

Millipedes (Diplopoda) of the Euskal Herria / Basque Region in Northern España / Spain – Results of an international field trip in 2009

HANS S. REIP^{1,*} & KARIN VOIGTLÄNDER¹

¹ Senckenberg Museum of Natural History Görlitz, Am Museum 1, 02826 Görlitz, Germany

* Corresponding author: Hans S. Reip (Reip@Myriapoden-info.de)

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Abstract. This contribution summarises the results of a field trip to the Basque Region in North Spain conducted in 2009. In total, 58 sites in northern Spain and three additional sites in neighbouring France were investigated. A total of more than 2.500 specimens belonging to 36 species (1 Polyxenida, 6 Glomerida, 1 Polyzoniida, 3 Chordeumatida, 19 Julida, 6 Polydesmida) were found, of which 25 species are new to the Basque fauna. Information on taxonomy, distribution, and additionally on ecology of the recorded species is provided.

Zusammenfassung. Tausendfüßer (Diplopoda) vom Baskenland in Nordspanien – Ergebnisse einer internationalen Exkursion im Jahr 2009. Im vorliegenden Beitrag sind die Ergebnisse einer Sammelexkursion in das Baskenland/Nordspanien im Jahr 2009 zusammengefasst dargestellt. Insgesamt wurden 58 Standorte in Nordspanien und ergänzend drei Standorte im angrenzenden Frankreich untersucht. Insgesamt wurden mehr als 2.500 Individuen aus 36 Arten (1 Polyxenida, 6 Glomerida, 1 Polyzoniida, 3 Chordeumatida, 19 Julida, 6 Polydesmida) gefunden, von denen 25 Arten neu für die baskische Fauna sind. Für alle Arten werden Hinweise zu Taxonomie, Verbreitung und, wenn möglich, zu Habitatpräferenzen gegeben.

Resumen. Los milpiés (Diplopoda) del País Vasco en el norte de España – Resultados de un viaje de campo internacional en 2009. Esta contribución resume los resultados de un viaje de campo al País Vasco en el Norte de España realizado en 2009. En total, se investigaron 58 lugares en el norte de España y tres lugares adicionales en la Francia vecina. Se encontraron más de 2.500 especímenes pertenecientes de 36 especies (1 Polyxenida, 6 Glomerida, 1 Polyzoniida, 3 Chordeumatida, 19 Julida, 6 Polydesmida), de las cuales 25 especies son nuevas para la fauna vasca. Se proporciona información sobre taxonomía, distribución y además sobre la ecología de las especies registradas.

Keywords. Alava, distribution, ecology, faunistic, Guipuzkoa, Navarra, Parque Natural del Gorbea, Sierra de Andía, Sierra de Aralar, Sierra de Urbasa, Sierra de Urquilla, taxonomy.

1 Introduction

The Spanish millipede fauna is relatively little explored compared to the fauna of other European countries such as Germany or Great Britain. However, the north of Spain has received somewhat more attention. In the first half of the last century, mainly ATTEMS (1927, 1952) contributed works on both northern and southern Spain. Brölemann's publications (BRÖLEMANN 1894, 1897, 1913, 1921) on the French diplopod fauna, summarised in BRÖLEMANN (1910) and (1923), served as an important basis for the study of the Spanish fauna. Many of the new species described by him were later found in Spain, particularly in the northern region.

Extensive studies of this region were conducted in the second part of the previous century, particularly in Cantabria by MAURIÈS (1964a, 1969, 1971a, b, c, MAURIÈS & VICENTE 1977a, b) and in Cataluña by VICENTE (1982, 1985). A first list of millipedes in the Basque regions comprising 26 species was provided by MAURIÈS (1975). New species were described by CONDÉ & DEMANGE (1961) and MAURIÈS & BARRAQUETA (1985), with subsequent notes on several species found in Biscay (MAURIÈS & BARRAQUETA 1985) resulting in a final list of 31 species. Recently, GILGADO & ORTUÑO (2023) discussed the polydesmid fauna of the superficial subterranean environment (MSS) in several regions bordering the Basque

region, while RECUERO & RODRÍGUEZ-FLORES (2023) provided an overview of bristle millipedes from Spain and various Spanish islands.

Since the 1980s, no further attention has been paid to the diplopod fauna of the Basque Country and Navarra. This led a group of international Myriapodologists to visit this region in 2009. Initial results and descriptions of new species have already been published (DJURSVOLL 2019, ANTIC & MAURIÈS 2022, READ 2022).

This paper compiles all the material collected during the week-long visit by the group of Myriapodologists and provides information on the taxonomy, distribution, and ecology of the species.

2 Investigation area, material, and methods

2.1 Investigation area

The greater region of the Basque country (referred in the text as Basque region) is situated at the western end of the Pyrenees, spanning the border between France and Spain on the coast of the Bay of Biscay (referred to as País Vasco, Euskadi or Pays Basque depending on the language). This region comprises the Autonomous Communities of the Basque Country (which includes the territories of Álava, Biscay, and Gipuzkoa) and Navarra in northern Spain, as well as the Northern Basque region in France. See figure 1 for the location on the Iberian Peninsula.

With 58 investigated sites, the main focus of the field trip was the Spanish part. In the French region of Nouvelle-Aquitaine, three sites were also investigated.

The Basque region is characterized by a warm, humid, and wet oceanic climate (Oceanic west coast climate, Köppen: Cfb). The coastal area is part of the so-called Green Spain. The higher altitude areas of Navarra and the southern regions of the Basque Country are transitional to a continental Mediterranean climate (Köppen: Csa and Csb) with more significant temperature variations between seasons.

Due to its diverse topography, encompassing coastlines, lowlands, and several mountainous regions, Northern Spain is also ecologically diverse. The Basque region is situated within the Cantabrian Mixed Forest Ecoregion (OLSON et al. 2001) which includes temperate broadleaf and mixed forests in southwestern Europe. These forests extend along the coastal Cantabrian Mountains and Galician Massif in northern Spain, southward into northern Portugal, and northwards through the westernmost Pyrenees into southwestern France.



Figure 1: The Iberian Peninsula with Spain (blue border) and Basque region including full Navarra (red border). Source of background map: Open Topo Map; source of borders: Centro Nacional de Información Geográfica.

2.2 Material and methods

Specimen collecting and preservation

All material was hand-collected during a week-long visit by an international group of Myriapodologists who visited the Basque region, in April 2009 (Fig. 2).

Participants and collectors: Hans Reip = HaR, Karin Voigtländer = KV, Norman Linder = NL (all from Germany), Helen Read = HeR, Paul Richards = PR, Steve Gregory = SG (all from Great Britain), Desmond Kime = DK (France), Per Djursvoll = PD (Norway), and Santiago Pagola-Carte (Spain/Basque) joined the excursion for a few days.

The material is preserved in 70% or 96% ethanol (DNA vouchers) respectively and is stored in the Myriapod-Collection of the Senckenberg Museum für Naturkunde Görlitz (collectors KV and HaR) and in private collections of the other participants (HeR, SG, DK, PD).



Figure 2: Excursion team 2009 (from left to right: Helen Read, Desmond Kime, Karin Voigtländer, Paul Richards, Steve Gregory, Per Djursvoll, Hans Reip, Norman Linder). Photograph: S. Pagola-Carte.

Permissions

The collections were made with permissions of:

- Arabako Foru Aldundia / Diputación Foral de Álava, Vitoria-Gasteiz, 14.04.2009, No. 32/09;
- Arabako Foru Aldundia / Diputación Foral de Álava, Vitoria-Gasteiz, 17.02.2009, No. 14/09;
- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Donostia / San Sebastián, 07.04.2009;
- Gobierno de Navarra, Departamento de Desarrollo Rural y Medio Ambiente, Pamplona, 14.04.2009, No. 15.863.810.

DNA extraction and molecular analysis

The barcoding data for the species *Loboglomeris rugifera* (Verhoeff, 1906) was obtained during the German Barcode of Life project (GBOL). For the project and the methods, see DECKER et al. (2017), WESENER et al. (2015, 2016) and REIP & WESENER (2018). The vouchers are deposited in the Museum Koenig Bonn (ZFMK). The clustering analyses were conducted in MEGA X (KUMAR et al. 2018). The relationship tree (Fig. 14) was inferred using the Neighbor-Joining method (SAITOU & NEI 1987). The tree is drawn to scale, with branch lengths in the same units as those of the evolutionary distances used to

infer the tree. The evolutionary distances were computed using the p-distance method (NEI & KUMAR 2000) and are in the units of the number of base differences per site. Codon positions included were 1st+2nd+3rd. All ambiguous positions were removed for each sequence pair (pairwise deletion option).

Determination and citation

If not otherwise stated, the specimens were identified by the first author.

For each of the widespread species, the most common identification literature is listed; for rare species, a selection of the most important publications is given.

Illustrations

Images of the specimen were made with microscope cameras by creating depth of field stacks and stacked together with Helicon Focus 5 and refined with Adobe Photoshop (version 6 or later).

The provided maps are based on maps of the Sistema de Información Geográfica de Parcelas Agrícolas (SIGPAC) of the Spanish Ministeria de Medio Ambiente y Medio Rural y Marino (access via: sigpac.mapama.gob.es/fega/visor/) and were created with QGis Desktop 3.24.2.

If not otherwise stated, the photos and illustrations are made by the first author.

3 Sampling sites by regions

The excursion was made in the mountainous region between Pamplona (Navarra) and Vitoria-Gasteiz (Álava), starting from Leitza (Navarra) to the Sierra de Aralar (Gipuzkoa and Navarra), Sierra de Andía (Navarra), Sierra de Urquilla (Álava), Sierra de Urbasa (Navarra), and finally to the Parque Natural del Gorbea (Álava and Vizcaya). See Figure 3 for an overview of the excursion spots.

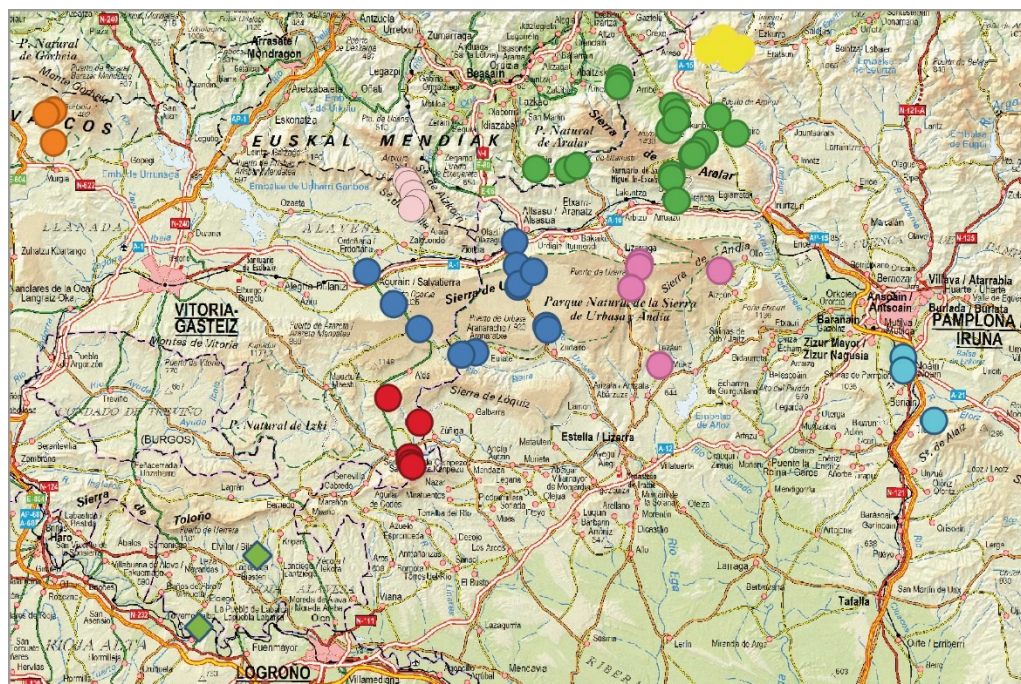


Figure 3: Basque region with location spots: Pamplona (light blue), Leitza (yellow), Aralar (green), Urquilla (rose), Andía (pink), Urbasa (dark blue), Campezo (red), Gorbea (orange), Logroño (green square). Background map: Centro Nacional de Información Geográfica, Mapa de España 1:500k.

Navarra – Pamplona

- 1: Airport (2009-Apr-19); 42.767°N, 1.643°W; 430 m.a.l.
- 2: South of Airport, near Salinas de Pamplona, at Río Elortz (2009-Apr-19); 42.754°N, 1.643°W; 440 m.a.l.:
- 2A: Edge strip at deep stream valley, meadow slope, dry area.
- 2B: Edge of deep stream valley, wooded slope, *Populus*, *Ulmus*, *Arum*.
- 54: South, Sierra de Izco, Sierra de Alaiz, north of Altos de la Cruz, south of village Guerendiain (2009-Apr-25): half-open bushy area:
- 54A: 42.705°N, 1.601°W; northern slope, closed area of *Buxus* bushes with some *Quercus* trees, *Crataegus*, *Hedera helix*, *Trifolium*, no humus layer; 640 m.a.l.
- 54B: 42.704°N, 1.599°W; northern slope, stony, with *Buxus*, some *Quercus* trees, strong mossy, *Corylus*, *Crataegus*, *Ribes*, *Lonicera*, *Genista*; 680 m.a.l.
- 54C: 42.703°N, 1.600°W; northern slope, bushes of *Corylus*, some *Quercus* trees, stony, strong mossy, humus rich; 700 m.a.l.

Navarra – Leitza

- 3–8: Leitza, Ariz Mendiak (2009-Apr-20):
- 3: Between area "Ustarleku" and "Karobieta", above side stream to Gorritzaran; 43.078°N, 1.878°W:
- 3A: Grove of *Castanea*, pollard trees on the slope, *Ranunculus ficaria*, *Daphne*, *Helleborus*, *Salvia*, *Rubus*, *Lathraea*, soil loamy and calcareous; 615 m.a.l. (Fig. 4A).
- 3B: Old eradication on the slope, old rotten wood and trees, *Euphorbia*, *Cardamine pratensis*, *Geranium*; 580 m.a.l.
- 3C: Group of *Picea* trees; 600 m.a.l.
- 3D: Forest of *Fagus*, *Hedera helix*, under vegetation, *Rubus*; 600 m.a.l.
- 4: Road NA-170 in direction to Ezkurra, circa 3 km east of Leitza; 43.090°N, 1.895°W; 580 m.a.l.:
- 4A: Close deep stream valley, young *Alnus*, *Corylus* et al.
- 4B: Border of the way, open area with bushes.
- 5: Between area "Ustarleku" and "Karobieta", Gorritzaran/Ibaia-stream valley; 43.079°N, 1.884°W; 550 m.a.l.:
- 5A: Wood of *Alnus* along stream.
- 5B: Slope to road verge, *Corylus* et al.
- 6: At area "Larbadegi", Gorritzaran/Ibaia-stream valley; 43.085°N, 1.897°W; wood of *Larix*, few *Castanea sativa*; abundant *Rubus*, ground and lower trunks mossy, *Oxalis*; 530 m.a.l. (Fig. 4B).
- 7: At area "Kornieta"; 43.070°N, 1.882°W; woodland of *Fagus*, poor understorey, rocky, siliceous soils, mosses, *Helleborus*; 910 m.a.l.
- 8: Road to area "Kornieta", between area "Ustarleku" and "Karobieta", above spring Gorritzaran/Ibaia-stream; 43.079°N, 1.870°W; *Fagus* pollards, calcareous soils; 750 m.a.l.
- 9: Leitza, town area (2009-Apr-20); 43.079°N, 1.916°W; house & garden around casa rurale Aztieta; 470 m.a.l.

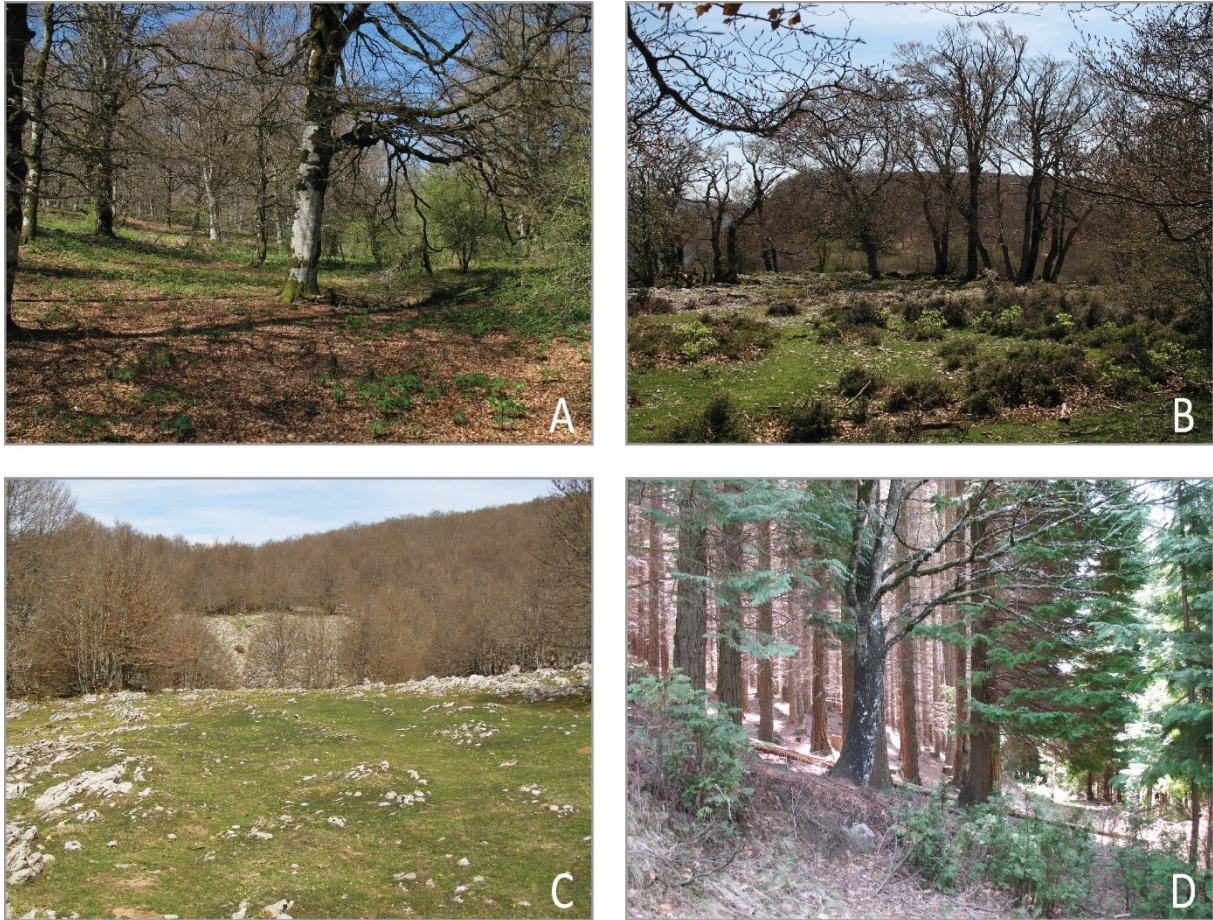


Figure 4: **A:** Above side stream to Gorritzaran (site 3A). **B:** Gorritzaran/Ibaia-stream valley (site 6). **C:** South of Bedaio/Goikoa (site 15). **D:** Pass Puerto de Lizarrusti (site 18A). Photographs: **C:** KV, **D:** NL.

Navarra / Guipuzkoa – Parque Natural Aralar

10–14, 19–26: Navarra / 15–18: Guipuzkoa

10–26: Sierra de Aralar:

10–18: (2009-Apr-21):

10: Lekumberri, local exit, N-130 direction to Betelu; 43.011°N, 1.902°W; industrial area, synantropic, meadow with stones and brick waste; 580 m.a.l.

11: 1 km ESE Betelu: at the road junction N-130 & NA-7514 (and at the confluence of the streams "Errazkinko Erreka" and "Ezpeleta Erreka"); 43.021°N, 1.966°W; 270 m.a.l.:

11A: Steep slope above flood area, below road, river bank wood, *Platanus*, *Fraxinus excelsior*, *Alnus*, *Salix*.

11B: Road verge.

11C: Slope above road - *Acer pseudoplatanus*, *Quercus*, *Pteridium*, *Hedera helix*.

12: South of Errazkin, north of area "Axkarateko Malkorra"; 42.997°N, 1.970°W; 630 m.a.l. (Fig. 5A):

12A: Young *Fagus* and old big *Quercus*, *Ilex*, *Ruscus*, *Hedera helix*, *Astragalus*, *Euphorbia*, ferns.

12B: Wood of *Fagus*.

13: 2 km SE Betelu: Seniorio de Eraso, at road NA-7514 (Betelu-Errazkin), road traversing the stream "Errazkinko Erreka"; 43.015°N, 1.960°W:

13A: Synanthropic, beside buildings and rubbish; 290 m.a.l.

- 13B:** Slope, grove of *Castanea* (with some coppiced trees, several bushes, *Ilex*, *Rubus*, ferns, mosses on the ground, dead wood standing and laying on the ground); 300 m.a.l. (Fig. 5B).
- 14:** Village Erratzin, village square; 43.008°N, 1.960°W; open village habitat, meadow (synanthropic); 400 m.a.l.
- 15:** Tolosa, 500 m south of Bedaio/Goikoa; 43.049°N, 2.040°W (Fig. 4C):
- 15A:** Farm buildings and stone wall, logs, wood, stones, and rubble; 420 m.a.l.
- 15B:** Horse pasture; 590 m.a.l.
- 15C:** *Fagus* pollards in wood pasture; circa 500 m.a.l.
- 16:** 10 km SSE Beasain: Kaxeta (at junction of road from Lazkao to Etxarri-Aranaz [GI-120] and road to Aia [GI-4153], Arrandoa, Kaxeta (stream "Arroyo Marumendi"); 42.958°N, 2.156°W; 310 m.a.l.:
- 16A:** Stream bank.
- 16B:** Meadow slope with basalt stones.
- 16C:** Forest edge with *Castanea*.
- 17:** Beasain, road from Lazkao to Etxarri-Aranaz, west pass; 42.957°N, 2.112°W; forest of *Fagus*; 550 m.a.l.
- 18:** Beasain, road from Lazkao to Etxarri-Aranaz, Pass Puerto de Lizarrusti; 42.961°N, 2.098°W; 690 m.a.l.:
- 18A:** Forest of *Fagus*, on slope (Fig. 4D).
- 18B:** Dry meadow with some *Crataegus*, *Rosa* and stones.
- 19–26:** (2009-Apr-22):
- 19:** Lekunberri, Mugiro, forest north of road parallel to autopista; 42.993°N, 1.877°W; 630 m.a.l.:
- 19A:** Limestone cliff.
- 19B:** *Quercus*, partly small meadows, on roadside verge.
- 19C:** *Quercus* woodland, partly road verge, abundant *Rubus*.
- 20:** South Baraibar, on road NA-7510 to Santuario de San Migel; 42.985°N, 1.920°W; open pasture with some *Fraxinus* and *Quercus*, stony, calcareous; 670 m.a.l. (Fig. 6A).
- 21:** South Baraibar, on road NA-7510 to Santuario de San Migel, at area "Urkia"; 42.976°N, 1.932°W; 710 m.a.l.:
- 21A:** Wet pasture with trees of *Corylus* and some *Quercus*, and with *Ilex*, *Ranunculus ficaria*, *Daphne*, *Oxalis*, *Helleborus*, *Euphorbia*, *Geranium*, *Lathraea*.
- 21B:** Wet pasture with trees of *Fagus* and with *Anemone nemorosa*, *Arum*, *Geranium*, *Helleborus*, *Euphorbia*, *Mercurialis*, *Ranunculus ficaria*.
- 21C:** Pasture with isolated *Fagus* trees.
- 22/23:** South Baraibar, on road NA-7510 to Santuario de San Migel, at area "Izáin"; karst area with deep grykes and bare limestone rocks, *Fagus* woodland and some *Crataegus* bushes;
- 22:** 42.971°N, 1.938°W; 790 m.a.l. (Fig. 6B).
- 23:** 42.972°N, 1.936°W; 730 m.a.l.
- 24:** Sierra de San Miguel, mountain point Artxueta at radio mast; 42.953°N, 1.967°W; Karst area with bare limestone rocks; 1,300 m.a.l.:
- 24A:** Pasture.
- 24B:** Grove of low growing *Fagus* (Fig. 6C).

25: Sierra de San Miguel, way branching to mountain point, area "Putzuzar"; 42.949°N, 1.967°W; pasture on karst area; 1,220 m.a.l.

26: Sierra de San Miguel, southern lower slope at Iraneta; 42.926°N, 1.960°W; dry *Quercus* wood; 500 m.a.l.



Figure 5: A: South of Errazkin (site 12). B: Betelu (site 13B), grove of *Castanea*. Photographs: A: KV, B: NL.

Navarra – Sierra de Andía

27–29: Between Sierra de Urbasa and Sierra de Andía (2009-Apr-22):

27: Road (NA-120) from Lizarraga to Puerto de Lizarraga, north of cliff; 42.863°N, 2.011°W; steep slope below cliff; 930-960 m.a.l.:

27A: Stony meadow.

27B: Forest of *Fagus*.

28: Road (NA-120), Puerto de Lizarraga (south of tunnels); 42.859°N, 2.012°W; meadow with big stones and some bushes (*Sambucus*); 1,030 m.a.l. (Fig. 6D).

29: Road (NA-120) 2.5 km SSW of Puerto de Lizarraga, "Fagadierer" (300 m E of Bentaberri); 42.837°N, 2.023°W; mediterranean forest of *Buxus-Fagus*; 860 m.a.l.

30–31: Sierra de Andía (2009-Apr-22):

30: At road NA-7330 (from Lezáun to Arizaleta), at area "Los Ristros", circa 500 m WNW Arizaleta; 42.759°N, 1.983°W; forest of evergreen *Quercus*, used as a pasture (forest grazing), incl. some small areas with dry meadows with small thorny bushes, some bigger stones, some small *Buxus*-bushes, *Ilex*, *Genista*, shrubby *Thymus*, *Lonicera*, *Sedum*, grass; 700 m.a.l.

31: Valle de Goñi, 500 m NE Goñi at area "Mustillogorri"; 42.855°N, 1.899°W; grazed deciduous *Quercus* woodland, within agricultural areas (pastures); 930 m.a.l.



Figure 6: **A:** South Baraibar (site 20). **B:** South Baraibar (site 22). **C:** Sierra de San Miguel (site 24B). **D:** Puerto de Lizarraga (site 28). Photographs: **B:** KV, **D:** NL.

Navarra / Alava – Sierra de Urbasa

32–39, 41: Navarra; **40, 42, 43:** Alava

32: Valle de Burunda, north of Sierra de Urbasa, Alsasua, at cement plant, river plain of Araquil (2009-Apr-23); 42.884°N, 2.186°W; 520 m.a.l.:

32A: Ruderal meadow area, near bushes of *Populus*, *Salix* and *Rubus*.

32B: Meadow with young *Populus* (natural regeneration).

32C: *Salix* inundation forest beside the river, *Salix* cf. *alba*, abundant *Equisetum*, *Ranunculus ficaria*, *Rubus*, *Urtica*.

33–42: Sierra de Urbasa (2009-Apr-23):

33: At northern border, Alsasua, road (NA7182) from Olazi/Olazagutía to top of Sierra de Urbasa at middle of hair pin bends; 42.860°N, 2.183°W; 800 m.a.l.:

33A: Stony slope with thorny bushes and meadows.

33B: Scrubs of *Prunus spinosus*.

33C: Meadow with some big stones.

33D: Stream valley, temporarily with water, with old trees of *Fagus*, *Prunus spinosus* and *Rubus* at edges.

- 34:** On top, near road NA-7182; 42.838°N, 2.182°W; grazed *Fagus* woodland, in parts with bushes of *Crataegus*, otherwise few bushes, partly covered with herbs *Corydalis*, *Urtica*, *Rubus* et al., little dead wood on the ground; 930 m.a.l. (Fig. 7A).
- 35:** On top at southern cliff border, east of road NA-7182; 42.799°N, 2.142°W; pasture on stony ground, some thorny bushes, occasional trees, and groups of *Fagus*; 930 m.a.l. (Fig. 7B).
- 36:** At south-eastern cliff border, eastern zig zag of road NA-7182, under cliffs; 42.795°N, 2.140°W; steep slope with forest of *Fagus*, thick leaf layer, thick humus layer (no more raw humus), in the herb layer *Hepatica nobilis*, *Scilla*; at the cliff: *Saxifraga*, *Asplenium alduterinum* cf.; 810 m.a.l.
- 37:** Under southern cliff border, Valle de Amescoa Alta, south of road NA-7130, between Larraona and Aranarache, at site "Karrerabide"; 42.772°N, 2.241°W; small wood of *Quercus*, badly disturbed by livestock, pronounced shrub layer: *Sambucus nigra*, *Viburnum*, *Crataegus*, *Rubus*, *Rosa*, mainly without herb layer; neighbouring pasture and grain field; 770 m.a.l.
- 38:** On top, near road NA-7182; 42.841°N, 2.180°W; *Fagus* woodland on limestone karst; 920 m.a.l.
- 39:** Under southern cliff border, Valle de Amescoa Alta, south of road NA-7130, south of Larraona; 42.770°N, 2.261°W; wood pasture with *Quercus* and scrub and grassy trackside verges; 780 m.a.l.
- 40:** Under northern border, on road A-2128 south of Opakua; 42.821°N, 2.355°W; woodland of *Corylus*, *Quercus* and *Crataegus*; 740 m.a.l.
- 41:** On top, 1 km east of road junction to road NA-7182 at site "Bentakaita"; 42.854°N, 2.160°W; forest of *Fagus*, *Prunus*, *Corydalis*, *Mercurialis*, *Anemone*, *Erythronium*; 890 m.a.l.
- 42:** West side, at road A-2128 to Salvatierra/Agurain, south of Puerto de Opacua, south of next road junction at spring of Arroyo/Larrondo, east of Alto de los Tiles, at site "Orguchi"; 42.796°N, 2.319°W; *Fagus* wood in gorge, fairly open with Ericaceae, *Anemone*, *Juniperus*, *Erythronium*, *Lathraea*, *Narcissus bulbocodium*, *Helianthemum*, grass; 940 m.a.l.
- 43:** Salvatierra/Agurain; 42.854°N, 2.392°W; in the town; parc with *Platanus* and *Castanea sativa*; 590 m.a.l.

Guipuzkoa / Alava – Sierra de Urquilla

44–48: Guipuzkoa / **49–50:** Alava:

- 44–50:** Montes de Alzania, Sierra de Urquilla, south of mountain chain Aikorriko Mendikatea, south-west of Mountain Aitzgorri, north of end of road from Salvatierra – Ordonana – Zaldondo – Zumarraundi (2009-Apr-24):
- 44:** High plain Alizania, north of Portua Zarra; 42.935°N, 2.330°W; karst plain with small growing trees of *Fagus* and open grass lands; 1,160 m.a.l. (Fig. 7C).
- 45:** North slope of Aldasbarreneta valley; 42.941°N, 2.334°W; forest of *Fagus*, strongly mossy, almost no herbs, isolated ferns and *Daphne*; 1,170 m.a.l.
- 46:** Northern lower edge of slope to valley plain Aldasbarreneta; 42.947°N, 2.339°W; karst slope with many stones, *Quercus* trees; 1,110 m.a.l.
- 47:** Southern lower edge of slope to valley plain Aldasbarreneta; 42.943°N, 2.335°W; forest of *Fagus*, lower edge of doline, circa 1 m above ground of doline;; 1,120 m.a.l.
- 48:** Portua Zarra, west of Eskaratza:
- 48A:** 42.933°N, 2.328°W; small sharp summit of limestone rock, cliffy, forest of *Fagus* with small spots of accumulations of leaves; 1,200 m.a.l.

- 48B:** 42.929°N, 2.324°W; stream valley, forest of *Fagus*; 1,000-1,100 m.a.l.
- 49:** North of Zumarraundi, deep gryke with stream discharge, in the lower third; 42.924°N, 2.322°W; 980 m.a.l.:
- 49A:** Slightly darker cave entry range, much leaf litter.
- 49B:** Forest of *Fagus*, thick leaf layer.
- 50:** 1 km south of "Zumarraundi", "Urbietia"; 42.918°N, 2.331°W; 830 m.a.l.:
- 50A:** Western slope of forest of *Fagus* with some *Quercus* trees.
- 50B:** Eastern slope of open forest of *Quercus* with some *Fagus* trees.

Alava – Sierra de Peña Gorbea

51–53: Sierra de Peña Gorbea [Gorbeia] (2009-Apr-24):

- 51:** Valley of the River "Bayas Ibaia", north of Sarria, area "Zentrala" (near the parking place and ranger station); 42.985°N, 2.830°W; 650 m.a.l.:
- 51A:** Forest of *Quercus* near riverbank, no brushes, partly bigger stones.
- 51B:** Grazed *Fagus* woodland, no bushes, few herbs.
- 52:** Valley of the River "Bayas Ibaia", north of Sarria, at (bridge) Arkarai; 43.017°N, 2.830°W; 720 m.a.l.:
- 52A:** Semiopen brook valley with old *Fagus* trees and different bushes, with pasture beside river, *Erica*, *Ulex*, *Ilex*, *Prunus*.
- 52B:** Slope with coniferous forest, mainly without herb layer, hardly rotten wood, some dead wood pieces, on the lower edge (hemline) some medium-sized stones on the ground (Fig. 7D).
- 52C:** Bank of brook with *Alnus*.
- 53:** North of Sarria, above River, north of area "Aldarro-Zubia"; 43.013°N, 2.841°W; 780 m.a.l.:
- 53A:** Sphagnum bog with *Fagus* trees round the margin.
- 53B:** *Fagus* wood; *Erica*, *Vaccinium myrtillus*, *Polytrichum*.
- 53C:** Fern area.
- 53D:** Forest of *Pinus*, in the middle of the forest.
- 53E:** Small valley in forest of *Pinus*.

Alava – Campezo

55, 56: south Salvatierra, Campezo, near village Oteo (2009-Apr-25):

- 55:** 42.726°N, 2.363°W; *Quercus faginea* wood; *Q. ilex*, *Arbutus unedo*, *Viburnum lantana*, *Juniperus*; 710 m.a.l.
- 56:** Parc Santa Lucia (2009-Apr-25); 42.701°N, 2.319°W; forest of *Quercus ilex* with *Buxus sempervirens*; 610 m.a.l.
- 59:** Sierra Chiquita, northern side, Santa Cruz de Campezo, south of Ermita de Ivernabo (2009-Apr-26):
- 59A:** 42.666°N, 2.333°W; forest of evergreen *Quercus* with *Buxus* and *Erica*; 680 m.a.l.
- 59B:** 42.659°N, 2.332°W; forest of *Quercus* with many rocks of limestone, above small valley; 710 m.a.l.
- 59C:** 42.657°N, 2.329°W; wood of *Pinus nigra* cf., with *Rubus*; 790 m.a.l.
- 59D:** 42.659°N, 2.331°W; evergreen of forest *Quercus*, on border of way; 740 m.a.l.

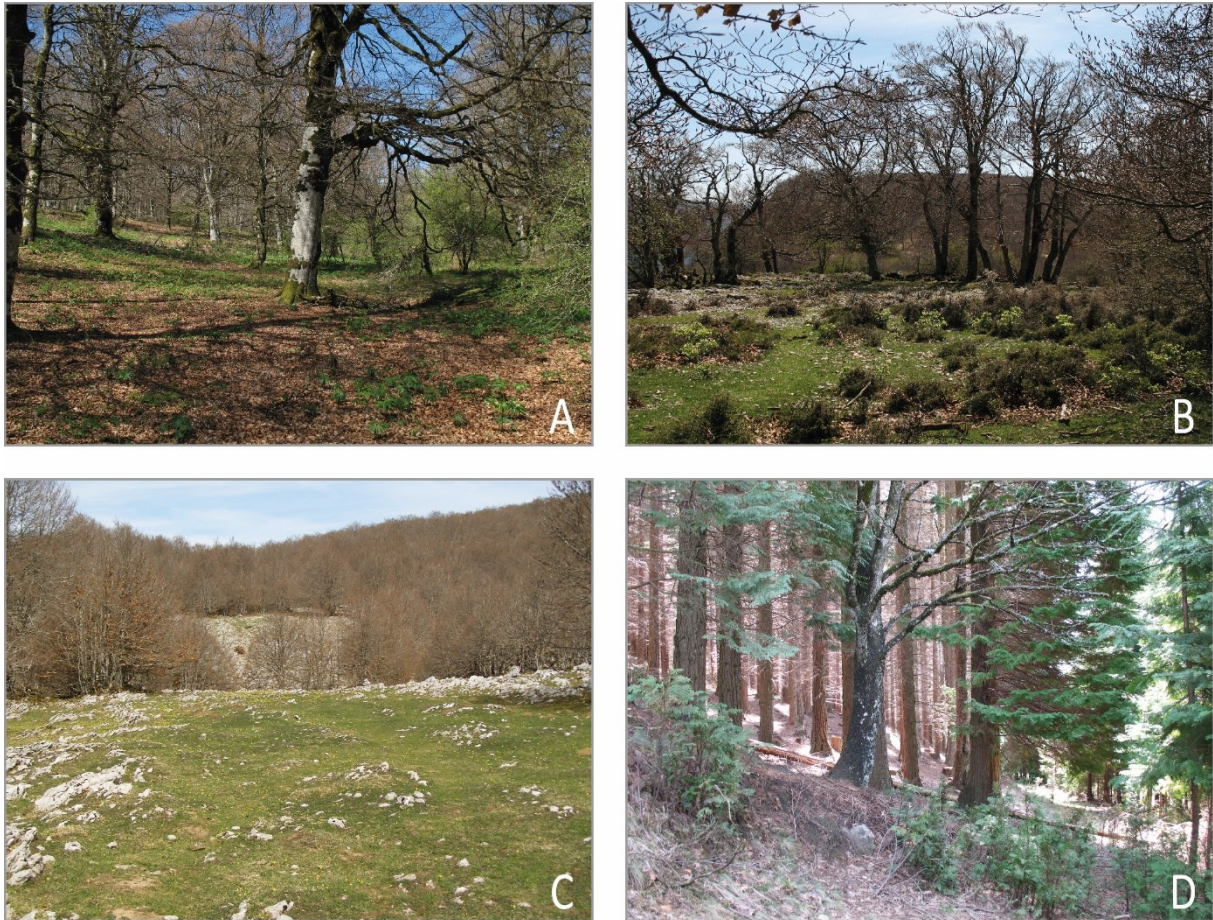


Figure 7: A: Sierra de Urbasa (site 34). B: Sierra de Urbasa (site 35). C: High plain Alizania (site 44). D: Sierra de Peña Gorbea (site 52B). Photographs: A, B, D: NL.

Logroño

57: Alava, north of Logroño, near village El Villar (2009-Apr-25); 42.566°N, 2.546°W; rocky bluff on ochre-coloured clay by vineyards; 550 m.a.l.

58: La Rioja, west of Logroño, near Cenicero, on the riverbank of Río Ebro (2009-Apr-25); 42.493°N, 2.627°W; trees, rank vegetation, flood debris on the south bank of river Ebro; 420 m.a.l.

France – south-west

60–61: France, Aquitaine:

60: Pyrénées-Atlantiques, Donibane Lohizune / Saint-Jean-de-Luz (2009-Apr-26); 43.390°N, 1.700°W; beach, *Robinia* trees along path side, under bark; 10 m.a.l.

61: Landes, Tarnos (2009-Apr-26); 43.520°N, 1.464°W; mixed deciduous forest; 30 m.a.l.

4 Results

4.1 Species inventory

In total, we investigated more than 2.500 specimens assigned to 36 species, whereas three morpho-species only could be identified to genus level. Here, we give a complete list of all our records.

POLYXENIDA

Family Polyxenidae Lucas, 1840

Polyxenus lagurus (Linnaeus, 1758)

Scolopendra lagura – LINNAEUS 1758: 637 (description)

Polyxenus lagurus – DEMANGE 1981: 59 (key); RECUERO & RODRÍGUEZ-FLORES (2023): 3-5, figs 1H, 2 (notes with distribution map)

Material examined: Pamplona: 2B: 3♀, 2juv., leg. HaR; Leitza: 3A: 3ex., leg. HeR; 5A: 20ex., leg. HaR [Reip-AS197]; 5B: 1♀, leg. HaR; 6: 1♀, leg. HaR; Aralar: 17: 8ex., leg. SG; 20: 1♀, 1ex., leg. HaR, KV [SMNG-VNR 14765]; 21A: 9ex., leg. HaR [Reip-AS198]; 21B: 2ex., leg. KV [SMNG-VNR 14768]; 22: 1♀, 9ex., leg. HaR, KV [SMNG-VNR 14770]; Urquilla: 44C: 1ex., leg. KV [SMNG-VNR 14828]; 50A: 1♀, leg. HaR; Andía: 29: 1♀, leg. HaR. Urbasa: 33: 4♀, leg. HaR; 35: 1ex., leg. NL; 36: 3ex., leg. KV [SMNG-VNR 14781].

Distribution: This species is common in northern and central Europe and also widespread in Spain (RECUERO & RODRÍGUEZ-FLORES 2023: fig. 2-map).

Habitat: The small Polyxenidae, which often lives under bark, is regularly found not only in forests but also in dry habitats. Its eurytopy is also evident in our studies.

GLOMERIDA

Family Glomeridae Leach, 1815

Glomeridella kervillei (Latzel, 1894), Figs 8, 9

Glomeris kervillei – LATZEL 1894: 138 (description)

Glomeridella kervillei – BRÖLEMANN 1913: 425-425 (description); VERHOEFF 1912: 423 (key); MAURIÈS 1964b: 440 (note); MAURIÈS 1971c: 423 (note); VICENTE 1982: 283, 284 (description).

Material examined: Pamplona: 2: 1♀, leg. SG; Leitza: 4A: 3♀, leg. HaR, KV [AS173; SMNG-VNR 14750]; 5B: 1♀, leg. HaR; Aralar: 12: 1♀, leg. PD; 17: 1♀, leg. KV [SMNG-VNR 14763]; Urquilla: 49A: 1♂, 1♀, leg. KV [SMNG-VNR 14793; Reip- AS171/2+P16]; 49B: 1♂, 2♀, leg. KV [SMNG-VNR 14792].

Distribution: *G. kervillei* is mainly known from southern France (DEMANGE 1981: 184). ATTEMS (1952), MAURIÈS (1964b, 1971c), and VICENTE previously (1982) recorded it from Spain in Guipúzcoa, Picos de Europa, Jaen, Gerona, and Lérida. A few specimens were found in the northern part of the mountains around the border between Navarra and Alava.

Remarks: Although relatively small, around 5 mm in length, the coloration is quite unique. The four dorsal stripes can have different extents (Fig. 8). The pincer-like telepods are typical for the genus *Glomeridella* (Fig. 9; compare BRÖLEMANN 1913: 425).

Habitat: In agreement with KIME & ENGHOFF (2011: 38), according to our study the species *G. kervillei* also prefers beech forests, where it lives in leaf litter.

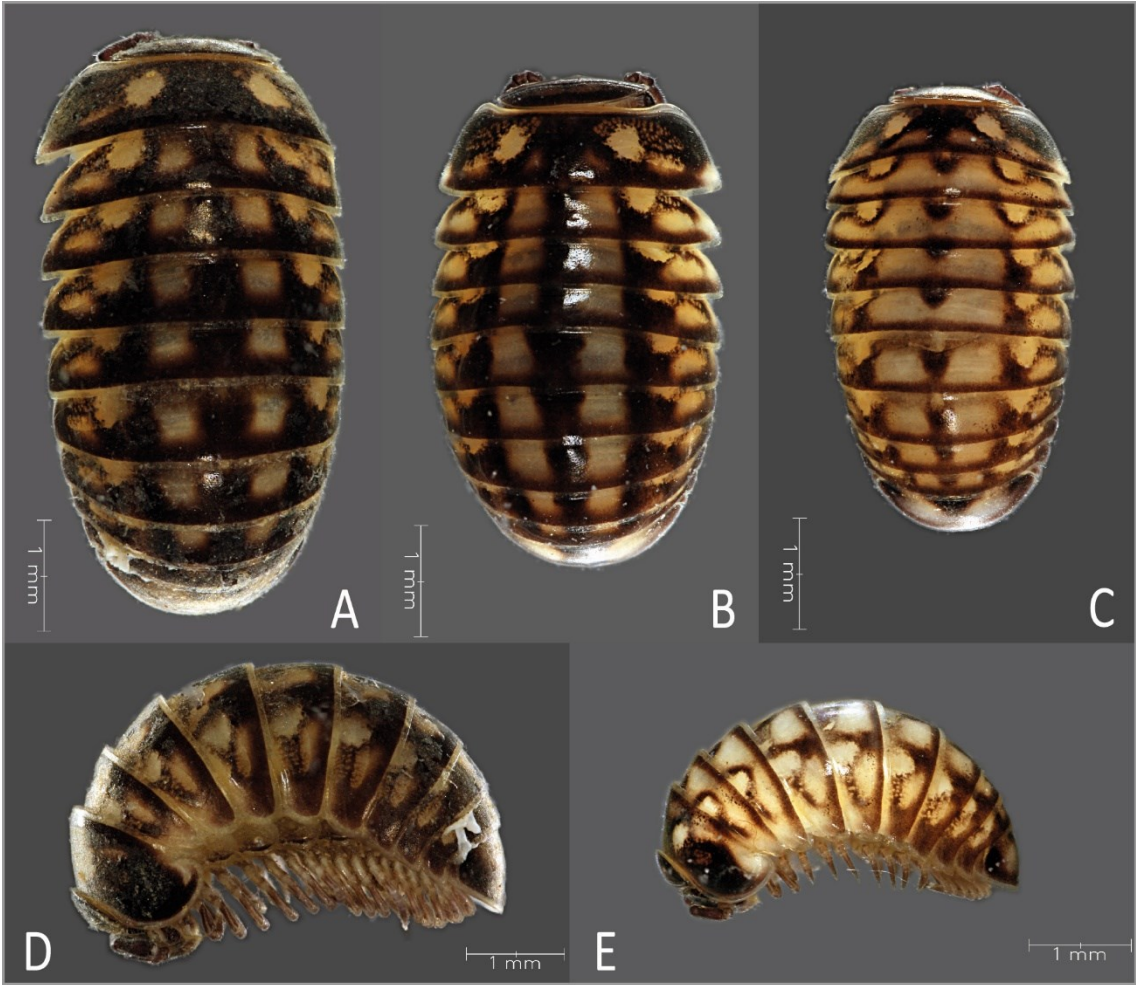


Figure 8: *Glomeridella kervillei* ♀♀. Sites: A, D: 4A; B: 17; C, E: 49B.

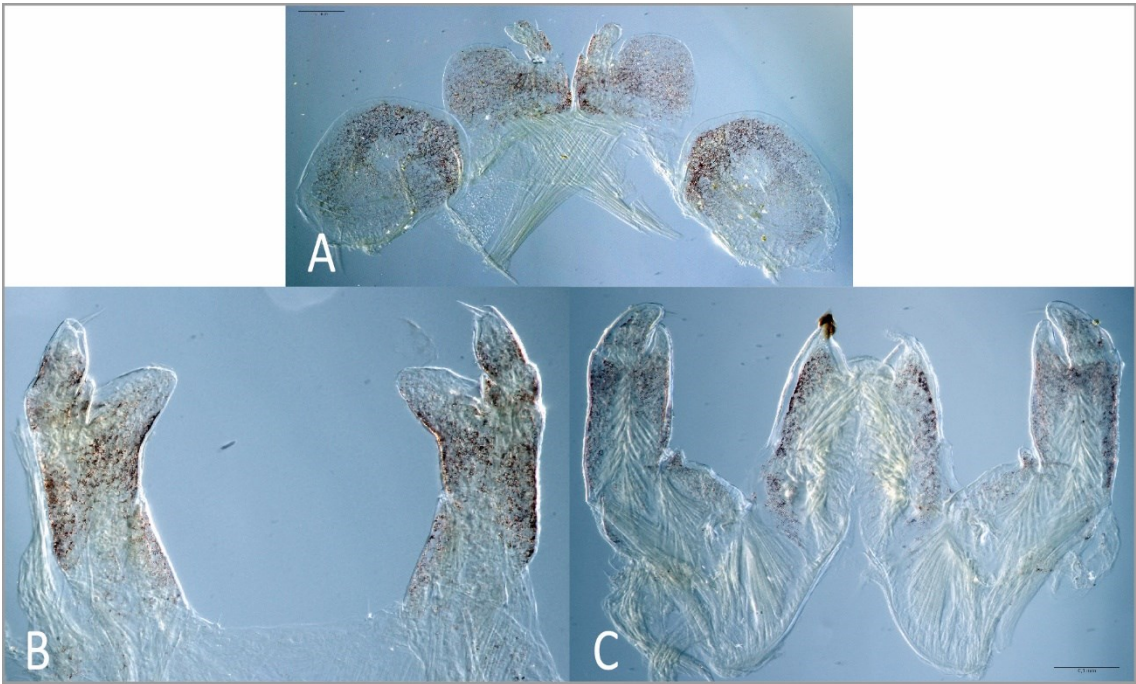


Figure 9: *Glomeridella kervillei* ♂, telepods (from A to C: 17, 18, 19 pair of legs). Site 49A. Scale: 0.1 mm.

***Glomeris intermedia* Latzel, 1884, Fig. 10**

Glomeris intermedia – LATZEL 1884: 113 (description); HOESS et al. 1997 (species division); HOESS 2000: 12, figs 5c, 6c, 7c, 8 (description)

Material examined: Pamplona: 54: 1♀, leg. KV [SMNG-VNR 14822]; 54B: 1♂, 4♀ leg. NL, HaR, KV [SMNG-VNR 14796], NL; 54C: 4♀, leg. HaR, KV [SMNG-VNR 14797], NL; Aralar: 11A: 2♂, 1♀, 4juv., leg. SG; 16B: 4♀, leg. SG, HaR; 18A: 2♀, 1juv., leg. NL; 19C: 1♀, leg. PD; 20: 3♂, 3♀, leg. HeR, KV [SMNG-VNR 14765]; 21B: 3♀, leg. KV [SMNG-VNR 14768]; 26: 1♀, 1juv., leg. HeR; Andía: 29: 5♂, 4♀, 2juv., leg. SG, DK, HaR; 30: 1♂, 1♀, leg. DK; 31: 1♀, leg. DK; Urbasa: 32: 1♂, leg. HaR; 33: 1♂, leg. HaR [Reip-AS166+P14]; 36: 1♀, leg. HaR; Campezo: 55: 1♂, leg. SG; 56: 1♂, leg. SG; 59B: 2♂, 4♀, leg. HaR [Reip-AS167], NL; 59C: 4♂, 4♀, leg. KV [SMNG-VNR 14802]; 59D: 1♀, leg. HaR.

Distribution: *Glomeris intermedia* is one of the most widespread European pill millipedes, found from western Germany to north-eastern Spain (KIME & ENGHOF 2011: 99).

Remarks: This species was regularly found in the centre of the Basque region (Fig. 10). We did not record it from the most western part of Gorbea. Possibly, its western distribution border is in the regions of Urbasa and Campezo.

Habitat: As also mentioned by KIME & ENGHOF (2011: 28), in our findings, the species was especially encountered in woods (mainly in Mediterranean *Quercus* woods) but also occurred in almost all open site types.



Figure 10: *Glomeris intermedia* in situ. Site 30. Photograph: PR.

***Glomeris marginata* (Villers, 1789)**

Oniscus marginatus – VILLIERS 1789: 187 (description)

Glomeris marginata – HOESS 2000: 11, figs 5a, 6a, 7a, 8 (description); REIP & WESENER 2018 (notes)

Material examined: Pamplona: 2C: 2♂, 5♀, leg. HaR; 2D: 1♂, leg. KV [SMNG-VNR 14743]; 54: 2♂, 2♀, leg. KV [SMNG-VNR 14822]; 54A: 1♀, leg. NL; 54B: 2♀, 1juv., leg. HaR; 54C: 3♂, 4♀, 1juv., leg. HaR, KV [SMNG-VNR 14797]; Aralar: 11A: 3♂, 2♀, leg. SG; 11B: 1♂, 2♀, leg. HaR; 15B: 1♂, 5♀, leg. KV [SMNG-VNR 14828]; 16A: 1♀, leg. HaR; 16B: 2♂, 6♀, leg. HaR; 20: 5♂, 7♀, leg. PD, HeR, KV [SMNG-VNR 14765], HaR; Andía: 28: 4♂, 4♀, leg. SG; 29: 1♂, 1♀, leg. SG; 30: 2♂, 5♀, leg. DK; 31: 1♀, leg. SG; Urbasa: 32: 2♀,

leg. KV [SMNG-VNR 14819]; 33A: 1♀, leg. NL; 33C: 1♂, 2juv., leg. NL; 33D: 2♀, leg. NL; 36: 1♂, 1♀, leg. HaR [Reip-AS168/9+P15]; 37: 2♂, 1♀, leg. NL; 39: 6♂, 9♀, 2juv., leg. SG, HeR; Campezo: 55: 10♂, 6♀, leg. HeR, SG, PD; 56: 4♂, 2♀, 1juv., leg. HeR, PD, SG; 59A: 4♂, 4♀, leg. HaR, KV [SMNG-VNR 14798]; 59B: 3♂, 2♀, 1juv., leg. HaR [Reip-AS170]; 59C: 1♂, leg. KV [SMNG-VNR 14802]; 59D: 2♀, leg. KV [SMNG-VNR 14803]; Gorbea: 53D: 1♂, leg. NL.

Distribution: *G. marginata* is the most widespread pill millipede in Europe, with a distribution from Norway/Sweden to north-eastern Spain (KIME & ENGHOF 2011: 104).

Remarks: The monophyly of this model species was previously proved by REIP & WESENER (2018). It has a deep black base coloration of the tergites. It differs from the smoky coloration of the more southern distributed species group of *Glomeris maerens* Attems, 1927 (including *G. lugubris* Attems, 1927 and *G. obsoleta* Attems, 1952). This species was regularly found in the central of the Basque region but also in the most eastern part of Gorbea. We still do not know the real extent of the distribution, but the first author was unable to find it in the more western Parque Nacional de Los Picos de Europa.

Habitat: The habitat requirements of this species are well known in Central Europe. Most of the ecofaunistic results indicate that it is a eurytopic forest species. However, it is not generally forest-bound or generally moisture-preferring, but due to its ability to roll up, it is dry-resistant and thus moisture-indifferent. Therefore, it can also colonise dry habitats as xeric or mesoxeric meadows (HAUSER & VOIGTLÄNDER 2019), e.g., the semi-arid grasslands on the shell limestone slope in the Leutra Valley, Jena/Germany (DUNGER & STEINMETZGER 1981). This corresponds to the occurrence in almost all site types in our study in northern Spain. The evergreen *Quercus* forests were preferred.

***Loboglomeris rugifera* (Verhoeff, 1906), Figs 11–14**

Glomeris rugifera – VERHOEFF, 1906: 187, 188 (description)

Loboglomeris rugifera – ATTEMES, 1927: 256-258 (key); HAACKER, 1969b: 67-69 (note)

Loboglomeris rugifera mauriesi – HAACKER, 1969b: 67-69 (description) – **syn. nov.**

Loboglomeris rugifera and *L. mauriesi* – MAURIÈS, 1971c: 427, 428 (notes)

Material examined: Pamplona: 2: 1♀, leg. SG; 54: 1♂, leg. KV [SMNG-VNR 14822]; 54B: 2♂, leg. NL; 54C: 2♂, 2♀, leg. HaR; Leitzza: 3A: 2♂, 2♀, leg. KV [SMNG-VNR 14744, 14746], HaR; 4A: 3♂, 1♀, 3ex., leg. KV [SMNG-VNR 14749, 14750], HaR; 5B: 6ex., leg. HaR; 6: 1♀, leg. HaR; 7: 1♂, 5♀, leg. PD, leg. DK; Aralar: 11A: 1♂, leg. SG; 12A: 1♀, leg. KV [SMNG-VNR 14757]; 12B: 3♂, 2♀, 3ex., leg. KV [SMNG-VNR 14758], HaR; 15A: 1♂, 2♀, leg. KV [SMNG-VNR 14812], DK; 15B: 1♀, leg. KV [SMNG-VNR 14828]; 17: 2♂, 2♀, leg. KV [SMNG-VNR 14763], HaR, SG; 18: 2♂, 6♀, 4juv., leg. KV [SMNG-VNR 14764], HaR; 18A: 1♂, leg. SG; 19C: 2♂, 1♀, leg. PD; 21A: 2♂, leg. PD; 22: 1♂, leg. PD; Urquilla: 47: 1♀, leg. KV [SMNG-VNR 14789]; 48A: 1♂, 1♀, leg. HaR; 50A: 2ex., leg. HaR; Andía: 30: 1♂, leg. DK; Urbasa: 36: 1♀, leg. HaR; 39: 4♂, 2♀, leg. SG; 42: 1♂, leg. DK; Campezo: 55: 1♀, leg. PD; 59B: 1♀, leg. HaR; 59C: 1♂, leg. KV [SMNG-VNR 14802].

Distribution: This species is recorded through the western Pyrenees (French and Spain parts) up to the Cantabria (KIME & ENGHOF 2011: 117).

Remarks: The species of *Loboglomeris* Verhoeff, 1906 is not only impressive for their size but also by their rare ability to stridulate (see HAACKER 1969a). The genus *Loboglomeris* differs from the sister genus *Glomeris* Latreille, 1802 by several strong latitudinal furrows at the male pygidium, which also occur weakly in females (VERHOEFF 1906: 207 and VERHOEFF 1909: 103). Additionally, in males, the posterior side of the femoral parts of the 19th leg pair is covered by strong furrows. These structures can be rubbed against the inner side of the furrowed pygidium to produce a scratchy noise (see HAACKER 1969a).

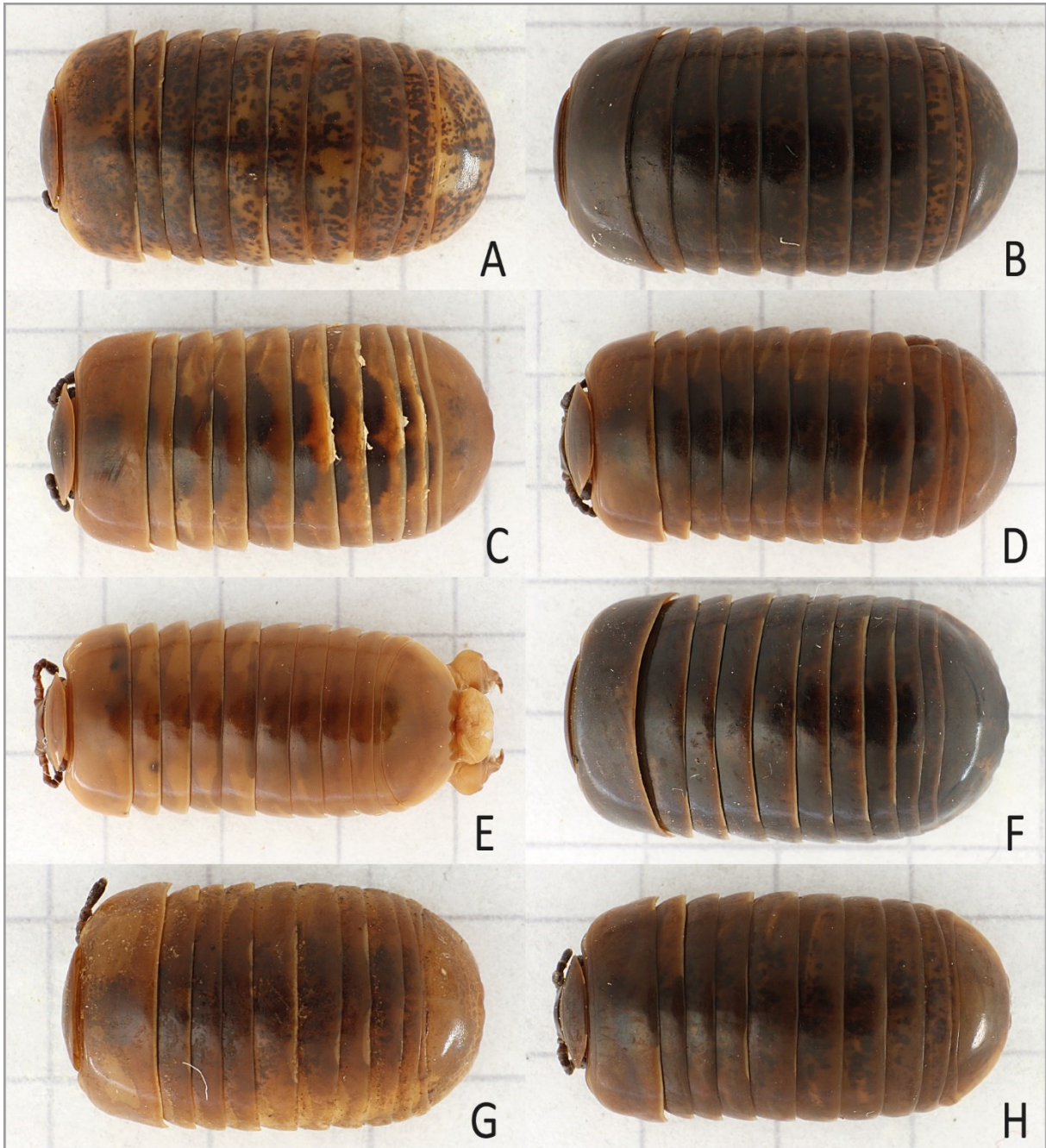


Figure 11: *Loboglomeris rugifera*, dorsal view. **A, B:** form of *rugifera* (sites: **A:** 4A; **B:** 15B). **C, D:** form of *mauriesi* (sites: **C:** 48; **D:** 22). **E, F:** light and dark forms (sites: **E:** 22; **F:** 7). **G, H:** intermediary form (sites: **G:** 12B; **H:** 18). Scale: grid background of 5 mm.

From the Pyrenees, there are two other species of the genus *Loboglomeris* described: *L. pyrenaica* (Latzel, 1886) and *L. haasi* Attems, 1927. HAACKER (1969b: 70) gave a key to differentiate the species. The most important character of the two species is a double row of dorsal spots. MAURIÈS (1971c: 425) and VICENTE (1982: 290, 292) provide figures of these species. Furthermore, according to MAURIÈS (1971c: 426), they can be divided by the structure of the telepods (17th to 19th pair of legs).

L. rugifera is a light brown glomerid with many speckles from dark brown to black all over the dorsal side of the body (Figs 11A, 11B) and therefore resembles a supersized *Glomeris undulata* C. L. Koch, 1844. After an extensive collection, HAACKER (1969b: 68) added a second subspecies: *L. r. mauriesi*

Haacker, 1969. It has a single row of big black spots at the middle of the tergites forming a long black dorsal band during the unrolled posture (figs 11C, 11D). On first view, these two subspecies are well distinguished by their pattern. However, MAURIÈS (1971c: 427) expressed his doubts about the status of the subspecies although still kept them separate. During our excursion, we had the chance to collect many specimens of this interesting glomerid. Most of the specimens could be sorted into either of the two subspecies, but there were also several intermediary forms between the two mentioned patterns. We could not only observe lighter and darker versions of the two current subspecies (Figs 11E, 11F) but also those in which only the middle band was speckled, and the borders were unmarked (Figs 11G, 11H). By comparison, using the morphology, especially of the telepods, we could not reveal any differences between *L. r. rugifera* and *L. r. mauriesi* (Fig. 12). Furthermore, a clear regional separation between these subspecies could not be detected (Fig. 13). A comparison of the COI coding region of the mDNA between the two subspecies also supports that *L. r. rugifera* and *L. r. mauriesi* do not form two separate groups with a barcoding gap but were mixed in the COI-relationship-tree and partially even identical in the COI-gene (Fig. 14). This confirms the doubt of MAURIÈS (1971c) that *L. rugifera* does not consist of two separable subspecies but of only two distinctive colour morphs. *L. r. mauriesi* is here proposed as a new synonym of *L. rugifera*.

Habitat: *L. rugifera* is known as a forest dweller (KIME & ENGHOFF, 2011: 33), which is confirmed by our study. Here it prefers *Fagus* forests.

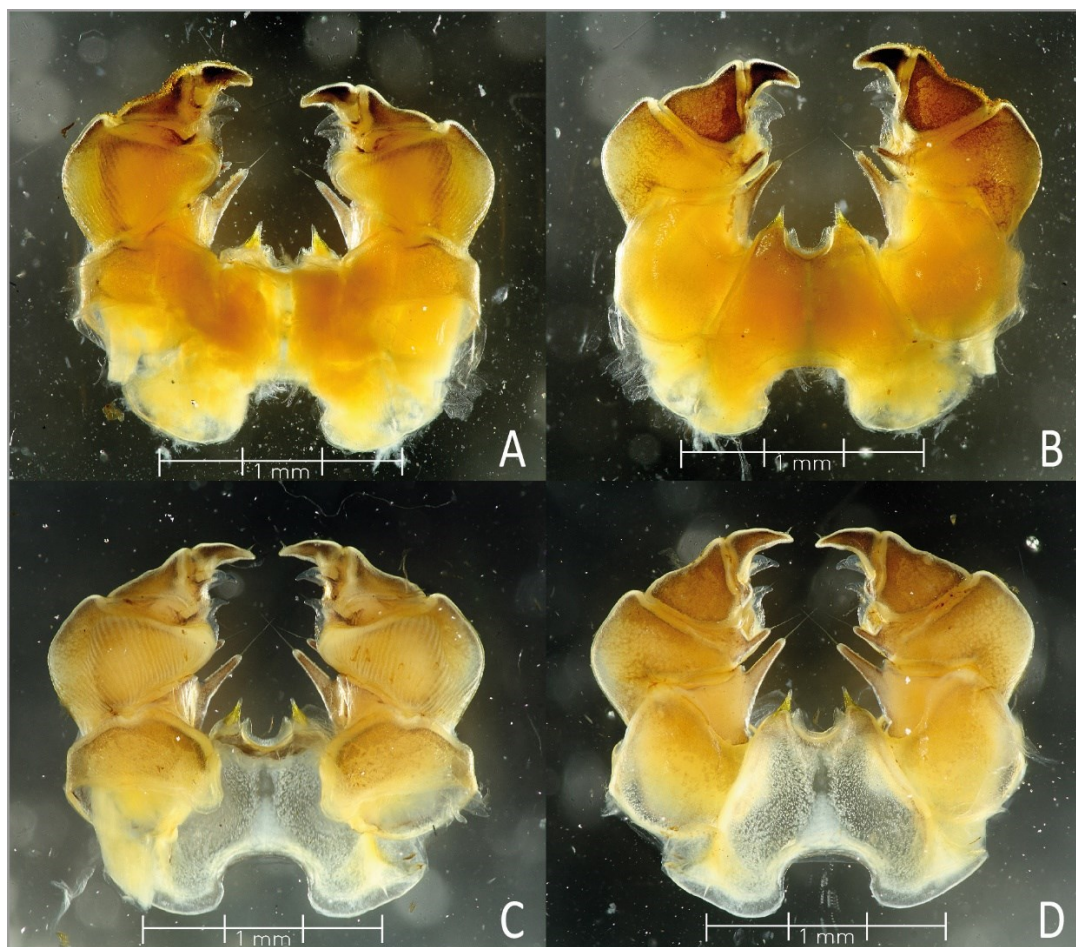


Figure 12: *Loboglomeris rugifera* ♂, 19th pair of legs. **A, B:** form *rugifera* (site 15B). **C, D:** form *mauriesi* (site 12B). **A, C:** posterior view; **B, D:** anterior view. Scales: 1 / 3 mm.



Figure 13: Records of the different forms of *Lobogloermis rugifera*: blue: form *rugifera*; red: form *mauriesi*; green: intermediary forms. Background map: Centro Nacional de Información Geográfica, Mapa de España 1:500k.

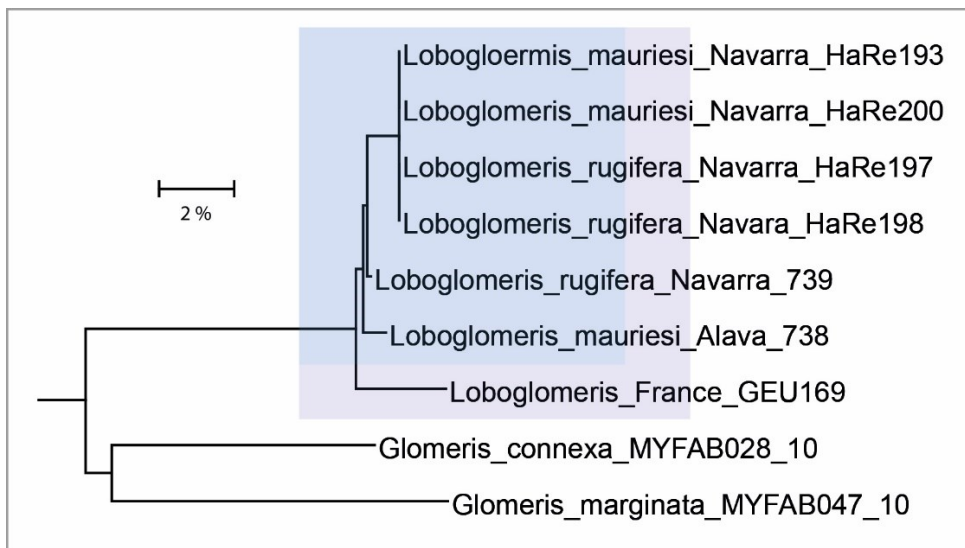


Figure 14: Neighbor-Joining-Tree of the barcoding part of the COI mitochondrial gene for *Lobogloermis rugifera*. Scale: percentage of changes.

***Trachysphaera rousseti* (Demange, 1959), Figs 15–17**

Gervaisia rousseti – DEMANGE 1959: 249-252, plate 1, figs 4-9 (description); CONDÉ & DEMANGE 1961: 190-191, figs 3A-C, 4A, 5A, B (description)

Material examined: Pamplona: 2: 1♂, 1♀, 1juv., leg. SG; Leitza: 3B: 1♀, 5juv., 11ex., leg. HaR, SG; 4A: 2♀, leg. HaR; 5B: 2♂, 4♀, 1juv., leg. HaR; 7: 1ex., leg. DK; Urquilla: 47: 15ex., leg. KV [Reip-AS191; SMNG-VNR 14789]; 49A: 13ex., leg. KV [SMNG-VNR 14793]; 49B: 1♂, 26ex., leg. PD [Reip-Ex564-P2+3+4, Reip-A192-6+P68], KV [SMNG-VNR 14792].

Distribution: *T. rousseti* is endemic to the Basque Country.

Remarks: DEMANGE (1959) described the first *Trachysphaera* Heller, 1858 from northern Spain (especially from “Monts Cantabryques” ≙ Monte Cantabria at the northern border of Logroño, La Rioja), as *T. rousseti* (as *Gervaisia rousseti*). The type locality lies around 50 km south of our southernmost findings of *Trachysphaera* sp. at site 49B.

This species is remarkable for a prominent protuberance at the centre of the pygidium, which is easily visible from the lateral side and forms a blunt triangle from above (Fig. 15). Therefore, this species resembles the east alpine species *T. gibbula* (Latzel, 1884). Furthermore, according to the additional drawings given by CONDÉ & DEMANGE (1961: figs 3 and 4), it is constricted above the posterior pygidium margin at the level of the row of bacilli. CONDÉ & DEMANGE (1961) also described two additional species, *T. drescoi* (as *Gervaisia drescoi*) from Renteria, Guipuzcoa and *T. ribauti* (as *Gervaisia ribauti*) from Montragon, Guipuzcoa, both found in caves. *T. drescoi* differs from *T. rousseti* by the strongly domed pygidium (“fortement bombé”), although the authors did not describe or draw how it looks from the dorsal view. The authors compare it with *T. pyrenaica* (Ribaut, 1908), indicating that it should look quite rounded from above. The species *T. ribauti* also has a strongly domed pygidium, but in contrast to *T. drescoi*, it is also constricted above the posterior margin of the pygidium. The drawing by CONDÉ & DEMANGE (1961) shows that the pygidium’s dome is quite rounded from above. All three species show a row of 4-5 bacilli above the posterior margin of the pygidium. CONDÉ & DEMANGE (1961: 191) previously mentioned that the pygidial protuberance in *T. rousseti* is remarkably variable. Our specimens also bear the pygidial protuberance and fit nicely with the drawings provided by DEMANGE (1959: plate 1) of *T. rousseti*. They also show the pygidial protuberance variations in form and size (Fig. 15). However, some of the pygidial protuberances of our specimens resemble closer to the drawing of the pygidium of *T. drescoi* in CONDÉ and DEMANGE (1961: fig. 3D) than that of *T. rousseti* (Figs 3A–C).

The use of telopods for species differentiation is controversial. WILBRANDT et al. (2015) concluded that the telopods were not very helpful for determining species whereas ANTIĆ et al. (2021) are relying on them as an additional character. The telopods in our specimens (Figs 16A, 16B) are similar to those in the drawings by DEMANGE (1959: plate 1). The central lobe of the syncoxid in the male from site 5B (Fig. 16A) is rounded as in the drawing of DEMANGE (1959: plate 1). However, in the male from site 49B (Fig. 16B), the central lobe of the syncoxid is more protruding. Furthermore, in the illustrated telopods of the specimen from site 49B (Fig. 16B), the big femur fingers are folded inwards. According to CONDÉ & DEMANGE (1961: 189, 190), the telopods of the 19th pair of legs are equal in the three species *T. rousseti*, *T. drescoi*, and *T. ribauti*. Therefore, they cannot serve for differentiation between *T. rousseti* and *T. drescoi*. The extensive distinction between the podit remnants of the 17th pair of legs by CONDÉ & DEMANGE (1961) does not help further. Our specimens differ from the drawings by DEMANGE (1959: plate 1) and sometimes even had a biparted second article. However, the first article (≙ prefemur) is always bearing an inner projection with a distal seta in contrast to *T. drescoi* and *T. ribauti* (CONDÉ & DEMANGE 1961: 188) (Figs 16E–G). This existing projection finally confirms the species *T. rousseti*. In contrast to DEMANGE (1959: plate 1), our specimens also bear an inner projection on the coxites and the prefemur of

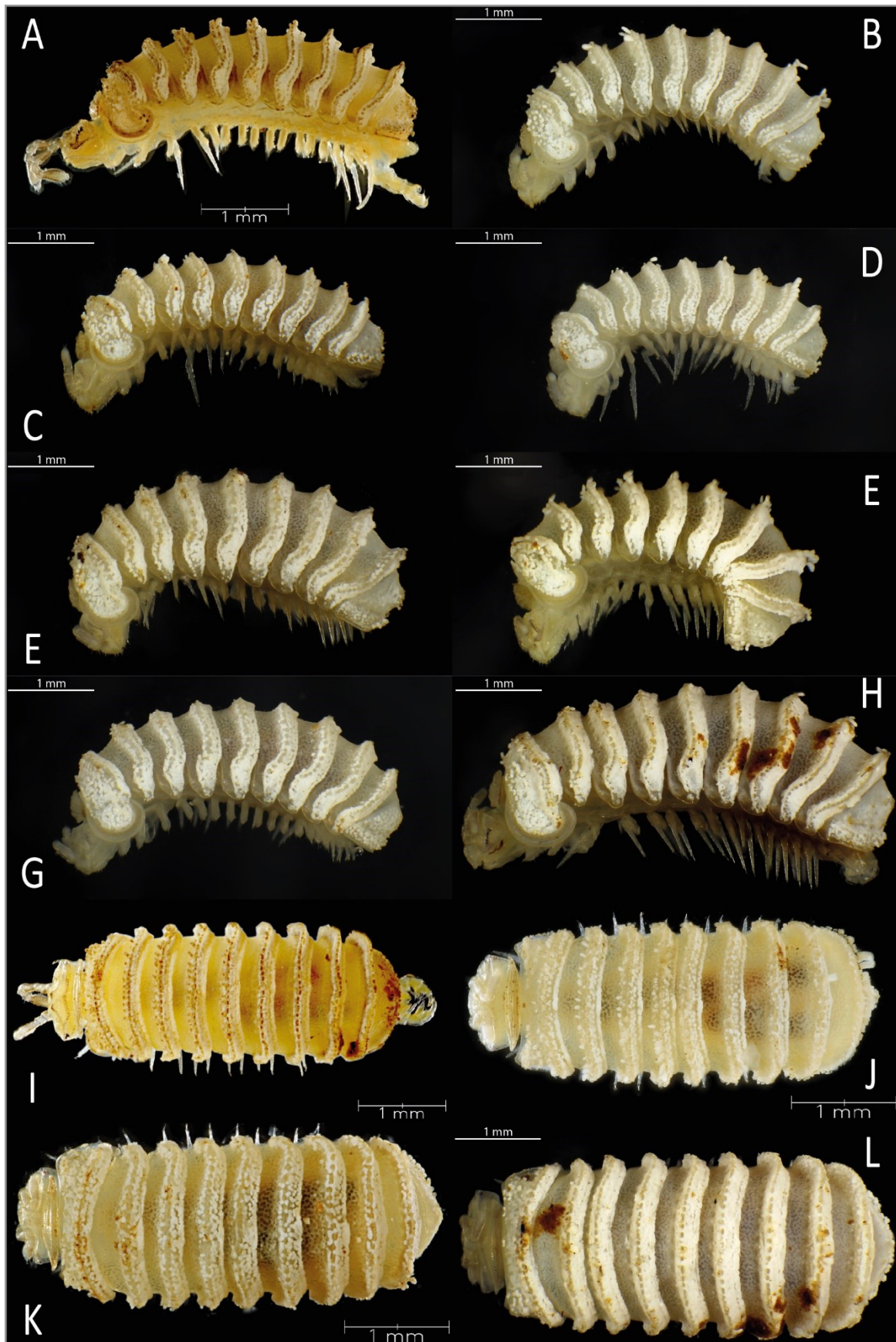


Figure 15: *Trachysphaera rousseti*. Lateral view: A–D: ♂♂. E–H: ♀♀. Dorsal view: I, J: ♂♂, K, L: ♀♀. Sites: A, I, K: 5B; B–H, J, L: 49B. Scale: 1 mm.

the 18th pair of legs (Figs 16C, 16D). During evaluating specimens, one has to avoid subadult males. These can be easily distinguished by the not yet fully developed main telopods (19th pair of legs) (Fig. 17). We were not able to find the two other *Trachysphaera*, namely *T. drescoi* and *T. ribauti*, for further comparisons. However, the species of *Trachysphaera* of northern Spain are not yet fully understood and surely will cause some further surprises. Therefore, more material should be checked for the variability of *T. rousseti* and the identity of the two other *Trachysphaera*.

Habitat: According to our investigations, the species prefers beech forests and other moist habitats (stream valley), where it lives in the litter layer. The clear-cut site in Leitza (site 3B) was also a former beech stand. As KIME & ENGHOF (2011: 38) point out, it is not to be classified as a cave species, as was concluded initially from the first records of the species.

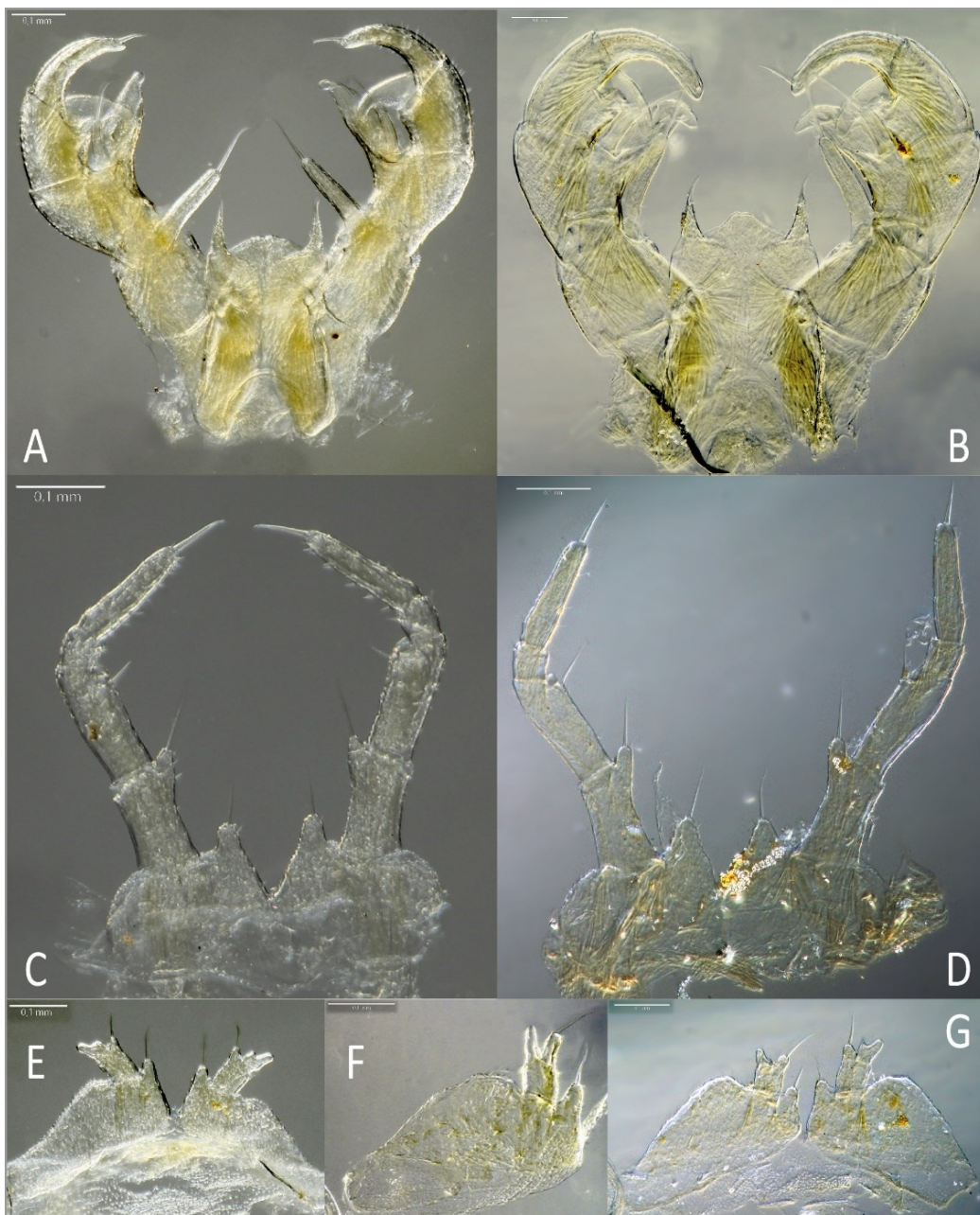


Figure 16: *Trachysphaera rousseti*, ♂♂, telepods, anterior views. **A, B:** 19th pair of legs. **C, D:** 18th pair of legs. **E–G:** 17th pair of legs. Sites: **A, C, E:** 5B; **B, D, F, G:** 49B. Scales: 0.1 mm.

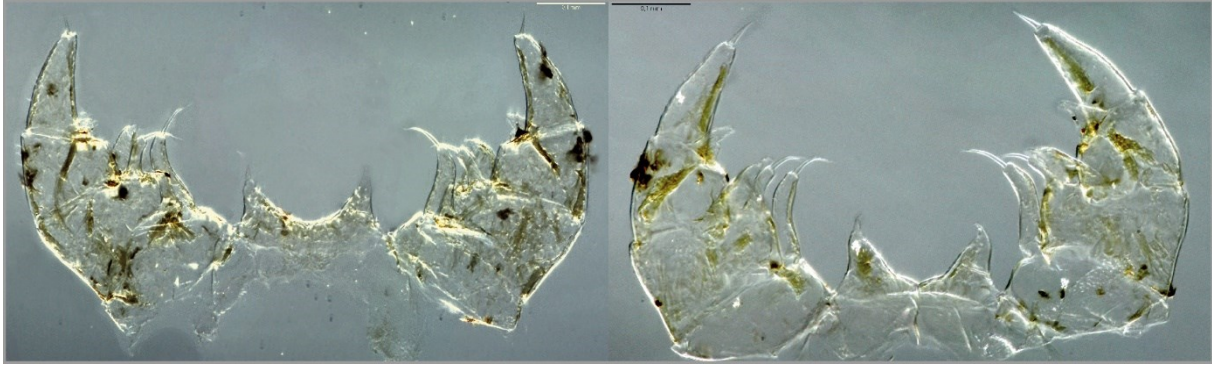


Figure 17: *Trachysphaera rousseti*, subadult ♂♂, telepods, 19th pair of legs. Site 49B. Scales: 0.1 mm.

Family Protoglomeridae Brölemann, 1913

Protoglomeris vasconica (Brölemann, 1897)

Glomeridella (*Protoglomeris*) *vasconica* – BRÖLEMANN 1897: 112-114 (description)

Protoglomeris vasconica – ATTEMS 1929: 338, plate 7b, figs 12-14 (description)

Material examined: Pamplona: 54: 1♀, 1juv., leg. KV [SMNG-VNR 14822]; 54B: 1♂, 2♀, 5ex., leg. KV [SMNG-VNR 14796], HaR, NL; Aralar: 11A: 7♀, leg. SG; 12: 1♂, leg. PD; 12B: 1♂, 2♀, leg. HaR; 16A: 1♀, leg. PD; 17: 6♂, 9♀, 5juv., leg. KV [SMNG-VNR 14763], [SMNG-VNR 14763]; 18: 2♂, 2♀, leg. KV [SMNG (VNR14764)]; 20: 4♂, 4♀, 1juv., leg. KV [SMNG-VNR 14765], HeR; 21A: 1♀, leg. PD; 21B: 2♂, 2♀, leg. KV [SMNG-VNR 14768]; 22: 7♂, 4♀, leg. KV [SMNG-VNR 14770], HaR, PD, HeR; 24A: 1♀, 2juv., leg. KV [SMNG-VNR 14772]; 24B: 1♀, 4juv., leg. PD, HeR; Urquilla: 44C: 2♂, 4♀, leg. PD; 45: 4♀, 1juv., leg. KV [SMNG-VNR 14787], PD; 46: 2♂, 1♀, 6ex., leg. KV [SMNG-VNR 14788], HaR, PD; 47: 1♂, 1♀, 1juv., leg. KV [SMNG-VNR 14789]; 48A: 1ex., leg. HaR; 48B: 3♀, leg. KV [SMNG-VNR 14791]; 49A: 3juv., leg. KV [SMNG-VNR 14793]; 49B: 5♂, 7♀, 3juv., leg. KV [SMNG-VNR 14792], PD; 50A: 1♀, leg. HaR; Andía: 29: 6♀, leg. SG, DK; 31: 2♀, leg. SG; Urbasa: 32: 4♂, 6♀, 3juv., leg. KV [SMNG-VNR 14819], HaR; 32C: 2♂, 7♀, leg. NL; 33: 1♂, leg. HaR [Reip-AS164+P13]; 33B: 1♂, leg. KV [SMNG-VNR 14777]; 36: 9ex., leg. HaR [Reip-AS164]; 43: 1♂, leg. KV [SMNG-VNR 14820]; Campezo: 59A: 2♀, leg. KV [SMNG-VNR 14798]; 59B: 4♂, 2♀, leg. HaR, KV [SMNG-VNR 14801]; 59C: 1♂, 2♀, leg. KV [SMNG-VNR 14802]; Gorbea: 52A: 1♂, 1♀, leg. HeR; NL; 53: 1♀, leg. DK.

Distribution: *P. vasconica* is widespread from western Pyrenees to northern Spain.

Habitat: BRÖLEMANN (1897) described the species from a beech forest, found under broadleaves. Today it is known from a wide range of habitats (KIME & ENGHOFF 2011: 39). We found it especially in *Fagus* forests, half-open scrub areas (partly with *Fagus*), and pastures also with *Fagus*. In urban areas, the species occurred at three sites (site 32, 32C, and 43).

POLYZONIIDA

Family Hirudisomatidae Silvestri, 1896

Hirudisoma getschmanni (Karsch, 1880) sensu Mauriès & Barraqueta, 1985, Fig. 18

Cryptodesmus getschmanni – KARSCH 1880 (description)

Hirudisoma getschmanni – MAURIÈS & BARRAQUETA 1985: 437-438 (description)

Material examined: Pamplona: 54B: 1♀, leg. HaR [Reip-AS160]; Aralar: 19B: leg. HeR; 21: leg. HeR; 22: 10♂, 4♀, leg. HaR [Reip-AS158/9], HeR, KV [SMNG-VNR 14770].

Distribution: *H. getschmanni* is endemic to northern Spain with only two previous records by KARSCH (1880, Oviedo) and MAURIÈS & BARRAQUETA (1985: 433, Monte Gorbea, Areatza, Vizcaya, Basque Country). We could not find it again in Gorbea but can provide two additional sites south of Pamplona and in the Sierra de Aralar.

Remarks: It is either a genuinely rare species or is regularly missed with usual collecting methods. The female from Pamplona was broader than the specimens from Aralar (Fig. 18). In the lack of males, we cannot be sure if this is the same or a related species.

Habitat: MAURIÈS & BARRAQUETA (1985) described the species from a *Pinus* plantation, the only previous habitat known. We found the species only at three sites, at a wet pasture with different trees (site 21), in a *Fagus* wood (site 22) and a half-open bushy area (site 54B). Currently, there are too few records to make a statement about the species' habitat preferences.



Figure 18: *Hirudisoma getschmanni*, in situ. Site 22. Photograph: PR.

CHORDEUMATIDA

The work on the chordeumatids of our excursion is still going on. In the meantime, two species have been described as new (ANTIĆ & MAURIÈS 2022). However, more new species can be expected.

Family Guipuzcosomatidae Antić & Mauriès, 2022

Guipuzcosoma karinae Antić & Mauriès, 2022

Guipuzcosoma karinae – ANTIĆ & MAURIÈS 2022: 149-155, figs 2-6, 12 (description)

Material examined: Leitza: 3A: 1♀, leg. NL; 4A: 1♀, 3juv., leg. HaR; 5A: 1♂, 1juv., leg. KV; Aralar: 21B: 1♀, leg. KV [SMNG-VNR 14768]; 23: 3juv., leg. KV [SMNG-VNR 14771].

All identified by Dragan Antić. Records already published by ANTIĆ & MAURIÈS (2022).

Distribution: *G. karinae* is endemic around Leitza and to the eastern part of the Sierra de Aralar.

Remarks: The species was new for science.

Habitat: The occurrences in the stream valleys under *Alnus* and *Corylus* (sites 4A, 5A), at a wet wood pasture with *Fagus* (site 21B), and in a *Fagus* wood (site 23) indicate a certain requirement for moisture of the species.

Guipuzcosoma reipi Antić & Mauriès, 2022

Guipuzcosoma reipi – ANTIĆ & MAURIÈS 2022: 156-163, figs 7-12 (description)

Material examined: Aralar: 17: 1♂, 1♀, 2juv., leg. HaR & KV; Urquilla: 47: 1♂, leg. HaR [SMNG-VNR 14789]; 49A: 1♀, leg. KV [SMNG-VNR 14793]; 49B: 2♂, leg. KV [SMNG-VNR 14792].

All identified by Dragan Antić. Records already published by ANTIĆ & MAURIÈS (2022).

Distribution: *G. reipi* is endemic in the western part of the Sierra de Aralar and the adjacent Sierra de Urquilla.

Remarks: The species was new for science.

Habitat: *G. reipi* has exclusively been found in *Fagus* woods.

Family Anthogonidae Ribaut, 1913

Anthogonidae – RIBAUT 1913: 447-449 (description)

Vascanthogona vicenteae Mauriès & Barraqueta, 1985

Vascanthogona vicenteae – MAURIÈS & BARRAQUETA 1985: 439-441, figs 9-14 (description)

Material examined: Aralar: 21A: 1♂, 1♀, 2juv., leg. HaR.

Distribution: Previously known only from the type locality: Monte Gorbea (Areatza, Vizcaya, Basque Country, MAURIÈS & BARRAQUETA 1985: 433).

Habitat: Previously, the only known site and habitat was the type locality: *Pinus radiata* plantation (MAURIÈS & BARRAQUETA 1985: 433), a quite dry site. In contrast, we found *V. vicenteae* in a wet woodland pasture (with *Corylus*, some *Quercus*, *Ilex*, and others).

JULIDA

Family Blaniulidae C. L. Koch, 1847

Blaniulus dollfusi Brölemann, 1894

Blaniulus dollfusi – BRÖLEMANN 1894: 98-100 (description); – BRÖLEMANN 1923: 291-296, figs 263-273 (description);

MAURIÈS 1971a: 103 (notes on distribution)

Typhloblaniulus dollfusi – RIBAUT 1905: 5-7, figs 1-4 (description)

Material examined: Leitzta: 3B: 1♂, leg. SG; 3D: 3♀, leg. PD; 8: leg. SG; Aralar: 25: 1♀, leg. HaR [Reip-E545-F2549].

Identified by Helen Read and Hans Reip.

Distribution: *B. dollfusi* is distributed from western France to west-northern Spain.

Remarks: Although widespread, we could find this species in three sites only.

Habitat: Frequently found in forest habitats, but also in stony pastures and dune systems (KIME & ENGHOFF 2017: 27). In agreement, we record the species from a pasture in a karst area, from two *Fagus* forests and a clear-cutting (formerly covered with *Fagus*).

cf. *Proteroiulus* Silvestri, 1897

Material examined: Leitzta: 3A: 3♀, leg. HaR; Aralar: 21B: ♀♀, leg. HaR; Andía: 27A: ♀♀, leg. SG; Urbasa: 35: 7♀, leg. NL; Gorbea: 53D: 1♀, leg. NL; Pyrénées-Atlantiques (France): 60: ♀♀, leg. SG, PR.

Identified by Helen Read and Hans Reip.

Remarks: BRÖLEMANN (1923: 344-349) described and depicted a *Proteroiulus* under the name *P. fuscus* (Am Stein, 1857) from the Pyrenees. Two years later, LOHMANDER (1925: 34) realised that BRÖLEMANN (1923) had described a new *Proteroiulus*, different from *P. fuscus*, and gave it the name *P. broelemanni* in his honour. Due to the lack of males, we only can provisory assign these blaniulid millipedes to the genus *Proteroiulus*.

Family Julidae Leach, 1815

Brachyiulus lusitanus Verhoeff, 1898

Brachyiulus lusitanus – VERHOEFF 1898: 153-154, fig. 28 (description)

Material examined: Logroño: 58: 1♂, leg. SG.

Identified by Helen Read.

Distribution: *B. lusitanus* is wide scattered recorded over southern Europe (KIME & ENGHOFF 2017: 207). It was perhaps introduced to Spain and Portugal by ship traffic.

Habitat: According to KIME & ENGHOFF (2017: 47), this species is found in forests and open lands (e.g., meadows, arable land, and vineyards). We found the species only on a riverbank.

Cylindroiulus elosegiorum Read, 2022

Cylindroiulus elosegiorum – READ 2022: 6-13, figs 19-39 (description)

Material examined: Leitzta: 7: 8♂, 4♀, 16ex., leg. SG, DK, HeR; 8: 1♀, 4 juv. ♀, leg. SG, HeR; 9: 2♂, leg. SG; Aralar: 12B: many ex., leg. KV [SMNG-VNR 14759-8]; 17: 5♂, 11♀, 1juv., leg. KV [SMNG (VNR14831-2)]; 22: 1♂, 2♀, 2juv., leg. HeR; 23: 2♂, 18♀, leg. KV [SMNG-VNR 14771-13]; 24B: 1♂, 3♀, 1juv., leg. HeR; Urquilla: 45: 2♂, 11♀, 3juv., leg. HaR [SMNG-VNR 14787-11], KV [SMNG-VNR 14787-13]; 48A: 1juv., leg. HaR [SMNG-VNR 14790-4]; 49B: 1♀, leg. HaR [SMNG-VNR 14792-6]; Andía: 29: 1♂, 6♀, leg. NL [SMNG-VNR 14753-4], SG; 30: 1♀, leg. PR; Urbasa: 34: leg. KV [SMNG-VNR 14820-4]; 35: 3♂, 5♀, 1juv., leg. HaR

[Reip-AS178/9+P5], HeR; 36: 4♂, 6♀, 3juv., leg. HaR [Reip-AS180], NL [SMNG-VNR 14781-16], KV [SMNG-VNR 14781-25]; 38: 3♂, 6♀, leg. PR, HeR; 41: 1♀, leg. PD & DK; Gorbea: 52: 1♀, leg. DK; 52A: 1♀, leg. DK.

Identified by Helen Read and Hans Reip. Records already published by READ (2022: 6, 8).

Distribution: *C. elosegiorum* is endemic to the Basque Country.

Remarks: Our specimens were the basis for the description of the species by READ (2022). The separation of this small whitish and until now not recognized *C. elosegiorum* from the brown, whitish/light brown-headed *C. pyrenaicus* (Fig. 19), both with almost similar gonopods, shows that it is crucial to focus on the entire morphology, instead only on the gonopods.

Habitat: The species was found at 17 sites. It prefers *Fagus* woodland (12 sites) and open *Fagus* forests (site 52A). According to the findings, it can be classified as a woodland species.

***Cylindroiulus latestriatus* (Curtis, 1845)**

Julus latestriatus – CURTIS 1845: 229-230 (description)

Material examined: Pamplona: 2B: 2♂, 2♀, 1juv., leg. HaR; Urbasa: cf: 43: 1♀, 1juv., leg. PR; Pyrénées-Atlantiques (France): 60: 1♂, 16♀, leg. SG.

Identified by Helen Read and Hans Reip.

Distribution: *C. latestriatus* is widespread over northern Europe (KIME & ENGHOFF 2017: 207), and probably introduced to northern Spain at several sites.

Remarks: The species is most probably introduced to the studied sites.

Habitat: In Central Europe, *C. latestriatus* is an open-land species with a marked preference for sandy soils or (wooded) dunes. It is often found synanthropically. (HAUSER & VOIGTLÄNDER 2019, VOIGTLÄNDER et al. 2020). We found the species at similar sites: in urban areas and on the beach at Saint-Jean-de-Luz (site 60).

***Cylindroiulus londinensis* (Leach, 1815)**

Julus londinensis – LEACH 1815: 378 (description)

Cylindroiulus londinensis – MAURIÈS 1964a: 444-449 (description); READ 2022: 16-18 (notes)

Material examined: Leiza: 3A: 3♂, 2♀, 2juv., 1ex., leg. KV [SMNG-VNR 14744-13, 14746-12], HaR, PR, HeR; 7: 2♂, 1♀, leg. SG, HeR, HeR; 8: 1♀, leg. DK; Aralar: 11C: 1♀, leg. HeR; 12: 1♂, 2♀, leg. PD; 12B: 1♂, leg. KV [SMNG-VNR 14758-13]; 15A: 3♂, 10F/Jex., leg. HeR; 17: 1♂, 1♀, leg. HaR; 18: 2♂, 3♀, leg. KV [SMNG-VNR 14764-11]; 18A: 1♂, 2juv., leg. HaR [Reip-AS183], NL; 21A: 1♂, leg. HaR; 21C: 2juv., leg. HaR; 21B: 9♀, leg. HeR; 22: 1♀, leg. HaR; 24B: 3♀, leg. PD; Urquilla: 48A: 1♀, leg. HaR; 48B: 4♀, 1juv., leg. KV [SMNG-VNR 14791-1]; Andía: 26: 1♂, leg. HaR; 29: 1♂, 1juv., leg. SG; Urbasa: 36: 2♂, 2♀, leg. HaR [Reip-AS181/2]; Gorbea: 52: 1♂, 2♀, leg. SG. Campezo: 55: 3♂, 4♀, 1juv., leg. DK, PR, SG, HeR.

Identified by Helen Read and Hans Reip. Records already published by READ (2022: 16, 18).

Distribution: This species is distributed in western Europe, from northern Scotland over western France south to northern Spanish Pyrenees.

Remarks: MAURIÈS (1964a) already studied extensively the morphology of this *Cylindroiulus*, impressive by its size.

Habitat: The eurytopic species occurs from dry open land up to moor- and wetland and in synanthropic habitats. The brief characteristics: “In woodlands and open habitats [...] Frequently in *Fagus* forests and also in *Quercus* woodland” by KIME & ENGHOFF (2017: 64) also apply to our findings.

***Cylindroiulus parisiorum* (Brölemann & Verhoeff, 1896)**

Iulus parisiorum – BRÖLEMANN & VERHOEFF 1896: 214-217, fig. 7

Cylindroiulus parisiorum – KORSÓS & ENGHOFF 1990: 349-350, figs 9-12 (description)

Material examined: Pyrénées-Atlantiques (France): 60: 3♂, 12♀, leg. PR.

Identified by Helen Read.

Distribution: *C. parisiorum* is scattered over Europe (see KIME & ENGHOFF 2017: 223).

Habitat: In almost all countries of its range, the occurrence of the species is linked to human activities. This is also reflected in our findings on the beach of Saint-Jean-de-Luz (site 60).

***Cylindroiulus punctatus* (Leach, 1815)**

Iulus punctatus – LEACH 1815: 379

Cylindroiulus punctatus – DEMANGE 1981: 180, fig. 263 (key); READ 2022: 18-20 (notes)

Cylindroiulus silvarum (Meinert, 1868) – CEUCA 1972: 509-510, fig. 2 (description)

Material examined: Pamplona: 2A: 1♂, 2♀, leg. HaR; 2B: 1♂, leg. HaR; Leitza: 3A: 1juv., leg. PR; 9: 1♀, leg. SG; Andía: 31: 2♀, 1 ex., leg. SG, PR.

Identified by Helen Read and Hans Reip. Records already published by READ (2022: 18, 20).

Distribution: *C. punctatus* is widespread from southern Sweden, Great Britain, Germany, France, and northern Spain (see KIME & ENGHOFF 2017: 223).

Remarks: The species is new for the Basque region.

Habitat: Lowland species, not drought-resistant, hygrophilous. HAACKER (1968) characterises the species as a stenotopic woodland species with a conspicuous preference for dead wood, into which it sometimes eats deeply. However, other habitats are also colonised. Only the presence of wood is essential. Because our few finds do not allow a classification, we base our assessment on information already known.

***Cylindroiulus pyrenaicus* (Brölemann, 1897), Fig. 19**

Cylindroiulus pyrenaicus – BRÖLEMANN 1897: 117-119 (description); READ 2022: 20-22, figs 62-74 (description)

Material examined: Leitza: 3A: 1♀, leg. HaR [SMNG(014744-9)]; 5B: 1♀, leg. KV [SMNG-VNR 14753-9]; Aralar: 11A: 1♀, leg. HaR [SMNG(014755-8)]; 12: several ex., leg. PD; 12A: 2♀, 1juv., leg. PR; 21B: 1♂, 3♀, leg. HeR; Urquilla: 50: 1♀, leg. PD; Andía: 27A: 1♀, leg. PR; Urbasa: 42: 1♂, 14♀/juv., leg. DK; Gorbea: 52: 2♂, leg. SG.

Identified by Helen Read and Hans Reip. Records already published by READ (2022: 20).

Distribution: *C. pyrenaicus* is endemic to the Pyrenees.

Remarks: See remarks on *Cylindroiulus elosegiorum*.

Habitat: According to KIME & ENGHOF (2017: 68), the species is mainly found in *Fagus* and mixed deciduous forests but also in stony meadows with bushes and some trees. The occurrence of the species found by us corresponds to this. Eurytopic species.



Figure 19: *Cylindroiulus pyrenaicus* ♀, after short storage in ethanol. Site 11A.

***Cylindroiulus sagittarius* (Brölemann, 1897)**

Iulus (Cylindroiulus) sagittarius – BRÖLEMANN 1897: 115-117, figs 16, 17 (description)

Cylindroiulus sagittarius – READ 2022: 22-26, figs 75-83 (description)

Cylindroiulus hispanicus – CEUCA 1972: 510-511, fig. 3 (description)

Material examined: Leitzza: 3A: 13♂, 5♀, 13juv., 1ex., leg. HaR [Reip-AS175], KV [SMNG-VNR 14744-12], PR, HeR; 3B: 2♂, 8♀, leg. SG; 3C: 3♂, 1♀, leg. KV [SMNG-VNR 14824-1]; 3D: 1juv., leg. PD; 5A: 2♂, 5♀, 9juv., leg. HaR; 7: 1♀, leg. HeR; 8: 1♂, 4♀, leg. SG; Aralar: 12: 1♂, 1 ex., leg. PR, PD; 12B: 2♂, 4♀, leg. KV [SMNG-VNR 14758-14]; 20: 1♂, 1♀, leg. PD; 22: 1♀, leg. HeR.

Identified by Helen Read and Hans Reip. Records already published by READ (2022: 22, 24).

Distribution: *C. sagittarius* is endemic to the Pyrenees (see KIME & ENGHOFF 2017: 223). With our records, the previously known western distribution border is extended to the Sierra de Aralar. Introduced to UK, Wales, North of Cardiff (GREGORY & OWEN 2019).

Remarks: Until now, it has been overlooked in the Basque region by the outstanding works of MAURIÈS (1971a) and MAURIÈS & VICENTE (1977b). It is a closely related species to *C. punctatus* but with a pointed telson (READ 2022: 24).

Habitat: Our findings are consistent with those of KIME & ENGHOFF (2017: 223). Above all, we found the species in *Fagus* forests (incl. a clear-cutting). Interestingly, we also found it in an *Alnus* wood along a stream, a *Picea* forest, in light forests and pastures. The montane species lives in leaf litter and moss, but most often in decaying tree stumps, where it seems to replace the more lowland species *C. punctatus*, which BRÖLEMANN (1897) already pointed out in the species description.

Cylindroiulus sanctimichaelis Attems, 1927

Cylindroiulus sanctimichaelis – ATTEMS 1927: 272-273, figs 59-61 (description); VICENTE 1985: 341-342, fig. 13 (description); READ 2022: 26-29, figs 84-88, 91, 96-97 (description)

Material examined: Pamplona: 1: 1♂, 3♀, 1juv., 45ex., leg. HaR [Reip-AS176], KV [SMNG-VNR 14741-4]; 2A: 3♂, 5♀, leg. HaR; 54: 1♀, leg. KV [SMNG-VNR 14822-5]; 54B: 1♂, leg. HaR; Leitza: 8: 1♀, leg. SG; Aralar: 15A: 3♂, 2♀, leg. HeR; 16B: 2♂, 8♀, 2juv., 46ex., leg. SG, HaR [Reip-AS177], NL; 18B: 1♂, 1♀, leg. PD; 20: 12♂, 4♀, 9 juv. ♀, leg. KV [SMNG-VNR 14765-19], HaR, HeR, PD; 24: 1♂, 3♀, 1juv., leg. KV [SMNG-VNR 14817-1]; 24A: 7♂, 3♀, 11juv., misc. ♀/juv., leg. HaR, HeR; 24B: 1♂, leg. PD; 26: 1♂, leg. HaR; Urquilla: 44A: 4♂, 2♀, 5juv., leg. HaR, KV [SMNG-VNR 14786-6, VNR 14828-7]; Andía: 27A: 1♂, 1♀, leg. PR; 28: 1♂, 2♀, 3juv., leg. HaR, NL, SG; 30: 1♂, 8♀, leg. SG; 31: 2♂, 8♀, 2juv., leg. SG, PR, DK; Urbasa: 35: 1♂, 1♀, leg. KV [SMNG-VNR 14826-5], PD; 37: 1♂, 9♀, 1juv., leg. HaR; 39: 4♂, 4♀, 1juv., leg. HeR, PR, SG; Campezo: 55: 1♂, 2♀, leg. HeR; 56: 6♂, 12♀, 9♀/juv., 2juv., leg. PD, DK, HeR, SG, PR; 59B: 2juv., leg. HaR.

Identified by Helen Read and Hans Reip. Records already published by READ (2022: 26-27).

Distribution: *C. sanctimichaelis* is widespread in northern Spain (see KIME & ENGHOFF 2017: 226). The records of this species for central Spain mentioned by KIME & ENGHOFF (2017: 226) refer probably to the new *C. caramelos* Read, 2022.

Remarks: Recently, the closely related species *C. caramelos* Read, 2022 was described. This species differs by its light brown colour from the grey-silverish coloured *C. sanctimichaelis* (READ 2022: 6).

Habitat: The species is widespread from Alava and Navarra to Barcelona. There it occupies a wide range of habitats. In our investigations, the occurrences also reflect this. They reach from mostly *Quercus* woods, open woodland, pastures, and meadows to urban areas. From this, a preference for drier habitats can be concluded.

Haplopodoiulus spathifer (Brölemann, 1897), Fig. 20

Haplopodoiulus spathifer – BRÖLEMANN 1897: 114-115, figs 13-15 (description); CORBET & JONES 1996: 13-15, figs 1-3 (description)

Material examined: Pamplona: 54B: 1♂, 4♀, 1juv., 6ex., leg. KV [SMNG-VNR 14796-14], HaR, NL; 54C: 4♂, 8♀, many ex., leg. KV [SMNG-VNR 14797-13], NL, HaR; Leitza: 7: 1♀, 8ex., leg. SG, DK, HeR; 8: 3♀, many ex., leg. DK, HeR; Aralar: 11A: 1♂, 1♀, leg. SG; 11B: 1♂, leg. HaR; 11C: 1♀, leg. HeR; 15A: 1♀, many

ex., leg. HeR, PR; 17: 2♂, 3♀, 13juv., leg. KV [SMNG-VNR 14831-1], HaR; 18A: 3♂, 3♀, leg. HaR, NL; 21A: 3♂, 6♀, 9ex., leg. HaR [Reip-AS199], KV [SMNG-VNR 14767-15]; 21B: 4♂, 5♀, leg. KV [SMNG-VNR 14768-15], HeR; 22: 6♂, 19♀, 2juv., leg. KV [SMNG-VNR 14770-21d], HaR [Reip-AS200], HeR; 26: 1♀, 1juv., many ex., leg. HaR, HeR; Urquilla: 44C: 2♀, leg. KV [SMNG-VNR 14828-5]; 45: 1♂, 6♀, 1juv., leg. HeR [SMNG-VNR 14787-12], HaR, PD; 46: 3♀, 6ex., leg. KV [SMNG-VNR 14788-14], HaR; 48A: 2♀, leg. HaR; 49B: 1♂, 2♀, leg. KV [SMNG-VNR 14792-11]; 50A: 2♀, leg. HaR; Andía: 27A: 3♀, leg. SG, PR; 28: 9♂, 17♀, 9 ex., leg. PR, SG; 29: 2juv., 1 ex., leg. HaR, SG, NL; 30: 2♂, 7♀, 6ex., leg. PR, HaR, SG; 31: 1♀, 1juv., leg. PR; Urbasa: 35: 4♂, 16♀, 1 ex., leg. KV [SMNG-VNR 14780-12], HaR, HeR, SG; 36: 2♂, 1♀, 3juv., many ex., leg. KV [SMNG-VNR 14781-24], HaR [Reip-AS201/2]; 37: 3♂, 4♀, 4juv., 2ex., leg. HaR [Reip-AS203+P10], NL; 38: 9♀, 2juv., leg. HeR, PR; 39: 1♂, leg. SG; 40: 3♀, leg. SG, HeR; 41: 2♀, 3 ex., leg. PD & DK; Campezo: 55: 3♂, 9♀, leg. SG, PR, DK, HeR; 56: 9♂, 14♀, 1juv., leg. PR, HeR, SG; 59: 1♂, 2♀, leg. KV [SMNG-VNR 14803-8], HaR; 59A: 3♂, 7♀, 5juv., 10ex., leg. KV [SMNG-VNR 14798-8], HaR; 59B: 1♂, 4♀, 2juv., divers ex., leg. KV [SMNG-VNR 14801-5, 14801-6], HaR; 59C: 1♂, leg. KV [SMNG-VNR 14802-7]; Gorbea: 52: 6 ex., leg. DK; 53: 1♂, 2♀, leg. PD/DK; Landes (France) 61: 1♂, 1♀, 1juv., leg. DK.

Identified by Helen Read and Hans Reip.

Distribution: This species is endemic in the Pyrenees and in the adjacent Basque regions of Spain and of France, but widespread there. It is introduced to southern England (KIME & ENGHOFF 2017: 92, 235).

Remarks: The males of this species are easily recognizable by the large hook-formed first pair of legs (see in situ drawings by CORBET & JONES 1996: figs 2a, 2b and Fig. 20A). It has strongly extended coxal pads at the second pair of legs (fig. 20B–D). Gonopods are relatively simple and slender (Fig. 20E). The body size of the specimens differed quite remarkably between around 1.5 to over 3 cm.

Habitat: Eurytopic woodland species, which also occurs in meadows and pastures primarily associated with bushes. It is also known from the Pyrenees and reported to be common in beech forests in leaf litter (BRÖLEMANN 1897).



Figure 20: *Haplopodoiulus spathifer* ♂. **A:** first pair of leg, anterior view. **B:** second pair of leg with paired coxal processes, posterior view. **C:** in situ, ventral view. **D:** in situ, lateral view, head slightly bent forward. (1): visible telepodid remnants of first leg pair, (2): coxal processes of second leg pair. **E:** Left gonopods, lateral view. Site 37. **A, B, E:** Scale: 0.1 mm.

***Leptoiulus meridionalis* (Brölemann, 1897)**

Iulus kervillei var. *meridionalis* – BRÖLEMANN 1897: 117, figs 18, 19 (description)

Iulus silvicola – BRÖLEMANN 1898: 189 (note) – junior objective synonym, **syn. nov.**

Material examined: Pamplona: 1: 2juv., leg. HaR; 2A: 2♂, 4♀, 1juv., leg. HaR [Reip-AS184/5+P12]; Aralar: 11A: 1♂, leg. SG; 16B: 1♂, 2♀, 2juv., leg. HaR [Reip-AS186/7]; Andía: 27A: 4♂, 1♀, 5juv., leg. NL, SG; 28: 2♂, 1♀, leg. SG, NL; 30: 1♂, 2♀, 6juv., leg. SG; Urbasa: 33: 1♂, 2♀, leg. HaR; 34: 1♀, leg. HaR; 36: 2♀, leg. HaR; 43: 1♂, 4♀, 1juv., leg. SG; 43: 2♀, 1juv., leg. HaR; Campezo: 56: 2♂, 2♀, leg. HeR; 59B: 2ex., leg. HaR; Gorbea: 51A: 1♀, leg. NL; 53: 2♂, 2♀, leg. HeR, SG.

Distribution: *L. meridionalis* is endemic to the western Pyrenees. Our records extend the previously known distribution area to the west of the whole Basque country.

Habitat: According to our findings, the species prefers thermophilic *Quercus* woods and other drier habitats (meadows), also urban habitats are not avoided.

***Leptoiulus remyi* Schubart, 1961**

Leptoiulus remyi – SCHUBART 1961: 616-618, figs 1-3 (description); VICENTE 1985: 335-337, fig. 10 (description)

Material examined: Andía: 30: 1♂, leg. SG [Reip-AS174-P17].

Distribution: *L. remyi* is known from the most eastern Pyrenees (VICENTE 1985: 337; SCHUBART 1961: 618). Our single find is remarkably distant from these records.

Habitat: This xerophilous species has been found in various Mediterranean habitats, such as maquis, (with *Rosmarinus* and *Lavendula*), on meadows and in various forests (olive groves, *Pinus halapensis* and *Quercus suber* forests), where it lives under stones or in leaf litter (SCHUBART 1961: 318, VICENTE 1985: 337). Our only finding of this species was in an evergreen *Quercus* forest.

***Ommatoiulus cervinus* (Verhoeff, 1910)**

Schizophyllum cervinus – VERHOEFF 1910: 199-202, 239, figs 11, 12, 24 (description)

Ommatoiulus moreleti – sensu VICENTE 1985: 324 (notes)

Ommatoiulus cervinus as a synonym of *Ommatoiulus moreleti* – AKKARI & ENGHOFF 2017: 22-24: fig. 16 (notes)

Material examined: Campezo: 59A: 1♂, leg. HaR.

The material is stored in the Natural History Museum of Denmark, Copenhagen, for further study.

Distribution: Described from the Sierra Estrella, Portugal, the species was also found in Teruel, Spain by VICENTE (1985: 324) as well as often by the authors (unpublished). Our finding mentioned here, extends the previously known distribution area toward northern Spain.

Remarks: LUCAS (1860) gave a short textual description of *O. moreleti* from the Azores Islands without an exact indication of the location. The species is also well known from the nearby Island of Madeira and the Canary Islands (SCHUBART 1966: 32). Schubart redescribed it extensively from South Africa (1966: 23-33). *O. moreleti* is also widely known from Australia (BAKER 1978). All the specimens of *O. moreleti* from Madeira, the Canaries and Australia - which the first author studied – fit very well to the description of SCHUBART (1966).

In contrast, the gonopods of our specimens from Northern Spain are relatively similar but still good separable from *O. moreleti* (Lucas, 1860) sensu SCHUBART (1966) and hence, they are also differing from the *O. moreleti* regularly found in the mainland of Portugal. They are fitting well to the description by VERHOEFF (1910). Additionally, these specimens are almost twice the body size as the specimens ordinary found at Madeira, the Canaries, and Australia. Therefore, we reject provisionally the synonymisation of *O. cervinus* under *O. moreleti* by AKKARI & ENGHOF, 2017: 24). Genetical studies may clarify the relationship of this species to *O. moreleti*.

Habitat: VICENTE (1985: 324) describes *O. cervinus* as a xerophilous species in the Mediterranean region. As our only record is from an evergreen *Quercus* forest with *Buxus* and *Erica*, we would follow this classification.

***Ommatoiulus haackeri* Mauriès, 1969**

Ommatoiulus haackeri – MAURIÈS 1969: 330-335, figs 1-5 (description)

Material examined: Andía: 27B: 1♂, leg. HaR; Urbasa: 36: cf. 2juv., leg. HaR.

Material is stored in the Natural History Museum of Denmark, Copenhagen, for further study.

Distribution: This is a rare millipede found in the western Pyrenees (MAURIÈS 1969: 330, 1971: 114, 1975: 134).

Habitat: We found *O. haackeri* exclusively in two *Fagus* forests.

***Ommatoiulus lienharti* (Brölemann, 1921)**

Schizophyllum moreleti lienharti – BRÖLEMANN 1921: 182-189, figs 1-9 (description)

Ommatoiulus karschi (Verhoeff, 1894) – Falsely identified by MACHADO 1946: 19, 20, fig. 1 (description)

Ommatoiulus moreleti lienharti as a synonym of *Ommatoiulus bipartitus* (Verhoeff, 1910) – AKKARI & ENGHOF 2017: figs 5C, D (notes)

Material examined: Urquilla: 50A: 2♂, leg. HaR.

The material is stored in the Natural History Museum of Denmark, Copenhagen, for further study. An SEM image of the gonopodal paracoxite of one male from our collection was previously published by AKKARI & ENGHOF (2017: fig. 5D).

Distribution: The species is known from Arcachon near Bordeaux, France. MACHADO (1946: 19, 20) gives a record from Coimbra, Portugal under the name *O. karschi*. MAURIÈS (1971a: 114) already assumed the occurrence of the species in northern Spain, which our findings now confirm.

Remarks: The complex paracoxite of our specimens (drawn in fig. 5D in AKKARI & ENGHOF 2017) fits well with the description and drawing by BRÖLEMANN (1921: 183-185, figs 3, 5). AKKARI & ENGHOF (2017: 8-9) see this species as a synonym of *O. bipartitus* (Verhoeff, 1910). Two arguments speak against this synonymisation: Firstly, the paracoxite is much more complex than that of *O. bipartitus* drawn by VERHOEFF (1910: fig. 14), secondly, AKKARI & ENGHOF (2017) found relatively constant morphs in the species group *O. bipartitus* (*moreleti-karschi-lienharti-bipartitus*) and they themselves suggested morphological / molecular analyses for delineating this species group.

Until further clarification, we keep *O. lienharti* as a distinct species.

Habitat: As already cited in KIME & ENGHOFF (2017: 139-140), we found this species in a *Fagus* forest with some *Quercus*.

***Ommatoiulus rutilans* (C. L. Koch, 1847), Fig. 21**

Julus rutilans – C. L. KOCH 1847: 111 (description)

Ommatoiulus rutilans (C. L. Koch, 1847) – VICENTE 1985: 324-331, figs 2-5 (description)

Material examined: Leitza: 8: 1♀, leg. HeR; Urbasa: 39: 2♂, 8♀, 1juv., leg. HeR, PR; Campezo: 55: 1♀, leg. HeR.

Distribution: *O. rutilans* is widespread from Baden-Wuerttemberg, Germany, to middle Italy and north-eastern Spain. Our findings are new for the Basque region but not surprisingly.

Remarks: *O. rutilans* is easily separable from the other black *Ommatoiulus* by its predominantly greyish coloration with golden-brown crosswise stripes (Fig. 21).

Habitat: According to KIME & ENGHOFF (2017: 143), the species prefers warm and dry calcareous grassland and occurs under *Juniperus* in Spain. Here, it also colonises forests (*Quercus*, *Fagus*), as our sampling results show.



Figure 21: *Ommatoiulus rutilans* ♀, in situ (from Tortosa, 07.10.2017).

***Ommatoiulus* sp.**

Various females and juveniles of *Ommatoiulus* were present at several sites (Leitza: 5, 7; Aralar: 12, 24; Andía: 30; Urbasa: 38; Urquilla: 46; Gorbea: 51, 52, 53; Campezo: 55, 56, 59). Giving species names without males would be pure speculation.

***Tachypodoiulus niger* (Leach, 1815)**

Julus niger – Leach 1815: 378 (description)

Tachypodoiulus albipes (C. L. Koch, 1838) – VICENTE 1985: 332-333 (notes)

Material examined: Andía: 27B: 1♂, leg. HaR; 29: 1♀, leg. HaR; Campezo: 59B: 1♂, leg. HaR.

Distribution: *T. niger* is a widespread species in Germany, Great Britain, France, and northern Spain (KIME & ENGHOFF 2017: 288). Our findings are at the south-western corner of its distribution area.

Habitat: In Central Europe, as well as in its entire distribution area, the species is classified as a eurytopic forest species (VOIGTLÄNDER 2011: 69, 75, KIME & ENGHOFF 2017: 159). The preference for forests is kept by *T. niger* in northern Spain (our investigations, VICENTE 1985: 333): deciduous and mixed forest (*Fagus sylvatica*, *Buxus sempervirens*, *Quercus*, *Fraxinus excelsior*), coniferous forests (*Abies alba*, *Pinus sylvestris*, *P. mugo*), and meadows (with *Fraxinus*).

POLYDESMIDA

Family Polydesmidae Leach, 1815

Archipolydesmus sp.

Material examined: Aralar: 12A: 1♀, leg. KV [SMNG-VNR 14757]; 12B: 1♀, leg. KV [SMNG-VNR 14758]; 19C: 2♀, leg. PD.

Identified by Per Djursvoll.

Remarks: *Archipolydesmus* is an enigmatic genus of Polydesmidae confined to the northern part of Spain. From the nearby Tolosa/province (Monte Alzo), the species *A. terrea* (Attems, 1952 as *Miradoria terrea*) is known (MAURIÈS 1971b). This place is 15/20 km distant from our records. Therefore, it is a good chance we rediscovered this species. Nevertheless, without males, we leave our records under the genus.

Brachydesmus superus Latzel, 1884

Brachydesmus superus – LATZEL 1884: 130 (description)

Material examined: Pamplona: 2D: 1♂, 1♀, 5juv., leg. KV [SMNG-VNR 14743]; Leitza: 9: 2♀, leg. SG; Aralar: 14: 1♂, 5♀, leg. PD; 16B: 1♂, leg. HaR; Urbasa: 43: 1♂, 2♀, 3juv., leg. HaR; Campezo: 56: 1♂, leg. SG; Logroño: 58: 1♂, 6♀, leg. DK, PD, SG.

Identified by Per Djursvoll and Hans Reip.

Distribution: *B. superus* is a widespread Middle-European species (see KIME & ENGHOFF 2011: 205), also introduced to various places in Europe from western Russia to Portugal and also worldwide.

Habitat: *B. superus* is synantropically widespread far beyond its natural distribution area (Atlanto-Mediterranean region). We also found the species in urban and anthropogenically influenced areas.

Polydesmus coriaceus Porat, 1870, Fig. 22

Polydesmus coriaceus – PORAT 1870: 819, fig. 7 (description); DEMANGE 1970: 28-35, fig. 13 (notes); VICENTE 1982: 309-313, figs 38-44 (notes); GILGADO & ORTUÑO 2023: 456-457, figs 3D, 4C (notes)

Material examined: Pamplona: 1: 1♂, leg. NL; 2A: 2♂, leg. HaR; 54C: 1juv., leg. HaR; Leitza: 3A: 4♀, leg. PD; 3D: 1♂, leg. PD; 5A: 1♀, leg. KV [SMNG-VNR 14751]; 7: 1♀, leg. SG; Aralar: 11A: 1♂, 1juv., leg. HaR; 11B: 1♂, leg. NL [SMNG-VNR 14829]; 12: 1♂, 1♀, leg. PD; 12A: 1♂, 1♀, leg. PR; 13A: 5♂, leg. SG, HeR; 13B: 1juv., leg. HaR; 15A: 5♂, 1♀, 1juv., leg. KV [SMNG-VNR 14812], HeR, PR; 15C: 1♂, leg. HeR; 16A: 4♂, 1♀, leg. DK, NL, PD; 16B: 1♂, 1♀, 1juv., leg. NL [SMNG-VNR 14815], HaR; 17: 4♂, 3♀, leg. PD, SG, HaR; 18: 1♂, leg. KV [SMNG-VNR 14764]; 18A: 1♂, 2♀, leg. SG; 18B: 1♀, leg. HaR; 19C: 1♂, leg. PD;

20: 3♂, 2♀, leg. KV [SMNG-VNR 14765], PD; 21A: 3♂, 1♀, leg. PD, HaR; 21B: 1♂, leg. KV [SMNG (VNR14768)]; 21C: 3♂, 1♀, 1juv., leg. HaR [Reip-AS161]; 24B: 3♂, 1♀, leg. KV [SMNG-VNR 14773], PD; 25: 3♂, 1♀, 2juv., leg. HaR [Reip-AS162]; 26: 4♀, leg. PD, HaR; Urquilla: 50A: 1juv., leg. HaR; 50B: 3♀, leg. PD; Andía: 27A: 6♂, 5♀, leg. DK, SG; 29: 2♂, leg. PR; 30: 3♂, 1♀, 1juv., leg. DK, SG; 31: 3♂, 2♀, 2juv., leg. SG, DK; Urbasa: 32A: 1♂, 1♀, 1juv., leg. KV [SMNG-VNR 14776]; 34: 1♀, leg. HaR; 35: 3♂, 4♀, leg. PD, HaR; 36: 1♀, leg. HaR; 39: 3♂, leg. SG; 40: 5♂, 4♀, leg. HeR, SG; 43: 3♂, 3♀, leg. PD, SG; 43: 1♂, 5♀, 1juv., leg. PD, HaR; Campezo: 55: 1♂, leg. PD; 56: 1♂, 1juv., leg. SG; 59B: 3♂, 1♀, 1juv., leg. KV [SMNG-VNR 14801], HaR; Gorbea: 51A: 1♀, leg. SG; 52A: 1♂, 2♀, leg. SG, NL; 53D1: 1♀, leg. NL; Logroño: 57: 24♂, 19♀, 3juv., leg. PD, DK, SG, HeR; 58: 12♂, 6♀, leg. SG, PD, DK.

Identified by Per Djursvoll and Hans Reip.

Distribution: The species is widely distributed in northern Iberia and adjacent islands (DJURSVOLL 2019: 53).

Remarks: *P. coriaceus* (Fig. 22) was split into numerous subspecies (see e.g., VICENTE 1982: 309-313). We refrained from assigning our specimens to subspecies. In our opinion, most subspecies are unjustified because of a lack of geographical or ecological borders. Therefore, they are only forms with regular gene transfer between them.

Habitat: The species is eurytopic in its whole distribution area (KIME & ENGHOF 2011: 62). We found *P. coriaceus* in deciduous forests and open woodlands or wood pastures as well as in parks and gardens in urban areas, with an equal percentage of open land and woodland colonisation.



Figure 22: *Polydesmus coriaceus* ♀, in situ (from Santander, Liencres, 29.07.2019).

***Polydesmus racovitzai* Brölemann, 1910**

Polydesmus racovitzai – BRÖLEMANN 1910: 352-354, figs 27-33 (description); DEMANGE 1981: 124, 125, 132 (short description); DJURSVOLL 2019: 60-62, fig. 19 (notes); GILGADO & ORTUÑO 2023: 458, figs 3E, 5D-F (notes)

Material examined: Pamplona: 3A: 1♂, 1juv., leg. PD; Leiza: 9: 1♂, leg. SG; Aralar: 10: 1♂, 1♀, leg. PD; 15: 1♂, leg. DK; 15A: 2♂, leg. DK, HeR; 17: leg. KV [SMNG-VNR 14763]; 18: 1♂, leg. KV [SMNG-VNR 14764-b]; 20: 4♂, 1♀, 4juv., leg. KV [SMNG-VNR 14765-b], PD; Urbasa: 35: 1♀, leg. SG; 36: 1♀, leg. KV [SMNG-VNR 14781]; 40: 1♀, leg. SG.

All Identified by Per Djursvoll. Records already published by DJURSVOLL (2019: 60).

Distribution: This species is distributed in the French Pyrenees and northern Spain (DJURSVOLL 2019: 60, GILGADO & ORTUÑO, 2023: 458).

Remarks: *P. racovitzai* is closely related to *P. inconstans*.

Habitat: The species could be classified as eurytopic according to our investigations, as it colonises forests and open forest stands, as well as meadows and pastures, and does not avoid urban areas.

***Propolydesmus dismilis* (Berlese, 1891)**

Polydesmus dismilis – BERLESE 1891: fasc. 59, No. 9 with plate (description)

Propolydesmus dismilis – ENGHOFF & GOLOVATCH 2003: 85, fig. 3 (note and new combination); GILGADO & ORTUÑO 2023: 458, figs 3F, 4D (notes)

Material examined: Campezo: 55: 2♂, leg. SG.

Identified by Per Djursvoll.

Distribution: *P. dismilis* is known from scattered records in Spain, Mallorca, and Italy (see KIME & ENGHOFF 2011: 249, DJURSVOLL 2019: 53 and GILGADO & ORTUÑO 2023: 458).

Habitat: Although this Italian species seems quite common in Spain (MAURIÈS 1971b: 118), we could only find it once in a *Quercus faginea* wood with *Quercus ilex*, *Arbutus unedo*, *Viburnum lantana*, and *Juniperus*.

cf. *Mastigonodesmus* Silvestri, 1898, Fig. 23

Mastigonodesmus (destefanii) – SILVESTRI 1898: 252-253 (description)

Material examined: Leiza: 8: 1♀, leg. PD; Aralar: 12: 1♀, leg. PR; 16A: 1juv., leg. PD.

Identified by Per Djursvoll.

Remarks: Due to the lack of a male (fig. 23), we hesitate to assign the few collected specimens to a species, but we assume, these specimens belong to the genus *Mastigonodesmus*. From northern Spain, there are records of *M. destefanii* Silvestri, 1898 sensu CEUCA, 1962 (MAURIÈS & VICENTE 1977a: 127, 1977b: 533). Apparently, these records are based on a redescription of this species by CEUCA (1962: 115-116, DEMANGE 1981: 121, fig. 159). However, the drawing of the gonopods by CEUCA (1962: 116, fig. 2) diverges considerably from the original drawings by SILVESTRI (1898: 253, fig. 20). Also, the type locality lies in Sicily, whereas the site of the redescribed specimens is located around 1,000 km away in Banyuls-sur-Mer, France, close to the Spanish border. We express our doubts that *M. destefanii* Silvestri, 1898 is the same species as *M. destefanii* sensu Ceuca, 1962.



Figure 23: cf. *Mastigonodesmus* ♀, in situ. Site: 12. Photograph: PR.

4.2 Habitat preferences

The great number of individuals and studied habitats of our collections in 2009, combined with information from the literature, allow an assessment and rough classification of the preference types of the species, as given in Table 1.

Of in total 36 collected species, most can be classified as woodland species (11), of which three are eurytopic forest species. Apart from the psammophilous species *Cylindroiulus latestriatus*, there are no other species that could be classified as purely open land species. Although *Cylindroiulus sanctimichaelis* prefers open land, it also colonises other sites and is therefore classified as a eurytopic open land species. No classification can be given for seven species due to too few records.

5 Discussion

Until around 1964, when Mauriès started his comprehensive research, there was almost no knowledge about millipedes in northern Spain. In the mid-1970s, MAURIÈS (1975) and, ten years later, MAURIÈS & BARRAQUETA (1985) recorded 31 species for the Basque provinces including Zaragoza within Navarra (Table 1). During our relatively short and regionally restricted excursion, we recorded a rich diplopod fauna in the Basque provinces, totalling 36 species (Table 1): 1 Polydesmida, 6 Glomerida, 1 Polyzoniida, 3 Chordeumatida, 19 Julida, 6 Polydesmida. Three species could only be identified at the genus level. The order Chordeumatida still lacks a complete study, and several more species of the latter can be expected. Additionally, three species were new to science (ANTIĆ & MAURIÈS 2022 and READ 2022).

Interestingly only eleven species from the list of MAURIÈS could be confirmed, meaning that 20 species were not rediscovered, and 25 species are new to the fauna of the Basque provinces.

Overall, the new list comprises 56 species, which is an increase of 80% (Table 1). The Julida is the largest group with 25 species, followed by Chordeumatida (11 species, still incomplete), Glomerida (8), Polyxenida (8), Polyzoniida (1), and Polyxenida (1). With the significant number of newly recorded species for the Basque region, we anticipate that further excursions will reveal more new discoveries. Excursions should explore other regions such as the coast or more eastern of Navarra, or be conducted in Autumn when more adult Chordeumatida are likely to be found. Consequently, the Basque region will likely harbour over 100 species.

Discussions on habitat preferences are provided under the individual species.

Table 1: Species for the Basque region. Literature – MAURIÈS (1975), MAURIÈS & BARRAQUETA (1985), R – recorded, FR – first record for the region, (R) – uncertain, NEW – new for science; e – eurytopic, w – woodland species, o – open-land species, s – synantropic, ? – too little data for assessing the habitat preferences.

Taxon	Literature before records	Sampling 2009	Habitat preferences
Polyxenida Verhoeff, 1934			
<i>Polyxenus lagurus</i> (Linnaeus, 1758)		FR	e
Glomerida Leach, 1815			
<i>Adenomeris viscaiana</i> Mauriès & Barraqueta, 1985	R		?
<i>Glomeridella kervillei</i> (Latzel, 1895)	R	R	w
<i>Glomeris intermedia</i> Latzel, 1884		FR	ew
<i>Glomeris marginata</i> (Villers, 1789)		FR	e
<i>Loboglomeris rugifera</i> (Verhoeff, 1906)	R	R	w
<i>Protoglomeris vasconica</i> (Brölemann, 1897)	R	R	e
<i>Speleoglomeris dooderoi</i> Silvestri, 1908	R		?
<i>Trachysphaera drescoi</i> (Condé & Demange, 1961)	R		?
<i>Trachysphaera ribauti</i> (Condé & Demange, 1961)	R		?
<i>Trachysphaera rousseti</i> (Demange, 1959)		FR	w
Polyzoniida Cook, 1895			
<i>Hirudisoma getschmanni</i> (Karsch, 1880)	R	R	?
Chordeumatida Pocock, 1894			?
<i>Chordeuma vasconicum</i> Ribaut, 1927	R		?
<i>Alavasoma muniesai</i> Mauriès & Vicente, 1975	R		?
<i>Guipuzcosoma karinae</i> Antić & Mauriès, 2022		NEW	w
<i>Guipuzcosoma reipi</i> Antić & Mauriès, 2022		NEW	w
<i>Krauseuma viscaianum</i> Mauriès & Barraqueta, 1985	R		?
<i>Opisthocheiron elegans</i> Ribaut, 1922	R		?
<i>Vandeleuma hispanicum</i> Ceuca 1967	R		?
<i>Vandeleuma vasconicum</i> Mauriès, 1966	R		?
<i>Vascosoma coiffaiti</i> Mauriès, 1966	R		?
<i>Vascanthogona vicentiae</i> Mauriès & Barraqueta, 1985	R	R	?
<i>Xystrosoma vasconicum</i> Mauriès & Barraqueta, 1985	R		?
Julida Brandt, 1833			
<i>Blaniulus dollfusi</i> Brölemann, 1894	R	R	e
<i>Brachyiulus pusillus</i> (Leach, 1815)	R		?
<i>Brachyiulus lusitanus</i> Verhoeff, 1898		FR	e
<i>Cylindroiulus elosegiorum</i> Read, 2022		NEW	w
<i>Cylindroiulus finitimus</i> (Ribaut, 1904)	R		?
<i>Cylindroiulus latestriatus</i> (Curtis, 1845)		FR	o (sandy soils)
<i>Cylindroiulus londinensis</i> (Leach, 1815)	R	R	e
<i>Cylindroiulus parisiorum</i> (Brölemann & Verh., 1896)		FR	s
<i>Cylindroiulus punctatus</i> (Leach, 1815)		FR	ew
<i>Cylindroiulus pyrenaicus</i> (Brölemann, 1897)	R	R	e
<i>Cylindroiulus sagittarius</i> (Brölemann, 1897)		FR	w
<i>Cylindroiulus sanctimichaelis</i> Attems, 1927		FR	eo
<i>Haplopodoiulus spathifer</i> (Brölemann, 1897)	R	R	ew
<i>Leptoiulus meridionalis</i> (Brölemann, 1897)		FR	e
<i>Leptoiulus remyi</i> Schubart, 1961		FR	?
<i>Mesoiulus cavernarum</i> (Verhoeff, 1938)	R		?
<i>Mesoiulus stammeri</i> (Verhoeff, 1938)	R		?
<i>Mesoiulus stammeri sancipriani</i> Ceuca, 1971	R		?

Taxon	Literature before records	Sampling 2009	Habitat preferences
cf. <i>Proteroiulus</i> Silvestri, 1897		FR	?
<i>Ommatoiulus cervinus</i> (Verhoeff, 1910)		FR	?
<i>Ommatoiulus haackeri</i> Mauriès, 1969		FR	?
<i>Ommatoiulus lienharti</i> (Brölemann, 1921)		FR	?
<i>Ommatoiulus rutilans</i> (C. L. Koch, 1847)		FR	e
<i>Tachypodoiulus niger</i> (Leach, 1815)		FR	ew
<i>Typhloblaniulus troglodites</i> (Brölemann, 1898)	R		?
Polydesmida Leach, 1815			
<i>Archipolydesmus terrea</i> (Attems, 1952)	R	(R)	?
<i>Brachydesmus superus</i> Latzel, 1884		FR	s
cf. <i>Mastigonodesmus</i> Silvestri, 1898		FR	?
<i>Polydesmus coriaceus</i> Porat, 1870	R	X	e
<i>Polydesmus minutulus</i> Mauriès & Barraqueta, 1985	R		?
<i>Polydesmus racovitzai</i> Brölemann, 1910		FR	e
<i>Propolydesmus dismilus</i> (Berlese, 1891)		FR	?
<i>Tolosanius parvus</i> Attems, 1952	R		?
Number of species	in total 56	31	36

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