The centipede genus *Clinopodes* C. L. Koch, 1847 (Chilopoda, Geophilomorpha, Geophilidae): reassessment of species diversity and distribution, with a new species from the Maritime Alps (France)

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ABSTRACT
Diagnosis, circumscription, species-level taxonomy and geographical occurrence of the genus *Clinopodes* C. L. Koch, 1847 (Chilopoda, Geophilomorpha, Geophilidae) are revised by integrating published information with new evidence on its morphological diversity. *Clinopodes* is clearly distinguishable from all other geophilid lineages by a combination of features mainly in the forcipular segment, the trunk sternites and the ultimate legs. It is widespread in south-eastern Europe, from the Alps to the Caucasus. A total of 10 species are recognized, mainly differing in minor features of the forcipular coxosternite and the arrangement of sternal and coxal pores: *C. carinthiacus* (Latzel, 1880) n. stat.; *C. caucasicus* (Selivanov, 1884) n. comb. formerly *Geophilus caucasicus*; *C. escherichii* (Verhoeff, 1896); *C. flavidus* C. L. Koch, 1847; *C. intermedius* Dărăbanţu & Matic, 1969; *C. latisternus* (Attems, 1947) n. comb. from *Pleurogeophilus latisternus*; *C. rodnaensis* (Verhoeff, 1938); *C. skopljensis* (Verhoeff, 1938); *C. verhoeffi* n. nom. (for *Geophilus*

KEY WORDS
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n. sp.,
new species.

flavidus porosus Verhoeff, 1934); *C. vesubiensis* n. sp., *Geophilus lindbergi* (Loksa, 1971), n. comb. formerly *Clinopodes lindbergi*, is demonstrated to have been classified erroneously under *Clinopodes*. *Clinopodes vesubiensis* n. sp. is described from a limited area in the southern Maritime Alps, at the western border of the entire range of the genus, and disjunct from the morphologically closest species *C. carinthiacus*, suggesting that the history of differentiation and colonization of the genus within the Alps has been more complex than previously thought.

MOTS CLÉS
Chilopoda,
Geophilomorpha,
Geophilidae
Clinopodes,
Alpes-Maritimes,
Clinopodes vesubiensis
n. sp.,
espèce nouvelle.

RÉSUMÉ
Le genre Clinopodes *C. L. Koch, 1847 (Chilopoda, Geophilomorpha, Geophilidae) : révision de la diversité et de la répartition des espèces, avec la description d'une nouvelle espèce des Alpes-Maritimes (France).*
La diagnose, la définition, la taxonomie des espèces et la répartition du genre *Clinopodes* C. L. Koch, 1847 (Chilopoda, Geophilomorpha, Geophilidae) sont ici révisées par l'intégration de nouvelles données dûes à l'examen de diverses collections et à une consultation étendue de la bibliographie, et qui fournissent de nouvelles preuves de sa diversité morphologique. *Clinopodes* est bien distinct de tous les autres genres de Geophilidae par la combinaison de plusieurs caractères, particulièrement en ce qui concerne le segment forcipulaire, les sternites du tronc et les pattes terminales. Ce genre est largement réparti dans le sud-est de l'Europe, des Alpes au Caucase. Un total de 10 espèces est reconnu valide ici, et ces dernières se différencient les unes des autres par des caractères concernant principalement le coxosternum forcipulaire et l'arrangement des pores sternaux et coxaux : *C. carinthiacus* (Latzel, 1880) n. stat. ; *C. caucasicus* (Selivanov, 1884) n. comb., auparavant *Geophilus caucasicus* ; *C. escherichii* (Verhoeff, 1896) ; *C. flavidus* C. L. Koch, 1847 ; *C. intermedius* Dărăbanțu & Matic, 1969 ; *C. latisternus* (Attems, 1947) n. comb., auparavant *Pleurogeophilus latisternus* ; *C. rodnaensis* (Verhoeff, 1938) ; *C. skopljensis* (Verhoeff, 1938) ; *C. verhoeffi* n. nom. (pour *Geophilus flavidus porosus* Verhoeff, 1934) ; *C. vesubiensis* n. sp. Il est démontré que *Geophilus lindbergi* (Loksa, 1948) n. comb. a été classé par erreur dans le genre *Clinopodes*. *Clinopodes vesubiensis* n. sp. est décrit d'une aire restreinte dans les Alpes-Maritimes, en limite occidentale de répartition du genre ; cette aire est disjointe de celle de l'espèce morphologiquement la plus proche, *C. carinthiacus*, suggérant que les origines de la différenciation et de la colonisation du genre à l'intérieur des Alpes sont plus complexes que ce qui était supposé auparavant.

INTRODUCTION

Clinopodes C. L. Koch, 1847 is one of the earliest centipede genera to have been described and among those most commonly found in south-eastern Europe, nevertheless its actual circumscription in respect to other geophilids and its species diversity are still poorly known.

Since the description of the first species by C. L. Koch (1847), a bulky taxonomic and faunistic literature accumulated on *Clinopodes* (Table 1), but in the last few decades only a couple of species (*C. flavidus* and *C. trebevicensis*) have been universally recognized as valid and regularly recorded. Another nine nominal species that had been previously included in the genus (*C. escherichii*, *C. improvisus*, *C. intermedius*, *C. karamani*, *C. polytrichus*, *C. porosus*, *C. rodnaensis*, *C. skopljensis*, *C. lindbergi*), plus several other nominal taxa never treated above the subspecific level, have been practically ignored by most authors, sometimes

because their validity has been disputed or explicitly rejected, but most often because their inadequate original diagnosis has not been improved and therefore their identity has remained uncertain. Now, the recent, unexpected discovery of a new morphologically distinct species from the southern Maritime Alps, at the westernmost border of the overall known range of the genus (Iorio 2008; Geoffroy & Iorio 2009) suggests that the actual species diversity within *Clinopodes* is still incompletely known.

This discovery prompted us to undertake a general reassessment of the circumscription and species-level taxonomy of *Clinopodes*, by both revisiting all information hitherto published and examining a sample of specimens encompassing most of the geographical range and the known morphological variation in the genus. The synopsis proposed here is admittedly preliminary, and only tentative in some respect, but we are confident that it will be a useful starting point for more in-depth investigations on the morpho-ecological diversity and evolutionary history of the lineage, in addition to providing identification tools much needed for faunistic and ecological surveys.

Additionally, the new species described here bears on our understanding of the geographical pattern of diversification of the lineage, suggesting a revision of our understanding of the historical processes of colonisation and differentiation within the Alpine range. The Maritime Alps in particular are emerging as an area of primary interest for investigating climatic and other ecological factors that have shaped the biota, particularly in relation to the recent glacial dynamics (e.g., Garnier *et al.* 2004; Casazza *et al.* 2008; Schmitt 2009).

MATERIAL AND METHODS

To the best of our knowledge, we have evaluated the entire taxonomic and faunistic literature relevant for a total of 48 species-group nominal taxa, including all those originally described or subsequently included in *Clinopodes* (Table 1), together with other taxa recognized here in *Clinopodes* but hitherto misplaced in other genera.

Moreover, we have examined adult specimens of both sexes confidently recognizable as representatives of different species of *Clinopodes*, from different localities throughout the known geographical range of the genus. Specific attention has been paid to the Alpine range, especially to compare the new species described here from the Maritime Alps with geographically close populations of other *Clinopodes* species. The 43 specimens examined are listed in the results, under each species. Specimens have been examined by light microscopy, using Leica MZ12.5 and DMLB microscopes, in the latter case after immersion in monoethylenglycol and mounting on temporary slides according to standard procedures (Pereira 2000; Foddai *et al.* 2002). Digital photographs taken with the microscopes have been assembled using the image stacking software CombineZP (Hadley 2008).

The scope of our taxonomic revision has been limited to the species level: we have not investigated the geographic variation within the species and the complex, inconsistent infraspecific taxonomy developed for some species by previous authors, because this would require a much more intense geographical sampling, which is out of our current possibilities. Therefore, we have merely recorded the large number of infraspecific taxa described thus far, while refraining from assessing their validity and relations.

For each species recognized, we have compiled: a revised diagnosis, whenever possible based on original observations; a synthetic description of the geographical distribution, after excluding questionable records; a full list of synonyms and nominal infraspecific taxa proposed, with detailed discussion for all new combinations and new synonyms introduced here. For the morphological terminology, we have followed Bonato *et al.* (2010b). Names of localities originally in Cyrillic alphabet have been transliterated following the ALA-LC standard (Barry 1997).

Abbreviations for collections

coll. ÉI	É. Iorio collection, Marseille, France;
coll. MB	A. Minelli & L. Bonato collection, Dip. Biologia, Univ. Padova, Italy;
MNHN	Muséum national d'Histoire naturelle, Paris, France;
MSNB	Museo di Scienze Naturali di Bergamo, Italy.

TABLE 1. — Nominal species-group taxa of Geophilidae (Chilopoda) that have been assigned to *Clinopodes* C. L. Koch by authors.

Name	Original description	Original combination	First citation under *Clinopodes*	Currently in
abbreviatus	Verhoeff 1925a	*Geophilus linearis abbreviatus*	Attems 1929a	*Stenotaenia*
ankarensis	Verhoeff 1945	*Geophilus flavidus ankarensis*	Zapparoli 1999	*Clinopodes*
apruzianus	Verhoeff 1934a	*Geophilus* (*Clinopodes*) *flavidus apruzianus*	Verhoeff 1934a	*Clinopodes*
asiaeminoris	Verhoeff 1898	*Geophilus* (*Geophilus*) *linearis asiaeminoris*	Attems 1929a	*Stenotaenia*
balcanicus	Kaczmarek 1972	*Geophilus balcanicus*	Stoev 2002 (synonymy under *C. trebevicensis*)	*Clinopodes*
carinthiacus	Latzel 1880	*Geophilus flavidus* var. *carinthiacus*	Attems 1929a	*Clinopodes*
carniolensis	C. L. Koch 1847	*Clinopodes carniolensis*	C. L. Koch 1847	*Dicellophilus*
escherichii	Verhoeff 1896	*Geophilus flavidus escherichii*	Ribaut 1912	*Clinopodes*
faitanus	Verhoeff 1943a	*Geophilus* (*Clinopodes*) *flavidus faitanus*	Verhoeff 1943a	*Clinopodes*
fimbriatus	Verhoeff 1934a	*Geophilus* (*Onychopodogaster*) *fimbriatus*	Attems 1947	*Stenotaenia*
flavidus	C. L. Koch 1847	*Clinopodes flavidus*	C. L. Koch 1847	*Clinopodes*
graecus	Verhoeff 1902	*Geophilus graecus*	Brölemann 1909	*Stenotaenia*
improvisus	Verhoeff 1943b	*Geophilus* (*Clinopodes*) *flavidus improvisus*	Verhoeff 1943b	*Clinopodes*
intermedius	Dărăbanţu & Matic 1969	*Clinopodes intermedius*	Dărăbanţu & Matic 1969	*Clinopodes*
karamani	Verhoeff 1943b	*Geophilus* (*Clinopodes*) *flavidus karamani*	Verhoeff 1943b	*Clinopodes*
kurdistanus	Verhoeff 1945	*Geophilus flavidus kurdistanus*	Zapparoli 1999	*Clinopodes*
lindbergi	Loksa 1971	*Clinopodes lindbergi*	Loksa 1971	*Geophilus*
linearis	C. L. Koch 1835	*Geophilus linearis*	Brolemann 1926	*Stenotaenia*
montanus	Meinert 1870	*Geophilus montanus*	Latzel 1880 (synonymy under *C. flavidus*)	*Clinopodes*
naxius	Verhoeff 1901	*Geophilus* (*Geophilus*) *naxius*	Brolemann 1909	*Stenotaenia*
nitens	C. L. Koch 1847	*Poabius nitens*	Latzel 1880 (synonymy under *C. flavidus*)	*Clinopodes*
noduliger	Verhoeff 1925a	*Geophilus flavidus noduliger*	Verhoeff 1934a	*Clinopodes*
noduliger	Verhoeff 1928	*Geophilus flavidus noduliger*	Verhoeff 1934a	*Clinopodes*
pachypus	Verhoeff 1942	*Geophilus flavidus pachypus*	Verhoeff 1943c	*Clinopodes*
pannonicus	Verhoeff 1895	*Geophilus pannonicus*	Verhoeff 1898 (synonymy under *C. flavidus*)	*Clinopodes*
polytrichus	Attems 1903	*Geophilus* (*Geophilus*) *flavidus polytrichus*	Attems 1929a	*Clinopodes*
porosus	Verhoeff 1934a	*Geophilus* (*Clinopodes*) *flavidus porosus*	Verhoeff 1934a	*Clinopodes*
poschiavensis	Verhoeff 1934a	*Geophilus trebevicensis poschiavensis*	Verhoeff 1938	*Clinopodes*
poseidonis	Verhoeff 1901	*Geophilus* (*Geophilus*) *poseidonis*	Brolemann 1926	*Tuoba*
pyrenaicus	Chalande 1909	*Geophilus pyrenaicus*	Kevan 1983	*Geophilus*
rodnaensis	Verhoeff 1938	*Geophilus* (*Clinopodes*) *rodnaensis*	Verhoeff 1938	*Clinopodes*
siscensis	Verhoeff 1943d	*Geophilus* (*Nesogeophilus*) *poseidonis siscensis*	Attems 1947	*Tuoba*
skopljensis	Verhoeff 1938	*Geophilus* (*Clinopodes*) *skopljensis*	Verhoeff 1938	*Clinopodes*
strasseri	Verhoeff 1938	*Geophilus* (*Clinopodes*) *rodnaensis strasseri*	Verhoeff 1938	*Clinopodes*
styriacus	Attems 1895	*Geophilus flavidus* var. *styriaca*	Attems 1929a	*Clinopodes*
sudanensis	Lewis 1963	*Clinopodes poseidonis sudanensis*	Lewis 1963	*Tuoba*
trebevicensis	Verhoeff 1898	*Geophilus flavidus trebevicensis*	Verhoeff 1934a	*Clinopodes*

SYSTEMATICS

Family GEOPHILIDAE Leach, 1815
Genus *Clinopodes* C. L. Koch, 1847

TYPE SPECIES. — *Clinopodes flavidus* C. L. Koch, 1847, by subsequent designation (Cook 1896).

DIAGNOSIS

Geophilids with body slightly narrowing forward, more distinctly tapering backward; head only slightly longer than wide, the transverse suture either weakly recognizable or not recognizable at all; clypeus uniformly areolate, without clypeal areas; labral side-parts partially distinct from the clypeus, clearly separated from each other; posterior margin of the labrum bordered by a row of bristles, with at most very few tubercles on the intermediate part; mandible with a single pectinate lamella; first maxillae with bi-articulated telopodites and two pairs of lappets; second maxillary coxosternite with long isthmus, without inner processes, and lacking distinctly sclerotised ridges; second maxillary telopodites composed of three articles, bearing a simple, elongated, only slightly bent claw; forcipular pretergite often partially exposed; forcipular tergite sub-trapezoid, only slightly narrower than the subsequent tergite, the anterior margin about as wide as the cephalic plate, the lateral margins distinctly convex; forcipular coxosternite wider than long, its anterior margin projecting forwards and bearing a pair of sclerotised denticles, chitin-lines present, coxopleural sutures distinctly diverging forwards and almost reaching the anterior corners of the coxosternite; forcipules stout and strongly tapering, the tarsungula distinctly curved, with a single small denticle at the basis (Fig. 1A, B); trunk segments without paratergites; carpophagus-structures with bilobed pits almost as wide as the metasternite; ventral pores from leg-bearing segment 1 to penultimate, arranged in a transverse band close to the posterior margin of the metasternite, the pore-field short on most segments but more elongated on the very posterior segments (Fig. 1C, D); leg claws bearing two slender accessory spines; ultimate pleuropretergite without sutures; metasternite of the ultimate leg-bearing segment trapezoidal, wider than those in front of it, lateral margins distinctly convex; most of the coxal organs opening on the ventro-internal side of the coxopleura (Fig. 1E, F); telopodites of the ultimate pair of six articles, distinctly swollen and covered ventrally with dense setae in the male, only moderately swollen in the female, without pretarsus but only with a tiny spine; bi-articulated gonopods in the male, short gonopodal lamina in the female; a pair of anal pores.

Differential characters with respect to the most similar genera are given in Table 2.

TAXONOMIC AND NOMENCLATURAL NOTES

The genus *Clinopodes* was established by C. L. Koch (1847) to accommodate two new species, *C. carniolensis* and *C. flavidus*. Since Meinert (1870), these species have been recognized as so distantly related as to deserve separation in distinct genera in different families: the mecistocephalid *C. carniolensis* was assigned first to *Mecistocephalus* Newport, 1843 or *Lamnonyx* Cook, 1896, then eventually to its current genus *Dicellophilus* Cook, 1896 (see Bonato *et al.* 2010a, for a historical overview); however, the geophilid *C. flavidus* was almost universally assigned to *Geophilus* Leach, 1814, under an early broad concept of this genus encompassing the vast majority of the geophilids known to that time. Because none of the two originally included species had been selected as the type species, *Clinopodes* was repeatedly listed, at least tentatively, among the synonyms of both *Mecistocephalus* and *Geophilus* (e.g., Meinert 1870; Fedrizzi 1878; Latzel 1880; Selivanov 1884; Daday 1889; Attems 1903). The nomenclatural status of *Clinopodes* was eventually fixed by Cook (1896), who selected *C. flavidus* as the type species of the genus, while including *C. carniolensis* together with another ten species in his genus *Lamnonyx*, which is a junior synonym of *Mecistocephalus* (Bonato & Minelli 2007; ICZN 1999). Following Brölemann (1909), *Clinopodes* has been treated as a valid genus by many influential authors (e.g., Brolemann 1926; Attems 1929a, 1947; Chamberlin 1952; Eason 1964; Dărăbanţu & Matic 1969; Matic 1972a; Würmli 1972; Kaczmarek 1979; Demange 1981), or at least as a subgenus of *Geophilus* (e.g., Verhoeff 1928, 1934a, 1938; Folkmanová 1952). It was considered to include

C. flavidus and other obviously related species, but also many other geophilids that have subsequently been separated into clearly distinct genera (see Table 1 for a full list of relevant taxa). Since the last decade of the 20th century, these unrelated taxa began to be referred more and more frequently to *Geophilus* rather than to *Clinopodes*, and eventually to *Tuoba* Chamberlin, 1920 and *Stenotaenia* C. L. Koch, 1847, which are currently recognized as distinct genera (Jones 1998; Bonato *et al.* 2008; see Table 2). In particular, *Tuoba poseidonis* (Verhoeff, 1901), which is the best known species in the genus *Tuoba*, was first suspected to have been misplaced in *Clinopodes* by Minelli & Zapparoli (1985), then cited under *Geophilus* since Foddai *et al.* (1995) and eventually recognized as belonging to *Tuoba* by Minelli (2001). *Stenotaenia linearis* (C. L. Koch, 1835), which is the best known species in the genus *Stenotaenia*, was first removed from *Clinopodes* and assigned to *Geophilus* by Minelli & Zapparoli (1985), but many authors still maintained it under *Clinopodes* (Spelda 2005), until the genus name *Stenotaenia* was resurrected for this and allied species (Bonato & Minelli 2008).

Clinopodes carinthiacus (Latzel, 1880)

TYPE MATERIAL AND TYPE LOCALITY. — 1 ♀, holotype; from "Kärnten" [= Carinthia (Austria)] (Latzel 1880).

SYNONYMS. — *Geophilus flavidus trebevicensis* Verhoeff, 1898: n. syn. (see below) (type material and type localities: unknown number of syntypes, from Mt. Trebević, Moscanica valley, Ivan Sedlo, Mt. Igman, Plasa near Jablanica, Jajce in the Pliva valley [all in Bosnia & Herzegovina] and Monte Baldo [Italy]). — *Geophilus rodnaensis strasseri* Verhoeff, 1938: n. syn. (see below) (type material and type localities: two syntypes, from Kanal [Slovenia] and Cavasso Nuovo [Italy]). — *Geophilus balcanicus* Kaczmarek, 1972: n. syn. (see below) (type material and type locality: holotype, from Borovets [Bulgaria]).

NOMINAL SUBSPECIES. — *Clinopodes carinthiacus poschiavensis* (Verhoeff, 1934).

MAIN REFERENCES. — Latzel 1880: 178 (original description, as *Geophilus flavidus* var. *carinthiacus*); Attems 1895: 162 (redescription); Verhoeff 1898: 350 (original description of *G. flavidus trebevicensis*); Attems 1929a: 204 (redescription as *C. flavidus escherichii* var. *trebevicensis*); Verhoeff 1934a: 12 (redescription as *G. trebevicensis*), 13 (original description of *G. trebevicensis poschiavensis*); Verhoeff 1938: 341 (original description of *G. rodnaensis strasseri*); Attems 1947: 120 (in key as *C. trebevicensis*); Kanellis 1959: 38 (in key as *C. flavidus escherichi* [sic] var. *trebevicensis*); Kaczmarek 1972: 262 (original description of *G. balcanicus*); Matic 1972a: 76 (in key as *C. trebevicensis*), 91 (redescription as *C. trebevicensis*); Stoev 2002: 89 (in key as *C. trebevicensis*).

MATERIAL EXAMINED. — **Albania**. Boga, Maya Tchardakut, 2.VI.1993 P. Beron lg: 1 ♀ (32 mm, 59 leg pairs) (coll. MB). — Maja Radohimës, 29.V.1993 P. Beron lg: 1 ♀ (35 mm, 61 leg pairs) (coll. MB).
Greece. Ori Vrondus, 7.VI.1983 G. Etonti lg: 1 ♀ (18 mm, 55 leg pairs), 1 ♂ (26 mm, 53 leg pairs) (coll. MB).
Italy. Oltressenda Alta, Orobic Alps, 26.IV.1981 A. Valle lg: 2 ♂♂ (19 and 21 mm, both 55 leg pairs) (MSNB). — Cansiglio, 20.VII.1997 A. Minelli lg: 2 ♀♀ (33 and 23 mm, 57 and 55 leg pairs), 1 ♂ (24 mm, 53 leg pairs) (coll. MB).

DIAGNOSIS. — A *Clinopodes* species up to *c*. 3-4 cm long; 51-57 pairs of legs in the male, 55-61 in the female; denticles of the forcipular coxosternite relatively short, distinctly wider than long; chitin-lines vanishing before reaching the condyles; the largest sternal pore-fields on the posterior leg-bearing segments reaching or even extending beyond the mid-length of the metasternite; all canals of the coxal organs opening through independent pores, more dense close to the lateral margins of the metasternites but most of them not covered by the latter, including a larger, posteriorly isolated pore on each coxopleuron. See also Table 3 and key to species.

GEOGRAPHIC DISTRIBUTION. — Central and Eastern Alps, western and southern part of the Balkan Peninsula; westwards to Rhetic and Orobic Alps, eastwards to regions west of the Black Sea, northwards to northern Prealps and Carpathians, southwards to southern Prealps, Dinarides, Corfu and continental Greece.

TAXONOMIC AND NOMENCLATURAL NOTES

Clinopodes carinthiacus was originally described by Latzel (1880) as a "variety" of *Geophilus flavidus*, and other specimens from Silesia, Bosnia and Herzegovina and Istria were later assigned to it (Haase 1881; Latzel 1888; Attems 1895). However, its status remained unclear: Selivanov (1884) considered it a junior synonym of *Geophilus montanus* Meinert, 1870, which he considered distinct from *C. flavidus* at difference from other authors (see below); Verhoeff (1898) suspected that it could be identical to his new subspecies *G. flavidus trebevicensis*, but later suggested

TABLE 2. — Main differential characters between *Clinopodes* C. L. Koch, 1847 and the most similar genera, including those to which *Clinopodes* taxa have been assigned in the past.

	***Clinopodes* C.L. Koch, 1847**	***Diphyonyx* Bonato, Zapparoli & Minelli, 2008**	***Geophilus* Leach, 1814**	***Pleurogeophilus* Verhoeff, 1901**	***Stenotaenia* C.L. Koch, 1847**	***Tampiya* Chamberlin, 1912**	***Tuoba* Chamberlin, 1920**
Type species	*C. flavidus* C. L. Koch, 1847	*G. conjungens* Verhoeff, 1898	*Scolopendra electrica* Linnaeus, 1758	*G. mediterraneus* Meinert, 1870	*G. linearis* C.L. Koch, 1835	*Tampiya pylorus* Chamberlin, 1912	*Tuoba curticeps* Chamberlin, 1920
Main sources for diagnosis	–	Bonato *et al.* 2008	Brolemann 1930; Crabill 1954; Eason 1964	Brolemann 1930	Bonato & Minelli 2008	Chamberlin 1912a	Jones 1998
Second maxillae: coxosternite: paired sclerotised ridges (“statuminia”)	absent	absent	absent	absent	absent	present	absent
Forcipular coxosternite: sclerotised denticles	present	present	absent	absent	absent	present	absent
Forcipular tarsungula: basal denticle	distinct	inconspicuous	distinct	absent	absent	absent	distinct
Leg-bearing segments: carpophagus-structure	present	absent	usually present	absent	absent	?	present
Leg-bearing segments: pore-fields	transverse band	absent	usually transverse band	circular area	longitudinally elongate oval area	absent?	transverse band
Ultimate leg-bearing segment: metasternite	trapezoidal, wider than long	trapezoidal, distinctly wider than long	trapezoidal, distinctly wider than long	trapezoidal, as long as wide	rectangular, distinctly wider than long	?	trapezoidal, distinctly wider than long
Coxopleuron: openings of coxal organs	either clustered in pouches or independent	most clustered in a pouch	all independent	all independent	clustered in pouches	independent	all clustered in a pouch
Ultimate legs: pretarsus	tiny spine	claw	claw	tiny spine	claw	claw	claw

that it could be closer to *Geophilus flavidus* var. *styriaca* Attems, 1895 (however, misquoting it as "*styricus* Verh.") (Verhoeff 1934a); Attems (1929a) considered it a mere variety of the subspecies *C. flavidus flavidus* but later cited it as a full subspecies of *C. flavidus* (Attems 1947); Würmli (1972) commented on the weak morphological evidence for a taxonomical distinction from *C. flavidus*, and all other modern authors simply ignored it. Based on the published accounts, the number of legs in the holotype (55 pairs, vs. usually more than 61 in typical *C. flavidus* from Eastern Alps; Latzel 1880) together with the size of the tubercles on forcipular coxosternites in other specimens subsequently recorded (smaller than in typical *C. flavidus*; Attems 1895), suggest that the name *G. flavidus* var. *carinthiacus* was actually applied since its introduction to the species that has been later distinguished and almost universally cited as *C. trebevicensis* (Verhoeff, 1898) (see below). According to the principle of priority, *G. flavidus* var. *carinthiacus* should therefore be adopted as the valid name of this species, as *C. carinthiacus* (new status at the species rank). Conditions for the reversal of precedence (ICZN 1999: art. 23.9) are not met, because *G. flavidus trebevicensis* has been used – to the best of our knowledge – in less than 25 publications in the preceding 50 years, and *G. flavidus* var. *carinthiacus* has been cited as valid after 1899 (including Attems 1947).

Notes on new synonymies

Geophilus flavidus trebevicensis was described by Verhoeff (1898), based on an unknown number of specimens of either sex from "Trebevic, im Mittelgebiet" (= Mt. Trebević [Bosnia and Herzegovina]), "Moscanicathal" (= Moscanica valley [Bosnia and Herzegovina]), "Ivan" (= Ivan Sedlo [Bosnia and Herzegovina]), "Igman" (= Mt. Igman [Bosnia and Herzegovina]), "Plasa b. Jablanica" (= Plasa, near Jablanica [Bosnia and Herzegovina]), "Jaice, Plivathal" (= Jajce, in the Pliva valley [Bosnia and Herzegovina]), and "Mt. Baldo" (= Monte Baldo [Italy]). It was first raised to the species rank by Verhoeff (1934a) as *Geophilus* (*Clinopodes*) *trebevicensis*. Its taxonomic distinction was never explicitly disregarded, but it was lowered to a mere "variety" of the subspecies *C. flavidus escherichii* (currently a full species *C. escherichii*) by Attems (1929a, b), an opinion followed only by Kanellis (1959). Since Attems (1947), it has been almost universally regarded as a full species in the genus *Clinopodes*. Identity with *G. flavidus* var. *carinthiacus* was explicitly suspected since its introduction (Verhoeff 1898), and is here confirmed based on all published accounts (see above). In agreement with such interpretation is the fact that all specimens assigned to *G. flavidus* var. *carinthiacus* are from within the known range of *C. trebevicensis*, and that specimens of both typical *C. flavidus* and the variety *carinthiacus* were apparently recorded by Latzel (1888) in two localities in Bosnia and Herzegovina.

Geophilus rodnaensis strasseri was described by Verhoeff (1938) based on two females from two localities from "Canale im Isonzotal" (= Kanal [Slovenia]) and "Cavasso" (= Cavasso Nuovo [Italy]), in the Julian and Carnic Prealps. It was later recorded further from the Caucasus (Verhoeff 1938), but it was frequently ignored by other authors and Minelli (1992) recognized it implicitly as identical to *C. trebevicensis*. Based on the few morphological traits described by Verhoeff (1938), *G. rodnaensis strasseri* corresponds to *C. carinthiacus* in a combination of characters diagnostic of the latter in respect to all other known *Clinopodes* species, including the aspect of the forcipular chitin-lines, the number of pairs of legs, the extent of the posterior pore-fields, and the arrangement of the coxal pores. The first three characters differentiate *G. rodnaensis strasseri* also from the typical *C. rodnaensis*. Apparently in contrast to *C. carinthiacus*, the marginal tubercles on the forcipular coxosternite were described by Verhoeff (1938) as relatively large in the species *G. rodnaensis*, to which the subspecies *strasseri* is referred, but it is not clear whether this character applies to *strasseri* too. Also the provenance of both syntypes of *G. rodnaensis strasseri* is consistent with the synonymy here proposed, as both localities are well within the known range of *C. carinthiacus* and not that of *C. rodnaensis*. Also worth noting is the fact that Verhoeff (1938) diagnosed *G. rodnaensis strasseri* only in respect to his new species *G. rodnaensis* and not in respect to *G. flavidus* var. *carinthiacus* or *G. flavidus trebevicensis*, based on his unwarranted opinion of a closer affinity to the former.

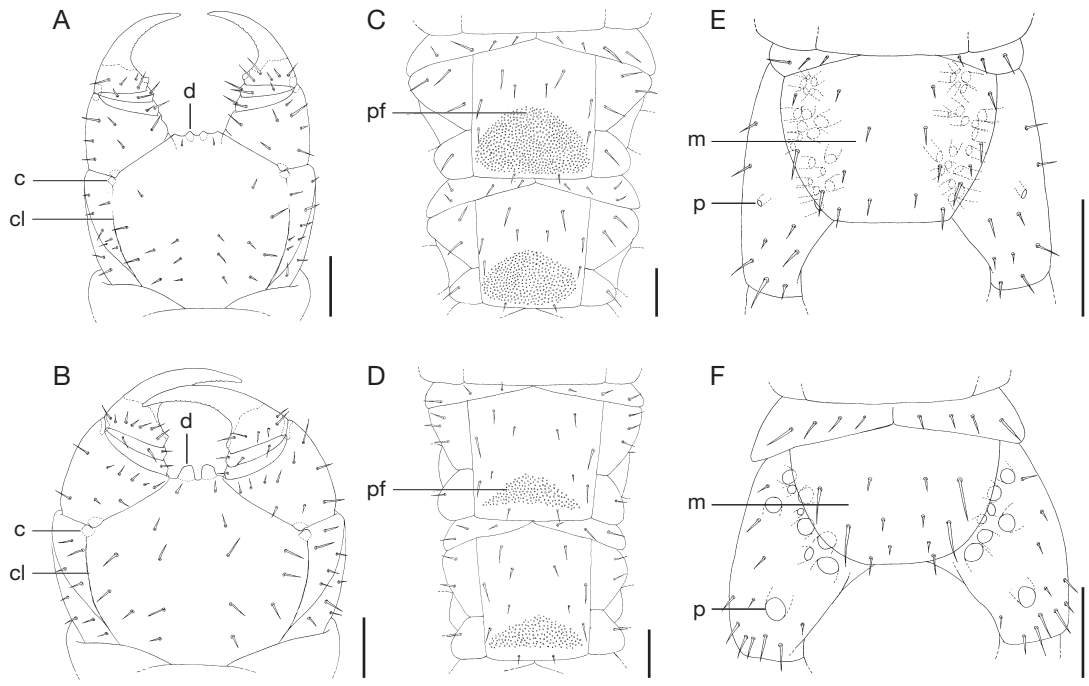

FIG. 1. — Main differential characters between species of *Clinopodes* C. L. Koch (line drawings from representative specimens, ventral view): **A**, forcipular segment of *C. carinthiacus* (Latzel, 1880) (♀, 33 mm long, from Cansiglio, Italy); **B**, forcipular segment of *C. rodnaensis* (Verhoeff, 1938) (♀, 32 mm long, from Casa de Piatra, Romania); **C**, metasternites of the most posterior leg-bearing segments of *C. escherichii* (Verhoeff, 1896) (♀, 55 mm long, from Boltoz Dağ, Turkey); **D**, metasternites of the most posterior leg-bearing segments of *C. verhoeffi* n. nom. (♀, 35 mm long, from Casa de Piatra, Romania); **E**, metasternite and coxopleura of ultimate leg-bearing segment of *C. caucasicus* (Selivanov, 1884) n. comb. (♀, 55 mm long, from Tbilisi, Georgia); **F**, metasternite and coxopleura of ultimate leg-bearing segment of *C. carinthiacus* (Latzel, 1880) (♀, 33 mm long, from Cansiglio, Italy). Abbreviations: **c**, condyle; **cl**, chitin-line; **d**, anterior denticle of forcipular coxosternite; **m**, metasternite of ultimate leg-bearing segment; **p**, isolated coxal pore; **pf**, pore-field. Scale bars: 0.2 mm.

Geophilus (*Clinopodes*) *balcanicus* was described by Kaczmarek (1972) based on a single female from "Borovec" (= Borovets [Bulgaria]) and another 19 specimens of either sex from different localities in the Balkans, and was recorded further from the region (Ribarov 1989). It was maintained as a valid species, in the genus *Geophilus*, by Ribarov (1989, 1996) and Stoev (1997), until Stoev (2002) synonymized it under *C. trebevicensis* (a synonym of *C. carinthiacus*; see above), referring to a unpublished document for supporting arguments. Based on the original description (Kaczmarek 1972), *G. balcanicus* agrees with *C. carinthiacus* in major characters that are diagnostic in comparison with all other species of *Clinopodes*, including the number of pairs of legs, the extent of the posterior pore-fields, and the arrangement of the coxal pores.

Clinopodes caucasicus (Selivanov, 1884) n. comb.

TYPE MATERIAL AND TYPE LOCALITIES. — 4 ♀♀ and 9 ♂♂, syntypes; from "Kakhetia" (= Kakheti [Georgia]), "Gudaur" (= Gudaur [Georgia]), "Lars" (= Lars [Georgia]), and "Nukha" (= Shaki [Azerbaijan]) (Selivanov 1884).

SYNONYMS. — *Geophilus transmontanus* Selivanov, 1884: first synonymized by Muralewicz (1926) (type material and type localities: four syntypes, from Akstafa, Adzhikent [both in Azerbaijan] and Elenovka [Kazakhstan]). — *Pleurogeophilus hypotrichus* Folkmanová, 1956: n. syn. (see notes below) (type material and type localities: 15 syntypes, from Krasnodar Krai [Russia]). — *Pleurogeophilus gorizensis caucasicus* Folkmanová, 1958: n. syn. (see notes below) (type material and type localities: six syntypes, from Gora Tkhab and Mount Achishkho [Russia]).

NOMINAL SUBSPECIES. — None.

MAIN REFERENCES. — Selivanov 1884: 85 (original description, as *Geophilus caucasicus*), 86 (original description of *G. transmontanus*); Lignau 1903: 101 (redescription); Folkmanová 1956: 1637 (original description of *P. hypotrichus*); Folkmanová 1958: 187 (original description of *P. gorizensis caucasicus*).

MATERIAL EXAMINED. — **Georgia**. Sioni, 24.VII.1967, 1 ♂ (45 mm, 71 leg pairs) (coll. MB). — Tbilisi, 26.VI.1988 K. Thaler lg, 2 ♀♀ (60 and 55 mm, both 73 leg pairs), 5 ♂♂ (54, 50, 48, 45, 40 mm; 71, 73, 73, 73, 71 leg pairs respectively) (coll. MB).

DIAGNOSIS. — A *Clinopodes* species up to *c*. 6 cm long; 57-89 pairs of legs, most often 61-73 in the male and 65-73 in the female; denticles of the forcipular coxosternite relatively short, distinctly wider than long; chitin-lines reaching the condyles; even the largest sternal pore-fields on the posterior leg-bearing segments remaining well behind the mid-length of the metasternite; almost all canals of the coxal organs converging into 2 or 3 poorly recognizable clusters aligned along the lateral margin of the metasternite and usually covered by it; additionally, usually one, sometimes two, small pores, on the ventro-lateral side of each coxopleuron, far apart from all the other pores and lateral to them. See also Table 3 and key to species.

GEOGRAPHIC DISTRIBUTION. — Caucasus and eastern Anatolia.

TAXONOMIC AND NOMENCLATURAL NOTES

The name *Geophilus caucasicus* was made available by Selivanov (1884) but it had been introduced before as a *nomen nudum* by the same author (Selivanov 1881). *Geophilus caucasicus* was maintained as a valid species in the genus *Geophilus* (Attems 1903, 1907; Lignau 1903; Muralewicz 1907, 1910, 1926; Titova 1969; Zapparoli 1999), and other specimens were reported from the Caucasus (Lignau 1903; Muralewicz 1907) and eastern Anatolia (Zapparoli 1999), even though it was ignored by Attems (1929a). Worth noting is that the same C. Attems labelled the type specimens, which are preserved at the Naturhistorisches Museum Wien, as "*Clinopodes flavidus polytrichus*" (Ilie *et al.* 2009). The species is assigned here for the first time to the genus *Clinopodes*, as *C. caucasicus* n. comb., after the direct examination of specimens reliably recognizable as representative of the species and the evaluation of all published accounts. According to the original description by Selivanov (1884) and the description and illustrations subsequently provided by Lignau (1903) for other reliably identified specimens, *G. caucasicus* has a combination of characters that is unambiguously diagnostic of *Clinopodes*, namely the general shape and features of the forcipular segment including chitin-lines and denticles of the coxosternite, the arrangement of sternal and coxal pores, and the lack of claws on the ultimate legs. Worth noting is that *G. caucasicus* was originally described by Selivanov (1884) in a key to *Geophilus* species including other species actually belonging to *Clinopodes*, i.e. *G. flavidus* (currently *C. flavidus*), *G. montanus* (a synonym of *C. flavidus*; see below), and *G. transmontanus* (a synonym of *C. caucasicus*; see above). *Geophilus caucasicus* and its synonym *G. transmontanus* were both made available simultaneously by Selivanov (1884), but the former is the valid name for the species since Muralewicz (1926), who acted as "First Reviser" (ICZN 1999: Art. 24.2) when synonymizing *G. transmontanus* under *G. caucasicus*.

NOTES ON NEW SYNONYMIES

Pleurogeophilus hypotrichus was described by Folkmanová (1956) based on 15 specimens of either sex from "Krasnodarskii krai (Georgievskoe lesnichestvo Tuapsinskogo raiona)" (= Krasnodar Krai [Georgievsk forest district, Tupsinsk region]) in the western Caucasus. It was cited subsequently only rarely (Titova 1969), and its status remained to be assessed. Based on the original description (Folkmanová 1956), *P. hypotrichus* is confidently recognizable as belonging to *Clinopodes* because it is characterized by a combination of characters that is unambiguously diagnostic of this genus, namely features of the forcipular segment including chitin-lines and denticles on the coxosternite, shape of sternal pore-fields, and general traits of the ultimate leg-bearing segment including the shape of the metasternite and the lack of claws. Moreover, *P. hypotrichus* agrees with *C. caucasicus* in all major characters that are diagnostic of the latter species in comparison with all other species of *Clinopodes*, including complete chitin-lines, relatively high number of trunk segments, and the peculiar arrangement of the coxal pores. Worth noting is that the type localities of *P. hypotrichus* are within the known range of *C. caucasicus*. Most probably, Folkmanová (1956) failed to classify the species in the

TABLE 3. — Differential characters between the species of *Clinopodes* C. L. Koch, 1847. Data are from original descriptions, subsequent redescriptions based on specimens confidently identified correctly (see "Main references" in the text, under each species), and direct observations of representative specimens (see "Material examined" in the text, under each species). An asterisk (*) marks those species for which the range of variation is estimated based on 1-3 specimens only.

C. carinthiacus (Latzel, 1880)	*C. caucasicus* (Selivanov, 1884)	*C. escherichii* (Verhoeff, 1896)	*C. flavidus* C. L. Koch, 1847	*C. intermedius* Dărăbanţu & Matic, 1969	*C. latisternus* (Attems, 1947)	*C. rodnaensis* (Verhoeff, 1938)	*C. skopljensis* (Verhoeff, 1938)	*C. verhoeffi* n. nom.	*C. vesubiensis* n. sp.
Marginal denticles on the forcipular coxosternite									
distinctly wider than long	distinctly wider than long	distinctly wider than long	from wider than long to as long as wide	wider than long	wider than long	*c.* as long as wide	slightly wider than long	from wider than long to as long as wide	*c.* as long as wide
Chitin-lines reaching the condyles									
no	yes	(almost) yes	yes	yes	yes	yes	no	yes	no
Leg-bearing segments									
♂ 51-57, ♀ 55-61	57-89, usually ♂ 61-73, ♀ 65-73	♂ 59-71, ♀ 63-73	51-81, usually ♂ 53-79, ♀ 59-81	♀ 79-81*	69-75*	57-71	61*	59-65	♂ 57-59, ♀ 61-63
Longitudinal extent of the pore-field in respect to the length of the metasternite, in the most posterior segments									
up to 1/2 or even more	up to 1/3-2/5	up to 1/2 or even more	up to 1/3-2/5	up to 1/2	?	up to 1/2	up to 1/3	up to 1/3	up to 1/2
Canals of the coxal organs									
opening independently, closer to the lateral margin of the metasternite but not covered by it	converging into 2 or 3 clusters along the lateral margin of the metasternite and covered by it	converging usually into 2 or 3 clusters along the lateral margin of the metasternite and usually covered by it	converging usually into 3 (2-4) clusters along the lateral margin of the metasternite and usually covered by it	converging into 4 clusters along the lateral margin of the metasternite and covered by it	opening independently, scattered	opening independently, closer to the lateral margin of the metasternite but not covered by it	opening independently, closer to the lateral margin of the metasternite but not covered by it	converging into 3 or 4 clusters along the lateral margin of the metasternite and covered by it	opening independently, close to the lateral margin of the metasternite but not covered by it
Isolated pores on the coxopleuron									
1 large pore posterior to all other pores	1, sometimes 2, small pores lateral to all other pores	none	none	1 small pore lateral to the other pores	?	1 large pore posterior to all other pores	none	1 small pore lateral to all other pores	1 small pore lateral to the other pores

proper genus because she relied on a wider, imprecise concept of the genus *Pleurogeophilus* Verhoeff, 1901, and the nominal species *G. caucasicus* had remained almost neglected in the literature.

Pleurogeophilus gorizensis caucasicus was described by Folkmanová (1958) based on six specimens of either sex from "Kavkaz, gora Tkhab" (= Gora Tkhab [Russia]) and "Krasnaya Poljana, sklon gory Achishkho" (= Mount Achishkho [Russia]), in the western Caucasus. No other specimens were referred to this taxon, which was cited only rarely (Titova 1969), but its status was never questioned explicitly. Based on the original description (Folkmanová 1958), *P. gorizensis caucasicus* can be confidently recognized as belonging to *Clinopodes* because it was described as a subspecies of *Geophilus gorizensis* Latzel, 1880, which is recognized here in *Clinopodes* (see below, under *C. flavidus*), and even the few characters listed by Folkmanová (1958) as differentiating it from the typical *P. gorizensis* are fully compatible with a *Clinopodes* species. Moreover, among all known species of *Clinopodes*, the extent of the posterior pore-fields and the pattern of coxal pores are suggestive of *C. caucasicus*, which is also the species most frequently reported from the whole Caucasus range.

Clinopodes escherichii (Verhoeff, 1896)

TYPE MATERIAL AND TYPE LOCALITY. — 2 ♀♀, 1 ♂, and another probable ♂, syntypes; from "Pera" (= Beyoglu [Turkey]) (Verhoeff 1896).

SYNONYMS. — *Geophilus flavidus ankarensis* Verhoeff, 1945: n. syn. (see notes below) (type material and type locality: unknown number of syntypes, from Ankara [Turkey]). — *Geophilus flavidus kurdistanus* Verhoeff, 1945: n. syn. (see notes below) (type material and type locality: unknown number of syntypes, from Gaziantep [Turkey]).

NOMINAL SUBSPECIES. — None.

MAIN REFERENCES. — Verhoeff 1896: 2 (original description, as *Geophilus flavidus escherichii*); Verhoeff 1898: 343 (in key); Attems 1901: 285 (redescription); Attems 1903: 223 (in key); Attems 1929a: 202 (in key), 204 (redescription); Verhoeff 1943b: 140 (redescription); Verhoeff 1945: 318 (redescription), 319 (original description of *G. flavidus ankarensis* and *G. flavidus kurdistanus*); Attems 1947: 120 (in key); Kanellis 1959: 38 (in key); Dărăbanţu & Matic 1969: 102 (in key); Matic 1972a: 76 (in key), 81 (redescription).

MATERIAL EXAMINED. — **Turkey**. Camlidere, 19.VIII.1980 A. Valle lg., 1 ♀ (43 mm, 73 leg pairs), 1 ♂ (53 mm, 67 leg pairs) (coll. MB). — Boltoz Dağ, VI.1983 M. Meregalli lg, 1 ♀ (55 mm, 67 leg pairs) (coll. MB). — Ilgar Dağ, near Kastamonu, 11.VII.1975 G. Osella lg, 1 ♀ (58 mm, 67 leg pairs) (coll. MB). — Spil Dağı, near Manisa, 14.VIII.1972 A. Valle lg, 1 ♂ (51 mm, 65 leg pairs) (coll. MB). — Uludag, near Bursa, 24.VIII.1969 V. Nobile lg, 1 ♂ (45 mm, 59 leg pairs) (coll. MB).

DIAGNOSIS. — A *Clinopodes* species up to *c*. 6 cm long; 59-71 pairs of legs in the male, 63-73 in the female; denticles of the forcipular coxosternite relatively short, distinctly wider than long; chitin-lines reaching or almost reaching the condyles; the largest sternal pore-fields on the posterior leg-bearing segments reaching or even extending beyond the mid-length of the metasternite; all canals of the coxal organs converging into two or three poorly recognizable clusters aligned along the lateral margin of the metasternite and frequently covered by it; usually no isolated pores. See also Table 3 and key to species.

GEOGRAPHIC DISTRIBUTION. — Most part of the Balkan Peninsula north to Carpathians, regions north of the Black Sea, Aegean islands and Anatolia. Some specimens from throughout the Italian Peninsula and even close to the Western Prealps have been referred to this taxon erroneously (Manfredi 1933; Matic 1971; Matic & Dărăbantzu 1971; Minelli 1979), as indicated by some of the same authors (Manfredi 1957; Minelli & Zapparoli 1992; Foddai *et al.* 1995; Zapparoli & Testa 1995).

TAXONOMIC AND NOMENCLATURAL NOTES

Clinopodes escherichii was originally described by Verhoeff (1896) as a subspecies of *Geophilus flavidus* (currently *Clinopodes flavidus*) and was generally maintained as such during the first half of the 20th century (e.g., Verhoeff 1925b, 1943b, 1945; Attems 1901, 1929a; Muralewicz 1926; Chamberlin 1952; Kanellis 1959). It was first cited at the species rank and assigned to the genus *Clinopodes* by Ribaut (1912), but was treated generally at this rank only much later (e.g., Attems 1947; Dobroruka 1958; Matic 1972a; Kos 1992), even though some modern authors did not distinguish it from *C. flavidus* (e.g., Stoev 2001a; Zapparoli 2002). Our direct examination of specimens confirmed the morphological differences given in the literature (Table 3), thus supporting its recognition as a distinct species.

NOTES ON NEW SYNONYMIES

Both *Geophilus flavidus ankarensis* and *Geophilus flavidus kurdistanus* were described by Verhoeff (1945), based on two series of specimens from near "Ankara" in central Anatolia and from "Gaziantep" in south-eastern Anatolia (both in Turkey) respectively. Both taxa have been almost completely neglected in the subsequent literature, and their validity has been explicitly questioned by Zapparoli (1999). According to the original description (Verhoeff 1945), they both agree with *C. escherichii*, the only putative difference being in more widely separated antennae. However, this character has long been disregarded in geophilid taxonomy as its diagnostic value is low because of subjective evaluation and intraspecific variation. Moreover, the labrum of *G. flavidus ankarensis* was described as unusually lacking distinct projections, and the metasternite of the ultimate leg-bearing segment of *G. flavidus kurdistanus* was illustrated as remarkably elongate. However, these apparently peculiar characters can probably be explained by the fact that delicate structures were overlooked, namely the labral projections and the posterior margin of the ultimate metasternite, in the permanent microscopic slides prepared by K.W. Verhoeff. It is worth noting that the type locality of both *G. flavidus ankarensis* and *G. flavidus kurdistanus* are well within the known range of C. *escherichii*.

Clinopodes flavidus C. L. Koch, 1847

TYPE MATERIAL AND TYPE LOCALITY. — 1 ♀, holotype; from "Oravitza" (= Oravița [Romania]) (C. L. Koch 1847).

SYNONYMS. — *Arthronomalus hopei* Newport, 1845: n. syn. (see notes below) (type material and type locality: holotype, from near Naples [Italy]). — *Poabius nitens* C. L. Koch, 1847: first synonymized by Latzel (1880) (type material and type locality: unknown number of syntypes, from Carniola [Slovenia]). — *Geophilus montanus* Meinert, 1870: first synonymized by Latzel (1880) (type material and type localities: unknown number of syntypes, from Alpe Lipanza [Slovenia], Gennazano and Ariccia [both in Italy]). — *Geophilus gorizensis* Latzel, 1880: n. syn. (see notes below) (type material and type locality: holotype, from Tarnova massif [Slovenia]). — *Geophilus pannonicus* Verhoeff, 1895: first synonymized by Verhoeff (1898) (type material and type locality: holotype, from Zagreb [Croatia]). — *Geophilus makrodontus* Attems, 1907: n. syn. (see notes below) (type material and type locality: holotype, from Alushta [Ukraine]).

NOMINAL SUBSPECIES. — *Clinopodes flavidus styriacus* (Attems, 1895); *C. flavidus polytrichus* (Attems, 1903); *C. flavidus setosus* (Lignau, 1903); *C. flavidus vestitus* (Lignau, 1903); *C. flavidus noduliger* (Verhoeff, 1925 nec Verhoeff, 1928); *C. flavidus noduliger* (Verhoeff, 1928 nec Verhoeff, 1925); *C. flavidus apruzianus* (Verhoeff, 1934); *C. flavidus pachypus* (Verhoeff, 1942); *C. flavidus faitanus* (Verhoeff, 1943); *C. flavidus improvisus* (Verhoeff, 1943); *C. flavidus karamani* (Verhoeff, 1943); *C. flavidus sorattinus* (Verhoeff, 1951).

MAIN REFERENCES. — Newport 1845: 433 (original description of *A. hopei*); C. L. Koch 1847: 182 (original description of *P. nitens*), 184 (original description, as *Clinopodes flavidus*); C. L. Koch 1863: 105 (redescription); Meinert 1870: 75 (original description of *G. montanus*); Latzel 1880: 168 (in key), 175 (redescription); Haase 1881: 75 (in key), 78 (redescription); Berlese 1883: 9 (redescription); Attems 1895: 163 (original description of *G. flavidus* var. *styriaca*); Verhoeff 1895: 350 (original description of *G. pannonicus*); Verhoeff 1896: 2 (redescription); Attems 1903: 222 (in key), 233 (original description of *G. flavidus polytrichus*); Attems 1907: 8 (original description of *G. makrodontus*); Folkmanová 1928: 111 (in key), 112 (redescription); Verhoeff 1928: 271 (in key, and original description of *G. flavidus noduliger*); Attems 1929a: 202 (in key), 203 (redescription); Verhoeff 1934a: 10 (original description of *G. flavidus apruzianus*); Verhoeff 1934b: 113 (in key); Verhoeff 1942: 505 (original description of *G. flavidus pachypus*); Verhoeff 1943a: 82 (original description of *G. flavidus faitanus*); Verhoeff 1943b: 146 (original description of *G. flavidus improvisus*); Attems 1947: 119 (in key); Verhoeff 1951: 231 (original description of *G. flavidus sorattinus*); Folkmanová 1952: 182 (in key); Kanellis 1959: 38 (in key); Dărăbanțu & Matic 1969: 102 (in key); Matic 1972a: 75 (in key); 76 (redescription), 79 (redescription as *C. polytrichus*); Kaczmarek 1979: 62 (redescription and in key); Stoev 2002: 89 (in key).

SPECIMENS EXAMINED. — **Bulgaria**. Rila, Rilski Manastir, 3.VII.1983 K. Marinčeva lg, 1 ♂ (50 mm, 69 leg pairs) (coll. MB).
Croatia. Plitvička Jezera, 13.IV.1968 A. Minelli lg, 1 ♀ (49 mm, 65 leg pairs) (coll. MB).
Greece. Geraki, Thrace, 5.VI.1983 G. Etonti lg, 1 ♂ (42 mm, 73 leg pairs) (coll. MB). — Kato Nevrokopi, 19.IV.1982 G. Etonti lg, 1 ♀ (58 mm, 73 leg pairs) (coll. MB). — Kavala Lekanis 4.VI.1983 G. Etonti lg, 1 ♀ (68 mm, 79 leg pairs), 1 ♂ (58 mm, 67 leg pairs) (coll. MB). — Phalakron, Drama, 18.IV.1982 G. Etonti lg, 1 ♀ (43 mm, 69 leg pairs) (coll. MB).

Italy. Arenzano, near Genova, 22.II.1980 G. Gardini, C. Torti & S. Zoia lg, 1 ♂ (28 mm, 61 leg pairs) (coll. MB). — Caprazoppa, near Finale Ligure, 29.X.1982 G. Gardini & R. Rizzerio lg, 1 ♀ (23 mm, 65 leg pairs) (coll. MB). — Casella, near Genova, 11.IV.1979 G. Gardini lg, 1 ♀ (48 mm, 65 leg pairs) (coll. MB). — Magliolo, near Savona, 25.IV.1985 G. Gardini lg, 1 ♀ (40 mm, 65 leg pairs) (coll. MB). — San Giacomo near Roburent, 22.V.1982 G. Gardini & R. Rizzerio lg, 1 ♀ (28 mm, 59 leg pairs) (coll. MB).
Jordan. Zubya, 30.IV.2009 M. Uliana lg, 1 ♂ (45 mm, 59 leg pairs) (coll. MB).

Diagnosis. — A *Clinopodes* species usually up to *c.* 6 cm long; 51-81 pairs of legs, most often 53-79 in the male, 59-81 in the female; denticles of the forcipular coxosternite from distinctly wider than long to as long as wide; chitin-lines reaching the condyles; even the largest sternal pore-fields on the posterior leg-bearing segments remaining well behind the mid-length of the metasternite; all canals of the coxal organs converging into 2-4 poorly recognizable clusters aligned along the lateral margin of the metasternite and usually covered by it; no isolated pores. See also Table 3 and key to species.

Geographic distribution. — Mainly central and south-eastern Europe, westwards to the Italian side of the Western Alps and most of the Italian Peninsula including coastal Tyrrhenian islands, eastwards to the regions around the Black Sea and to the Aegean islands, northwards inhabiting the whole Alps and Carpathians and some scattered more northern localities, southwards reaching Sicily, Malta, Crete, Cyprus and the Levant. Published records from the Caucasus and Anatolia deserve confirmation, as they were possibly based on a wider concept of the species encompassing *C. caucasicus* and *C. escherichii*.

Taxonomic and nomenclatural notes

Originally described in the genus *Clinopodes* by C. L. Koch (1847), *C. flavidus* was treated by subsequent authors under *Geophilus* until it was reinstated in the genus *Clinopodes* by Brölemann (1909). Since Attems (1929a), this generic combination has been followed by most subsequent authors, with the notable exceptions of K.W. Verhoeff and B. Folkmanová, who treated *Clinopodes* as a subgenus of *Geophilus* (see notes above, under the genus *Clinopodes*). The validity of the species was never disputed.

Clinopodes flavidus and its synonym *P. nitens* were described simultaneously in the same publication (C. L. Koch 1847), but the former is the valid name for the species since Latzel (1880), who acted as "First Reviser" (ICZN 1999: art. 24.2) when synonymizing *P. nitens* under *C. flavidus*.

The nomenclature of the putative subspecies is confused by the fact that the name *noduliger* was introduced twice by K.W. Verhoeff for two actually distinct subspecies, based on specimens from Israel (Verhoeff 1925a) and from Italy (Verhoeff 1928) respectively.

Notes on new synonymies

Arthronomalus hopei was described by Newport (1845) based on a single male collected "prope Neapolin" (= near Naples [Italy]). As the original description was very vague, the true identity of this nominal species remained unknown, as explicitly acknowledged by Attems (1929a) and Manfredi (1956), and no other specimens were referred to it. *Arthronomalus hopei* was reported as a putatively valid species only in some old publications, either under *Arthronomalus* Newport, 1845 (currently a synonym of *Geophilus*) or *Geophilus* (Gervais 1847; Newport 1856; Fanzago 1874), whereas it was almost completely ignored by subsequent authors. It is worth noting that Meinert (1870), when describing the new species *G. montanus* (a synonym of *C. flavidus*; see above), commented on the fact that it could be identical to *A. hopei*. Among the very scarce morphological information provided in the original description (Newport 1845), "labio [...] minute bidentato" may be interpreted most probably as indicating the presence of a pair of denticles on the anterior margin of the forcipular coxosternite. This character, together with the number of trunk segments and the provenance of the holotype, allows the confident recognition of *A. hopei* as identical to *C. flavidus*, which is relatively common in the area (e.g., Verhoeff 1928, 1943a; Zapparoli & Minelli 2005). Even though *A. hopei* is recognized as a senior synonym of *C. flavidus*, we think that resurrecting the former name would not serve nomenclatural stability and universality and therefore we advocate the conservation of *Clinopodes flavidus* C. L. Koch, 1847 over *Arthronomalus hopei* Newport, 1845 (ICZN 1999: Art. 23.9): at best of our knowledge, the name *A. hopei* was not used as valid after

Fanzago (1874), even though it continued to be cited as a species of uncertain validity up to Manfredi (1956); conversely, *C. flavidus* has been universally and repeatedly used as the valid name for this species since the end of the 19th century and, in particular, in more than 25 publications by more than 10 authors in the last 50 years and encompassing a span of more than 10 years (e.g., Dărăbanțu & Matic 1969; Negrea *et al.* 1970; Matic 1972a, b; Würmli 1972; Kaczmarek 1979, 1980; Minelli 1982, 1992, 1993; Minelli & Zapparoli 1985, 1992, 1994; Kos 1992; Foddai *et al.* 1995; Ribarov 1996; Stoev 1997, 2001a, 2002, 2004; Wytwer 1997; Zapparoli 1999, 2002; Stašiov 2001; Bonato *et al.* 2005, 2008).

Geophilus gorizensis was described by Latzel (1880), based on a single female from the "südöstlichste Theil des Tarnowaner-Gebirges" (= extreme south-east part of Tarnova massif [Slovenia]). It was repeatedly cited as a valid taxon, most often at the rank of species, and it was also reported from another locality, close to the type locality (Manfredi 1940). Since Attems (1929a), it has been cited invariantly in the genus *Pleurogeophilus*, according to its putative affinity to *P. mediterraneus* (Meinert, 1870). This taxonomic position was first questioned by Minelli (1992), who suspected instead that *G. gorizensis* could actually represent a *Clinopodes* species, and uncertainty as to its true identity has been repeatedly expressed by modern authors (Foddai *et al.* 1995; Stoev 1997). Based on the original description (Latzel 1880), the traditional assignment of *G. gorizensis* to *Pleurogeophilus* appears unwarranted, as *G. gorizensis* differs from *P. mediterraneus* in characters that are regarded as diagnostic for *Pleurogeophilus*, such as a toothless anterior margin of the forcipular coxosternite and sub-circular sternal pore-fields. *Geophilus gorizensis* is consistent with *Clinopodes* in a combination of characters diagnostic for the latter genus in respect to all other western Palaearctic geophilids, including the presence of denticles and chitin-lines on the forcipular coxosternite, the arrangement of sternal pores into posterior transversal bands on most trunk segments and larger areas on the most posterior segments, and the lack of claws on the ultimate legs. Inconsistently, however, the metasternite of the ultimate leg-bearing segment was described as relatively narrow, rather than wider than long as typical for *Clinopodes*, and the coxal pores were indicated as distributed on the entire surface of the coxopleura, whereas they are usually concentrated towards the metasternite in *Clinopodes*. Nevertheless, among the known species of *Clinopodes*, information provided by Latzel (1880) on body size, forcipular denticles, chitin-lines, and number of trunk segments are together suggestive of *C. flavidus*, which is known to occur widely in the area.

Geophilus makrodontus was described by Attems (1907) based on a single female from "Aluschta, Krim" (= Alushta, in Crimea [Ukraine]). No other specimens were referred to this species, which was only cited in major faunistic revisionary works, even though with the incorrect subsequent spelling *G. macrodontus* (Attems 1927, 1929a, 1947; Titova 1969). Attems (1907) assigned *G. makrodontus* to the subgenus *Geophilus*, and considered it most similar to *Geophilus strictus* Latzel, 1880 (a species of uncertain identity, possibly a *Clinopodes* species; see below under Discussion) and secondarily to *Geophilus gracilis* Meinert, 1870 (a true *Geophilus* species; Eason 1961) and *Geophilus latro* Meinert, 1870 (a synonym of *Arenophilus bipuncticeps* (Wood, 1862); Chamberlin 1912b). Subsequently, Attems (1927, 1929a, 1947) confirmed *G. makrodontus* in the genus *Geophilus* and included it in keys where it was contrasted directly with *G. electricus* (Linnaeus, 1758). The taxonomic position of *G. makrodontus* was never reassessed. Based on the quite detailed original description and illustrations (Attems 1907), and contrary to the taxonomic position maintained by the same C. Attems, the holotype of *G. makrodontus* is unambiguously recognizable as belonging to the genus *Clinopodes*, as it shares all major diagnostic characters of this genus, including the overall features of maxillary complex, forcipular segment (general shape, and denticles on the anterior margin of the coxosternite), trunk metasternites (carpophagus socket and shape of the pore-fields), and ultimate leg-bearing segment (shape of metasternite, pattern of coxal pores, lack of claws). In particular, the presence of complete chitin-lines, the size of the denticles on the forcipular coxosternite, the

number of leg pairs, the short extent of the pore-fields on the most posterior metasternites, and the arrangement of the coxal pores into clusters are fully and exclusively diagnostic of *C. flavidus*. It is worth noting that *C. flavidus* has been already recorded from Crimea (Selivanov 1881, 1884; Attems 1907).

Clinopodes intermedius Dărăbanțu & Matic, 1969

TYPE MATERIAL AND TYPE LOCALITY. — 3 ♀♀, syntypes; from "Măcin" (= Macin [Romania]) (Dărăbanțu & Matic 1969).

SYNONYMS. — None.

NOMINAL SUBSPECIES. — None.

MAIN REFERENCES. — Dărăbanțu & Matic 1969: 102 (in key), 104 (original description, as *Clinopodes intermedius*); Matic 1972a: 76 (in key), 86 (redescription).

MATERIAL EXAMINED. — None.

DIAGNOSIS. — A *Clinopodes* species up to *c.* 7 cm long; 79-81 pairs of legs in the female; denticles of the forcipular coxosternite relatively short, wider than long; chitin-lines reaching the condyles; the largest sternal pore-fields on the posterior leg-bearing reaching the mid-length of the metasternite; almost all canals of the coxal organs converging into apparently four clusters aligned along the lateral margin of the metasternite; additionally, a single small pore on the ventro-lateral side of each coxopleuron, far apart from all the other pores and lateral to them. See also Table 3 and key to species.

GEOGRAPHIC DISTRIBUTION. — Dobrogea (Romania) (only known from the type locality).

TAXONOMIC AND NOMENCLATURAL NOTES

Clinopodes intermedius was originally described by Dărăbanțu & Matic (1969) and subsequently maintained as a valid species (e.g., Matic 1972a; Stoev 1997), even though it was frequently ignored and no other specimens were referred to it. Pending further investigations, the published accounts suggests that *C. intermedius* could be actually different from all other species of *Clinopodes* (see Table 3), and therefore it is maintained here provisionally as a distinct species.

Clinopodes latisternus (Attems, 1947) n. comb.

TYPE MATERIAL AND TYPE LOCALITY. — One specimen, holotype; from "Cilicischer Taurus" (= Taurus Mountains [Turkey]) (Attems 1947).

SYNONYMS. — *Pleurogeophilus turkensis* Chamberlin, 1952, n. syn. (see below) (type material and type locality: holotype, from Mt Honaz [Turkey]).

NOMINAL SUBSPECIES. — None.

MAIN REFERENCES. — Attems 1947: 64 (original description, as *Pleurogeophilus latisternus*), 125 (in key); Chamberlin 1952: 204 (original description of *Pleurogeophilus turkensis*).

MATERIAL EXAMINED. — None.

DIAGNOSIS. — A *Clinopodes* species with 69-75 pairs of legs; denticles of the forcipular coxosternite relatively short, wider than long; chitin-lines reaching the condyles; coxal organs opening through independent pores on the ventral side of the coxopleura. See also Table 3 and key to species.

GEOGRAPHIC DISTRIBUTION. — Southern Anatolia (Turkey) (only two localities known).

TAXONOMIC AND NOMENCLATURAL NOTES

Clinopodes latisternus n. comb. was originally described by Attems (1947) as a species of *Pleurogeophilus*. No other specimens were identified subsequently, and it was merely registered as a species of uncertain identity by Zapparoli (1999). A dubious record given by Zapparoli (1999) as "Mersin?" is simply derived from a tentative interpretation of the type locality (Zapparoli pers. com.). The species is assigned here for the first time to the genus *Clinopodes*. According to the original description and illustrations (Attems 1947), *P. latisternus* has a combination of characters unambiguously diagnostic for *Clinopodes*, namely the structure of the labrum, the overall features of the forcipular segment including the denticles on the anterior margin of the coxosternite and the chitin-lines, the presence of carpophagus sockets, the pattern of sternal pores, the shape of the metasternite of the ultimate leg-bearing segment, the arrangement of the coxal pores, and the lack of claws on the ultimate legs. Further support comes from the fact that the three differences listed by Attems (1947) between *P. latisternus* and *P. mediterraneus* (pattern

of sternal pores, shape of ultimate metasternite, and arrangement of coxal pores) are actually differential characters between the two genera *Clinopodes* and *Pleurogeophilus* (Table 2). Though the original description of *P. latisternus* is incomplete and even vague on some characters, it suggests that *P. latisternus* is possibly different from all other species of *Clinopodes* (see Table 3), and therefore it is maintained here provisionally as a distinct species.

NOTES ON NEW SYNONYMIES

Pleurogeophilus turkensis was described by Chamberlin (1952) based on a single specimen from "Honoz dağı" (= Mt Honaz [Turkey]). No other specimens were subsequently assigned to this nominal species, which remained of uncertain identity and was even suspected to be a synonym of *P. mediterraneus* (Zapparoli 1999). Based on the original description (Chamberlin 1952), *P. turkensis* can be confidently recognized to belong to *Clinopodes*, as it is characterized by a combination of traits obviously diagnostic for this genus, namely the features of the labrum and the forcipular coxosternite (including anterior denticles and chitin-lines), the pattern of sternal pore-fields, the shape of the metasternite of the ultimate leg-bearing segment, and the lack of claws on the ultimate legs. It is worth noting that *P. turkensis* was described by Chamberlin (1952) as similar to *P. gorizensis* (synonymized here under *C. flavidus*; see above), and putatively differing from the latter in the shape of the labrum and the sternal pore-fields, which are actually more consistent with *Clinopodes*. Among the known species of *Clinopodes*, the relatively high number of trunk segments and the independently opening coxal organs described for *P. turkensis*, as well as the geographical provenance of the holotype, are all suggestive of its identity with *C. latisternus*.

Clinopodes rodnaensis (Verhoeff, 1938)

TYPE MATERIAL AND TYPE LOCALITIES. — Unknown number of ♀♀ and juveniles, syntypes; from "Valea Vinului (bei Rodna)" (= Valea Vinului [Romania]), "Bistritz" (= Bistrita [Romania]), "Kronstadt" (= Brasov [Romania]), "Schäßburg" (= Sighisoara [Romania]), and "Bükkgebirge" (= Bükk [Hungary]) (Verhoeff 1938).

SYNONYMS. — None.

NOMINAL SUBSPECIES. — None.

MAIN REFERENCES. — Verhoeff 1938: 340 (in key), 342 (original description, as *Geophilus rodnaensis*); Attems 1947: 120 (in key); Dărăbanțu & Matic 1969: 102 (in key); Matic 1972a: 76 (in key); 88 (redescription).

MATERIAL EXAMINED. — **Romania**. Casa de Piatra, Bihor Mountains, 10.VIII.2007 G. Gardini & R. Rizzerio lg, 1 ♀ (32 mm long, 61 leg pairs) (coll. MB).

DIAGNOSIS. — A *Clinopodes* species up to *c.* 4 cm long; 57-71 pairs of legs; denticles of the forcipular coxosternite relatively elongate, about as long as wide; chitin-lines reaching the condyles; the largest sternal pore-fields on the posterior leg-bearing segments reaching the mid-length of the metasternite; all canals of the coxal organs opening through independent pores, more dense close to the lateral margins of the metasternites but most of them not covered by the latter, including a larger, posteriorly isolated pore on each coxopleuron. See also Table 3 and key to species.

GEOGRAPHIC DISTRIBUTION. — Carpathians and Dobrogea.

TAXONOMIC AND NOMENCLATURAL NOTES

Clinopodes rodnaensis was originally described by Verhoeff (1938) as a species in the subgenus *Clinopodes* of the genus *Geophilus*, and first assigned to the genus *Clinopodes* by Attems (1947). It was maintained as a distinct species by most subsequent authors, who also identified new specimens (Dărăbanțu & Matic 1969; Dărăbanțu *et al.* 1969; Negrea *et al.* 1970; Matic & Dărăbantzu 1971; Negrea 1994), but it was listed as a synonym of *C. trebevicensis* (a synonym of *C. carinthiacus*; see above) by Foddai *et al.* (1995) (see also Minelli 1992). After the direct examination of a specimen that we confidently identified as *C. rodnaensis*, we can confirm the morphological differences given in the literature in respect to *C. carinthiacus* and all other species of *Clinopodes* (Table 3), thus supporting the recognition of *C. rodnaensis* as a distinct species.

Clinopodes skopljensis (Verhoeff, 1938)

TYPE MATERIAL AND TYPE LOCALITY. — 1 juvenile, holotype; from "Skoplje" (= Skopje [Macedonia]) (Verhoeff 1938).

SYNONYMS. — None.

NOMINAL SUBSPECIES. — None.

MAIN REFERENCES. — Verhoeff 1938: 341 (original description, as *Geophilus skopljensis*); Attems 1947: 120 (in key).

MATERIAL EXAMINED. — None.

DIAGNOSIS. — A *Clinopodes* species with around 61 pairs of legs; denticles of the forcipular coxosternite moderately elongate, slightly wider than long; chitin-lines vanishing before reaching the condyles; even the largest sternal pore-fields on the posterior leg-bearing segments well behind the mid-length of the metasternite; all canals of the coxal organs opening through independent pores, more dense close to the lateral margins of the metasternites but most of them not covered by the latter, without a distinctly isolated pore. See also Table 3 and key to species.

GEOGRAPHIC DISTRIBUTION. — Macedonia (only known from the type locality).

TAXONOMIC AND NOMENCLATURAL NOTES

Clinopodes skopljensis was originally described by Verhoeff (1938) as a species in the subgenus *Clinopodes* of the genus *Geophilus*, and was transferred to *Clinopodes* by Attems (1947). No other specimens were identified, it was almost completely ignored with the exception of mere citations in faunistic catalogues (Kos 1992; Stoev 1997, 2001b), and its identity has been regarded as uncertain (Stoev 2001b). Even though the original description is incomplete for some characters and is based on a single juvenile, it suggests that *C. skopljensis* could actually be different from all other species of *Clinopodes* (see Table 3), and therefore it is provisionally maintained here as a distinct species.

Clinopodes verhoeffi n. nom.

TYPE MATERIAL AND TYPE LOCALITY. — 2 ♀♀, syntypes; from "Kirjat Anawim" = (Kiryat Anavim [Israel]) (Verhoeff, 1934a, under *Geophilus flavidus porosus*).

SYNONYMS. — *Geophilus flavidus porosus* Verhoeff, 1934 (see below).

NOMINAL SUBSPECIES. — None.

MAIN REFERENCES. — Verhoeff 1934a: 10 (original description, in key, of *Geophilus flavidus porosus*); Dărăbanțu & Matic 1969: 102 (in key, as *Clinopodes porosus*); Matic 1972a: 76 (in key); 83 (redescription, as *Clinopodes porosus*).

MATERIAL EXAMINED. — **Romania**. Casa de Piatra, Bihor Mountains, 10.VIII.2007, G. Gardini & R. Rizzerio lg, 1 ♀ (35 mm long, 61 leg pairs) (coll. MB).

DIAGNOSIS. — A *Clinopodes* species up to *c.* 5 cm long; 59-65 pairs of legs; denticles of the forcipular coxosternite variously from wider than long to as long as wide; chitin-lines reaching the condyles; even the largest sternal pore-fields on the posterior leg-bearing segments remaining well behind the mid-length of the metasternite; almost all canals of the coxal organs converging into3 or 4 poorly recognizable clusters aligned along the lateral margin of the metasternite and usually covered by it; additionally, a single small pore on the ventro-lateral side of each coxopleuron, far apart from all the other pores and lateral to them. See also Table 3 and key to species.

GEOGRAPHIC DISTRIBUTION. — Originally described from the Levant and also recorded from north-western Anatolia and the Carpathians. A single record as "*Clinopodes flavidus* forma *porosus*" from a locality in the central part of the Italian Peninsula (Marcuzzi 1968) is not accompanied by supporting evidence and has been disregarded by all subsequent authors.

TAXONOMIC AND NOMENCLATURAL NOTES

The species was originally described by Verhoeff (1934a) as *Geophilus* (*Clinopodes*) *flavidus porosus*. It was first raised to the species rank, in the genus *Clinopodes*, by Attems (1947), who however suspected that it could be identical to *C. trebevicensis* (a synonym of *C. carinthiacus*; see above). Some subsequent authors maintained it as a valid species and identified other specimens (Dărăbanțu & Matic 1969; Matic 1970, 1972a), but others ignored it, though not questioning its validity explicitly. It is maintained here as a distinct species after the direct examination of a specimen matching the putative diagnostic characters given in the literature (Table 3).

Geophilus flavidus porosus Verhoeff, 1934 is a primary junior homonym of *Geophilus porosus* Porat, 1894 (a nominal species of uncertain identity, but obviously unrelated to *Clinopodes*; Fahlander 1937). Conditions for reversal of precedence between homonyms (ICZN 1999: art. 23.9) do not occur, because *G. porosus* Porat, 1894 has been used as a valid name even after 1899 (Fahlander

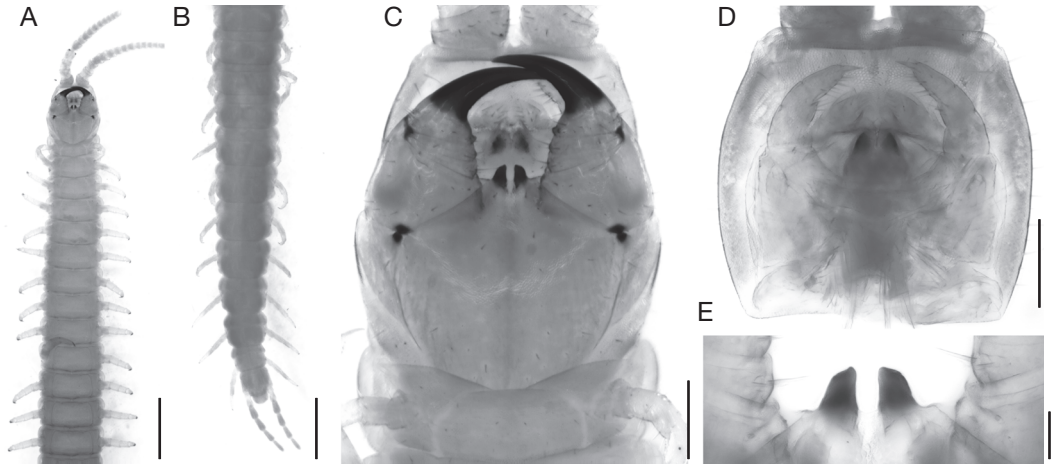

FIG. 2. — *Clinopodes vesubiensis* n. sp. (light microscope photographs of the holotype, ♀, 38 mm long, from Lucéram, France): **A**, anterior part of body, ventral view; **B**, posterior part of body, dorsal view; **C**, head and forcipular segment, without antennae, ventral view; **D**, head, detached from trunk and without antennae, ventral view; **E**, anterior denticles of the forcipular coxosternite, ventral view. Scale bars: A, B, 1 mm; C, D, 0.2 mm; E, 0.05 mm.

1937) and *G. flavidus porosus* Verhoeff, 1934 has been used as valid in the preceding 50 years in considerably less than 25 publications and by less than 10 different authors. Moreover, *G. porosus* Porat, 1894 has been cited under *Geophilus* even by Attems (1903) and therefore the two taxa have been treated as congeneric even after 1899 (ICZN 1999: art. 23.9.5). As a consequence, the name *G. flavidus porosus* Verhoeff, 1934 must be rejected (ICZN 1999: art. 60) and, lacking any synonym, it is replaced here by *Clinopodes verhoeffi* (n. nom.), from the name of the author of the junior homonym.

Clinopodes vesubiensis n. sp.
(Figs 2; 3)

TYPE MATERIAL AND TYPE LOCALITY. — Holotype ♀, 38 mm long, with 61 leg pairs, from Lucéram, Peira-Cava, La Cabanette (France) (MNHN). — Paratype ♂, 37 mm long, with 59 leg pairs, from Saint-Martin-Vésubie, cime de la Palu, 2100-2150 m, *Rhododendron*, 11.VII.1962, J.-L. Amiet lg (France) (MNHN).

ETYMOLOGY. — From "Vesubia", ancient Latin name of the river Vésubie, referring to the fact that all three known localities are within this river basin or close to it.

OTHER MATERIAL EXAMINED. — **France**. Alpes-Maritimes department, Lucéram, Peira-Cava, La Cabanette, 1320-1450 m, *Abies alba*, *Pinus* and *Fagus sylvatica*, 9.III.2007, É. Iorio lg; 2 ♀♀ (42, 46 mm; both 61 leg pairs) (coll. EI and coll. MB); 1 ♂ (35 mm, 57 leg pairs) (coll. EI). — Saint-Martin-Vésubie, cime de la Palu, 2100-2150 m, *Rhododendron*, 11.VII.1962, J.-L. Amiet lg, 1 ♂ (35 mm, 57 leg pairs) (MNHN). — Venanson, mont le Conquet, 1130-1150 m, *Pinus* and *Buxus sempervirens*, 3-8.VII.1961, J.-L. Amiet lg, 1 ♀ (27 mm, 61 leg pairs) (MNHN). — Venanson, mont le Conquet, 1600 m, meadow, 7.VI.1960, J.-L. Amiet lg, 1 ♀ (35 mm, 63 leg pairs) (MNHN).

DIAGNOSIS. — A *Clinopodes* species up to *c.* 4-5 cm long; 57-59 pairs of legs in the male, 61-63 in the female; denticles on the anterior margin of the forcipular coxosternite relatively elongate, about as long as wide; chitin-lines vanishing before reaching the condyles; the largest sternal pore-fields on the posterior leg-bearing segments reaching the mid-length of the metasternite; all canals of the coxal organs opening through independent pores, more dense close to the lateral margins of the metasternites but most of them not covered by the latter; additionally, a single small pore, on the ventro-lateral side of each coxopleuron, far apart from all the other pores and lateral to them. See also Table 3, Figures 2, 3, and key to species.

GEOGRAPHIC DISTRIBUTION. — Maritime Alps; recorded hitherto from three localities (see under "Other material examined"; Fig. 4), 1130-2150 m.

DESCRIPTION

Holotype

Preserved in ethanol 70%; head detached from trunk, maxillary complex partially detached from the cephalic capsule.

General features (Fig. 2A, B). Body slender, slightly narrowing forward, more attenuated towards the posterior tip. Colour (preserved in ethanol 70%) almost uniform, dark yellow.

Cephalic capsule (Figs 2D; 3A). Cephalic plate sub-quadrate, approximately as long as wide; anterior margin slightly convex, lateral margins evidently convex, posterior margin slightly concave; areolation uniform on the entire surface, without a distinct transverse suture; setae arranged approximately in 5 transverse rows. Clypeus uniformly areolate, without finely areolate clypeal areas and without non-areolate areas close to the labrum; 3 medial pairs of setae on the anterior part of the clypeus, a group of 5 setae on each half of the anterior part of the clypeus, and 3 mid-longitudinally aligned setae on the posterior part of the clypeus. Labrum: margin slightly angled medially, projecting backwards; a row of slender hyaline filaments and 2 or 3 medial sclerotised tubercles.

Antennae. Each antenna *c.* 2.4 times as long as the head. Articles slightly narrowing and shortening from article II, which is *c.* 1.1 times as long as wide, to article XIII, which is *c.* 0.9 times as long as wide. Article XIV sub-ovoid, *c.* 2.0 times as long as wide. Setae gradually denser and shorter from the basal articles to the distal ones. Apical sensilla *c.* 12 µm long, spear-like, slender, narrowing quite abruptly from about the mid-length. Club-like sensilla *c.* 10 µm long, only on article XIV, grouped on the distal parts of both the internal and external sides. Three longitudinal rows of propioceptive spine-like sensilla at the bases of the articles: 4 or 5 sensilla in each row on articles II-V, 2 or 3 sensilla in each row on articles VII-IX, 1 or 2 sensilla in each row on articles XI-XIII; rows lacking on articles VI, X and XIV, where only a single, dorsal sensillum is present. Sensilla similar to the apical ones, 5-7 µm long, on both the ventro-internal and the dorso-external sides of the distal part of articles II, V, IX and XIII: 3 sensilla on the dorso-external side of articles IX and XIII, a single sensillum in all other positions. A slender spine, *c.* 10 µm long, on the external side of the distal part of articles V, IX and XIII.

Mandible. A single pectinate lamella.

First maxillae (Fig. 3B). Coxosternite entire, with elongate lappets. Coxal projections sub-triangular, longer than wide. Telopodites longer than the coxal projections, composed of two articles, with elongate lappets. Both the coxal projections and the distal article of the telopodites with setae on the basal part, spine-like sensilla close to the tip, and fine scales covering the tip.

Second maxillae (Fig. 3B). Coxosternite entire, uniformly areolate; anterior margin widely concave; setae close to the anterior margin. Telopodites composed of three articles, gradually narrowing towards the tip; claw simple, almost straight and gradually tapering.

Forcipular segment (Figs 2C, E; 3C). Tergite subtrapezoid, *c.* 2.6 times as wide as long; anterior margin distinctly concave so that a pretergite is partially visible; lateral margins evidently converging forward. Exposed part of coxosternite *c.* 1.5 times as wide as long; a medial pair of dark subtrapezoidal denticles on the anterior margin, *c.* 1.1 times as long as wide at the base, their mesal margins subparallel; coxopleural sutures entirely ventral, strongly converging backward; chitin-lines pointing forward towards the condyles, vanishing forward but almost reaching the condyles. Trochanteroprefemur slightly wider than long, the internal side only ⅓ the length of the external side, without denticles. Forcipular intermediate articles distinct, without denticles, each with a shallow bulge only. Tarsungulum abruptly narrowing near the base, the distal part curved and tapering uniformly; a basal, small denticle; internal margin crenulate.

Leg-bearing segments (Fig. 3D). Tergite 1 wider than metatergite 2, lateral margins slightly converging backward; no distinct pretergite 1. Metasternite 1 smaller than the next one, lateral margins distinctly convex, and converging forward. Metasternites from 2 to penultimate sub-trapezoid to sub-rectangular; setae of various sizes, the longest arranged in two transverse rows. "Carpophagus" pits on the anterior margin of metasternites 9-20, their maximum size on metasternite 16 (slightly bilobed, *c.* 0.6 times as wide as the anterior margin of the metaster-

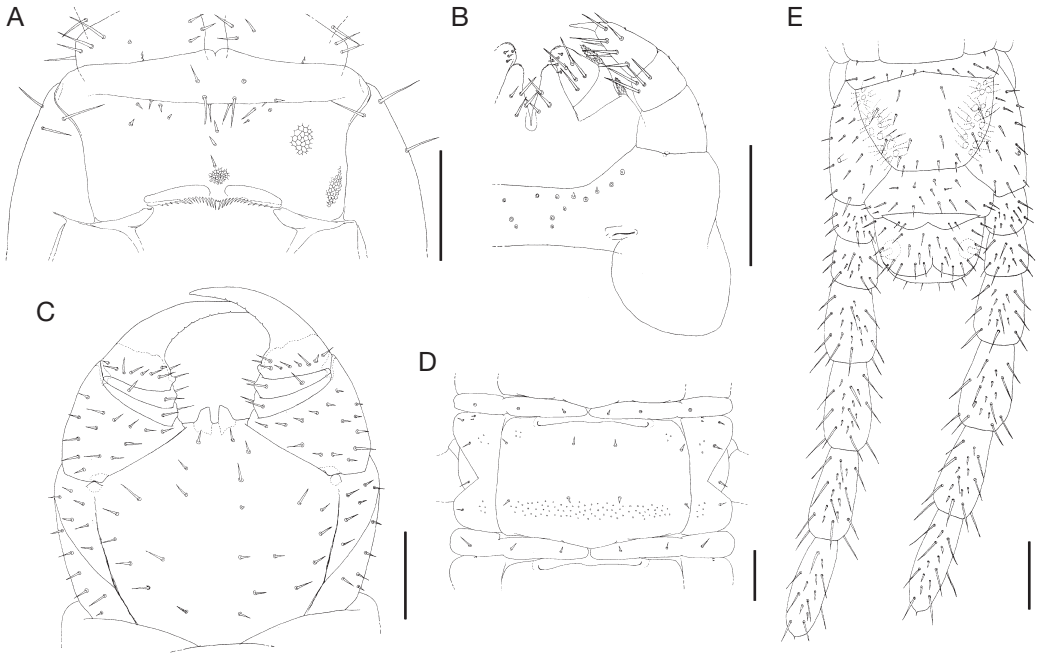

FIG. 3. — *Clinopodes vesubiensis* n. sp. (line drawings of the holotype, ♀, 38 mm long, from Lucéram, France): **A**, anterior part of cephalic capsule, without maxillae and mandibles, ventral view, areolation only partially drawn; **B**, left half of the maxillary complex, ventral view; **C**, forcipular segment, ventral view; **D**, leg-bearing segment 12, without legs, ventral view; **E**, ultimate leg-bearing segment and postpedal segments, ventral view. Scale bars: 0.2 mm.

nite), gradually decreasing in size both forward and backward. A transversal, posterior band of pores on all metasternites from 1 to penultimate; on most segments, the band does not extend forward, but is limited to the posterior third of the metasternite; on the five most posterior segments, it extends mid-longitudinally forward, reaching the maximum extent on leg-bearing segment 58 (reaching the mid-length of the metasternite). Groups of few pores on the anterior corners of the metasternites, procoxae and metacoxae from approximately leg-bearing segment 10 to 25. Legs 1 smaller than the others, legs 2 to penultimate similar in size and shape; pretarsus claw-like, with two accessory spines; the anterior accessory spine longer than the posterior and almost reaching the mid-length of the unguis proper on the anterior part of the trunk, but smaller than the posterior spine and reaching *c*. ⅓ of the length of the unguis proper on the posterior part of the trunk.

Ultimate leg-bearing segment (Fig. 3E). Pleuropretergite *c*. 4.5 times as wide as long, without apparent sutures. Metatergite *c*. 1.1 times as wide as long, lateral margins evidently convex and converging backward, posterior margin truncate. Metasternite *c*. 1.3 times as wide as long, lateral margins evidently convex, posterior margin almost straight; setae uniformly scattered. Coxopleura moderately swollen, reaching forward the lateral sides of the presternite; setae rare, uniformly scattered. Coxal organs opening into pores almost completely covered by the metasternite, grouped along the lateral margins of the latter in 2 or 3 weakly distinct clusters, additionally a single pore isolated on the ventrolateral side of each coxopleuron, at *c*. 65-70% of the total length of the coxopleuron, smaller than most other pores (diameter *c*. 7-8 µm); no pores opening on the dorsal side. Ultimate telopodites *c*. 1.5 times as long and slightly more swollen than the penultimate; a few long setae around all articles,

denser short setae on the ventral side only. Pretarsus a simple slender apical spine *c*. 10 µm long.

Postpedal segments (Fig. 3E). Intermediate sternite inconspicuous, medially not exposed. First genital sternite *c*. 3 times as wide as long, posterior margin approximately straight; uniformly covered with setae. Gonopodal lamina distinctly bilobed, with a pair of setae on each lobe. A pair of distinct anal organs and pores.

Differences in male paratype

Differences in the terminal part of the body in an adult male (paratype, 37 mm long, 59 leg pairs; from Saint-Martin-Vésubie, cime de la Palu, data under "Other material examined"). Ultimate telopodites distinctly more swollen than in the female. First genital sternite separated from pleurites by distinct suture converging forward. Gonopods bi-articulate, conical penis inbetween.

Key to the species of *Clinopodes*

1. All or almost all openings of the coxal organs distinctly grouped into 2-4 clusters on each side, completely or almost completely covered by the metasternite (Fig. 1E) 2
— Openings of the coxal organs scattered or only partially grouped close to the metasternite, and not covered by the latter (Fig. 1F) 6

2. No coxal pores isolated from the clusters 3
— One small pore on each coxopleuron, isolated from the clusters (Fig. 1E) 4

3. The largest sternal pore-fields on the posterior leg-bearing segments extending forward to reach or even extending beyond the mid-length of the metasternites (Fig. 1C) .... *C. escherichii*
— The sternal pore-fields on the posterior leg-bearing segments limited to 1/3-2/5 of the length of the metasternites (Fig. 1D) ..... *C. flavidus*

4. The largest sternal pore-fields on the posterior leg-bearing segments extending forward to reach the mid-length of the metasternites (Fig. 1C) ..... *C. intermedius*
— The sternal pore-fields on the posterior leg-bearing segments limited to 1/3 of the length of the metasternites (Fig. 1D) 5

5. Anterior denticles of the forcipular coxosternite not very prominent, usually distinctly wider than long (Fig. 1A). Usually more than 65 leg-bearing segments .... *C. caucasicus* n. comb.
— Anterior denticles of the forcipular coxosternite very prominent, usually only slightly wider than long or as wide as long (Fig. 1B). Usually less than 65 leg-bearing segments ..... *C. verhoeffi* n. nom.

6. Chitin-lines reaching the condyles of the forcipular coxosternite (Fig. 1B) 7
— Chitin-lines not reaching the condyles of the forcipular coxosternite (Fig. 1A) 8

7. Anterior denticles of the forcipular coxosternite not very prominent, wider than long (Fig. 1A) ..... *C. latisternus* n. comb.
— Anterior denticles of the forcipular coxosternite not very prominent, about as long as wide (Fig. 1B) ..... *C. rodnaensis*

8. The sternal pore-fields on the posterior leg-bearing segments limited to 1/3 of the length of the metasternites (Fig. 1D). No coxal pore distinctly isolated from the other pores ... . *C. skopljensis*
— The largest sternal pore-fields on the posterior leg-bearing segments extending forward to reach or even extending beyond the mid-length of the metasternites (Fig. 1C). One coxal pore on each coxopleuron, isolated from all other pores (Fig. 1E, F). 9

9. Isolated coxal pore larger and posterior to all other pores on each coxopleuron (Fig. 1F) ..... *C. carinthiacus*
— Isolated coxal pore smaller and lateral to the other pores on each coxopleuron (Figs 1E; 3E) ..... *C. vesubiensis* n. sp.

DISCUSSION

Taxonomy

Our survey of the morphological diversity within *Clinopodes* provides evidence for the provisional recognition of a total of 10 species. Comparative examination of representative specimens confirms the validity of six previously recognized species (*C. carinthiacus*, *C. escherichii*, *C. flavidus*, *C. rodnaensis*, *C. verhoeffi* and *C. caucasicus* n. comb.), to which we add a prevously undetected species (*C. vesubiensis* n. sp.). Additionally, through a reassessment of the relevant literature, we have maintained as valid, at least provisionally, another three nominal species (*C. intermedius*, *C. skopljensis* and *C. latisternus* n. comb.). Each of these species was found to be unambiguously diagnosed by a unique combination of characters, nevertheless it should be noted that we could assess the intraspecific variation of these characters for some species only (*C. caucasicus* n. comb., *C. escherichii*, *C. flavidus*, *C. carinthiacus*), for which at least eight specimens comprising both sexes have been available to examination. It will not be possible to extend such an evaluation to the other species until an adequate series of specimens has been collected and/or identified in collections. Consequently, the species-level taxonomy of *Clinopodes* proposed here should be taken as a preliminary, tentative framework only, and further investigations are needed to address the actual species diversity within the genus, as well as the geographical pattern of this diversity.

A total of 37 nominal species-group taxa have been assigned to *Clinopodes* by previous authors (Table 1). A further name *fiumaranus* was introduced by Verhoeff (1938) as a variety of *Geophilus* (*Clinopodes*) *rodnaensis strasseri* and was even cited occasionally in the subsequent literature, but it remains unavailable because it was applied to an infrasubspecific entity only (ICZN 1999: art. 45.5). Of these nominal taxa, 12 are obviously not *Clinopodes*. Among these, the mecistocephalid *Dicellophilus carniolensis* was originally included in *Clinopodes* together with *C. flavidus* but has long been recognized in a different family (see Notes above, under *Clinopodes*), and another nine taxa had been referred to *Clinopodes* due to a wider circumscription of the genus, but have been recently recognized as belonging to either *Stenotaenia* or *Tuoba*, which are currently established as clearly distinct genera (Jones 1998; Bonato & Minelli 2008). Additionally, *Geophilus pyrenaicus* has been cited once under *Clinopodes* (Kevan 1983) but without supporting arguments, and actually its well known morphology (Brolemann 1930; Salinas 1990) confirms unambiguously that it should be maintained under *Geophilus*, according to the current diagnosis of the latter genus. As to *C. lindbergi*, whose original combination under *Clinopodes* was never disputed, the detailed original description and the accompanying illustrations provided by Loksa (1971) demonstrate a combination of characters unambiguously diagnostic of the genus *Geophilus*, as currently diagnosed (Table 2), including the lack of denticles on the forcipular coxosternite and the presence of claws on the ultimate legs. Because *C. lindbergi* does not match any other known Palaearctic species of *Geophilus* in those characters that are traditionally regarded as diagnostic at the species level, it is maintained here as a distinct species as *Geophilus lindbergi* n. comb.

Conversely, we found that another eight species-group taxa that had never been recognized under *Clinopodes* actually belong to this genus. Among these, *G. caucasicus*, *G. makrodontus*, *G. gorizensis* and *G. transmontanus* had been described in the old literature under *Geophilus* on the basis of an earlier broad concept of this genus (Latzel 1880; Selivanov 1884; Attems 1907), whereas *P. latisternus*, *P. turkensis*, *P. hypotrichus* and *P. gorizensis caucasicus* have been described more recently under the poorly circumscribed genus *Pleurogeophilus* (Attems 1947;

Chamberlin 1952; Folkmanová 1956, 1958). All these taxa have been largely ignored, and their taxonomic position was problematic prior to our reassessment.

Another nominal species that could have been based on *Clinopodes* specimens is *Geophilus strictus* Latzel, 1880, but uncertainty still remains on its true identity. *Geophilus strictus* was described by Latzel (1880) based on a single male from "Pinguente" (= Buzet [Croatia]), in Istria (Ilie *et al.* 2009). Most of the characters of the holotype described by Latzel (1880) are consistent with a *Clinopodes* specimen, including some traits that are diagnostic of this genus in respect to other geophilid genera, such as the arrangement of the openings of the coxal organs and the lack of claws on the ultimate legs. However, doubt is cast by the fact that the head is described as relatively elongate and the anterior margin of the forcipular coxosternite as lacking denticles, whereas no information is given on the presence and shape of sternal pore-fields. Direct examination of the holotype appears necessary to decide the matter.

Morphology

As circumscribed in this paper, *Clinopodes* is a clearly distinguishable lineage with respect to all other geophilids. It can be easily distinguished from the most similar genera (including those with which it has been partially merged, namely *Geophilus*, *Pleurogeophilus*, *Stenotaenia* and *Tuoba*; Table 2) by means of the unique combination of a couple of major characters, namely the invariant presence of a pair of sclerotised denticles on the anterior margin of the forcipular coxosternite (very rare in the geophilomorphs) and the lack of a recognizable pretarsus on the ultimate legs (a condition quite frequently found in geophilids, but not associated to forcipular sclerotised tubercles in any other lineage).

By the direct examination of representative specimens, we could confirm and integrate the morphological differences between most species of *Clinopodes*, namely *C. carinthiacus*, *C. caucasicus* n. comb., *C. escherichii*, *C. flavidus*, *C. rodnaensis*, and *C. verhoeffi*. Accounts and illustrations hitherto published for *C. caucasicus* n. comb. were so inadequate as to hinder the definitive recognition of this taxon as a distinct species in *Clinopodes*. The morphology of *C. intermedius*, *C. latisternus* n. comb., and *C. skopljensis* is still only partially known because it rests exclusively on the incomplete original descriptions of these taxa and their synonyms.

Taking into account the interspecific diversity documented in this paper, *Clinopodes* appears quite conservative in the head, including the antennae and the feeding apparatus, and most part of the leg-bearing trunk, both in the gross shape and in detail. Species differentiation has been accompanied by variation in features of the forcipular segment (relative elongation of the anterior tubercles of the coxosternite, and length of the chitin-lines) and conspicuous changes in the most posterior leg-bearing segments (extent of the areas pierced with glandular pores on the metasternites, and arrangement of the openings of the coxal organs). Especially remarkable has been the evolution of the arrangement of the coxal pores, different species being characterized by very different patterns in the adult stage: in some species (*C. rodnaensis*, *C. carinthiacus* and *C. vesubiensis* n. sp., among the best known) distinct pores are exposed independently on the surface of the coxopleura (Figs 1F; 3E), whereas in other species (e.g., *C. caucasicus* n. comb., *C. escherichii* and *C. flavidus*) all or almost all openings are clustered in a few pouches mainly concealed under the metasternite (Fig. 1E). Moreover, a relatively isolated pore may be found on each coxopleuron, either distinctly posterior (e.g., in *C. carinthiacus*; Fig. 1F) or lateral to all other pores (e.g., in *C. vesubiensis* n. sp.; Fig. 3E). It is worth noting that the pattern of coxal pores is well established as one of the major differential characters between many geophilid genera, and conspicuous interspecific diversity as found in *Clinopodes* is known only in a few other genera, which are very large and possibly not monophyletic, e.g., in *Geophilus* and *Plateurytion* Attems, 1909 (Crabill 1954; Bonato *et al.* 2007).

Intraspecific variation has been reported in *Clinopodes* species for some of the characters mentioned above, including the profile and elongation of the coxosternal denticles, the extent of the posterior pore-fields and the presence of isolated coxal pores (e.g., Verhoeff 1928, 1934a, 1942, 1951;

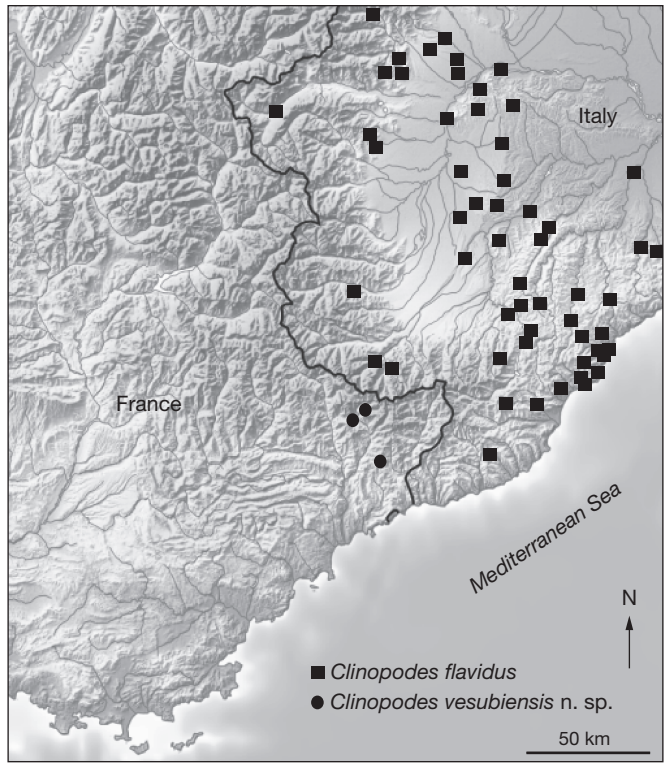

FIG. 4. — Distribution of *Clinopodes* C. L. Koch populations in the South-western Alps, based on all published and new records. The black line indicates the boundary between France and Italy.

Matic 1972a), and also for a few other characters including the relative length and density of setae on the most anterior trunk sternites (e.g., Attems 1903; Lignau 1903; Verhoeff 1928). This variation has been given taxonomic value by some authors, therefore a complex infraspecific taxonomy has been developed for *C. flavidus* based on these characters, as witnessed by the names applied to putative subspecies and varieties, e.g., *polytrichus*, *setosus*, *vestitus* and *noduliger*. However, these infraspecific taxa have mostly been ignored by modern authors. As a matter of fact, the geographical basis of the intraspecific variation of these characters has not been evaluated yet, and available data are too scarce to inform a sound infraspecific taxonomy.

GEOGRAPHICAL DISTRIBUTION

Clinopodes is widespread in a broad area in southeastern Europe and nearby regions of western Asia. To date, it has been reported westwards not beyond the Italian side of the Western Alps, where the westernmost populations of *C. flavidus* are known to occur (Minelli & Zapparoli 1985, 1992; Zapparoli 1993); to the east, it has been thought to reach the Hindu Kush, from where the species *C. lindbergi* has been described (Loksa 1971). However, the discovery of the new species *C. vesubiensis* n. sp. from the Maritime Alps and the clarification of the true identity of *C. lindbergi* (see above) change significantly the known geographical distribution of this lineage, which actually occurs also in the French side of Western Alps, while eastwards, as far as is known, it does not extend beyond the Caucasus mountain range.

Clinopodes vesubiensis n. sp. has been collected in only three localities within a limited area in the Maritime Alps (Fig. 4). Referring to the SOIUSA classification of the Alpine range (Marazzi 2005),

these localities are in the "subsection" of the Maritime Alps s.s., specifically on the southern side of the two groups of Argentera-Pépoiri-Matto and Gelas-Grand Capelet. Because the surrounding regions, between south-eastern France and north-western Italy, are among those best investigated as to their centipede fauna (Brolemann 1930; Minelli & Zapparoli 1985; Zapparoli 1993), it is expected that *C. vesubiensis* n. sp. is actually confined to a narrow area. On the French side of the Western Alps, no *Clinopodes* populations have been ever recorded before the discovery of *C. vesubiensis* n. sp. On the Italian side, the rich material hitherto collected indicates the widespread occurrence of the single species *C. flavidus*, and our direct examination of specimens from different localities close to the Maritime Alps have confirmed that such populations morphologically match *C. flavidus* and not *C. vesubiensis* n. sp. (Fig. 4).

Species exclusive to limited areas in the south-western Alps are quite frequent in many animal and plant groups (Casale & Vigna Taglianti 1985, 1993; Médail & Verlaque 1997; Casazza *et al.* 2005), including a few other centipede species: *Lithobius scotophilus* Latzel, 1887 from the Maritime Alps (Alpes-Maritimes department, and Liguria and Piemonte regions), *Cryptops lobatus* Verhoeff, 1931 from the Maritime Alps and Ligurian Apennines (Alpes-Maritimes and Var departments, in the eastern part only for the second, and Liguria region), and *Haplophilus arcisherculis* (Brölemann, 1904) from the Maritime Alps (Principauté de Monaco and Liguria region) (Iorio 2008). Actually, a few other nominal taxa have been described under *Geophilus* from coastal localities south of the Maritime Alps, but their actual identity is still unknown, raising doubts as to whether they are distinct. They are *Geophilus insculptus debilis* Brolemann, 1930 from Cannes and Cap d'Antibes (Alpes-Maritimes department), *Geophilus pinivagus* Verhoeff, 1928 from Mt. Esterel (Alpes-Maritimes and Var departments), and *Geophilus promontorii* Verhoeff, 1928 from Cap Martin (Alpes-Maritimes department). Other centipede species exclusive to different areas in the Western Alps are *Lithobius delfossei* Iorio & Geoffroy, 2007, which is apparently limited to the western side of the Cottian Alps and the south-western Prealps (Isère, Savoie, Hautes-Alpes, Alpes-de-Haute-Provence, and Vaucluse departments) and *Strigamia cottiana* (Verhoeff, 1935), which is limited to the Cottian Alps (Alpes-Maritime department and Piemonte region) (Iorio & Geoffroy 2007; Iorio 2008, 2010).

The two other species of *Clinopodes* inhabiting the Alpine range (*C. carinthiacus* and *C. flavidus*) show very different patterns of distribution, suggesting different historical processes of evolutionary differentiation and colonisation. *Clinopodes carinthiacus* inhabits the Eastern Alps and Prealps, reaching the Rhetic and Orobic Alps to the west, the westernmost known populations being near Poschiavo in the Rhetic Alps (Verhoeff 1934a), and Roncobello and Oltre il Colle in the Orobic Alps (Zapparoli & Minelli 2005). *Clinopodes flavidus* is widespread throughout the entire Alpine range, reaching the Italian side of the Cottian and Maritime Alps to the west, the westernmost localities being known near Oulx, Frossasco and Cartignano in the Cottian Alps (Minelli & Zapparoli 1992; Zapparoli 1993) and Baiardo, Entracque and Valdieri in the Maritime Alps (Minelli & Zapparoli 1985; Zapparoli 1993) (Fig. 4). In contrast to *C. carinthiacus*, *C. flavidus* is distributed throughout most of the Italian Peninsula. While the current wide distribution of *C. flavidus* makes it difficult to elaborate hypotheses on its biogeographical history, that of *C. carinthiacus* strongly suggests a partial post-glacial recolonisation of the Alps from the Balkan core area of this species, whereas *C. vesubiensis* n. sp. could represent a relic lineage that survived Pleistocene Alpine glaciation on the Maritime Alps or nearby refugial areas, but did not expand significantly from those areas.

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