The European centipedes hitherto referred to \textit{Eurygeophilus}, \textit{Mesogeophilus}, and \textit{Chalandea} (Chilopoda, Geophilomorpha): taxonomy, distribution, and geographical variation in segment number

LUCIO BONATO\textsuperscript{1}, ANTHONY BARBER\textsuperscript{2} & ALESSANDRO MINELLI\textsuperscript{1}

\textsuperscript{1}Dipartimento di Biologia, Università degli Studi di Padova, Padova, Italy, and \textsuperscript{2}College of St Mark \& St John, Derriford, Plymouth, UK

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Abstract
We have carried out a comprehensive revision of the European centipede species currently assigned to \textit{Eurygeophilus}, \textit{Mesogeophilus}, and \textit{Chalandea}. This was based on comparative morphological study of specimens from throughout the range of the group and representative of the different nominal taxa, as well as a critical evaluation of all relevant literature. We consider this group to be represented by a single genus \textit{Eurygeophilus} Verhoeff, 1899 \cite{5} \textit{Geophilus (Mesogeophilus)} Verhoeff, 1901, n. syn.; \textit{Chalandea} Brölemann, 1909, n. syn.] including two morphologically clearly distinguished species, \textit{Eurygeophilus multistiliger} (Verhoeff, 1899) \cite{5} \textit{Eurygeophilus multistiliger velmanyensis} Brölemann, 1926, n. syn.] and \textit{Eurygeophilus pinguis} (Brölemann, 1898) \cite{5} \textit{Geophilus (Mesogeophilus) baldensis} Verhoeff, 1901, n. syn.; \textit{Chalandea cottiana} Verhoeff, 1938; \textit{Chalandea cottiana} var. castrensis Manfredi, 1948; \textit{Chalandea scheerpetzi} Attems, 1952, n. syn.\textsuperscript{.} On the basis of analysis of both published and new records these two species appear to be geographically vicariant: \textit{E. multistiliger} occurs mainly in Mediterranean woodlands of southern regions (the western part of the Iberian Peninsula, eastern Pyrenees and Sardinia), whereas \textit{E. pinguis} occurs mainly in temperate deciduous woodlands in montane and more northern regions (a limited area in Great Britain, the Cantabrian Mountains, most of the western and central Pyrenees, Corsica and the entire Alps). Despite morphological uniformity throughout its range, \textit{E. pinguis} shows a consistent geographical pattern in variation of the number of segments, the modal values being different between the three major areas: (1) Pyrenees, Cantabrian Mountains and Great Britain, (2) western and central Alps, and (3) eastern Alps.

Keywords: \textit{Chalandea}, \textit{Chilopoda}, \textit{Eurygeophilus}, \textit{geographical distribution}, \textit{Mesogeophilus}, \textit{segment number}, taxonomy

Introduction
European centipedes currently assigned to the genera \textit{Eurygeophilus} Verhoeff, 1899, \textit{Mesogeophilus} Verhoeff, 1901, and \textit{Chalandea} Brölemann, 1909 represent one of the least
known but most fascinating groups among the geophilomorphs of the western Palaeartic region. Their quite stout, “swollen” body and their delicate, slender poison claws are very distinct compared with those of all other geophilids, suggesting specialised, but as yet unknown, ecological and behavioural traits. In addition, they have hitherto been recorded from scattered localities in western Europe and their distribution appears puzzling from a biogeographical perspective.

Although the geophilid fauna of many of these areas, including Great Britain and the Alps, has been investigated in some detail over the last century, only very few records are currently available for this particular group. However, it is still unclear as to whether this is a consequence of genuine rarity, secretive habits, or both. In addition, the group is in need of a thorough taxonomic revision: three genus-group and seven species-group taxa have been described to date, but the validity of most of them has awaited critical evaluation.

For this reason we have carried out a comprehensive revision of the species of *Eurygeophilus*, *Mesogeophilus*, and *Chalandea* based on morphological examination of representative specimens from throughout the range of the group, together with a critical evaluation of the whole of the relevant literature. We have also updated and analysed the known geographic distribution of the species and investigated geographical variation in the number of trunk segments as possible evidence of phylogeographic patterns.

**Materials and methods**

We have examined directly a total of 22 specimens from 14 localities (see Appendix). Our material included the holotype of *Geophilus (Eurygeophilus) multistiliger* Verhoeff, 1899, which has never been adequately described before, as well as specimens recognisable as representative of almost all the nominal taxa of the group, based on morphology and provenance, namely *Geophilus pinguis* Brölemann, 1898, *Geophilus (Mesogeophilus) baldensis* Verhoeff, 1901, *Chalandea cottiana* Verhoeff, 1938, *Chalandea cottiana* var. *castrensis* Manfredi, 1948, and *Chalandea scheerpeltzi* Attems, 1952. The only nominal taxon for which we did not examine directly any specimens was *Eurygeophilus multistiliger velmanyensis* Brölemann, 1926 for which, however, we could rely on the detailed description and accurate illustrations published by Brölemann (1926a, 1930). Our material also included representative specimens from all the disjunct areas of the geographical range of the group with the exception of Corsica, and particularly from different localities throughout the Alps. We were not able to locate the only specimen recorded from Corsica by Léger and Duboscq (1903), which has probably been lost, and field collection performed by one of us (L.B.) in that island failed to secure new material.

All specimens were studied under light microscopy after having been cleared in ethylene glycol with the exception of the holotype of *G. (E.) multistiliger* which was already mounted on a slide. Because of the scarcity of available material, detachment of the head and dissection of the mouth parts were performed on a few representative specimens only, leaving the others undamaged. One specimen was also studied through “environmental” scanning electron microscopy (Philips™ XL30).

Specimens were checked on a comparative basis for all morphological characters traditionally considered in the taxonomic literature, particularly those previously reported as diagnostic among the nominal taxa of the group. Many other characters were investigated for possible interspecific differences, sexual dimorphism, age-dependent changes and inter-individual variation. We also carried out an exhaustive bibliographic search to retrieve all published accounts of the relevant taxa.
For each valid taxon, we present here a full list of citations, including synonymies, as well as an emended diagnosis. Standard drawings of a representative specimen for each species were produced using a camera lucida.

The geographical distribution of the species and the variation in the number of leg-bearing segments have been analysed on the basis of all published records and on new data either collected by ourselves or provided by colleagues (see under Acknowledgements).

**Results and discussion**

**Taxonomy**

Critical evaluation of the literature as well as the comparative study of representative specimens have allowed us to recognise two morphologically clearly distinct species, which we consider as belonging to a single genus.

Each of these species is very homogeneous throughout its geographical range. A geographically consistent variation was however found in the number of trunk segments, at least in one species (see below under Geographical variation). Despite the fact that segment number is only in part genetically determined in geophilid centipedes (Kettle and Arthur 2000), this geographic pattern suggests a phylogeographic differentiation, possibly deserving taxonomic recognition but in need of being investigated adequately. In any case, the diagnostic value of segment number will be very limited because of inter-individual variation within each population and the overlap of the range of variation between different population clusters. We believe that further taxonomic division of either species lacks an adequate factual basis at present; accordingly, we consider many of the nominal taxa described so far as invalid.

**Eurygeophilus** Verhoeff, 1899

*Geophilus* (*Eurygeophilus*) Verhoeff, 1899

= *Geophilus* (*Mesogeophilus*) Verhoeff, 1901 (n. syn.)

= *Chalandea* Brölemann, 1909 (n. syn.)

*Geophilus* (*Eurygeophilus*) Verhoeff 1899, p 366 (original description); 1901a, p 418; 1902–25, p 284 (diagnosis), 285, 295, 581 (in key); 1928, p 267 (in key); Attems 1903, p 170, 217 (in key), 240 (diagnosis).

*Eurygeophilus*: Attems 1926, p 328, 359, 361 (in key); 1929, p 211 (diagnosis); 1947, p 107 (in key); Brolemann 1926b, p 233, 236; 1930, p 35, 52, 186, 187 (diagnosis), 190; Verhoeff 1938, p 346, 351; 1940, p 19; Eason 1951, p 264; Machado 1952, p 84; 1953, p 82; Demange 1981, p 212.

*Geophilus* (*Mesogeophilus*) Verhoeff 1901b, p 681 (original description); 1902–25, p 284 (diagnosis), 285, 295, 580 (in key); 1928, p 266 (in key); 1938, p 346; 1941, p 89; Attems 1903, p 170, 217 (in key), 240 (diagnosis).

*Mesogeophilus*: Attems 1929, p 159 (in key), 194 (diagnosis, key to species); 1947, p 109 (in key), 124; Minelli 1978, p 158; Foddai et al. 1995, p 31 (validity doubted); Turcato et al. 1995, p 198, 208; Pereira et al. 1997, p 79.

Not *Mesogeophilus*: Attems 1938, p 191; Shinohara 1999, p 698 (in key), 707.

*Chalandea* Brölemann 1909a, p 330, 331, 338 (original description); 1930, p 35, 52, 186, 190 (diagnosis); Attems 1926, p 260, 359, 361 (in key); 1929, p 210 (diagnosis); 1947,
p 107 (in key), 127 (key to species); 1952a, p 50 (also Chalandes [sic] on p 50); Verhoeff 1938, p 352 (diagnosis); 1940, p 19; 1943, p 5; Würmli 1972, p 4; Minelli 1978, p 158; 1992, p 170, 188; Demange 1981, p 212; Minelli and Zapparoli 1985, p 381; Koren 1986, p 36 (diagnosis); Salinas 1990, p 3; Foddai et al. 1995, p 10, 31; Turcato et al. 1995, p 198, 208.

*Geophilus* (Chalandea): Verhoeff 1902–25, p 581.

**Diagnosis**

Head shield convex, slightly wider than long; lateral margins distinctly curved, convergent anteriorly; posterior margin truncate, slightly concave; no frontal line. Antennae 2.2–3.6 times as long as the head width. Clypeus with a pair of non-areolate semicircular areas along the posterior margin. Labrum mid-part with a few round-tipped teeth; side-pieces well delimited, each bearing a fringe of slender projections. Mandibles and maxillae as typical of geophilids; two pairs of lateral lappets on the first maxillae; claw of the second maxillae quite long but round-tipped. Forcipular segment stout; coxosternum two to three times wider than long, with lateral margins sinuous, without distinct chitin-lines; forcipular tergum with lateral margins convergent anteriorly, only slightly narrower than the following tergum; no teeth on the internal side of forcipules; basal article of forcipules shorter than wide; tarsungulum strongly narrowed close to the base, slender and flattened. Sternal pores in a narrow transverse band on the posterior part of each sternum from the first to the penultimate leg-bearing segment; no median sockets on the anterior margin of sterna. Praetergum of last leg-bearing segment not separated from pleurites. Last pair of legs distinctly swollen and bearing additional dense setae on the ventral side in the male, slender and without additional setae in the females; claw present. Gonopods as typical of geophilids.

*Type species.* *Geophilus* (*Eurygeophilus*) *multistiliger* Verhoeff, 1899 by monotypy.

*Included species.* *Eurygeophilus* *multistiliger* (Verhoeff, 1899); *Eurygeophilus pinguis* (Brölemann, 1898) (n. comb.).

**Taxonomic and nomenclatural remarks**

*Meso*geophilus was described by Verhoeff (1901b) as a subgenus of *Geophilus* to include the only species *Geophilus* (*Meso*geophilus) *baldensis* Verhoeff, 1901, which is its type species by monotypy. *Meso*geophilus was then elevated to genus rank by Attems (1929), followed by most other authors, but the diagnosis of this nominal genus remained very vague indeed (Minelli 1992; Foddai et al. 1995). *Meso*geophilus Verhoeff, 1901 is here synonymised with *Eurygeophilus* Verhoeff, 1899 since we recognize the type species of the former as a junior synonym of *Geophilus pinguis* Brölemann, 1898 (see remarks under *E. pinguis*) and we include this latter species in the genus *Eurygeophilus* (see below).

*Chalandea* was described by Brölemann (1909a) to include only the species *Geophilus pinguis* Brölemann, 1898, which is its type species by monotypy. *Chalandea* was regarded as a genus by most authors; only Verhoeff treated it as a subgenus of *Geophilus* in one of his major works (Verhoeff 1902–25). *Chalandea* Brölemann, 1909 is here synonymised with *Eurygeophilus* Verhoeff, 1899 because the type species of both nominal taxa share some
major characters which differentiate them from all other geophilids such as to justify their inclusion in the same genus. Among these characters are the general body shape and the unusual shape of the forcipular segment. Despite the fact that the phylogenetic relationships within the geophilids are still unresolved (Foddai and Minelli 1999, 2000; Edgecombe and Giribet 2004) and thus the current taxonomic arrangement of this group remains in need of a thorough revision, some of the peculiar characters shared by these two species are very probably synapomorphic. All previous authors had indeed acknowledged that *Eurygeophilus* and *Chalandea* are closely related: Attems assigned *G. pinguis* to the subgenus *Eurygeophilus* in one of his earliest papers (Attems 1903) and Brolemann (1930) introduced the tribe Eurygeophilini to include *Eurygeophilus* and *Chalandea*.

Published diagnoses of *Chalandea* and *Mesogeophilus* are widely congruent, only differing in respect to the chitin-lines, which have been described as present and complete in the type species of *Chalandea* (Brölemann 1909a, 1930), absent in *Mesogeophilus* (Verhoeff 1901b, 1902–25). This putative difference has been reported uncritically by subsequent authors (e.g. Attems 1929) even though some inconsistency has been highlighted (Verhoeff 1938; Koren 1986). Attems (1929, 1947) indeed introduced another putative difference in relation to the trunk sterna, which he described as provided with tubercles in *Chalandea* but lacking any tubercle in *Mesogeophilus*. However, our examination of specimens from throughout the geographic range of *E. pinguis*, including some representing *G. (M.) baldensis*, revealed that chitin-lines are invariantly weakly evident and the sternal tubercles invariantly present (see also remarks under *E. pinguis*). Attems (1929, 1947) also considered *Chalandea* as having anterior sternal sockets, but we did not find such sockets in any specimen.

According to the diagnoses of *Eurygeophilus* previously published (Verhoeff 1899, 1902–25; Attems 1903, 1929; Brolemann 1930), the poison calyx is characteristically composed of an anterior swollen part and a posterior slender part and the forcipular coxosternum is provided with shortened chitin-lines. However, direct examination of the holotype of *G. (E.) multistiliger* has revealed that these diagnoses were incorrect in respect of both points (see remarks under *E. multistiliger*). Chitin-lines, in particular, are only weakly marked and their appearance is therefore similar to what is observed in *E. pinguis* (Figure 3).

Three other species were included in *Mesogeophilus* by Attems (1929), namely *Zelanophilus wheeleri* Chamberlin, 1920, *Zelanophilus kapiti* Archey, 1922, and *Geophilus monoporus* Takakuwa, 1934. A further species was described by Attems (1947) under this genus, namely *Mesogeophilus plusioporus* Attems, 1947. In a later paper (Attems 1959), two other species are apparently moved to *Mesogeophilus*, namely *Geophilus ormanyensis* Attems, 1903 and *Geophilus xylophagus* Attems, 1903, but this was probably only a misprint for *Nesogeophilus* Verhoeff, 1924. In any case, all these six species are obviously unrelated to *G. (M.) baldensis* and thus have to be removed from *Mesogeophilus* as has already been observed (Foddai et al. 1995; Pereira et al. 1997). *Zelanophilus* Chamberlin, 1920 was considered a synonym of *Geophilus* (Mesogeophilus) Verhoeff, 1901 by Attems (1929), but we reject this opinion since the type species of the two taxa, namely *Zelanophilus wheeleri* Chamberlin, 1920 and *Geophilus* (Mesogeophilus) *baldensis* Verhoeff, 1901, are obviously unrelated.

*Eurygeophilus multistiliger* (Verhoeff, 1899)
(Figures 9–13)

*Geophilus* (Eurygeophilus) *multistiliger* Verhoeff, 1899.
= *Eurygeophilus multistyliger* [sic] velmanyensis Brolemann, 1926 (n. syn.).
Geophilus (Eurygeophilus) multistiliger Verhoeff 1899, p 367 (original description); 1902–25, p 581, 656; 1928, p 581, 656; 1928, p 267; Attems 1903, p 170, 241.

Eurygeophilus multistyliger: Attems 1929, p 212 (diagnosis).

Eurygeophilus multistiliger [sic]: Brolemann 1926a, p 239, 260; Machado 1952, p 84 (diagnosis), Figure 9(1–6); Serra and Ascaso 1990, p 391 (n. loc.).

Eurygeophilus multistiligeri [sic]: Attems 1952b, p 325.

Eurygeophilus multistiliger [sic] velmanyensis Brolemann 1926a, p 235, 237, 260 (original description), Figures 28–34; 1930, p 52 (in key), 187 (diagnosis), Figures 305–311; Demange 1981, p 222 (in key, as Eurygeophilus multistylifer [sic] velmanyensis), 233; Geoffroy 2000, p 162.

Eurygeophilus multistiliger velmanyensis: Attems 1929, p 212 (diagnosis); Machado 1953, p 82 (n. loc.).

Eurygeophilus multistiliger [sic] var. velmanyensis: Machado 1952, p 86.

Holotype

Female, 32 mm long, 51 leg-bearing segments; L. Vieira leg.; in the collections of the Museum für Naturkunde, Humboldt-Universität, Berlin, ZMB13504. Body separated into six parts (1–6), mounted on two slides (labelled “a” and “b”): (1) head, forcipular segment, leg-bearing segment I; (2) maxillary complex and left mandible; (3) right
mandible; (4) leg-bearing segments II–XXV; (5) leg-bearing segments XXVI–XLVI; (6) terminal part of trunk including leg-bearing segments XLVII–LI. Parts 1–3 and 6 are included in the slide labelled “a”, parts 4 and 5 in the slide labelled “b”.

Type locality

“Coimbra” (Verhoeff 1899; also on the label).

Diagnosis

See Table I and Figures 9–13.

Taxonomic and nomenclatural remarks

The correct spelling of the specific epithet is “multistiliger”, which is the name originally used in the description of the species (Verhoeff 1899) and also applied in the original label.
Table I. Main differential characters between *Eurygeophilus multistiliger* (Verhoeff, 1899) and *E. pinguis* (Brölemann, 1898) (see also Figures 9–18).

| Character                        | *E. multistiliger*                                                                 | *E. pinguis*                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Antenna: apical sensilla        | Well distinguished from the surrounding setae, both in shape (slightly inflated at mid-length) and length (0.13–0.14 mm versus 0.2–0.4 mm) | Not distinct from the surrounding setae either in shape or length (Figure 1) |
| Clypeus: one median seta between the paired semicircular non-areolated areas | Absent                                                                           | Present                                                                      |
| Maxillae I: hyaline scales covering the distal part of telopodites     | Absent                                                                           | Present; not recognisable in young specimens                                  |
| Forcipular coxosternum: width to length ratio of the exposed part       | 2.7–2.9                                                                          | 2.2–2.7                                                                      |
| Trunk: number of leg-bearing segments                                    | 55 in the only known male, 49–57 in females                                      | 33–45 in males, 35–47 in females                                             |
| Trunk: short swollen setae on sterna                                     | Present                                                                           | Absent                                                                        |
| Last leg-bearing segment: shape of sternum                               | Subrectangular (lateral sides sub-parallel)                                      | Trapezoid (lateral sides distinctly convergent posteriorly)                  |
| Last leg-bearing segment: pattern of coxal pores                         | Along the internal margins of each coxopleuron, on both ventral and dorsal side | Scattered on the entire ventral surface of each coxopleuron, absent on dorsal surface |
| Length of last to penultimate pair of legs in females                     | Longer                                                                            | Shorter                                                                      |

of the holotype. The name is from the Latin word “stilus”, referring to the specialised setae on the trunk sterna. The alternative spelling “multistyliger” was invariably used by H.-W. Brölemann and by some other authors but has to be considered an unjustified emendation.

*Eurygeophilus multistiliger velmanyensis* was described by Brolemann (1926a) based on two specimens from “Velmanya” in the eastern Pyrenees. Relying only on the brief original description of *G. (E.) multistiliger* published by Verhoeff (1899), Brolemann (1926a, 1930) established the new subspecies on a few putative differences compared with the nominotypical subspecies concerning the shape of the sternal pore groups and the pattern of coxal pores. However, our direct examination of the holotype of *G. (E.) multistiliger* reveals that its original description was incorrect in certain respects. Looking at the detailed description and careful illustrations of one of the two syntypes of *E. multistiliger velmanyensis* provided by Brolemann (1926a, 1930), we found that these latter specimens agreed completely in their morphology with the holotype of *G. (E.) multistiliger*, even in the case of the putative differential characters mentioned above apart from some obvious sexually dimorphic traits. The only real difference is in the segment number, but we do not regard this character alone as taxonomically significant since inter-individual and geographical variation is commonly found within individual geophilid species and even within the related *E. pinguis* (see below). Consequently, *Eurygeophilus multistiliger velmanyensis* Brolemann, 1926 is here synonymised with *Geophilus (Eurygeophilus) multistiliger* Verhoeff, 1899.
Figures 9–13. *Eurygeophilus multistiliger* (Verhoeff, 1899), female, 24 mm long, Campu Omo (Sardinia). (9) Head, dorsal (right antenna and setae not drawn). (10) Head, ventral (antennae not drawn). (11) Forcipular segment, ventral. (12) Sternum of leg-bearing segment V, ventral. (13) Last leg-bearing segment and terminal segments, ventral (right telopodite and setae on the relevant coxopleuron not drawn).
The original description of the holotype of *E. multistiliger* by Verhoeff (1899) was inaccurate or incorrect in relation to the following points: the head was described as being as long as wide, but it is actually slightly wider than long; the “Endgliedorgane” (probably the apical sensilla of the antennae) were described as absent but are actually present and visible; the chitin-lines were described as shortened but are actually weakly visible and uniform along the entire length of the exposed part of the coxosternum (see also remarks under *Eurygeophilus*); the poison calyx was described as composed of an anterior swollen part and a posterior slender part but the left calyx (the only visible one) is only apparently shaped as described (Figures 5, 6) because of a probable secondary displacement, while it is actually quite uniform in width and slightly S-shaped and thus similar to that known in *E. pinguis*; the sternal pore fields were described as “Haufen” and “Häuflein” by Verhoeff (1899) and these terms were interpreted by Brolemann (1926a, 1930) as indicating quite broad groups of pores, but the pore fields are actually transverse narrow bands like those described in *E. multistiliger velmanyensis* (Figure 7); the most anterior coxal pores were described as grouped together, but they actually open independently of each other and are scattered along an arc from the dorsal to the ventral side, resembling those described in *E. multistiliger velmanyensis* (Figure 8); the female gonopods are described as absent but are actually present in the shape typical of female geophilids (Figure 8).

**Distribution (see Appendix and Figure 19)**

Western part of the Iberian Peninsula (one locality), eastern Pyrenees including the neighbouring Sierra de Montseny (three localities), south-eastern part of Sardinia (one locality).

The newly identified specimen from Sardinia fully agrees in morphology with the holotype of the species as well as with the specimens from the eastern Pyrenees as described and illustrated in detail by Brolemann (1926a, 1930).

*Eurygeophilus pinguis* (Brölemann, 1898)
(Figures 14–18)

*Geophilus pinguis* Brölemann, 1898.
= *Geophilus (Mesogeophilus) baldensis* Verhoeff, 1901 (n. syn.).
= *Chalandea cottiana* Verhoeff, 1938.
= *Chalandea cottiana* var. *castrensis* Manfredi, 1948.
= *Chalandea scheerpeltzi* Attems, 1952 (n. syn.).

*Geophilus pinguis* Brölemann, 1898a, p 46 (original description), Figures 29–32; 1898b, p 189, 201 (n. loc.); 1909b, p 211 (in key); Léger and Duboscq 1903, p 313 (n. loc.), 354.

*Geophilus (Eurygeophilus) pinguis*: Attems 1903, p 170, 241.

*Chalandea pinguis*: Brölemann 1909a, p 330, 338; 1926a, p 262; 1926b, p 233, 236 (also as *Geophilus pinguis* on p 236); 1930, p 36, 53 (in key), 190, 191 (diagnosis), Figures 11–12, 312–318; Verhoeff 1902–25, p 657; 1938, p 351, 352, 353 (diagnosis); 1943, p 5, 19, 20; Attems 1929, p 211 (diagnosis), Figures 185; 1947, p 127 (in key); 1952a, p 50; Manfredi 1948, p 208; Barber 1972, 46; 1985a, p 18, 21; 1985b, p 35 (diagnosis), Figures 3–5; 1992a, p 348; 1992b, p 31, 33, 38 (n. loc.); 2003, p 69, 70; Blower 1972, p 1, 3 (n. loc.); Würmli 1972, p 4; Barber and Fairhurst 1974, p 614; Minelli 1978, p 158; Barace and Herrera 1980, p 4, 11 (diagnosis; n. loc.), 14, Figures 60–63; 1982, p 119; Demange 1981, p 222 (in key), 233; Minelli and Zapparoli 1985, p 380 (n. loc.),
Figures 14–18. *Eurygeophilus pinguis* (Brölemann, 1898), female, 27 mm long, M. La Marzola (Alps). (14) Head, dorsal (right antenna and setae not drawn). (15) Head, ventral (antennae not drawn). (16) Forcipular segment, ventral. (17) Sternum of leg-bearing segment V, ventral. (18) Last leg-bearing segment and terminal segments, ventral (right telopodite and setae on the relevant coxopleuron not drawn).
404, 406, 409; 1992, p 213, 214, 219, 225 (n. loc.); Minelli and Iovane 1987, p 10, 24 (n. loc.); Barber and Keay 1988, p V, 5, 61 (n. loc.), 108–120, Map 25; Keay 1989, p 10; 1993, p 38; Salinas 1990, p 3, 64 (n. loc.), Map 33; Zapparoli 1994, p 103 (n. loc.); Foddai et al. 1995, p 10, 31; Foddai et al. 1996, p 361, 363; Jones and Barber 1997, p 22 (diagnosis), Figures 1–12; Geoffroy 2000, p 162; Mann et al. 2003, p 43.

Geophilus (Chalandea) pinguis: Verhoeff 1902–25, p 581, 655.
Geophilus (Mesogeophilus) baldensis Verhoeff 1901b, p 682 (original description), Figures 1–4; 1902–25, p 304, 580, 623; 1928, p 266; Attems 1903, p 170, 240.

Mesogeophilus baldensis: Attems 1929, p 194 (in key), 195 (diagnosis); 1947, p 63, 124; 1949, p 108; Minelli 1978, p 158; 1981, p 87 (validity doubted); Foddai et al. 1995, p 10, 31 (validity doubted).

Chalandea cottiana Verhoeff 1938, p 353 (original description), 354; Attems 1947, p 127 (in key); Würmli 1972, p 4; Minelli 1978, p 158; 1985, p 32; Minelli and Zapparoli 1985, p 380 (validity doubted); Barber 1992b, p 31, 35 (validity doubted).

Chalandea cottiana var. castrensis Manfredi 1948, p 208 (original description), 223; 1976, p 229; Scossiroli 1951, p 36; Minelli 1985, p 32; Barber 1992b, p 31, 35 (validity doubted).

Chalandea scheerpeltzi Attems 1952a, p 50 (original description), Figures 1–4; Strouhal 1961, p 34; Würmli 1972, p 4; Koren 1986, p 36 (diagnosis; n. loc.), Figure 13; Kos 1992a, p 354 (n. loc.); 1992b, p 138; 1996, p 638, 639 (n. loc.); Stoev 1997, p 103.

Syntypes

Five specimens: two males, adult, 35 leg-bearing segments; two females, adult, 37 leg-bearing segments; one female, 8 mm long, 47 leg-bearing segments; all in the collections of the Muséum national d’Histoire naturelle, Paris.

Type localities

Indicated generically as “Ahusquy” in the original description (Brölemann 1898a), more precisely as “Bois d’Ithée”, “Naboleguy”, and “Et Ustarila” by Brölemann (1898b).

Diagnosis

See Table I, Figures 1–3 and Figures 14–18.

Taxonomic and nomenclatural remarks

Geophilus (Mesogeophilus) baldensis was described by Verhoeff (1901b) based on one specimen from “Mori”, near Trento, in the Italian Pre-Alps. No other specimen was ever referred to this nominal taxon and its identity with Geophilus pinguis has indeed been suspected even though not formally recognised before (Minelli 1981; Foddai et al. 1995). Geophilus (Mesogeophilus) baldensis Verhoeff, 1901 is here recognised as a synonym of Geophilus pinguis Brölemann, 1898 based on critical evaluation of its original description as well as on the examination of representative specimens of E. pinguis from throughout its range including four specimens of both sexes from La Marzola, no more than 30 km from the type locality of G. (M.) baldensis. The only putative difference between the two species recognized in the literature was in the forcipular chitin-lines which were described and
Figure 19. Geographical occurrence of *Eurygeophilus multistiliger* (Verhoeff, 1899) (white symbols) and *Eurygeophilus pinguis* (Brølemann, 1898) (grey symbols) in (a) Europe generally; (b) the Pyrenees; and (c) the Alps. Type localities are indicated with diamonds, other published records with circles, and new records with squares. Localities of the specimens directly examined by us are indicated with dotted symbols. All published records of *E. pinguis* from different localities in Devon (see Appendix) are indicated by a single symbol. Contour lines of 500 m are drawn in maps b and c.
illustrated as completely absent in \textit{G. (M.) baldensis} (Verhoeff 1901b) but invariantly present and complete in \textit{G. pinguis} both from the Pyrenees (Brölemann 1898a, 1930) and from Great Britain (Jones and Barber 1997). However, our direct examination of representative specimens revealed that chitin-lines are actually poorly evident in all specimens of \textit{E. pinguis} throughout its range including the Pyrenees and Great Britain (Figure 3 versus Figure 4). Differences described in the literature are thus very probably only due to different subjective interpretations by authors or to the different microscopic techniques used by them. Another minor putative difference between \textit{G. (M.) baldensis} and \textit{G. pinguis} was described by Verhoeff (1938) in the position of some coxal pores, but this is not significant in the light of inter-individual variability. Worth notice is the fact that the holotype of \textit{G. (M.) baldensis} was considered lost by Foddai et al. (1995) but is actually still in existence in the collections of the Museum für Naturkunde, Humboldt-Universität, Berlin (Moritz and Fischer 1979).

\textit{Chalandea cottiana} was described by Verhoeff (1938) based on two females from “Crissolo”, in the Cottian Alps. No other specimens were ever identified under this name and subsequent authors did not accept the validity of this taxon, considering it as a synonym of \textit{G. pinguis} (Minelli and Zapparoli 1985, 1992; Barber 1992b; Foddai et al. 1995). \textit{Chalandea cottiana} Verhoeff, 1938 is here confirmed as a synonym of \textit{Geophilus pinguis} Brölemann, 1898 on the basis of critical evaluation of its original description and direct examination of three topotypical specimens of both sexes. Putative differential characters of \textit{C. cottiana} compared with \textit{G. pinguis} were described by Verhoeff (1938) relying only on the description of the latter provided by Brölemann (1898a, 1930). Labral teeth, setae on the second maxillae and coxal pores were described as more numerous in \textit{C. cottiana} than in \textit{G. pinguis}, but we found that the numbers of all these elements are size-related in \textit{E. pinguis} as in other geophilid species; thus the different values were due to the different body size of the representative specimens, i.e. up to 28 mm long for \textit{C. cottiana} versus up to 20 mm for \textit{G. pinguis} (Brölemann 1930; Verhoeff 1938). Other minor differences were described in the shape of the intermediate article of the telopodite of the second maxillae, in the shape of the poison calyx and in the shape of the sternum of the last leg-bearing segment (Verhoeff 1938), but we found that these differences are not significant in comparison with the inter-individual variation in \textit{E. pinguis}.

\textit{Chalandea cottiana} var. \textit{castrensis} was described by Manfredi (1948) based on one female from “Gana di Scles de Sota” in the Orobian Pre-Alps. Subsequent authors did not accept the validity of this form and often considered it as a synonym of \textit{G. pinguis} (Barber 1992b; Foddai et al. 1995). \textit{Chalandea cottiana} var. \textit{castrensis} Manfredi, 1948 is here confirmed as a synonym of \textit{Geophilus pinguis} Brölemann, 1898 on the basis of critical evaluation of its original description and direct examination of representative specimens of \textit{E. pinguis} from throughout its range, including one specimen from Gorno, no more than 20 km from the type locality of \textit{C. cottiana} var. \textit{castrensis}. The only diagnostic characters described by Manfredi (1948) in respect to the typical \textit{C. cottiana} were minor differences in the number and shape of the labral teeth, in the shape of the sternum of the last leg-bearing segment and in the position of the coxal pores relative to the sternum of the last leg-bearing segment. All these characters, however, are affected by slight inter-individual variation and developmental changes within \textit{E. pinguis} (see above); thus the described differences lack taxonomic value.

\textit{Chalandea scheerpeltzi} was described by Attems (1952a) based on two specimens from “am Fusse des Jovanberges, im Obirstock”, in the Caravanche Alps. All the other few specimens collected in the eastern Alps have been so far referred to this nominal species
Chalandea scheerpeltzi Attems, 1952 is here recognised as a synonym of Geophilus pinguis Brölemann, 1898, on the basis of critical evaluation of its published descriptions (Attems 1952a; Koren 1986) and examination of specimens of E. pinguis from throughout its range, including one specimen from the Julian Alps which should be considered representative of C. scheerpeltzi because of its provenance and the number of segments. We found C. scheerpeltzi to be fully congruent in morphology with all other examined specimens of E. pinguis. Putative diagnostic characters of C. scheerpeltzi in respect to G. pinguis were described by Attems (1952a) relying only on the descriptions of the latter species provided by previous authors (Brolemann 1930; Verhoeff 1938). The antennal article XIV was said to be relatively longer in C. scheerpeltzi than in G. pinguis (Attems 1952a; Koren 1986), but we found that the elongation of this article in representative specimens of the former is well within the range of variation estimated for the latter (Figure 20). The forcipular pretergum was described as completely covered by the head shield in C. scheerpeltzi but partially exposed in G. pinguis (Attems 1952a), but this sclerite is actually visible from above to different degrees in different specimens of E. pinguis depending on the degree of contraction of the body articulations. Chitin-lines were described as absent in C. scheerpeltzi but present and complete in G. pinguis (Brölemann 1898a, 1930), but they are actually indistinct in all the examined specimens of E. pinguis from throughout its range (see above; Figure 3). Anal pores were described as absent in C. scheerpeltzi but present in G. pinguis, but they are actually present in all specimens of E. pinguis examined by us (including the representative specimen of C. scheerpeltzi) even though sometimes covered by the gonopods. In considering the detailed description and illustration of C. scheerpeltzi provided by Koren (1986), other possible differential characters with respect to G. pinguis may be suspected in the number of projections of the labral side-pieces, in the elongation of the lappets of the first maxillae and in the shape of the sternum of the last leg-bearing segment; however, we found that all these characters are within the inter-individual variation of E. pinguis and thus lack taxonomic value.

Figure 20. Elongation of antennal article XIV in representative specimens of E. pinguis (Brölemann, 1898). The ratio between the length of article XIV and the total length of the previous two articles is plotted against head width as a measure of the body size. A black circle marks the only specimen putatively representative of the nominal species Chalandea scheerpeltzi.
Distribution (see Appendix and Figure 19)

North Devon (12 localities), middle part of the Cantabrian chain (one locality), most of the Pyrenees with the exception of the easternmost part (23 localities), Corsica (one locality), Alps from Ligurian to Julian Alps (26 localities).

Phyletic relationships

*Eurygeophilus* represents a well-differentiated lineage within the diverse group of geophilomorphs currently recognised as the family Geophilidae s.l. (including Linoteniidae and Dignathodontidae; Attems 1929). It shares with other geophilids some major diagnostic characters involving the mandibles (each bearing only one pectinate lamella and no dentate lamella), the maxillary complex (with a typical shape and pattern of appendages) and the female gonopods (reduced to a short undivided lamina).

The phyletic position of *Eurygeophilus* within the geophilids is however hard to assess since neither morphological nor molecular analyses adequately resolve the internal phylogeny of this group (Foddai and Minelli 2000; Edgecombe and Giribet 2004). A close relationship to some lineages traditionally included in the Geophilinae (*Geophilus* and allies) is suggested by morphological characters such as the structure of the labrum and the pattern of the sternal pores. Indeed *Eurygeophilus* has been traditionally classified under this subfamily and was usually considered very close to *Geophilus*. However, other characters, such as the peculiar shape of the forcipular segment, resemble strongly those of *Henia*, a lineage traditionally classified in a different subfamily, Dignathodontinae (or family Dignathodontidae).

Geographical distribution

On the basis of both published and new records, *Eurygeophilus* appears to be limited to several disjunct regions of western and southern Europe (see Appendix and Figure 19).

*Eurygeophilus multistiliger* was known previously from only five specimens from four localities in the western part of the Iberian Peninsula and in the eastern Pyrenees, including the neighbouring Sierra de Montseny. The identification of a new specimen from south-eastern Sardinia is relevant in extending significantly the geographical range of the species.

*Eurygeophilus pinguis* has been known up to the present from some tens of specimens from a limited region of Great Britain and some localities in the Pyrenees, Corsica and the Alps. Our new records extend the known distribution of the species within the Pyrenees and the Alps and include the first record from the Cantabrian chain. In Great Britain *E. pinguis* appears to be restricted to an area in North Devon of less than 900 km² (see Barber 1992b); this limited occurrence is particularly striking in view of the extensive existing knowledge of the British centipede fauna and the indigenous status of the species in this region has been questioned (Minelli and Zapparoli 1985, 1992; Barber 1992a). In the Pyrenees, *E. pinguis* appears quite uniformly distributed along the main axis of the mountain chain from its western margin to the central part, the easternmost record being from the Ariège. The occurrence of the species in the Cantabrian chain is established by a new record from the Picos de Europa. Its occurrence in Corsica is based on an old, but reliable, record (Léger and Duboscq 1903). Within the Alps, *E. pinguis* occurs throughout the chain from the Ligurian and Maritime Alps in the west, to the Caravanche and the
southernmost Julian Alps in the east; almost all records are from the southern marginal part of the chain.

The two species are apparently both geographically and ecologically vicariant: *E. multistiliger* occurs in more southern, Mediterranean regions, mainly in arid soils of sclerophyllous woods, whereas *E. pinguis* occurs in more northern, temperate regions, mainly in fresh and moist soils under beech and other broadleaf woodland. In Great Britain *E. pinguis* has been found in lowland sites less than 200 m a.s.l. whilst in the Cantabrians, the Pyrenees, and the Alps it occurs in the altitudinal range from 650 to 1650 m. The vicariant pattern is particularly evident in a continuous mountainous area such as the Pyrenees where *E. multistiliger* appears limited to the south-eastern relief whilst *E. pinguis* inhabits most of the strictly montane chain. Further, while the former species is found in Sardinia, the latter is found in Corsica.

**Geographic variation in segment number**

As in most geophilomorphs, in both *Eurygeophilus* species the number of trunk segments was found to be variable among individuals of the same population. The data collected (see Appendix) show that within each population females usually have two more segments than males. We have also recorded variation in segment number between populations and have been able to recognise some geographical patterns.

In *E. pinguis* segment number is quite uniform within large areas of the species’ range but different between such regions. In North Devon (data on specimens from a dozen localities) all known males have 35 leg-bearing segments while all females have 37. In the Pyrenees (data on 19 males and 17 females from 21 localities) 35 is again the most frequent value for the males and 37 for the females; rare exceptions were one male with 37 segments and one female with 35 segments, but there was also one female from Et Ustarila with 47 segments. The only specimen from the Cantabrian chain is a male with 35 segments, which is consistent with the modal values in Devon and the Pyrenees. In the western and central Alps from the Ligurian and Maritime Alps to the Venetian Pre-Alps (eight males and 19 females from 15 localities), the most frequent values are 41 for the males and 43 for the females; other values are found less frequently, the range for females being from 41 to 47. Within this same region most of the populations are similar in segment numbers but comparatively higher values are typical of some (e.g. Casteldelfino and M. La Marzola). In the eastern Alps (nine males and eight females from seven localities), all known males have 33 leg-bearing segments while all females have 35. The only record from Corsica is for one female with 45 leg-bearing segments. From this, three main regions may be recognised within the geographical range of *E. pinguis* on the basis of the prevailing number of segments: (1) the Pyrenees and Devon (and most probably also the Cantabrian chain), (2) the western-central Alps (and most probably also Corsica), and (3) the eastern Alps. Whether this geographical pattern in the segment number is consistent with a phylogeographic structure remains to be evaluated.

By comparison with *E. pinguis*, too few data are available for *E. multistiliger* to recognize any geographical pattern of variation in the segment number. Worth noticing, however, is that similarly high values were found in the three specimens from the eastern Pyrenees (55–59 leg-bearing segments) whereas different, lower values were found from other regions (49 and 51 in two females from Sardinia and western Iberian Peninsula, respectively).
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Appendix. Published and new records of *Eurygeophilus multistiliger* (Verhoeff, 1899) and *Eurygeophilus pinguis* (Brölemann, 1898)

Number of specimens, sex, and number of leg-bearing segments for each specimen (in rounded parentheses) are indicated whenever available. Sources of data are referred to in square brackets. Series of specimens directly studied by us are marked with an asterisk (*).
Abbreviations for collections: AB, Anthony D. Barber (College of St Mark and St John, Plymouth); AM, Alessandro Minelli (University of Padova); AS, Antoni Serra (University of Barcelona); GD, Giovanni B. Delmastro (Museo di Storia naturale di Carmagnola); IK, Ivan Kos (University of Ljubljana); MNHN, Muséum national d’Histoire naturelle, Paris; MSNM, Museo civico di Storia naturale, Milano; MZ, Marzio Zapparoli (University of Tuscia, Viterbo); MZUN, Museo de Zoología de la Universidad de Navarra; PG, Piermauro Giachino (Torino); NHMW, Naturhistorisches Museum, Wien; ZMB, Museum für Naturkunde, Humboldt-Universität, Berlin; ZMZ, Zoologisches Museum Universität, Zürich-Irchel.

_Eurygeophilus multistiliger_ (Verhoeff, 1899)

*Western Iberian Peninsula*

*Cocimbra*: one female (51); Vieira lg, ZMB [Verhoeff 1899, as _Geophilus_ (_Eurygeophilus_) _multistiliger_, holotype].

*Eastern Pyrenees*

Velmany: one male (55), one female (57); 10 April 1913, MNHN [Brolemann 1926a, as _Eurygeophilus multistiliger_ [sic] _velmanyensis_, syntypes].

S. Bartolome, Vidra: one female (57); J. Mateu lg [Machado 1952, as _Eurygeophilus multistiliger_ [sic] var. _velmanyensis_; Machado 1953, as _Eurygeophilus multistiliger velmanyensis_].

Montseny, Turó Gros, Passavets: one female (59); 4 May 1986, A. Serra lg [Serra and Ascaso 1990, as _Eurygeophilus multistyliger_ [sic]; A. Serra, personal communication].

*Sardinia*

*Sarrabus, Campu Omu*: one female (49); 21/23 October 1957, Jeekel lg, AM [new locality].

_Eurygeophilus pinguis_ (Brölemann, 1898)

*North Devon*

Millwood+Woody Bay+Barton Wood: males (35), females (37); April 1970, Blower lg [Blower 1972, as _Chalandea pinguis_].

Clifton: April 1973, Bishop lg [Barber and Keay 1988, as _Chalandea pinguis_].

Woody Bay: April 1976, Barber lg, AB [Barber and Keay 1988, as _Chalandea pinguis_].

Lee Bay, Windcutter Hill: 18 October 1987, Barber lg, AB [Barber 1992b, as _Chalandea pinguis_].

*South of Muddiford*: one female (37); 18 October 1987, Barber lg, AB [Barber 1992b, as _Chalandea pinguis_].

*Watergate Bridge*: one male (35); 31 May 1989, Barber lg, AB [Barber 1992b, as _Chalandea pinguis_].

Hallsannery FC+Heddon Valley: males (35), females (37); 31 May 1989, Barber, Hopkins, Jones and Morgan lg [Barber 1992b, as _Chalandea pinguis_].
Arlington Court: two males (35, 35), one female (37); 1 April 1989, Barber lg, AB [Barber 1992b, as *Chalandea pinguis*].

North of Braunton+Ilfracome outskirts: males (35), females (37); 1 April 1989, Barber, Jones and Keay lg [Barber 1992b, as *Chalandea pinguis*].

*Cantabrian chain*

*Picos de Europa, La Vega, 650 m: one male (35); 14 April 1997, Smithers lg, AB [new locality].

*Pyrenees (localities are listed approximately from west to east)*

Aduana, 860 m: one female (37); 4 August 1977, Vierna lg, MZUN [Barace and Herrera 1980, 1982, as *Chalandea pinguis*].

Navarra, Panatano de Irabia: one female; 4 September 1979, Barace lg, MZUN [Salinas 1990, as *Chalandea pinguis*].

Ahusqy, Bois d’Ithé: one male (35), one female (37); MNHN [Brölemann 1898a, 1898b, as *Geophilus pinguis*, part of the syntypes].

Ahusqy, Naboéguy: one male (35), one female (37); MNHN [Brölemann 1898a, 1898b, as *Geophilus pinguis*, part of the syntypes].

Ahusqy, Ét Ustarila: one female (47) [Brölemann 1898a, 1898b, as *Geophilus pinguis*, part of the syntypes].

Bois de Bager: two males (35, 35); 18 April 1914, MNHN [new locality].

Bois de Pau: one ex. (35); 26 October 1927, MNHN [new locality].

Bois d’Isee: one male (35); 16 April 1914, MNHN [new locality].

Benoude Bielle: one male (35); 22 April 1910, MNHN [new locality].

*Col de Pourtalet, near Laruns, 1600 m: one female (37); 3 August 1977, Messina lg, AM [new locality].

Eaux Chaudes: one male (35), four females (all 37); 2 September 1918, MNHN [new locality].

Bois d’Isalec—Val du Bital, near L’Eaux-Chaudes: one female (37); 4 October 1908, MNHN [new locality].

Saint Pé de Bigorre: one male (35); 22 April 1927, MNHN [new locality].

Lourdes: two males (35, 35), one female (37); 21 May 1909, 26 April 1910, 5 October 1927, MNHN [Brolemann 1930, as *Geophilus pinguis*; also seen by us].

Bois de Supercanére, near Lourdes: one female (37); MNHN [new locality].

Calypso, near Cauterets: one male (35), two females (35, 37); 8 April 1909, MNHN [new locality].

Gèdre: one male (35); 26 August 1912, MNHN [new locality].

Gèdre—Barada: one male (37); 10 September 1917, MNHN [new locality].

Gèdre—Bué: one female (37); 16 August 1928, MNHN [new locality].

Gèdre—Mousqua: two males (35, 35), one female (37); 14 August 1924, MNHN [new locality].

Saint Béat: two males (35, 35), one female (37); 11 September 1910, MNHN [Brolemann 1930, as *Geophilus pinguis*; also seen by us].

Forêt de la Séoubo, near Saint Béat: one male (35); MNHN [new locality].

Aulus: one male (35); September 1926, MNHN [new locality].
Corsica

Vizzavona: one female (45); April 1902 [Léger and Duboscq 1903, as Geophilus pinguis].

Alps (localities are listed approximately from west to east)

Peïra-Cava, Bois de Turini: one male (47); 25 October 1903, MNHN [Brolemann 1930, as Chalandea pinguis; also seen by us].

*Bardineto, Roveirola: one male (41), one female (43); 27 November 1984, Gardini and Rizzerio lg, AM [Minelli and Zapparoli 1985, as Chalandea pinguis].

Colle del Melogno, 820 m: one female (43); 13 February 1984, Gardini, Rizzerio and Zoia lg, AM [Minelli and Iovane 1987, as Chalandea pinguis; altitude erroneously reported as 1000 m].

Comba di Valmala, Ponte Parasacco, 750 m: two exx.; 14 May 1993, Delmastro lg, GD [Zapparoli 1994, as Chalandea pinguis].

Brossasco, Combale della Comba, 650 m: one male (41), three females (all 43); 28 February 1992, Delmastro lg, MZ [Zapparoli 1994, as Chalandea pinguis; M. Zapparoli, personal communication].

Casteldelfino, Bosco de l’Alevé, Villaretto, 1650 m: two females (45, 47); 26 February 1993, Delmastro lg, MZ [Zapparoli 1994, as Chalandea pinguis; M. Zapparoli, personal communication].

Crissolo, 1370–1400 m: two female (43, 43); 3–4 October 1932, Verhoeff lg, ZMB (only one specimen preserved there according to Moritz and Fischer 1979) [Verhoeff 1938, as Chalandea cottiana, syntypes].

*Crissolo, 900 m: three females (41, 43, 43); 5 November 1982, Zoia lg, AM [Minelli and Zapparoli 1985, as Chalandea pinguis].

S. Pietro Val Lemina, Cerviera: one ex.; 16 December 1991, Delmastro lg, GD [Zapparoli 1994, as Chalandea pinguis].

Val Germanasca, 1500 m: one ex.; 15 July 1984, Giachino lg, PG [Minelli and Zapparoli 1992, as Chalandea pinguis].

Coazze, Valle Sanguonetto, Sordini, 1100 m: one male (43); 28 April 1992, Delmastro lg, MZ [Zapparoli 1994, as Chalandea pinguis; M. Zapparoli, personal communication].

Mezzeneile, 1100 m: one ex.; 15 May 1986, Giachino lg, PG [Minelli and Zapparoli 1992, as Chalandea pinguis].

Val Serrata, S. Giorgio: two males (41, 41); ZMZ [Barber 1992b, as Chalandea pinguis; also seen by us].

*Serina, Valpiana, 1000 m: one female (43); 7 June 1988, Valle lg, AM [new locality].

*Valle Seriana, Gorno, miniere: one female (45); 4 February 1988, Zanon lg, AM [new locality].

Gana di Scles de Sota, near Castro: one female (43); 1941, Scossiroli lg, MSNM [Manfredi 1948, as Chalandea cottiana var. castrensis, holotype].

Mori, near Trento: one female (43); October 1899, Verhoeff lg, ZMB [Verhoeff 1901b, as Geophilus (Mesogeophilus) baldensis, holotype].

*Monte La Marzola, Fonte dei Gai, near Trento, 1200 m: two males (43, 43), two females (45, 45); 8 July 1992, Zanon lg, AM [new locality].

*Altopiano dei Sette Comuni, Val Galmarara, 1350 m: one female (45); 14 June 1986, Zanon lg, AM [new locality].
Rosental, Tösching near Rosenbach: one ex.; 18 May 1981, Koren lg [Koren 1986, as Chalandea scheerpeltzi].

Rosental, 2 km east of Ma. Elend: one male (33), one female (35); 18 May 1981, Koren lg [Koren 1986, as Chalandea scheerpeltzi].

Obirstock, Jovanberg: one male (33), one female (35); NHMW [Attems 1952a, as Chalandea scheerpeltzi, syntypes].

Savica—Komna, 700 m: one male (33), one female; July 1986, Kos lg, IK [Kos 1992a, as Chalandea scheerpeltzi].

*Predmeja—Lokve, 1130 m: one female (35); 1 August 1992, Gasparo lg, AM [new locality].

Kot, near Ribnica, 600 m: four males (all 33), five females (all 35); 8 May 1987, 21 July 1987, 4 August 1987, Kos lg, IK [Kos 1996, as Chalandea scheerpeltzi; I. Kos, personal communication].

Mala Gora, near Ribnica, 900 m: one male (33), one female, one ex.; 24 April 1987, 19 May 1987, Kos lg, IK [Kos 1996, as Chalandea scheerpeltzi; I. Kos, personal communication].

Pri Žagi, Medvednjak, Kočevska reka, 1000 m: one male (33), one ex. (33); 16 September 2002, Kos lg, IK [new locality; I. Kos, personal communication].