

New records of centipedes (Myriapoda, Chilopoda) from some European countries

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Abstract

European centipedes collected by colleagues in England, France, Germany, Norway, Portugal, Sweden and Switzerland are reported. Ecological data on these captures are also provided.

Key words: *Cryptops*, *Dignathodon*, *Eupolybothrus*, *Geophilus*, *Henia*, *Lithobius*, *Schendyla*, *Scolopendra*, *Stigmatogaster*, *Strigamia*.

Introduction

Centipedes are a predatory group of soil-dwelling myriapods which comprise more than 500 species in Europe (Zapparoli, 2003, Bonato & Minelli, 2014; Enghoff, 2016). Comprehensive works on the class Chilopoda have been developed in several European countries, for example in Belgium (Lock, 2000a, 2000b), Bulgaria (Stoev, 2002), France (Brolemann, 1930; Iorio, 2014; Iorio *et al.*, 2022, 2023), Italy (Bologna *et al.*, 2022), Lithuania (Tuf *et al.*, 2015), Fennoscandia and the Nordic countries (Andersson *et al.*, 2008, 2013), Netherlands (Berg *et al.*, 2008), Poland (Kaczmarek, 1979), Portugal (Machado, 1952), Romania (Matic, 1966, 1972), Spain (Serra, 1980; Iorio & Voigtländer, 2019), Switzerland (Am Stein, 1857; Stöckli, 2009) and the United Kingdom (Eason, 1964; Barber, 2009, 2022), amongst others. Many regional studies on centipedes are also known from Austria (Koren, 1986, 1992), Belgium (Lock *et al.*, 2001; Dethier & Hubart, 2010), Italy (Gobbi *et al.*, 2020; Bains & Zapparoli, 2022), Germany (Voigtländer, 2007, 2009; Reip & Voigtländer, 2009), Greece (Simaiakis *et al.*, 2004, 2005, 2016), Hungary (Novák & Dányi, 2010), Luxembourg (Kime, 2007), Netherlands (Jeekel, 1978; Jeekel & van der Hammen, 1983), Portugal (Serra, 1988; Gregory & Lewis, 2015), Romania (Ion, 2008; Giurginca *et al.*, 2017), Slovakia (Stašiov & Svitok, 2014), Spain (García-Ruiz & Serra, 2003; Cabanillas, 2019a, 2021) or Switzerland (Gilgado *et al.*, 2022), amongst others. Other works have contributed to expanding our knowledge on the centipede fauna of Europe (Eason, 1982; Bonato *et al.*, 2012a, 2017; Bonato & Minelli, 2014; Iorio, 2021). Nevertheless, many countries have poorly been studied due to the small numbers of myriapodologists and the unavailability of samples. Since centipedes are a neglected group within the Phylum Arthropoda, even small contributions play an important role in increasing morphological and ecological knowledge. Bearing this in mind, certain samples deposited in the author's collection could provide complementary data to extend the known distribution and ecology of European centipedes. The main aim of this work is to provide the myriapodologist community with new collecting data on 24 centipede species from seven European countries.

Material & methods

Specimens collected by colleagues and collaborators from different parts of Europe (England, France, Germany, Norway, Portugal, Sweden and Switzerland) during their diplopodological and entomological surveys, were kindly provided and deposited in the author's collection to provide material for future publications. Specimens were searched for under rocks, logs or leaf-litter and then hand collected. Some subterranean traps (70-100 cm deep), consisting of glass jars baited with smelly cheese, filled with

propylene glycol as preservative substance (see Giachino & Vailati, 2010), were also installed in the Mesovoid Shallow Substratum.

A binocular stereo microscope, model AmScope SM-1TSZZ-144S-10M-3PL (3.5-180x), was used to study specimens. Identification keys and morphological works were consulted to determine the species (Brolemann, 1930; Machado, 1952; Eason, 1982; Barber, 2008; Iorio, 2010a, 2010b, 2021; Bonato *et al.*, 2012b, 2014; Voigtländer *et al.*, 2017; Iorio *et al.*, 2022). Taxonomical criteria of Ganske *et al.* (2020) were followed for Lithobiomorpha, Iorio (2021) for Himantariidae and Bonato *et al.* (2016) for the remaining taxa. Coordinates are expressed in the Universal Transverse Mercator system (Datum ETRS89).

Abbreviations: *leg.* = *legit* (collector), LP - leg pairs. MSS – Mesovoid Shallow Substratum. spec. = specimen/s.

Results

Class Chilopoda

Order Geophilomorpha

Family Dignathodontidae

Dignathodon microcephalus (Lucas, 1846)

Material examined: Portugal – Algarve, Faro, Mexilhoeira Grande, near A ROCHA Life: 1 ♀ with 81 LP (S. Santos García *leg.*), 10/11/2021, under a rock in a grassland (29S 534 4111).

Henia (Chaetechelyne) vesuviana (Newport, 1845)

Material examined: France – Provence-Alpes-Côte d'Azur, Hautes-Alpes, Veynes, near Les Villages des Jeunes: 1 ♂ with 73 LP and 1 ♀ with 79 LP (S. Santos García *leg.*), 01/04-15/05/2021, under a rock in a valley (31T 724 4935). Germany – Freiburg, Lörrach, Grenzach-Wyhlen: 1 juvenile with 73 LP (B. Braschler & J.D. Gilgado *leg.*), 17/09/2020, in an urban forest (32T 397990 5268381). Freiburg, Lörrach, Inzlingen: 1 ♂ with 65 LP, 1 ♀ with 69 LP, 1 ♀ with 71 LP and 2 ♀ with 73 LP (B. Braschler & J.D. Gilgado *leg.*), 17/09/2020, in the boundaries of a beech forest (32T 400586 5270962). Switzerland – Aargau, Rheinfelden, Altägerte, Z'loch: 1 ♀ with 71 LP (S. Skillman *leg.*), 23/05/2018, in a grassland near crops (32T 410019 5263359). Basel-Stadt, Basel: 1 ♀ with 71 LP (J.D. Gilgado *leg.*), May 2018, in an urban park (32T 396224 5269724). Binningen: 1 ♂ with 65 LP (J.D. Gilgado *leg.*), 17/10/2018, probably in a garden (32T 39 526).

Family Geophilidae

Geophilus carpophagus Leach, 1815

Material examined: England – Norfolk, King's Lynn: 3 ♀ with 55 LP (S. Santos García *leg.*), 03/11/2020, under bark of a decaying log in a woodland (31U 328165 5852128).

Geophilus easoni Arthur, Foddai, Kettle, Lewis, Luczynski & Minelli, 2001

Material examined: England – Norfolk, Sandringham: 1 ♀ with 49 LP (S. Santos García *leg.*), 14/11/2020, under bark of a decaying log in a woodland (31U 332457 5857019).

Geophilus electricus (Linnaeus, 1758)

Material examined: Switzerland – Basel-Landschaft, Liestal, Lupsingen: 1 ♀ and 1 juvenile with 69 LP (B. Braschler *leg.*), May 2018, in a mixed forest (32T 402340 5256264).

Geophilus flavus (De Geer, 1778)

Material examined: England – Norfolk, Sandringham: 1 ♀ with 57 LP (S. Santos García *leg.*), 14/11/2020, under bark of a decaying log in a woodland (31U 332457 5857019). France – Provence-Alpes-Côte d'Azur, Hautes-Alpes, Veynes, near Les Villages des Jeunes: 1 ♂ with 53 LP (S. Santos

García *leg.*), 01/04-15/05/2021, under a rock in a valley (31T 724 4935). **Norway** – Eastern Norway, Innlandet, near Hamar: 1♀ with 57 LP, 13/09/2022 (S. Santos García *leg.*), under a rock near crop fields of *Allium cepa* L. (Onion) and *Brassica oleracea* L. var. *botrytis* (Cauliflower) (32V 613 6742).

Family Himantariidae

Stigmatogaster subterranea (Shaw, 1789)

Material examined: Switzerland – Basel-Stadt, Bitburg-Prüm, St. Chrischona: 1♂ with 79 LP (J.D. Gilgado *leg.*), 16/09/2019, soil trap in a mixed forest of coniferous trees and beech (32T 400229 5270010).

Family Linotaeniidae

Strigamia acuminata (Leach, 1815)

Material examined: Germany – Freiburg, Breisgau-Hochschwarzwald, Breitnau, Black Forest (surroundings of Hammerloch-Gut): 1♀ with 41 LP (J.D. Gilgado *leg.*), 19/07/2020, in a coniferous forest (32T 434459 5311585). **Switzerland** – Basel-Landschaft, Dornach: 1♂ with 39 LP and 2♀ with 41 LP (J.D. Gilgado *leg.*), 24/06/2019-24/07/2020, MSS trap in scree in a beech forest (32T 397688 5258332). Graubünden, Albula, Alvaneu: 1 juvenile with 39 LP (J.D. Gilgado *leg.*), 03/06/2019, near a river in a coniferous forest (32T 548768 5168071). Graubünden, Prättigau/Davos, road from Klosters-Serneus to Laret: 1♂ with 39 LP and 1♀ with 41 LP (J.D. Gilgado *leg.*), 03/06/2019, in a mountainous grassland (32T 567233 5188481).

Family Schendylidae

Schendyla nemorensis (C.L. Koch, 1837)

Material examined: Switzerland – Basel-Stadt, Basel: 2♀ with 39 LP (J.D. Gilgado *leg.*), May 2018, in an urban park (32T 396224 5269724). Riehen: 1♀ with 41 LP (J.D. Gilgado *leg.*), May 2018, in a forest (32T 399013 5269875).

Order Lithobiomorpha

Family Lithobiidae

Eupolybothrus (Eupolybothrus) longicornis (Risso, 1826)

Material examined: France – Provence-Alpes-Côte d'Azur, Hautes-Alpes, Veynes, near Les Villages des Jeunes: 1♂/1♀ (S. Santos García *leg.*), 01/04-15/05/2021, under a rock in a valley (31T 724 4935).

Eupolybothrus (Leptopolybothrus) tridentinus (Fanzago, 1874)

Material examined: Switzerland – Basel-Landschaft, Dornach: 1♀ (J.D. Gilgado *leg.*), 24/06/2019-24/07/2020, MSS trap in scree in a beech forest (32T 397688 5258332).

Lithobius agilis C.L. Koch, 1847

Material examined: Switzerland – Basel-Stadt, Basel: 1♂/1♀ (J.D. Gilgado *leg.*), May 2018, in an urban park (32T 396224 5269724).

Lithobius crassipes L. Koch, 1862

Material examined: France – Provence-Alpes-Côte d'Azur, Hautes-Alpes, Veynes, near Les Villages des Jeunes: 1♀ (S. Santos García *leg.*), 01/04-15/05/2021, under a rock in a valley (31T 724 4935).

Lithobius curtipes C.L. Koch, 1847

Material examined: Sweden – Norrland, Västerbotten, Vindeln: 1♂ (J. Díaz-Calafat *leg.*), 24/05/2021, under a rock in a mixed forest of *Picea abies* (L.) H. Karst, *Betula pendula* Roth and *Betula pubescens* Ehrh. (34W 439178 7132127).

***Lithobius forficatus* (Linnaeus, 1758)**

Material examined: **England** – Norfolk, King's Lynn: 1♂/1♀ (S. Santos García *leg.*), 05/11/2020, under a decaying log in a woodland (31U 328165 5852128). **France** – Provence-Alpes-Côte d'Azur, Hautes-Alpes, Veynes, near Les Villages des Jeunes: 1♀/1 *agenitalis* (S. Santos García *leg.*), 01/04-15/05/2021, under a rock in a valley (31T 724 4935). **Germany** – Freiburg, Breisgau-Hochschwarzwald, Breitnau, Black Forest (surroundings of Hammerloch-Gut): 1♀ (J.D. Gilgado *leg.*), 19/07/2020, in a coniferous forest (32T 434459 5311585). Freiburg, Lörrach, Inzlingen: 1♂ (B. Braschler & J.D. Gilgado *leg.*), 17/09/2020, in the boundaries of a beech forest (32T 400586 5270962). **Norway** – Eastern Norway, Innlandet, near Hamar: 1♀, 05/09/2022; 2♂/1♀, 06/09/2022; 1♀, 12/09/2022 and 1♀, 13/09/2022 (S. Santos García *leg.*), under a rock near crop fields of *Allium cepa* L. (Onion plant) and *Brassica oleracea* L. var. *botrytis* (Cauliflower) (32V 613 6742); near Ottestad: 1♀, 09/09/2022 (S. Santos García *leg.*), in a bathroom of a private house at night and 1♂ (S. Santos García *leg.*), 05/11/2020, under a rock near the road (32V 616 6736). Østlandet, Østfold, Løen: 1♀, 19/05/2022 (S. Santos García *leg.*), under moss in a mountainous environment (32V 387 6861). Trøndelag, Sør-Trøndelag, Trondheim, near Elvarli: 1♀, 09/06/2022 (S. Santos García *leg.*), under a rock near a road (32V 604 7029). Vestlandet, Møre og Romsdal, Ålesund, near Moa: 1 *agenitalis*, 08/05/2022 and 1♂, 19/05/2022 (S. Santos García *leg.*), under a rock near a road (32V 363 6928). **Sweden** – Götaland, Skåne County, Scania, Vivarp: 2♂/1♀ (J. Díaz-Calafat *leg.*), 16/08/2021, under a decaying log in a mixed forest of *Picea abies* (L.) H. Karst, *Betula pendula* Roth and *Betula pubescens* Ehrh. (33V 4367 62391). **Switzerland** – Basel-Landschaft, Liestal, Lupsingen: 1♂ (B. Braschler *leg.*), May 2018, in a mixed forest (32T 402340 5256264). Graubünden, Albula, road from Mulegns to Rona: 2♂ (J.D. Gilgado *leg.*), 03/06/2019, in a mixed coniferous forest (32T 547994 5154403).

***Lithobius macilentus* L. Koch, 1862**

Material examined: **Germany** – Freiburg, Breisgau-Hochschwarzwald, Breitnau, Black Forest (surroundings of Hammerloch-Gut): 1♂ (J.D. Gilgado *leg.*), 19/07/2020, in a coniferous forest (32T 434459 5311585). **Switzerland** – Basel-Landschaft, Dornach: 2♀ (J.D. Gilgado *leg.*), 17/02-30/06/2019, subterranean trap in scree in a beech forest (32T 397691 5258317); 2♀ (J.D. Gilgado *leg.*), 24/06/2019-24/07/2020, MSS trap in scree in a beech forest (32T 397688 5258332).

***Lithobius microps* Meinert, 1868**

Material examined: **Switzerland** – Basel-Stadt, Bitburg-Prüm, St. Chrischona: 2♂/4♀ (J.D. Gilgado *leg.*), 16/09/2019, soil trap in a mixed forest of coniferous trees and beech (32T 400229 5270010).

***Lithobius muticus* C.L. Koch, 1847**

Material examined: **Switzerland** – Aargau, Rheinfelden, Altägerte, Z'loch: 1♂ (S. Skillman *leg.*), 23/05/2018, in a grassland near crops (32T 410019 5263359).

***Lithobius piceus* L. Koch, 1862**

Material examined: **Germany** – Freiburg, Lörrach, Inzlingen: 1♀ (B. Braschler & J.D. Gilgado *leg.*), 17/09/2020, in the boundaries of a beech forest (32T 400586 5270962).

***Lithobius tricuspis* Meinert, 1872**

Material examined: **France** – Provence-Alpes-Côte d'Azur, Hautes-Alpes, Veynes, near Les Villages des Jeunes: 1♂ (S. Santos García *leg.*), 01/04-15/05/2021, under a rock in a valley (31T 724 4935). **Germany** – Freiburg, Lörrach, Inzlingen: 1♀ (B. Braschler & J.D. Gilgado *leg.*), 17/09/2020, in the boundaries of a beech forest (32T 400586 5270962). **Switzerland** – Basel-Landschaft, Dornach: 2♀ (J.D. Gilgado *leg.*), 24/06/2019-24/07/2020, MSS trap in scree in a beech forest (32T 397688 5258332).

Order Scolopendromorpha**Family Cryptopidae**

***Cryptops (Cryptops) anomalans* Newport, 1844**

Material examined: **Germany** – Freiburg, Lörrach, Grenzach-Wyhlen: 1 spec. (B. Braschler & J.D. Gilgado *leg.*), 17/09/2020, in an urban forest (32T 397990 5268381). **Switzerland** – Basel-Landschaft, Binningen, Basel: 2 spec. (J.D. Gilgado *leg.*), 17/10/2018, probably in a garden (32T 39 526). Jura, Porrentruy, Saint-Ursanne: 1 spec. (J.D. Gilgado *leg.*), 28/06/2019, in a mixed forest (32T 360697 5247562).

***Cryptops (Cryptops) hortensis* (Donovan, 1810)**

Material examined: **Germany** – Freiburg, Lörrach, Inzlingen: 1 spec. (B. Braschler & J.D. Gilgado *leg.*), 17/09/2020, in the boundaries of a beech forest (32T 400586 5270962).

***Cryptops (Cryptops) parisi* Brolemann, 1920**

Material examined: **France** – Provence-Alpes-Côte d'Azur, Hautes-Alpes, Veynes, near Les Villages des Jeunes: 2 spec. (S. Santos García *leg.*), 01/04-15/05/2021, under a rock in a valley (31T 724 4935). **Switzerland** – Basel-Stadt, Bitburg-Prüm, St. Chrischona: 1 spec. (J.D. Gilgado *leg.*), 16/09/2019, soil trap in a mixed forest of coniferous trees and beech (32T 400229 5270010).

Family Scolopendridae***Scolopendra oraniensis* Lucas, 1846**

Material examined: **Portugal** – Algarve, Faro, Mexilhoeira Grande, near A ROCHA Life: 1 spec. (S. Santos García *leg.*), 05/11/2021, under a rock in a grassland (29S 534 4111).

Discussion

Results mainly included species common in Europe which were previously known for each country (Bonato *et al.*, 2016), although most records provided new location data which extended their local distribution range. Additionally, ecological remarks on habitat and microhabitat diversity provided useful information for better understanding the biology of the studied species. Epigeal records agree with previous reports from each country (Machado, 1952; Voigtländer, 2007, 2009; Andersson *et al.*, 2008, 2013; Reip & Voigtländer, 2009; Stöckli, 2009; Iorio, 2010a; Iorio *et al.*, 2015; Barber, 2022; Gilgado *et al.*, 2022). Hypogean records provided useful information to expand knowledge on the niche segregation of certain centipede species. This is particularly the case of *L. tricuspis*, which was previously not known to dwell in the Mesovoid Shallow Substratum. Nevertheless, its presence in the MSS is not surprising since *L. tricuspis* is a troglophile species commonly found in caves and mines (Serra, 1980; Minelli, 1985; Dethier & Hubart, 2010; Iorio, 2014; Iorio & Voigtländer, 2019). Other species, such as *E. tridentinus*, *L. macilentus* and *S. acuminata*, were previously collected in deep layers of soil (up to 95 cm) or in the MSS (Mammola *et al.*, 2017; Tuf *et al.*, 2017; Haľková *et al.*, 2020). Swiss MSS traps (up to 100 cm deep) also captured these species.

There are still many European countries in which the centipede fauna is poorly studied. This is particularly the case of Norway, Portugal, Sweden and Switzerland (Bonato *et al.*, 2016), where centipede records are scarce and there is a lack of faunistic studies. Nevertheless, there is an increasing trend in consulting photograph repositories and social media, in which naturalists provide their observations on myriapods. These resources can be useful to extend our knowledge in regional studies, especially when species are easily identifiable from pictures (Cabanillas, 2019b; Cabanillas & Robla, 2022). Amongst other photograph repositories, “iRecord” in the United Kingdom or “Biodiversidad Natural” in the Iberian Peninsula, are available for myriapodologists to acquire complementary data on species distribution. Social media, for example the popular Facebook groups of “Isopods and Myriapods of Britain and Ireland”, “Miriápodos ibéricos y europeos (European Myriapoda)” or “Myriapod Morphology and Evolution”, can also inform about the presence of unreported, rare or exotic species.

Although surveys should be increased in poorly studied areas of Europe, on-line databases are strongly recommended to be consulted in future works.

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