberian records of *H. (H.) tumidicornis* are older than the year of description of *H. (H.) italicus* and they refer to northern Iberian Peninsula: Moncayo mountain between the provinces of Zaragoza, in Aragon, and Soria, in Castile and Leon (Champion and Chapman, 1904), and two localities of Alt Empordà and Baixa Cerdanya, in Catalonia (Cuní i Martorell, 1881, 1885), as compiled by Ribes and Goula (1997) for Aragon and Goula and Ribes (1995) and Ribes *et al.* (2004) for Catalonia. If forthcoming efforts to find and study the specimens collected by Champion, Chapman and Cuní i Martorell reveal that they in fact belong to *H. (H.) italicus*, I would be in favour of deleting *H. (H.) tumidicornis* from the Iberian fauna. In the meanwhile, a great question mark should be written in my opinion.

***Heterocordylus (Heterocordylus) montanus* Lindberg, 1934**

MATERIAL STUDIED: ALMERÍA: Vúcar: Cerro de los Lobos; 170 m; 30SWF37; 27/03/2017; 9 ♂♂, 21 ♀♀. (Of them, 2 ♂♂, 2 ♀♀, coll. Carapezza, 1 ♂, 1 ♀, coll. Matocq, 1 ♂, 1 ♀ coll. Rieger.) [previously published record (Pagola-Carte, 2018a)]. GRANADA: Baza: Cerro del Morrón (Sierra de Baza/Filabres); 2040 m; 30SWG12; 25/06/2019; 7 ♂♂, 13 ♀♀. (Of them, 2 ♂♂, 2 ♀♀, coll. Carapezza.).

Until recently, it was considered a high mountain species endemic to Sierra Nevada and living on *Genista versicolor* (= *G. baetica*) in summer. Pagola-Carte (2018a) showed that it also occurs on sea-level bushes of *Genista umbellata* at the beginning of spring. Both external morphology and male genitalia were found to be similar between mountain (– summer – on-*versicolor*) and plain (– spring – on-*umbellata*) populations.

At the beginning of summer 2019 I was guided by F. Rodríguez Luque to the top of the mountain chain Baza/Filabres, and we discovered a «mountain population» of *H. (H.) montanus* on bushes of *Genista versicolor* (Fig. 3a). The fresher and more abundant material (as compared with previously examined material from Sierra Nevada of Wagner's collection) has made it possible to carry out a more detailed comparison between «mountain» and «plain» specimens,

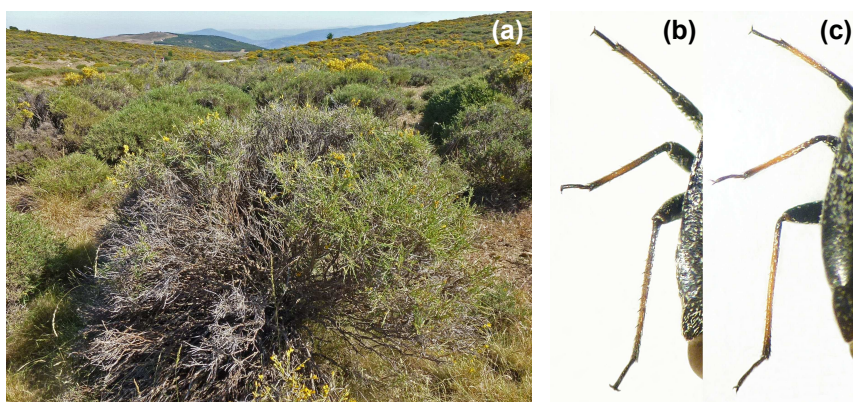


FIGURE 3. *Heterocordylus* (*Heterocordylus*) *montanus* Lindberg, 1934: (a) Habitat of a «mountain population» with the host plant *Genista versicolor* (Fabaceae) in Sierra de Baza/Filabres; (b) Tibiae of a «mountain» female (Baza/Filabres); (c) Tibiae of a «plain» female (Vicar).

including the study of the female genitalia for the first time.

The most outstanding difference concerns colouration of tibiae (compare Figs. 3b and 3c), always being markedly paler in «plain» specimens, both males and females. In addition, several morphometric traits are distinguishing as well, as summarised in Table 2, with females showing the greatest difference for every character (even almost non-overlapping ranges for some of them!). «Plain» specimens are bigger and more elongate, as revealed respectively by total length and by first two ratios in the Table, and their ocular index is smaller. Quite the opposite, «mountain» specimens (particularly females) are smaller and stouter and have smaller eyes with respect to vertex.

As in my first approach to the species (Pagola-Carte, 2018a), again I have not been able to find differences in the parameres and sclerotized processes of the vesica of the male genitalia. As to the gynatrial complex of the female genitalia, no noticeable differences have been observed in the shape and structure of the dorsal wall, apart from slight details due to inter-individual variability (Fig. 4a) and presumably in connection to either the size or the sclerotization level of the insect. On the contrary, the dorsal lobes of interrampal sclerites (= K structures) show one subtle difference concerning the density and size of the microspine covering (compare Figs. 4b and 4c): having been examined 8 females (4 «mountain» + 4 «plain»), a greater surface of the inner half of those sclerites

appeared constantly barer in «mountain» than in «plain» specimens.

It seems obvious that the life cycle of these two populations is separated by a non-negligible temporal gap of two-three months for the maximum of adults' occurrence. In addition, they depend on different host plants of Fabaceae Genisteae. Moreover, co-occurring with the «mountain» population of *H. (H.) montanus*, also an old couple of *H. (H.) tibialis* (Hahn, 1833) were found on *Genista versicolor*, suggesting one of the typical faunistic successions on Fabaceae bushes and reducing the possibility of a still unnoticed, previous generation of *H. (H.) montanus* (in parallel with the spring-occurring «plain» population) at such high altitude.

Should, therefore, «mountain» and «plain» populations represent different subspecies of *H. (H.) montanus*? Even more, do they in fact belong to two sibling species? As we have seen, differences of external morphology exist between both populations, but the study of male and female genitalia is not conclusive. On the other hand, and taking into account the known oligophagy and phenological plasticity within the genus *Heterocordylus*, it may happen that we are looking at two «photo finish» at the end points of a larger ecological (as well as morphological) spectrum.

Personally, I think that it will be a matter of prudence to keep on considering a single species, at least until new data on morphology, ecology and/or molecular analyses provide a better insight into the taxonomy.

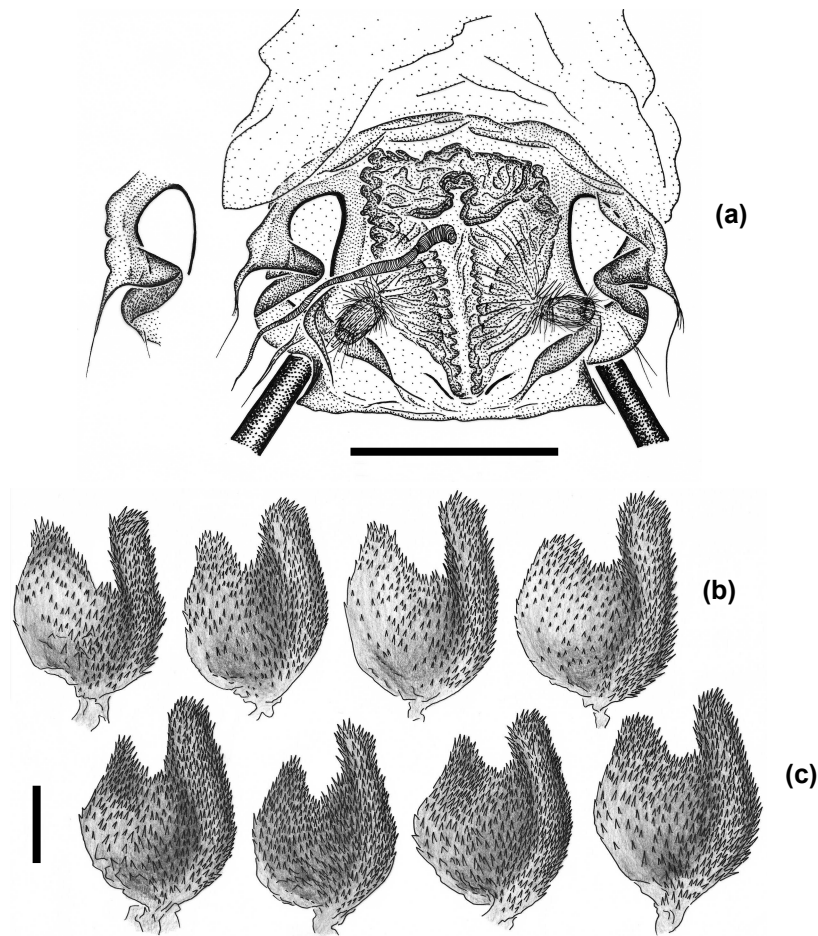


FIGURE 4. *Heterocordylus (Heterocordylus) montanus* Lindberg, 1934: Female genitalia: (a) Dorsal wall of the gynatrial complex (fields of spinules omitted), including a detail of interindividual variability independent of the population; (b) Dorsal lobes of the interrampal sclerites (= K structures) in 4 specimens of the «mountain population» (Baza/Filabres); (c) Dorsal lobes of the interrampal sclerites (= K structures) in 4 specimens of the «plain population» (Vicar) (Scale bars: (a) = 0.4 mm; (b)-(c) = 0.1 mm).

	«Mountain» population		«Plain» population	
	♂♂	♀♀	♂♂	♀♀
Total length (mm)	4.26 (3.99–4.55)	3.78 (3.63–3.93)	4.42 (4.24–4.59)	4.17 (3.89–4.48)
Total length / Total width	2.44 (2.35–2.65)	1.99 (1.93–2.05)	2.58 (2.57–2.59)	2.10 (2.00–2.23)
Total length / Pronotum width	2.92 (2.80–3.10)	2.61 (2.50–2.73)	3.14 (3.10–3.19)	2.74 (2.61–2.83)
Metatibia length / Pronotum width	1.19 (1.14–1.24)	1.12 (1.07–1.23)	1.20 (1.19–1.23)	1.11 (1.08–1.17)
Ocular index	2.26 (2.20–2.33)	2.80 (2.51–2.94)	2.17 (2.10–2.33)	2.42 (2.10–2.67)
Antennal segment I / Head	0.38 (0.36–0.41)	0.35 (0.33–0.36)	0.39 (0.38–0.41)	0.36 (0.33–0.38)
Antennal segment II / Pronotum	0.90 (0.88–0.95)	0.76 (0.71–0.81)	0.96 (0.94–0.98)	0.82 (0.79–0.87)
Antennal segments II / III+IV	1.80 (1.76–1.86)	1.72 (1.54–1.92)	1.86 (1.79–1.93)	1.86 (1.68–2.00)

TABLE 2. *Heterocordylus (Heterocordylus) montanus* Lindberg, 1934: A selection of morphological characters comparatively measured in «mountain» and «plain» populations, based on 7 males and 10 females each. Substantial differences are indicated in bold letters.

***Orthotylus (Pachylops) adenocarpi maroccanus*
Wagner, 1958**

MATERIAL STUDIED: ALMERÍA: Abruena: Sierra Nevada; 1168 m; 30SWG10; 31/05/2016; 1 ♂, 1 ♀, F. Rodríguez Luque *leg.* ALMERÍA: Bayárcal: Puerto de la Ragua (Sierra Nevada); 2017 m; 30SVG90; 14/07/2016; 1 ♂, F. Rodríguez Luque *leg.* GRANADA: Baza: Cerro del Morrón (Sierra de Baza/Filabres); 2000 m; 30SWG12; 25/06/2019; 8 ♂♂, 4 ♀♀.

The subspecies *maroccanus* Wagner, 1958 of *Orthotylus (Pachylops) adenocarpi* (Perris, 1857) was described from Ras Foughal, northeastern Morocco, on the basis of material collected by Vidal in 1939, but without indication of host plant. Wagner (1974b) added the locality of Azrou, central Morocco, and the host plant *Adenocarpus bacquei* (Fabaceae). The Palaearctic Catalogue includes, in addition to Morocco, also Algeria (Kerzhner and Josifov, 1999; Aukema, 2019), a country

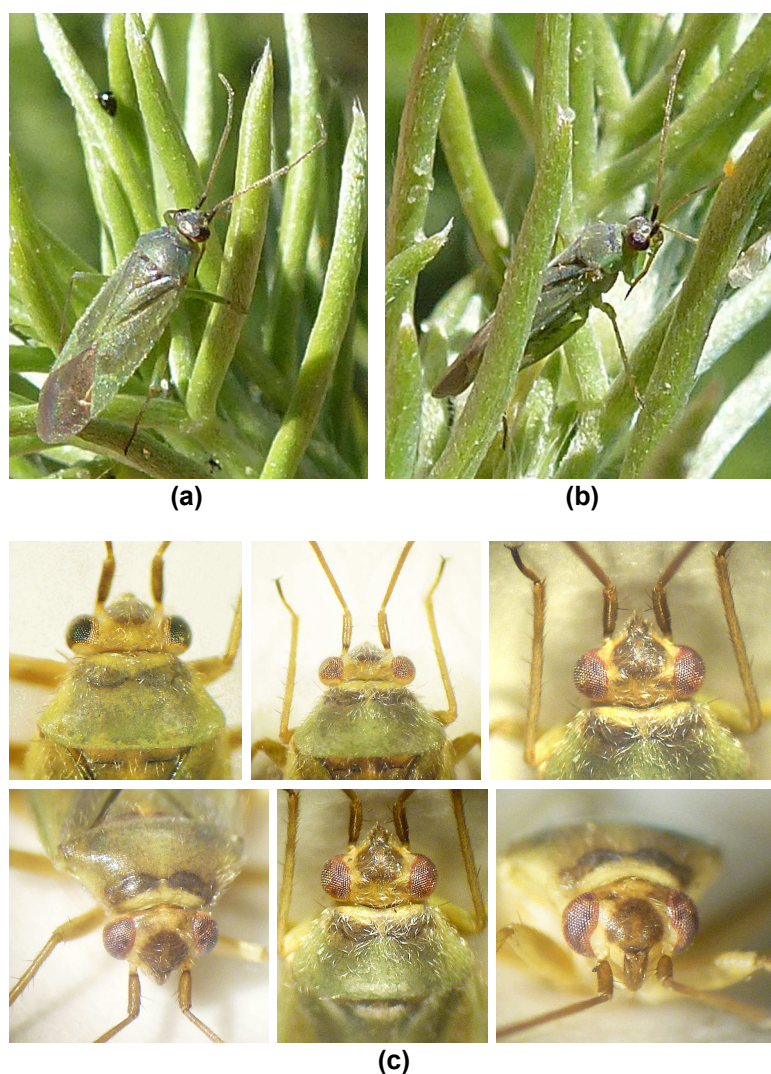


FIGURE 5. *Orthotylus (Pachylops) adenocarpi maroccanus* Wagner, 1958: (a)-(b) Living individuals on *Adenocarpus decorticans* (Fabaceae) in Sierra de Baza/Filabres; (c) Partial habitus of collected specimens, showing the most darkened body regions: antennal segment I, frons, tylus and pronotal calli.

for which I have not been able to find any explicitly published record.

This is the first record of this subspecies for the Iberian Peninsula and Europe. The specimens were collected in Sierra Nevada and Sierra de Baza/Filabres on *Adenocarpus decorticans*, which is a Betic-Rifean endemism occurring on several mountain areas of southern Spain and northern Morocco and Algeria (Castroviejo, 1999; Blanca *et al.*, 2011).

The study of external morphology allows nothing else but the ascription of the specimens to *O. (P.) adenocarpi*. As Wagner (1974b) recognized, the splitting of the species into subspecies is only possible according to the distinguishing shape of their male genitalia and to their different biology; to a lesser extent, some details of the colour of body and pubescence should be regarded. Both parameres of the Andalusian male specimens are in accordance with Wagner's description and illustrations (1958, 1974b), leaving little room for doubt about their belonging to *O. (P.) adenocarpi maroccanus*. I will provide my own illustrations in a forthcoming paper dealing with the subgenus *Pachylops*. Herein I present a few pictures of their habitus, given that slight differences have been observed with respect to the original description. The general colouration is somewhat darker in most specimens (Fig. 5a-c), particularly antennal segment I, frons and tylus as well as pronotal calli, only partly due to the specimens' drying process (Fig. 5c). In addition, total length is slightly greater than stated by Wagner (1958, 1974b; according to whom this would be the smallest subspecies): 4.6 (4.2–4.8) mm instead of 3.7–4.4 (♂♂) and 4.2 (4.0–4.3) mm instead of 3.5–4.5 (♀♀).

Zanchius breviceps (Wagner, 1951)

MATERIAL STUDIED: ALMERÍA: Adra: Sierra de Adra; 566 m; 30SVF97; 21/09/2018; 1 ♂, 3 ♀♀, 1 nymph; F. Rodríguez Luque *leg.*; B. Çerçi & S. Pagola-Carte *det.*

The specimens studied were sent to the author by the collector, who had photographed some of them (Fig. 6a) and shown on his blog «Mundo Natural Faluke» (<http://faluke.blogspot.com>) under the name *Malacocoris chlorizans* (Panzer, 1794), true individuals of which were also photographed and included in the same section (Fig. 6c). In fact, both species are very similar externally and can be mistaken. Having noticed some subtle differences on those pictures, our colleague Barış Çerçi warned us (the photographer and me) against probable confusion. Finally, the

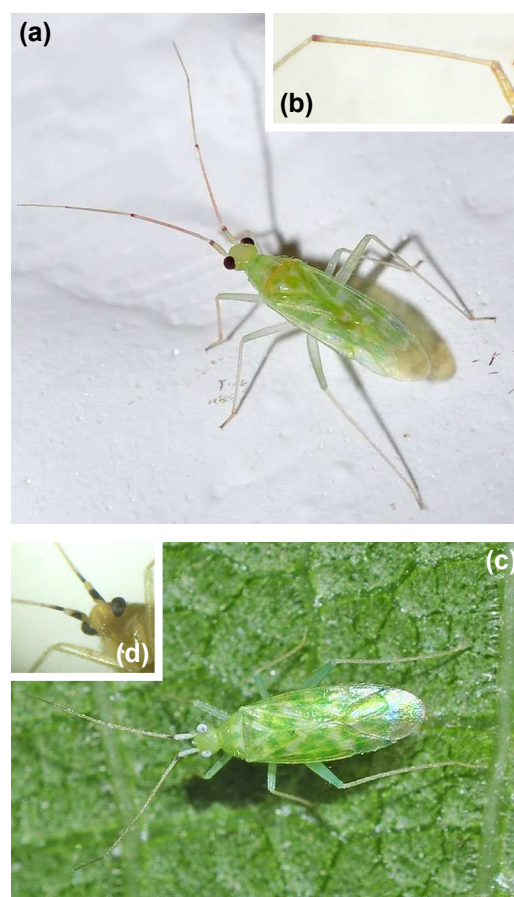


FIGURE 6. *Zanchius breviceps* (Wagner, 1951) and *Malacocoris chlorizans* (Panzer, 1794): External morphology: (a) A living individual of *Zanchius breviceps* (Almería); (b) Dorsal detail of left antenna in a collected specimen of *Zanchius breviceps* (Almería); (c) A living individual of *Malacocoris chlorizans* (Almería); (d) Ventral detail of basal part of antennae in a collected specimen of *Malacocoris chlorizans* (Gipuzkoa). [(a) and (c) Photos by Francisco Rodríguez Luque.]

examination of the material, including study of external morphology and particularly male genitalia, has revealed that a part of the specimens occurring on *Ficus carica* (Moraceae) actually belong to *Zanchius breviceps*.

This represents the first record of the species for Spain and the Iberian Peninsula. Widely distributed in tropical Africa (Linnavuori, 1994) and some parts of the Palaearctic Region (Kerzhner and Josifov, 1999; Aukema, 2019), in Europe it was only known until present from the islands of Crete (Greece) (Heiss

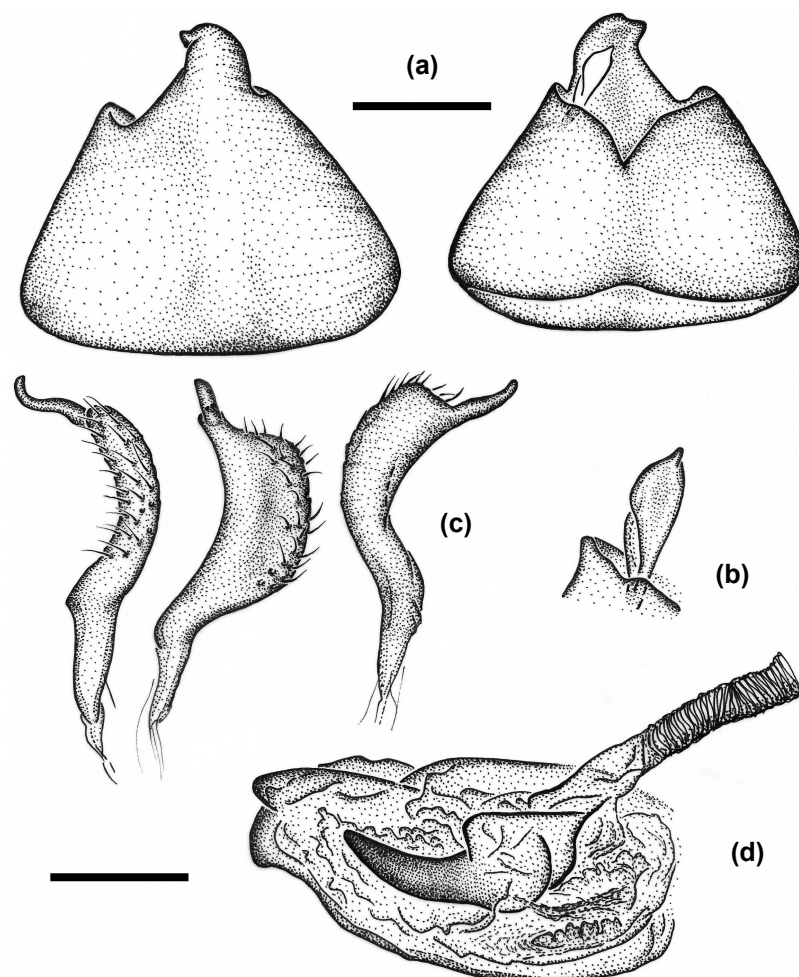


FIGURE 7. *Zanchius breviceps* (Wagner, 1951): Male genitalia: (a) Pygophore; (b) Right paramere; (c) Left paramere; (d) Vesica (Scale bars: (a) = 0.2 mm; (b)-(d) = 0.1 mm).

et al., 1993) and Malta (Mifsud *et al.*, 2012). It is more widespread in the eastern Mediterranean subregion, including the island of Cyprus, several countries of the Middle East and since recently also Turkey (Çerçi *et al.*, 2019).

It seems that the species has either been overseen for many years in the northern coastline of the Mediterranean or only recently started to spread in this region (Barış Çerçi, pers. comm.). Its occurrence in Almeria, southeastern Iberian Peninsula, is not surprising and might be part of its native, previous

distribution range. On the contrary, it would be interesting to detect and track its likely process of expansion to central or even northern Iberian Peninsula in coming years, for example paying attention to the entomofauna living on *Ficus carica*. Curiously, Goula and Ribeiro (1995) found *Malacocoris chlorizans* abundantly in middle Portugal, using a systematic methodology of sticky yellow traps on *Ficus carica*. They studied the male genitalia (page 11, fig. 1), there is hence little doubt that *Z. breviceps* was not collected there in September-October 1993.

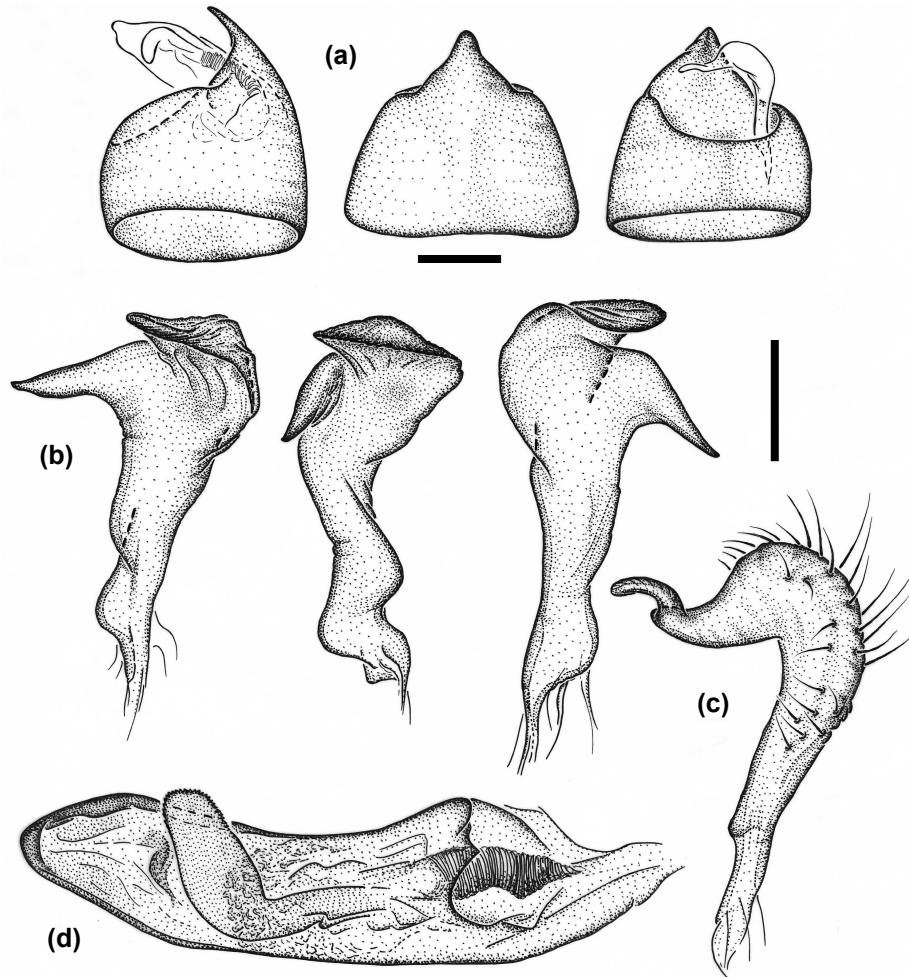


FIGURE 8. *Malacocoris chlorizans* (Panzer, 1794): Male genitalia: (a) Pygophore; (b) Right paramere; (c) Left paramere; (d) Vesica (Scale bars: (a) = 0.2 mm; (b)-(d) = 0.1 mm).

The morphology of the specimens examined is in general accordance with Wagner's (1974b) and Linnavuori's (1994) identification keys, diagnoses and/or descriptions for *Z. breviceps*, even if some of them have a slightly greater size (up to 4.2 mm) and care must be taken with respect to ocular index measurements, which are not correctly indicated by Wagner (or not measured as usually). Moreover, although Wagner's identification key (1974b: page 111) and Linnavuori's «Affinities» section of genus *Zanchius* (1994: page 69) allow a clear separation between the genera *Zanchius* and *Malacocoris* according to the shape

and structure of their head and pronotum, it is also true that in the context of western European Orthotylinae (with both genera being monospecific here) a more straightforward separation is obtained by simple examination of antennae: in *Z. breviceps*, the segment II is apically darkened (reddish) and about 2× longer than pronotum width, whereas in *M. chlorizans* it is basally darkened and about 1.5× longer than pronotum width; in addition, in the latter the segment I bears a sub-longitudinal dark stripe ventrally (Fig. 6d) and in the former a reddish tinge can usually be observed also apically on segments I and III (Fig.

6a-b). A thorough description of *Z. breviceps* including numerous details about colouration of body and antennal segments were provided by Linnavuori (1994: page 71).

All in all, the examination of male genitalia is crucial for an accurate identification. Here I illustrate the parameres and the vesica, as well as the pygophore, for *Z. breviceps* (Fig. 7) and *M. chlorizans* (Fig. 8). Some of those structures for one or both species can also be consulted in a few previous works (Wagner, 1974b; Linnavuori, 1994; Goula and Ribeiro, 1995). Particularly interesting is the shape of the pygophore in *Z. breviceps*, not illustrated by Linnavuori (1994) but mentioned by him for its similarity with that of *Z. laodameia* Linnavuori, 1994 (page 72, fig. 44b). On the other hand, his drawing of the aedeagus of *Z. breviceps* (page 72, fig. 44a) shows a greater detail concerning the dentate plates, which were not enough sclerified in my observations.

***Chlamydatus (Eurymerocoris) evanescens* (Boheman, 1852)**

MATERIAL STUDIED: GIPUZKOA: Itsasondo: Murumendi (crest); 835 m; 30TWN67; 5/07/2019; 3 ♂♂, 8 ♀♀, 3 nymphs. HUESCA: Casbas de Huesca: Sierra de Guara: Santa Cilia –Peña del Agón; 800-900 m; 30TYM38; 27/04/2015; 1 ♂, 1 ♀; 21/05/2015; 3 ♂♂. LA RIOJA: Lumberas de Cameros: Puerto de Piqueras –Cabezo; 1710-1931 m; 30TWM35; 12/08/2021; 3 ♂♂, 3 ♀♀.

Although explicit records are scarce for the Iberian Peninsula, this is a widespread species which is probably associated, in the author's experience, to a certain degree of continentality. Wagner (1960) recorded it from Catalonia and Ribes (1982a, 1982b) gave a profusion of further Catalan records and added the province of Huesca in Aragon. Compilations by Ribes and Goula (1997) and Ribes *et al.* (2004) underpinned the knowledge for Aragon and Catalonia, respectively. Here are presented the first records for the Basque Country (inner of Gipuzkoa province) and La Rioja, which, together with a new one from Aragon (province of Huesca), represent different types of locally dry and stony habitats from the northern Iberian Peninsula.

C. (Eur.) evanescens is known for its dependence on plants of the genus *Sedum* (Crassulaceae) and for frequently passing unperceived due to its occurrence on the ground level exploiting microhabitats provided by the basal parts of its hosts. Several species of *Sedum* have been mentioned throughout the available

literature concerning its wide Euroasian distribution (see, for example: Wagner, 1975; Ehanno, 1987; Linnavuori, 1998; Wachmann *et al.*, 2004).

I have similarly found it on *Sedum* spp. in Gipuzkoa and Huesca. As to the population of La Rioja, it is interesting to note that it was found associated to another genus of Crassulaceae, specifically to the Iberian endemic *Sempervivum vicentei* (Fig. 9a). A similar duality *Sedum*–*Sempervivum* has been shown by Albrecht (2011) for another typical *Sedum*-dependent insect, the paradigmatic *Parnassius apollo* (Linnaeus, 1758) or Apollo butterfly (Lepidoptera: Papilionidae). Having confirmed that characters of external morphology and male genitalia are similar among all these populations, here I take the occasion to illustrate in Fig. 9b the vesica, which to my knowledge was scarcely illustrated previously (Wagner and Weber, 1964; Wagner, 1975; Putshkov and Putshkov, 1983) with some uncertainty about the correct location of the secondary gonopore (Fig. 9c-e). Cobben (1960) did not illustrate it in his thorough contribution to the biology and morphology of this and other species of genus *Chlamydatus*.

***Macrotylus (Alloeonycha) ribesi* Carapezza, 1994**

MATERIAL STUDIED: ALMERÍA: Vúcar: Cerro de los Lobos; 170 m; 30SWF37; 27/03/2017; 7 ♂♂, 6 ♀♀. ALMERÍA: Roquetas de Mar: Aguadulce; 123 m; 30SWF37; 26/04/2017; 5 ♂♂, 5 ♀♀, F. Rodríguez Luque *leg.*

The recent description of this species of *Macrotylus* (*Alloeonycha*) of the *solitarius*-group, by Carapezza (1994), was based on a series of males and females collected by him at Puerto de Oncala, in the province of Soria, and an additional male collected in 1897 by Ignacio Bolívar in the province of Madrid. The only subsequent records are those provided by Günther and Günther (2019) from the provinces of Alacant and Almeria, some of their specimens having been attracted to light. No data on the host plants have ever been mentioned.

The present specimens were collected on *Sideritis pusilla* (Lamiaceae) (Fig. 10), which has a Maghrebian and southern Iberian distribution. Given the known distribution of *M. (A.) ribesi*, it is highly probable that it depends on several species of *Sideritis* rather than a single one. As a meaningful example, *Sideritis* other than *pusilla* grow abundantly, in the author's experience, at the type locality of the mirid (northern half of Spain).

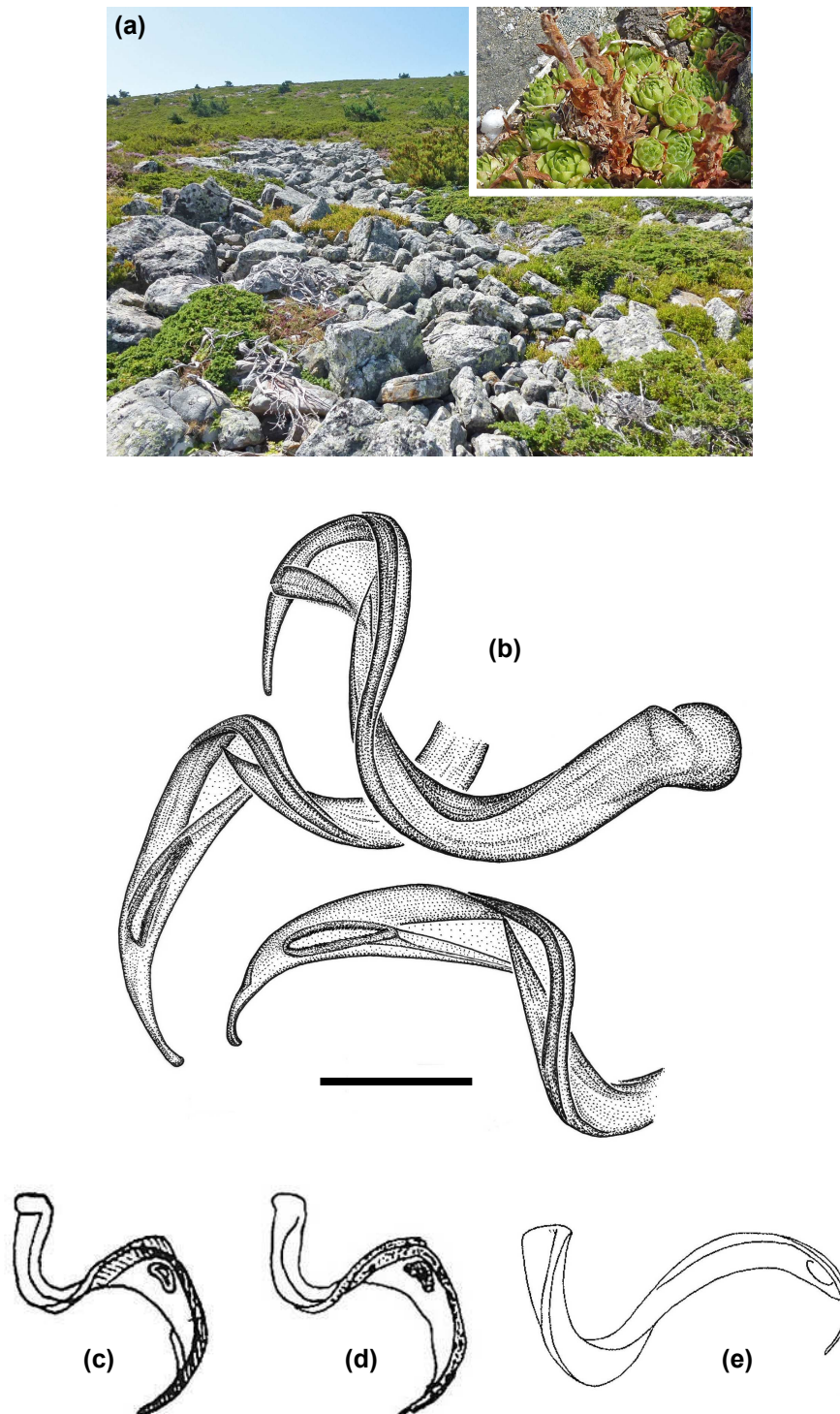


FIGURE 9. *Chlamydatus* (*Eurymerocoris*) *evanescens* (Boheman, 1852): (a) Habitat of the population found in La Rioja with the host plant *Sempervivum vicentii* (Crassulaceae); (b) Vesica in different views or specimens from Gipuzkoa, Huesca and La Rioja; (c)-(e) Vesica according to previous authors. [Reproduced from: (c) Wagner and Weber, 1964; (d) Wagner, 1975; (e) Putshkov and Putshkov, 1983.]

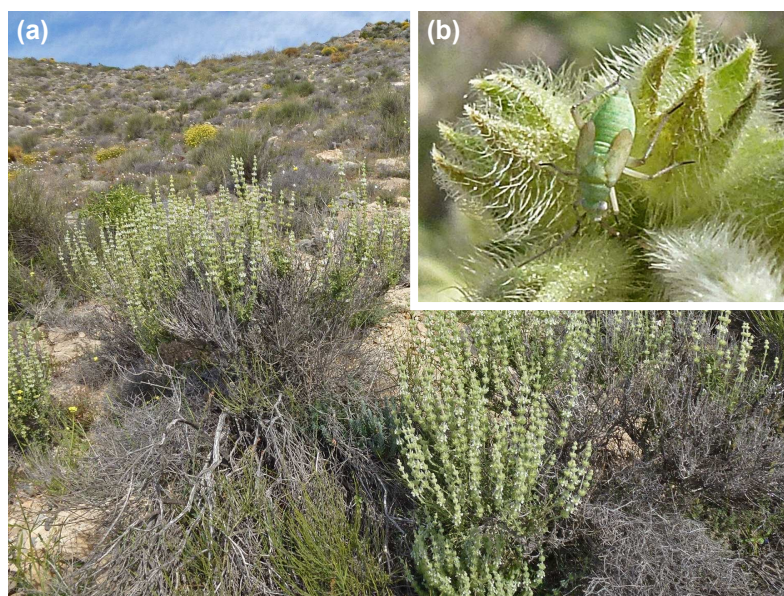


FIGURE 10. *Macrotylus* (*Alloeonycha*) *ribesi* Carapezza, 1994: (a) Habitat with its host plant *Sideritis pusilla* (Lamiaceae) in Vúcar (Almería); (b) A last-instar nymph on *Sideritis pusilla*.

***Psallus* (*Psallus*) *anashanti* Pagola-Carte, 2017**

MATERIAL STUDIED: MADRID: Madrid: Casa de Campo: Encinar de San Pedro; aprox. 650 m; 30TVK37; 06/2018; 1 ♂, 2 ♀♀; D. Hernández & J.A. Hernández *leg.*

Within the nominate subgenus of *Psallus*, the highly diversified group of *P. (P.) haematodes* (Gmelin, 1790) contains many host-specific species on trees other than *Quercus* spp. (Fagaceae). Among them, the sub-group of *P. (P.) lepidus* Fieber, 1858 consists of up to six species associated to ash trees (*Fraxinus* spp., Oleaceae) (Matocq and Pluot-Sigwalt, 2011; Pagola-Carte, 2017, 2018b). *P. (P.) anashanti* was recently described from Mediterranean and sub-Mediterranean regions of the peninsular Basque Country (Araba and Nafarroa), on the banks of the Ebro river and some of its tributaries, the narrow-leaved ash *Fraxinus angustifolia* being its only known host plant.

In the original description (Pagola-Carte, 2017) it was suggested that this species might occur over a larger area following the distribution of its host plant *Fraxinus angustifolia* (Oleaceae), or it might represent an Iberian endemic species associated to the glacial refuges provided by river depressions and their gallery forests.

Here is presented the first record of *P. (P.) anashanti* on central Iberian Peninsula, on the basis of several specimens collected, again on *Fraxinus angustifolia*, in the context of thesis works (Universidad Rey Juan Carlos) by Diego Hernández and Juan Antonio Hernández in the greatest urban park of the city of Madrid. For the moment, thus, both hypotheses about the distribution of the species can be seen as plausible.

***Psallus* (*Psallus*) *vicinus* Reuter, 1899**

MATERIAL STUDIED: ALMERÍA: Adra: Sierra de Adra; 566 m; 30SVF97; 26/05/2017; 1 ♂; F. Rodríguez Luque *leg.* ARABA: Iruraitz-Gauna: Gazeo: Laku; 585 m; 30TWN44; 15/07/2007; 1 ♀; 27/07/2007; 1 ♀; 11/07/2009; 3 ♀♀; 7/07/2018; 7 ♀♀, 2 nymphs; 11/07/2018; 2 ♂♂, 9 ♀♀, 2 nymphs; 13/07/2018; 2 ♂♂, 10 ♀♀; 24/07/2018; 3 ♀♀; 26/07/2018; 2 ♂♂, 16 ♀♀; 29/07/2021; 1 ♂, 5 ♀♀. (Of them, 1 ♂, 3 ♀♀, coll. Matocq, 1 ♂, 2 ♀♀, coll. Rieger.).

Wagner (1975) compiled this species with doubt («Bisher nur einmal auf den Balearen (Mallorca) gefunden. Vermutlich identisch mit *P. flavellus* Stich.»), but Matocq (2011) confirmed its validity and characterized it by external morphology and male and female genitalia,

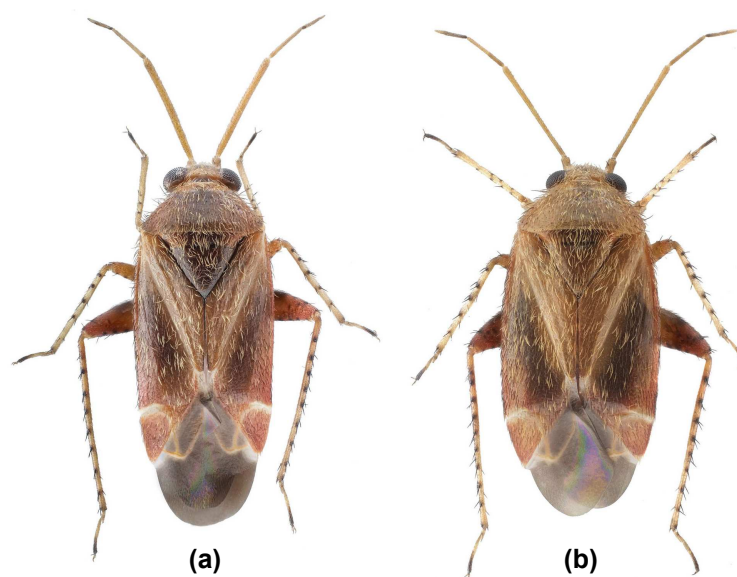


FIGURE 11. *Psallus (Psallus) vicinus* Reuter, 1899: Habitus of specimens from Iruraitz-Gauna (Araba): (a) Male; (b) Female. [Photos by Gerhard Strauss.]

after careful examination of specimens of the type series from Mallorca, as well as providing new records from Corse and «Espagne: Gironès: Llorà». Only the specimens from Corse, collected by Jean Péricart and regarded by Wagner and Weber (1964) and Wagner (1975) as *P. jokkeri*, had indication of host plant: *Populus nigra* (Salicaceae). [Aukema (1999) established the synonymy *Compsidolon (Chamaeliops) crotchii* (Scott, 1870) = *Psallus jokkeri* Reuter, 1899.]

Intensive collecting on *Populus nigra* in the province of Araba has allowed me to record it there in recent years. As can be inferred by looking at the data above, in the locality of Iruraitz-Gauna a few females had been collected some years earlier (2007 and 2009) without clear ascription to any species due to lack of males. The apparent rareness of the species could simply reflect that it is a typical inhabitant of the canopy, as is the case with many other *Psallus* species. It can be added that the canopy structure of *Populus nigra* poses a particular difficulty to some of the usual methods of sampling, such as beating and sweeping of the foliage. In any case, even in the best collecting days the population density seemed not to be very high, reaching to find the specimens at a rate of 3-4 per hour. It is interesting to note that females were

numerically dominant always throughout the month of July, with a sex ratio of 1 male to 7 females approx. Given the illustrative value of the freshly collected specimens, which were captured and processed in optimal conditions, here are presented photographs (Fig. 11) of the male and female habitus.

The record of the species in the province of Almería is due to the collecting efforts of F. Rodríguez Luque. Fortunately (but not surprisingly) the only specimen collected by means of light traps was a male, leaving no doubt about its belonging to *P. (P.) vicinus*.

The specimens are morphologically in agreement with previous diagnoses and descriptions, including male and female genitalia as illustrated by Matocq (2011). However, I have realized that much care has to be taken when interpreting the different degrees of vesical torsion that can be observed depending on different KOH treatments.

Concerning distribution, *P. (P.) vicinus* is known, as aforementioned, from the islands of Corsica and Mallorca, as well as from Catalonia on the continent. The present records considerably enlarge the known distribution of the species to the south and to the west of the Iberian Peninsula.

Acknowledgements

I am immensely grateful to many friends and colleagues who have helped me in the preparation of this paper. Many thanks for your interesting specimens, your wonderful photographs and your advice on identifications. Listed alphabetically (but mentioned where corresponds throughout the text): Berend Aukema (Wageningen), Barış Çerçi (Ankara), Hannes Günther (Ingelheim), Theodoor Heijerman (Wageningen), Diego Hernández (Madrid), Juan Antonio Hernández (Madrid), Armand Matocq (Paris), José Joaquín Pérez De-Gregorio (Barcelona), Christian Rieger (Nürtingen), Francisco Rodríguez Luque (Almería), Gerhard Strauss (Biberach), Francesc Vallhonrat (Barcelona) and Imanol Zabalegui (Hernani). Thanks are also given to several institutions that supported different projects in the frame of which some of the captures were made as direct or collateral results: Arabako Foru Aldundia, Bizkaiko Foru Aldundia, Eusko Jaurlaritza, Gipuzkoako Foru Aldundia and Naturtzaindia. Last but not least, I warmly thank Berend Aukema (Wageningen) and Hannes Günther (Ingelheim) for the critical reading of the manuscript and for their comments, which have greatly improved the final version of the article.

References

- AIZPURU I, ASEGINOLAZA C, URIBE-ECHEBARRÍA PM, URRUTIA P, ZORRAKIN I. 1999. *Claves ilustradas de la flora del País Vasco y territorios limítrofes*. Eusko Jaurlaritza Argitalpen Zerbitzu Nagusia / Servicio Central de Publicaciones del Gobierno Vasco. Vitoria-Gasteiz.
- ALBRECHT M. 2011. Beobachtungen zu den Raupen-Nahrungspflanzen von *Parnassius apollo* (Linnaeus, 1758) in den Schweizer Alpen (Lepidoptera: Papilionidae). *Entomo Helvetica* **4**: 199-205.
- AUKEMA B. 1999. *On type specimens of some Palaearctic Miridae*: 1-32. Aukema. Renkum.
- AUKEMA B (Ed.). 2019. *Catalogue of the Palaearctic Heteroptera*. Naturalis Biodiversity Center. Available online: <https://catpalhet.linnaeus.naturalis.nl>. Last accessed: 2022/04/15.
- BLANCA G, CABEZUDO B, CUETO M, SALAZAR C, MORALES TORRES C (Eds.). 2011. *Flora vascular de Andalucía Oriental* (2ª edición). Universidades de Almería, Granada, Jaén y Málaga. Granada.
- CARAPEZZA A. 1994. New species of Phylinae from Spain, Italy and Iran (Insecta: Heteroptera, Miridae). *Il Naturalista Siciliano* **18(3-4)**: 277-286.
- CASTROVIEJO S. 1999. *Adenocarpus* DC. In: Talavera S, Aedo C, Castroviejo S, Romero C, Sáez L, Herrero A, Salgueiro FJ, Velayos M (Eds.). Leguminosae. *Flora Iberica* **7(1)**: 189-205. Real Jardín Botánico, CSIC. Madrid.
- ÇERÇİ B, KOÇAK Ö, TEZCAN S. 2019. Two new species and ten new records of Heteroptera from Turkey, including the first record of the potential alien *Campylomma miyamotoi* in the Western Palearctic. *Acta Entomologica Musei Nationalis Pragae* **59(1)**: 295-306.
- CHAMPION GC, CHAPMAN TA. 1904. An entomological excursion to Moncayo, N. Spain. *Transactions of the Royal Entomological Society of London* **52(1)**: 81-98.
- COBBEN RH. 1960. De eerste vondsten in Nederland van een met *Sedum* en een met *Carex* geassocieerde wants (Heteroptera: Miridae). *Entomologische Berichten* **20**: 195-208.
- CUNÍ I MARTORELL M. 1881. Excursión entomológica y botánica a la Cerdaña española (Cataluña). *Anales de la Sociedad Española de Historia Natural* **10(2)**: 369-389.
- CUNÍ I MARTORELL M. 1885. Excursión entomológica a varias localidades de la provincia de Gerona (Cataluña). *Anales de la Sociedad Española de Historia Natural* **14(1)**: 51-73.
- EHANNO B. 1987. *Les hétéroptères mirides de France. Tome II-A: Inventaire et synthèses écologiques* (Inventaires de faune et de flore, fascicule 40). Secrétariat de la Faune et de la Flore. Paris.
- GOULA M, RIBEIRO FN. 1995. *Malacocoris chlorizans* (Panzer, 1794), nueva especie para Portugal (Insecta, Heteroptera, Miridae). *Boletim da Sociedade Portuguesa de Entomologia* **152(VI-2)**: 9-15.
- GOULA M, RIBES J. 1995. Lista de especies de los Miridae de Cataluña (Insecta, Heteroptera). *Boletín de la Asociación Española de Entomología* **19(1-2)**: 175-217.
- GÜNTHER CH, GÜNTHER H. 2019. List of bugs collected in southern Spain (Heteroptera). *Entomologische Zeitschrift Schwanfeld* **129(4)**: 223-242.
- HECKMANN R, RIEGER CH. 2001. Wanzen aus Baden-Württemberg – Ein Beitrag zur Faunistik und Ökologie der Wanzen in Baden-Württemberg (Insecta, Heteroptera). *Carolinea* **59**: 81-98.
- HEISS E, GÜNTHER H, RIEGER CH, MALICKY H. 1993. Heteroptera collected by light traps in Crete (Heteroptera from the Island of Crete VIII). *Biologia Gallo-Hellenica* **20(1)**: 107-114.

- KERZHNER IM, JOSIFOV M. 1999. Miridae Hahn, 1833. In: Aukema B, Rieger Ch (Eds.). *Catalogue of the Heteroptera of the Palaearctic Region. Volume 3. Cimicomorpha II*. The Netherlands Entomological Society. Amsterdam.
- KERZHNER IM, SCHUH RT. 1995. Homonymy, synonymy, and new combinations in the Miridae (Heteroptera). *American Museum Novitates* 3137: 1-11.
- LINNAVUORI RE. 1994. Orthotylinae of West, Central and North-East Africa (Heteroptera, Miridae). *Acta Zoologica Fennica* 193: 1-84.
- LINNAVUORI RE. 1998. Studies on the Miridae (Heteroptera) of Iran. *Acta Universitatis Carolinae, Biologica* 42: 23-41.
- MATOCQ A. 2011. Mise au point sur *Psallus vicinus* Reuter, 1899, une espèce peu connue (Hemiptera, Heteroptera, Miridae). *Revue Française d'Entomologie (N.S.)* 33(1-4): 1-4.
- MATOCQ A, PLUOT-SIGWALT D. 2011. Une nouvelle espèce de *Psallus* de Turquie associée à *Fraxinus* sp. (Oleaceae) (Hemiptera, Heteroptera, Miridae, Phyllinae). *Nouvelle Revue d'Entomologie (N.S.)* 27(2)[2010-2011]: 163-172.
- MAZUY M, MATOCQ A. 2016. Sur trois espèces passées inaperçues en France jusqu'à présent dans les genres *Orthotylus*, *Heterocordylus* et *Psallus* (Hemiptera Heteroptera Miridae). *L'Entomologiste* 72(3): 159-162.
- MIFSUD D, FALZON A, MALUMPHY C, DE LILLO E, VOVLAS N, PORCELLI F. 2012. On some arthropods associated with *Ficus* species (Moraceae) in the Maltese Islands. *Bulletin of the Entomological Society of Malta* 5: 5-34.
- PAGOLA-CARTE S. 2011. Chinchas mífidos (Insecta: Hemiptera: Miridae) del Humedal de Laku (Gazeo, Iruraz-Gauna, Araba). *Estudios del Museo de Ciencias Naturales de Álava* 23[2009-2010]: 187-198.
- PAGOLA-CARTE S. 2015. New Iberian records of interesting Miridae (Hemiptera: Heteroptera) with notes on their biology. *Heteropterus Revista de Entomología* 15(1): 23-42.
- PAGOLA-CARTE S. 2017. *Psallus* (*Psallus*) *anashanti* n. sp. from the Basque Country, northern Iberian Peninsula (Hemiptera: Heteroptera: Miridae). *Heteropterus Revista de Entomología* 17(1): 9-20.
- PAGOLA-CARTE S. 2018a. New Iberian records of interesting Miridae (Hemiptera: Heteroptera) with notes on their biology. Part 2. *Heteropterus Revista de Entomología* 18(1): 81-96.
- PAGOLA-CARTE S. 2018b. *Psallus* (*Psallus*) *enejokosu* n. sp. from the Basque Country, northern Iberian Peninsula (Hemiptera: Heteroptera: Miridae). *Heteropterus Revista de Entomología* 18(2): 181-191.
- PAGOLA-CARTE S, ZABALEGUI I, RIBES J. 2006. Miridae (Hemiptera: Heteroptera) de los Parques Naturales de Aralar e Izki (País Vasco, norte de la Península Ibérica). *Heteropterus Revista de Entomología* 6: 105-135.
- PUTSHKOV VG, PUTSHKOV PV. 1983. Little-known bugs (Heteroptera) of the south of the USSR. *Vestnik Zoologii* 1983(3): 17-25. [in Russian]
- RIBES J. 1978. Heteròpters nous o interessants per als Països Catalans. *Butlletí de la Institució Catalana d'Història Natural* 42 (Sec. Zool. 2): 83-88.
- RIBES J. 1982a. Hemípters del nord de Catalunya nous o interessants per a la fauna ibèrica. *Miscel·lània Zoològica* 6[1980]: 45-57.
- RIBES J. 1982b. Hemípteros del norte de Cataluña nuevos o interesantes para la fauna ibérica. *Pirineos* 117: 35-47.
- RIBES J. 1984. Troballes noves o remarcables d'hemipters per a Catalunya. *Sessió Conjunta d'Entomologia ICHN-SCL* 3: 105-115.
- RIBES J, BAENA M. 2006. Two new species of *Dicyphus* Fieber 1858 from the Iberian Peninsula and Canary Islands with additional data about the *D. globulifer*-group of the subgenus *Brachyceroea* Fieber 1858 (Hemiptera, Heteroptera, Miridae, Bryocorinae). *Denisia* 19 (Neue Serie 50): 589-598.
- RIBES J, GOULA M. 1997. Familia Miridae (Insecta: Heteroptera 2 / Familia 4). *Catalogus de la Entomofauna Aragonesa* 16: 15-23.
- RIBES E, RIBES J. 2000. Noves dades d'hemipters per a Catalunya i territoris limítrofs (Heteroptera). *Sessió Conjunta d'Entomologia ICHN-SCL* 10[1997]: 5-29.
- RIBES J, RIBES E. 2002. A new Iberian *Phytocoris* Fallén, 1814 from the Balearic archipelago, Spain (Hemiptera: Heteroptera: Miridae). *Butlletí de la Institució Catalana d'Història Natural* 70: 105-109.
- RIBES J, SERRA A, GOULA M. 2004. *Catàleg dels heteròpters de Catalunya* (Insecta, Hemiptera, Heteroptera). Institució Catalana d'Història Natural i Secció de Ciències Biològiques de l'Institut d'Estudis Catalans. Barcelona.
- TASZAKOWSKI A, PASIŃSKA A. 2017. New data on the occurrence of terrestrial true bugs (Hemiptera: Heteroptera) in Pieniny Mountains. *Fragmenta Faunistica* 60(1): 1-13.
- WACHMANN E, MELBER A, DECKERT J. 2004. *Wanzen, Band 2: Cimicomorpha: Microphysidae (Flechtenwanzen), Miridae (Weichwanzen)*. Die Tierwelt Deutschlands und der angrenzenden Meeressteile nach ihren Merkmalen und nach ihrer Lebensweise. 75 Teil. Goecke & Evers. Keltern.

WAGNER E. 1953. Neue Heteropteren der Sammlung des Naturhistorischen Museums in Wien. *Annalen des Naturhistorischen Museums in Wien* **59**[1952-1953]: 296-300.

WAGNER E. 1958. Einige neue *Orthotylus*-Arten aus Marokko. *Bollettino della Società Entomologica Italiana* **88**(5-6): 84-87.

WAGNER E. 1960. Beitrag zur Heteropteren-Fauna Nordost-Spaniens. *Miscelánea Zoológica* **1**(3): 33-56.

WAGNER E. 1974a. Die Miridae Hahn, 1831, des Mittelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera). Teil 1. *Entomologische Abhandlungen herausgegeben vom Staatlichen Museum für Tierkunde in Dresden* **37**(Suppl.)[1970-1971]: 1-484.

WAGNER E. 1974b. Die Miridae Hahn, 1831, des Mittelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera). Teil 2. *Entomologische Abhandlungen herausgegeben vom Staatlichen Museum für Tierkunde in Dresden* **39**(Suppl.)[1973]: 1-421.

WAGNER E. 1975. Die Miridae Hahn, 1831, des Mittelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera). Teil 3. *Entomologische Abhandlungen herausgegeben vom Staatlichen Museum für Tierkunde in Dresden* **40**(Suppl.)[1975]: 1-483.

WAGNER E, WEBER HH. 1964. *Hétéroptères Miridae* (Faune de France 64). Fédération Française des Sociétés de Sciences Naturelles. Paris.

WHEELER AGJR. 2015. Host grasses of the little-known stink bugs *Chlorochroa* (*Rhytidolomia*) *belfragii* (Stål) and *C. (R.) faceta* (Say) (Hemiptera: Pentatomidae) in inland saline wetlands. *Proceedings of the Entomological Society of Washington* **117**(2): 226-237.

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Appendix 1

Heterocordylus (*Heterocordylus*) *italicus* Kerzhner & Schuh, 1995: Records from Croatia, chronologically arranged.

♂♂	♀♀	Locality	Coordinates	Date	leg., det., coll.
3	1	Istarska (Pazin): Lanterna: Bucht und Steinbruch	045.17.10 N 013.35.20 E	01/06/1995	Ch. Rieger
0	1	Istarska (Pazin): Novigrad: Mirnamündung	045.18.00 N 013.35.59 E	08/06/1995	Ch. Rieger
0	1	Istarska (Pazin): Nova Vas: Baredine	045.16.13 N 013.39.42 E	25/05/1996	Ch. Rieger
8	5	Istarska (Pazin): Nova Vas: Baredine	045.16.13 N 013.39.42 E	02/06/1999	Ch. Rieger
1	0	Umag Sv. Lovrecica	045.23.06 N 013.32.04 E	23/05/2001	G. Strauss
1	0	Buzet Pocekaji 2 km NW	045.26.37 N 013.58.05 E	30/05/2002	G. Strauss
3	0	Porec Crvar	045.15.00 N 013.36.00 E	25/05/2004	G. Strauss
1	1	Umag Crveni Vrh Gingsterhang	045.29.15 N 013.32.27 E	26/05/2004	G. Strauss
1	1	Porec Crvar	045.15.00 N 013.36.00 E	28/05/2004	G. Strauss
2	1	Umag Umgebung Kanegra Bucht v. Piran	045.28.28 N 013.34.38 E	03/06/2005	G. Strauss
1	0	Motovun Umg. Livade Pirelici Mirnata	045.21.20 N 013.45.06 E	06/06/2005	G. Strauss
0	1	Porec Crvar	045.15.25 N 013.35.38 E	12/06/2006	G. Strauss
1	0	Buje Umg. Marusici Sv. Lucija	045.25.20 N 013.44.01 E	13/06/2006	G. Strauss
1	1	Motovun Umg. Kostanjica Mirnata	045.21.13 N 013.43.21 E	14/06/2006	G. Strauss
1	0	Buzet Umgebung Trstenik	045.26.49 N 014.03.35 E	17/06/2006	G. Strauss
1	0	Umag Crveni Vrh Gingsterhang	045.29.15 N 013.32.27 E	07/06/2008	G. Strauss