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Taxonomy and phylogeny of the species of the weevil genus *Miarus* SCHÖNHERR, 1826 (Coleoptera: Curculionidae, Curculioninae)

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Abstract

The Palaearctic genus *Miarus* SCHÖNHERR, 1826 (Coleoptera: Curculionidae, Curculioninae) is revised. Nineteen species are recognized as valid. *Miarus ursinus* ABEILLE ssp. *maroccanus* SOLARI, 1947 is considered as distinct species. The following new synonymies are proposed: *M. abnormis* SOLARI, 1947 (= *M. zoufali* SOLARI, 1947 syn.n.), *M. ajugae* (HERBST, 1795) (= *M. portae* SOLARI ssp. *confusus* ROUDIER, 1966 syn.n., = *M. thuleus* KANGAS, 1980 syn.n.), *M. campanulae* (LINNAEUS, 1767) (= *M. moroi* SOLARI, 1947 syn.n.), *M. dentiventris* REITTER, 1907 (= *M. armenus* IABLOKOFF-KHNZORIAN, 1967 syn.n.), *M. maroccanus* SOLARI, 1947 (= *M. italicus* FRANZ ssp. *maroccanus* FRANZ, 1947 syn.n.), *M. monticola* PETRI, 1912 (= *M. fennicus* KANGAS, 1978 syn.n.), *M. simplex* SOLARI, 1947 (= *M. alzonae* SOLARI, 1947 syn.n., = *M. portae* SOLARI, 1947 syn.n.). The lectotypes of the following taxa are designated: *Curculio ajugae* HERBST, 1795, *Miarus abeillei* DESBROCHERS DES LOGES, 1893, *M. abnormis* SOLARI, 1947, *M. alzonae* SOLARI, 1947, *M. araxis* REITTER, 1907, *M. binaghii* SOLARI, 1947, *M. brevisrostris* SOLARI, 1947, *M. dentiventris* REITTER, 1907, *M. frigidus* FRANZ, 1947, *M. horni* FRANZ, 1947, *M. italicus* FRANZ, 1947, *M. longicollis* SOLARI, 1947, *M. moroi* SOLARI, 1947, *M. muelleri* SOLARI, 1947, *M. phyteumatis* FRANZ, 1947, *M. phyteumatis imitator* FRANZ, 1947, *M. portae* SOLARI, 1947, *M. rotundicollis* DESBROCHERS DES LOGES, 1893, *M. simplex* SOLARI, 1947, *M. stoeckleini* FRANZ, 1947, *M. subseriatus* SOLARI, 1947, *M. ursinus maroccanus* SOLARI, 1947, *M. zoufali* SOLARI, 1947. A key to the species and descriptions of diagnostic characters, biological and distributional notes, as well as illustrations of male genitalia of all species are provided. Moreover a cladistic analysis was performed to reconstruct the phylogenetic relationships of the species of this genus. Evolutionary trends of some characters are discussed.

Key words: Coleoptera, Curculionidae, Curculioninae, Mecinini, *Miarus*, taxonomy, phylogeny.

Introduction

The Palaearctic genus *Miarus* SCHÖNHERR, 1826 was initially separated from *Cleopomiarus* PIERCE, 1919 by SOLARI (1947) and FRANZ (1947) on the basis of markedly peculiar characters of the male: the shape of the median lobe of the aedeagus (apparently unique in Curculionidae), the presence of foveae on pygidium and ventrite 5, and the presence of two teeth placed posterolaterally to the fovea of ventrite 5. SOLARI (1947) and FRANZ (1947) described several new taxa without studying type material of the previously described species, which each of them interpreted in a different manner. This confusion was partly solved by SMRECZYŃSKI (1957) and ROUDIER (1966), who, however, did not treat the taxonomy of all species. Recently, a phylogenetical approach to the genera of the tribe Mecinini, including *Miarus* and *Cleopomiarus*, was attempted by CALDARA (2001a).

The aim of the present study is the taxonomic and phylogenetic treatment of all the taxa belonging to the genus *Miarus*.

Material and Methods

About 1,500 specimens of *Miarus* were studied, including specimens of the type series of most taxa. Lectotypes of some taxa are designated as appropriate. It is noteworthy that SOLARI (1947) did not designate holotypes in his publication but only on labels pinned under syntypes, whereas FRANZ (1947) "designated" only type localities.

DIAGNOSIS AND VARIABILITY: Since most species of *Miarus* are very similar in the habitus, a complete description of them would be superfluous. Diagnoses include only those features which distinguish at least one taxon from others. With regard to external characters the infraspecific variability of many characters is noteworthy, which was already emphasized by ROUDIER (1966): colour of the scales of the dorsal vestiture (white to brown to white and brown intermixed), length of the elytral scales, width of the rostrum at antennal insertion (these characters are reported in the diagnosis only in those species where they are not variable), body size, curvature of rostrum in lateral view, and sometimes, although moderate, curvature of pronotum at sides, length of elytra, depth of fovea and size of the teeth of ventrite 5 of male. For some of these characters reported in the diagnosis the usual condition is considered. Also the median lobe of the aedeagus is variable in the same species, but usually within a moderate range.

TERMINOLOGY FOR STRUCTURES OF THE MEDIAN LOBE OF THE AEDEAGUS: SOLARI (1947) proposed the following terms used also by ROUDIER (1966): mitre ("mitra" in Italian, "mitre" in French) for the median dorsal apical protuberance (Fig. 26c), auricle ("orecchietta" in Italian, "oreillette" in French) for the two lateral apical protuberances (Fig. 28b), and flange ("aletta" in Italian, "ailette" in French) for two lateral apical expansions (Fig. 21a). However, the interpretation of the terms mitre and auricle is not exactly the same for the two above-mentioned authors, because some species which have neither mitre nor auricles for Solari (i.e. *M. ajugae* and *M. simplex*), possess these structures, although distinctly reduced, for Roudier. I agree with the opinion of Roudier.

ILLUSTRATIONS: As well emphasized by ROUDIER (1966) the complex form of the aedeagus in *Miarus* is difficult to describe without the help of many drawings obtained by the examination of the median lobe from at least four different orientations: ventral (a), dorsal (b), apical (c), and lateral (d). It is very important that these orientations are followed very carefully, because slightly different angles cause distinct differences.

For easier examination of the characters of the median lobe useful for taxonomy I have omitted the apical setae and the sclerites of the endophallus.

MEASUREMENTS: Measurements were made using an ocular micrometer in a Wild M8 stereoscopic microscope. Body length was measured from the anterior margin of the pronotum along the midline to the apex of the elytra. The rostrum (Rl) was measured in lateral view from the apex (excluding mandibles) to the anterior margin of the eye; its relative length was expressed as a ratio length of rostrum/length of pronotum: if Rl/Pl was less than 0.80 it was considered fairly short, if 0.80–0.95 moderately long, if 0.96–1.15 long, if more than 1.15 very long. The length of the pronotum (Pl) was measured along the midline from the apex to the base, whereas its width (Pw) was measured transversely at the widest point. The width of pronotum was expressed as a ratio width/length: it was considered weakly transverse if the ratio was 1.20–1.25 and moderately transverse if the ratio was 1.26–1.35. The length of the elytra (El) was measured along the midline from the transverse line joining the most anterior point of the humeri to the apex, whereas its width (Ew) was measured transversely at the widest point. Also the proportions of the elytra were expressed as a ratio length/width: they were considered short if the ratio was less than 1.10, fairly short if the ratio was 1.11–1.20, and moderately long if the ratio was more than 1.21.

DISTRIBUTION: The data on the distribution of the species are based on my observations and those reported by FRANZ (1947), ROUDIER (1966), SMRECZYŃSKI (1973), DIECKMANN (1978), and KANGAS (1978, 1980).

HOST PLANTS: Data on host plants which were published by earlier authors (before SOLARI 1947 and FRANZ 1947) are reported only when considered undoubted on the basis of geographical considerations or if confirmed by the study of specimens with label data including host plant information.

PHYLOGENETIC ANALYSIS: A phylogenetic approach (HENNIG 1966), as discussed by WILEY (1981), was used in reconstructing phylogeny. The outgroup criterion, as discussed by WATROUS & WHEELER (1981), was used to polarize character states. Two outgroups were used: *Rhinumiarus* CALDARA, 2001 and *Cleopomiarus*, which are presently considered as genera more closely related to *Miarus* (CALDARA 2001a).

Phylogenetic reconstruction was undertaken manually and with the help of the cladistic computer programme Hennig86 (FARRIS 1988), using the implicit enumeration option (ie-).

The hypothesized plesiomorphic state of each character was coded as 0, and the apomorphic states as 1 or 1, 2 and 3. Autapomorphies were included only in case of parallelism or reversal of characters used for the phylogenetic study. However they are reported in the discussion, since they may possibly be useful in future analyses. Character weighting was not employed.

ACRONYMS: The following acronyms of public and private collections were used:

CAF	Coll. Angelini, Francavilla Fontana
CBB	Coll. Bayer, Berlin
CBI	Coll. Białooki, Sopot
CBP	Coll. Benedikt, Plzeň
CBS	Coll. Borovec, Smidary
CCM	Coll. Caldara, Milano
CCP	Coll. Cornacchia, Porto Mantovano
CCR	Coll. Colonnelli, Roma
CDM	Coll. Diotti, Milano
CGV	Coll. Gillerfors, Varberg
CMT	Coll. Meregalli, Torino
COA	Coll. Osella, L'Aquila
CPB	Coll. Podlussány, Budapest
CSP	Coll. Strejček, Praha
CTM	Coll. Talamelli, S. Giovanni in Marignano
CVK	Coll. Voříšek, Kladno
CWB	Coll. Winkelmann, Berlin
DEI	Deutsches Entomologisches Institut, Müncheberg (L. Behne)
HNHM	Hungarian Natural History Museum, Budapest (O. Merkl)
KUEC	The Kyushu University Museum, Kyushu University, Fukuoka (H. Kojima)
MNHN	Muséum National d'Histoire Naturelle, Paris (H. Perrin)
MSNG	Museo civico di Storia Naturale, Genova (R. Poggi)
MSNМ	Museo civico di Storia Naturale, Milano (C. Pesarini, F. Rigato)
MSNV	Museo civico di Storia Naturale, Verona (L. Latella)
NMW	Naturhistorisches Museum Wien (M.A. Jäch, H. Schönmann)
SMTD	Staatliches Museum für Tierkunde, Dresden (O. Jäger, K. Klass)
ZISP	Zoological Institute, Russian Academy of Sciences, St. Petersburg (B. Korotyaev)
ZMHB	Museum für Naturkunde der Humboldt Universität, Berlin (J. Frisch, J. Willers)

Miarus SCHÖNHERR

Miarus SCHÖNHERR 1826: 320 (type species: *Curculio campanulae* LINNAEUS, 1767 by original designation). – DESBROCHERS DES LOGES 1893: 15, 51; REITTER 1907: 2, 43; HUSTACHE 1931: 399, 430; SOLARI 1947: 72; FRANZ 1947: 210; SMRECZYŃSKI 1957: 239; 1973: 167; 1976: 22, 41; HOFFMANN 1958: 1264, 1311; ROUDIER 1966: 276; KANGAS 1976: 69; 1978: 119; LOHSE & TISCHLER 1983: 259, 271; ALONSO-ZARAZAGA & LYAL 1999: 80; CALDARA 2001a: 189.

DIAGNOSIS: Length 1.8–3.1 mm; body short oval to moderately long subcylindrical; integuments completely black, covered with short to moderately long, seta-like scales, which are arranged in one regular or more irregular rows on each elytral interstria, and with digitate scales on part of ventral sides; eyes very large, moderately convex; antennal funicle composed of five segments; pronotum more or less curved at sides, usually widest at basal 1/3; prosternum deeply sulcate; elytra with anterior margin moderately concave to weakly convex to interstria 5 then markedly directed forwards; femora unarmed; claws free, both of same length. Male: rostrum moderately long, subcylindrical, in lateral view more or less curved, in dorsal view distinctly striate-punctate at least in basal 2/3 and with scrobe only slightly visible; unci present on all tibiae, those of metatibiae smaller than others, with pointed apex; ventrite 5 regularly convex to strongly modified by presence of a more or less deep fovea and two more or less robust posterolateral teeth; pygidium regularly convex to gibbous in upper portion and foveate in lower portion; median lobe of aedeagus subcylindrical and elongate to short, strongly narrowed at middle 1/3 and enlarged at apical 1/3, with apex perpendicular to body, orifice small to large, apex with numerous setae; internal sac with flagellum and more or less numerous variously-shaped sclerites. Female: rostrum usually slightly, sometimes distinctly, longer than in male, less punctate and more shining in apical 2/3; unci smaller, very small on metatibiae; ventrite 5 regularly convex; pygidium regularly convex to foveate; spermatheca with body moderately expanded medially; bursa copulatrix usually with two flat semilunate sclerites.

REMARKS: *Miarus* shares many external characters with *Cleopomiarus*: prosternal sulcus present and markedly deep, forecoxae separate, mesoventral process as wide as coxa and concave, median portion of metaventrite with distinct fovea, some of the scales covering sides of venter digitate, claws free. Presently all the species of *Miarus* can be clearly distinguished from *Cleopomiarus* by some characters of the male: median lobe of the aedeagus with apical setae and high sides at apex proximity and slightly more pronounced convexity of the pygidium. However, other characters will separate at least some of the species belonging to the two genera: in *Miarus* the femora are always unarmed and usually not clavate, the uncus of the metatibiae is always pointed at apex, the pygidium is often foveate in both sexes and the ventrite 5 of male is often foveate and dentate, the male genitalia are often strongly modified and with a complex of sclerites in the internal sac.

At least in the Palearctic Region, *Miarus* and *Cleopomiarus* are the only genera of weevils living on Campanulaceae; sometimes the same species of *Campanula* is reported as host plant for species of both genera. However, *Miarus* is known only from the Palearctic Region with the major concentration of species in the western Mediterranean area, while many species of *Cleopomiarus* are also widely diffused in southern Africa and two of them in the Nearctic Region.

Checklist of the species of *Miarus*
(in phylogenetic order)

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|---|--------------------------------------|
| 1. <i>afér</i> DANIEL, 1912 | 5. <i>hellenicus</i> DIECKMANN, 1978 |
| 2. <i>praecursor</i> CALDARA, 2001 | 6. <i>abnormis</i> SOLARI, 1947 |
| 3. <i>stoeckleini</i> FRANZ, 1947 | = <i>zoufali</i> SOLARI, 1947 |
| 4. <i>rotundicollis</i> DESBROCHERS DES LOGES, 1893 | = <i>muelleri</i> SOLARI, 1947 |

- = *phyteumatis* FRANZ, 1947
- = *phyteumatis* ssp. *imitator* FRANZ, 1947
- 7. *monticola* PETRI, 1912
- = *fennicus* KANGAS, 1978
- 8. *solarii* SMRECZYŃSKI, 1957
- 9. *araxis* REITTER, 1907
- 10. *dentiventris* REITTER, 1907
- = *armenus* IABLOKOFF-KHNZORIAN, 1967
- 11. *simplex* SOLARI, 1947
- = *alzonae* SOLARI, 1947
- = *portae* SOLARI, 1947
- 12. *ajugae* (HERBST, 1795)
- = *perjuratus* ROUDIER, 1966
- = *portae* SOLARI ssp. *confusus* ROUDIER, 1966
- = *thuleus* KANGAS, 1980
- 13. *atricolor* MORIMOTO, 1983
- 14. *longicollis* SOLARI, 1947
- 15. *banaticus* REITTER, 1907
- 16. *ursinus* ABEILLE, 1906
- = *subseriatus* SOLARI, 1947
- = *italicus* FRANZ, 1947
- = *horni* FRANZ, 1947
- 17. *maroccanus* SOLARI, 1947
- = *italicus* ssp. *maroccanus* FRANZ, 1947
- 18. *campanulae* (LINNAEUS, 1767)
- = *brevirostris* SOLARI, 1947
- = *binaghii* SOLARI, 1947
- = *moroi* SOLARI, 1947
- = *frigidus* FRANZ, 1947
- 19. *abeillei* DESBROCHERS DES LOGES, 1893

1. *Miarus afer* DANIEL

Miarus afer DANIEL, 1912: 151.

TYPE LOCALITY: Massif de Mouzaïa, Algeria.

TYPE SERIES: Male and female specimens collected in the Massif de Mouzaïa (Algeria) by Peyerimhoff (April 1909), which I did not examine. However, I studied three specimens (MNHN, MSNM) collected by Peyerimhoff at the same locality on other occasions and agreeing well with the excellent original description.

DIAGNOSIS: Length 2.1–2.4 mm (Fig. 41); dorsal vestiture of unicolorous whitish scales; pronotum weakly transverse (Pw/Pl 1.22–1.26), moderately convex; elytra moderately long (El/Ew 1.25–1.30), with basal margin weakly and nearly regularly concave, with scales of interstriae moderately long and subrecumbent, regularly arranged in single rows. Male: rostrum moderately long (Rl/Pl 0.87–0.94), distinctly punctate-striate in basal 2/3 and moderately punctate and shining in apical 1/3, in lateral view moderately curved; uncus of protibia small (Fig. 7); ventrite 5 and pygidium regularly convex without fovea and teeth; median lobe of aedeagus (Fig. 14a–b) subcylindrical, elongate, in median 1/3 moderately constricted in dorsal view and with ventral portion weakly convex, endophallus with elongate flagellum forked at base and connexed with a short tooth-shaped sclerite by a small membranous portion. Female: rostrum slightly longer (Rl/Pl 0.93–0.98) and as curved as in male, sparsely punctate in apical half; pygidium moderately and regularly convex, without fovea; bursa copulatrix without sclerites; spermatheca as in Fig. 14s.

REMARKS: No author has treated *M. afer* since its description. This species is very closely related in habitus to *Cleopomiarus plantarum* and *M. praecursor*. It differs from both taxa by the basal margin of the elytra nearly regularly and weakly concave (in *C. plantarum* and *M. praecursor* weakly convex from suture to fifth interstria, then distinctly directed forwards), the scales of the interstriae slightly shorter and mostly arranged in single regular rows. Moreover, it can be distinguished from *C. plantarum* by the unarmed femora and from *M. praecursor* by the smaller uncus of the protibiae.

Presently, the male genitalia of *M. afer* appear the most primitive in the genus, because the median lobe of the aedeagus is as elongate as that of *C. plantarum* and the sclerites of the endophallus are similar in shape in both species. The median lobe differs by the shape of the apex, which possesses numerous setae, and by the venter, which in lateral view is weakly convex in the median 1/3. It lacks the ventral and dorsal elongate sclerite and the small basal sclerite, which are present in all other species of *Miarus*. On the other hand, the shape of the spermatheca

is the same as in other *Miarus*. As *M. praecursor* and *Cleopomiarus*, *M. afer* also lacks particular characters on ventrite 5 and pygidium.

BIOLOGICAL NOTES: Borovec (pers. comm.) collected this species in long series on *Fedia cornucopiae* L. belonging to Valerianaceae, a family which was never reported as host plant for Mecinini. Therefore, this very interesting information needs to be confirmed in order to show that this plant was not being used only as a refuge.

DISTRIBUTION: Morocco, Algeria, Tunisia. Previously reported only from Algeria.

ADDITIONAL MATERIAL EXAMINED:

MOROCCO: Dayet Ifrah, 12.V.1997, leg. Talamelli (1, CTM).

ALGERIA: Annaba, Aïn Berda, 14.VII.1970, leg. Doguet (1, COA); Bou Berak near Dellys (1, MNHN); Blida, Chr  a, Mts. Atlas de Blida, 8.V.1990 (1, CPB); Blida, Chr  a, Atlas tellien Mts., 1500 m, 10.V.1987, leg. Strej  ek (1, CSP); Bouira, 12.–14.VI.1971, leg. Hoffer-Nor  k (1, CVK); Massif de Mouza  ia (1, MNHN); For  t de Mouza  ia, 20.IV.1935, leg. Peyerimhoff (2, MSNM); G. Kabilie, For  t de Mizrana, 750 m, 10.V.1983, leg. Osella (1, CCP); Kabylia, Bonira, 3.V.1970, leg. Doguet (1, COA); El Kseur, 7.V.1979, leg. Osella (1, COA).

TUNISIA: Jendouba, Ghardimaou, For  t de Feidja, Dj. Statir, 880 m, 1.V.1998, on *Fedia cornucopiae* (Valerianaceae), leg. Borovec (20, CBS; 6, CCM); Beja, Teboursouk, III.1898 (4, MNHN); Teboursouk, leg. Normand (2, MSNM); Le Kef, leg. Normand (3, MNHN; 5, MSNM).

2. *Miarus praecursor* CALDARA

Miarus praecursor CALDARA, 2001: 190.

TYPE LOCALITY: S  lakos, Profitis Ilias Mountain, Rhodes, Greece.

TYPE SERIES: The holotype is stored in CBS. The paratypes (Rhodes, Turkey, Jordan) are in CBS, CCM, CGV, DEI and ZISP (CALDARA 2001a).

DIAGNOSIS: Length 1.9–2.5 mm (Fig. 42); dorsal vestiture of unicolorous whitish scales; pronotum weakly transverse (Pw/Pl 1.22–1.25), moderately convex; elytra moderately long (El/Ew 1.25–1.32), with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and subrecumbent to suberect, arranged in 1, partly 2 rows. Male: rostrum fairly short (Rl/Pl 0.72–0.78), moderately punctate on dorsum, in lateral view distinctly curved; uncus of protibia large (Fig. 8); ventrite 5 and pygidium regularly convex, without fovea and teeth; median lobe of aedeagus (Fig. 15a–b, e) moderately elongate, in median 1/3 subrectangular in section, nearly straight in lateral view and moderately constricted in dorsal view, with ventral portion distinctly convex, with sides in apical 1/3 distinctly enlarged, with apex elongate and truncate, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), one pair of small suboval sclerites positioned caudally to ventral elongate sclerite, two other median sclerites, which are respectively thorn-shaped (flagellum) and subtriangular, and a very small horse-shoe shaped basal sclerite. Female: rostrum slightly longer (Rl/Pl 0.80–0.85) than and as curved as in male, sparsely punctate in apical half; pygidium moderately and regularly convex, without fovea; bursa copulatrix without sclerites; spermatheca as in Fig. 15s.

REMARKS: Previously this species was considered as the most basal member in the genus (CALDARA 2001a). The examination of *M. afer* showed that this latter taxon possesses a median lobe of the aedeagus still more basal because more closely related to that of *Cleopomiarus plantarum*, which is considered the most primitive species in the sister-group genus *Cleopomiarus* (CALDARA 2005). *Miarus praecursor* shares the lack of particular characters (fovea and teeth) on ventrite 5 and pygidium with *M. afer*. In both species the upper portion of the pygidium is only slightly more convex than in *C. plantarum*. This last species differs from *M. praecursor* in the scales of the pronotum partly erect, the scales of the elytral interstriae slightly longer, the femora subclavate and with a minute tooth and the uncus of the protibiae smaller.

Miarus praecursor differs from *M. afer* in the base of the elytra weakly convex from suture to fifth interstria then distinctly directed forwards, the scales of the interstriae slightly longer and less regularly arranged in 1–2 rows and the uncus of the protibiae more robust.

Miarus praecursor is also closely related to *M. stoeckleini*, from which it differs in ventrite 5 and pygidium lacking a fovea in male, the more elongate elytra (length/width 1.25–1.32 vs. 1.15–1.20) and the finer and subrecumbent to suberect scales of pronotum and elytra (in *M. stoeckleini* recumbent to subrecumbent) and the shape of the median lobe of the aedeagus.

BIOLOGICAL NOTES: Borovec collected this species on *Campanula* sp. at the type locality (CALDARA 2001a).

DISTRIBUTION: Greece, Turkey, Syria, Jordan.

ADDITIONAL MATERIAL EXAMINED:

GREECE: Central Greece, Domokos, Fthiotis (1, CPB).

TURKEY: Denizli, Pamukkale, 20.IV.1998, leg. Winkelmann (1, CWB).

SYRIA: Hama, Jabal an Nusayriyah, Autan, 700 m, 27.V.2004, leg. Náday (1, CPB).

3. *Miarus stoeckleini* FRANZ

Miarus stoeckleini FRANZ, 1947: 236.

TYPE LOCALITY: Cavtat-Obod, Croatia.

TYPE SERIES: I have examined three syntypes (NMW): “Dalmatia m. Stöcklein / Cavtat-Obod, 17.-28.5.34 / Sammlung Stöcklein / Typus / ♂ / Miarus Stöckleini m. ♀ [sic], det. H. Franz” (♂, stuck dorsally; lectotype by present designation); one male labelled as lectotype except “Paratypus / repraep. M. Košťál 1989” (♂); one female labelled as lectotype except “Dalmatia m. Stöcklein / Dalmatia m. Stöcklein / Sammlung Stöcklein / Typus / ♀ / Miarus Stöckleini m., det. H. Franz”.

DIAGNOSIS: Length 1.9–2.4 mm (Fig. 43); dorsal vestiture of unicolorous whitish scales; pronotum weakly transverse (Pw/Pl 1.22–1.27), moderately convex; elytra fairly short to moderately elongate (El/Ew 1.18–1.24), with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent to subrecumbent, arranged in 1–2 rows; tibiae short. Male: rostrum moderately long (Rl/Pl 0.82–0.88), moderately punctate on dorsum in basal half, sparsely punctate and shining in apical half, in lateral view moderately curved; uncus of protibia large (Fig. 9); ventrite 5 with scarcely pubescent weak median depression; pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 16a–c, e) short, in dorsal view distinctly wider at base than at apex, in lateral view distinctly curved, thin in apical 1/3 and still thinner in median 1/3 with ventral portion moderately convex in basal and apical 1/3, with apex short, with orifice very small and narrow, with endophallus containing a complex of two flat elongate sclerites (one dorsal and one ventral), one pair of small suboval sclerites bearing spines and positioned caudally to ventral elongate sclerite, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.92–0.98) than and as curved as in male, sparsely punctate in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites; spermatheca as in Fig. 16s.

REMARKS: This species appears intermediate between *M. praecursor* and *M. rotundicollis* in the shape of the median lobe of the aedeagus, which is however very different from each of these species and still more so from the strongly peculiar features of other *Miarus* except *M. afer* and *M. praecursor*. The ventrite 5 possesses a weak median depression, without trace of lateral teeth as in *M. rotundicollis*. It differs from the other two species by the shorter protibiae in both sexes, with more robust and longer uncus in male and from *M. rotundicollis* also by its smaller size,

less rounded pronotum, less dense vestiture of the elytral interstriae and of the median depression of the ventrite 5.

BIOLOGICAL NOTES: Korotyaev (pers. comm.) collected this species on *Campanula* sp. in Turkey.

DISTRIBUTION: Croatia, Macedonia, Greece, Turkey, Armenia, Syria. Previously reported only from the type locality.

ADDITIONAL MATERIAL EXAMINED:

CROATIA: Dalmatia, Cavtat-Obod, 17.–28.V.1934, leg. Stöcklein (2, MSNM).

MACEDONIA: Dobriste (Kavadarci) (1, CPB); Gorica near Ohrid, 4.VI.1986, leg. Boness (1, CCM); Mazuciste (Prilep) (1, CPB); Mt. Vodno (Skopje) (1, CPB).

GREECE: E Macedonia, 18 km NW Drama, Falakron Oros, 2000 m, 8.VII.2003, leg. Bayer (3, CBB); Thessalia, Mt. Olympos, Karia, 3.VI.1998, leg. Carapezza (1, COA); Peloponnese, Taigetos, Anavriti, 1100–1700 m, 20.VI.1997, leg. Winkelmann (2, CCM).

TURKEY: Eur. Turkey, Poyrali env., NE Pinarhisar, 4.VI.2003, leg. Bialooki (4, CBI); Bursa, Harmancik (1, CPB); Bilecik, 14.VII.1972, leg. Osella (1, COA); Manisa (1, CPB); Antalya, Mt. Beydağları, 1650–1900 m, Saklıkent, 17.VI.1994, leg. Pütz (1, DEI); Konya, Karaman env., 1000 m (2, COA); Erzurum, Sutkans, 8 km S of Oltu, 10.VI.1997, leg. Korotyaev (1, CCM).

ARMENIA: Khosrov reserve, 12.VI.1998, leg. Kalashian (3, CTM).

SYRIA: Jabal al Ansariyah Mts., Slinfeh env., N of Latakia, 1000 m, 3.VI.1999, leg. Benedikt (1, CBP).

4. *Miarus rotundicollis* DESBROCHERS DES LOGES

Miarus rotundicollis DESBROCHERS DES LOGES, 1893: 53. – ROUDIER 1966: 283; SMRECZYŃSKI 1973: 176; DIECKMANN 1978: 295.

TYPE LOCALITY: Attica, Greece.

TYPE SERIES: ROUDIER (1966) reported that he examined the “unique” type (♀) in the Desbrochers des Loges collection (MNHN). However, DESBROCHERS DES LOGES (1893) described this taxon from Attica, without specifying sex and number of the specimens forming the type series. I also studied this specimen (lectotype, by present designation), which is labelled “Attica / Type / Ex Musaeo Desbrochers des Loges 1914”.

DIAGNOSIS: Length 2.4–2.8 mm (Fig. 44); dorsal vestiture of whitish to brown scales; pronotum moderately transverse (Pw/Pl 1.27–1.33) and with rounded sides, distinctly convex; elytra fairly short (El/Ew 1.18–1.26), nearly parallel-sided, with basal margin moderately concave from suture to sides, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum moderately long (Rl/Pl 0.84–0.89), strongly punctate on dorsum to apex, in lateral view moderately curved; uncus of protibia medium-sized; ventrite 5 with weak median depression covered with setae slightly longer and slightly denser than elsewhere; pygidium weakly gibbous in upper half and with fovea in lower half; median lobe of aedeagus (Fig. 17a–d, ue, ie, le) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where there is no defined tongue, with pronounced mitre and small auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.93–0.98) and more curved than in male, sparsely punctate in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites; spermatheca as in Fig. 17s.

REMARKS: This taxon was misunderstood by SOLARI (1947), who regarded the species presently named *M. ajugae* as *M. rotundicollis*. ROUDIER (1966), SMRECZYŃSKI (1973) and DIECKMANN (1978) examined the specimen which I designated as lectotype, but only Dieckmann gave an adequate description and illustration of the median lobe of the aedeagus. In

my phylogenetic order *M. rotundicollis* is the first species which possesses a strongly modified median lobe as in the more advanced species, with the apical orifice perpendicular to the tube. At its apical third this structure is wide in lateral view, with a distinct dorsal mitre and with a short tip at apex. However in ventral view there is no definite tongue in its apical portion.

Due to the ventrite 5 of the male having only a weak median depression covered with denser and longer white setae than at sides, *M. rotundicollis* appears to be closely related to *M. hellenicus*, from which it differs usually by the more rounded pronotum, the basal margin of elytra regularly concave and not abruptly directed forwards at sides, the lack of a small tooth posterolaterally to the median fovea of ventrite 5, and the shape of the median lobe of the aedeagus.

BIOLOGICAL NOTES: Osella (pers. comm.) collected this species usually on *Campanula* sp.

DISTRIBUTION: Albania, Macedonia, Greece. Previously reported only from Greece.

ADDITIONAL MATERIAL EXAMINED:

ALBANIA: Nat. Park Logara, 17.V.1994, leg. Strejček (1, CSP).

MACEDONIA: Kosani, 15.V.1987, leg. Angelov (1, CMT).

GREECE: Epirus, Beotia, Arachowa, 1.VI.1987, leg. Freude (1, DEI); Epirus, Igoumenitza, Pentina, 1100 m, 24.V.2004, leg. Osella (1, COA); Epirus, Pindos, Passo Katara, 1700–1800 m, 17.VI.1999, leg. Osella (2, COA); Thessalia, Ag. Dimitris, Mt. Olympos, 4.V.1981, leg. Podlussány (7, CPB); Thessalia, Moskohori, Mt. Olympos, 3.V.1981, leg. Podlussány (1, CPB); Thessalia, Karia, Mt. Olympos, 3.VI.1998, leg. Carapezza (1, COA); Thessalia, Ambelakia, 10.V.1987, leg. Freude (2, DEI); Thessalia, Elasson, 9.V.1971, leg. Wewalka (1, DEI); Thessalia, Larissa, Spilia, Mt. Ossa, Kataphigion, 1600 m, 9.VI.2003, leg. Osella (11, COA); central Greece, Karpenissi env., Mount Timfristos slopes, 1000 m, 23.V.2004, leg. Osella (4, COA); central Greece, Karpenissi, Mt. Halia Kuda, Mega Chorio, 1200 m, 23.V.2004, leg. Osella (52, COA).

5. *Miarus hellenicus* DIECKMANN

Miarus hellenicus DIECKMANN, 1978: 296.

TYPE LOCALITY: Argos, Peloponnese, Greece.

TYPE SERIES: I examined the holotype and some paratypes preserved at DEI.

DIAGNOSIS: Length 2.0–2.8 mm (Fig. 45); dorsal vestiture of whitish to brown scales; pronotum moderately transverse (Pw/Pl 1.23–1.29), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra fairly short (El/Ew 1.08–1.15), nearly parallel-sided, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum moderately long (Rl/Pl 0.88–0.95), strongly punctate on dorsum, in lateral view slightly curved; uncus of protibia moderately large; ventrite 5 with weak median depression covered with setae slightly longer and slightly denser than elsewhere and with two very small to small teeth posterolaterally to depression, pygidium weakly gibbous in upper half and with fovea in lower half; median lobe of aedeagus (Fig. 18a–d) short, in both dorsal and lateral views distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a well-defined short tongue, with distinct mitre with apex in lateral view not protruding and small auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.93–0.98) and more curved than in male, sparsely punctate and shining in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: *Miarus hellenicus* seems more closely related to *M. rotundicollis* than to other species by the shape of ventrite 5, which possesses a weak median depression covered with denser and longer white setae than at sides. It differs from this taxon by the shape of the median

lobe of the aedeagus and the usually less rounded pronotum, which is widest at basal third and not at middle, the basal margin of elytra strongly directed forwards at sides, ventrite 5 with a shallow median depression with a very small to small posterolateral tooth.

BIOLOGICAL NOTES: Osella (pers. comm.) collected this species usually on *Campanula* sp.

DISTRIBUTION: Bulgaria, Greece. Previously reported only from Greece.

ADDITIONAL MATERIAL EXAMINED:

BULGARIA: Osogovo, leg. Angelov (1, COA).

GREECE: Western Macedonia, Klissoura, 1200 m (Kastoria), 27.VI.1997, leg. Winkelmann, Bayer & Messutat (2, CWB); Thessalia, Moskohori, Mt. Olympos, 3.V.1981, leg. Podlussány (1, CPB); Western Greece, Agrinion, 14.V.1987, leg. Angelov (1, CMT); Western Greece, Achaia, Krástoni Kalavriton, 13.V.1993, leg. Colonnelli (1, CCR); Peloponnese, Sparta, 10.V.1987, leg. Angelov (2, CMT); Peloponnese, Pyrgos, Gastuni, 26.IV.1980, leg. Bellò & Pierotti (1, COA); Peloponnese, Korintias, Mt. Kilini, Kataphygion, 1600 m, 31.V.2003, leg. Osella (4, COA).

6. *Miarus abnormis* SOLARI

Miarus abnormis SOLARI, 1947: 75. – HOFFMANN 1953: 62; 1958: 1326; ROUDIER 1966: 286; LOHSE & TISCHLER 1983: 274.

Miarus zoufali SOLARI, 1947: 76 (syn.n.).

Miarus muelleri SOLARI, 1947: 77. – ROUDIER 1966: 286.

Miarus phyteumatis FRANZ, 1947: 227. – HOFFMANN 1958: 1326; ROUDIER 1966: 286.

Miarus phyteumatis ssp. *imitator* FRANZ, 1947: 229. – ROUDIER 1966: 286.

TYPE LOCALITY: “Schneeberg” [Snežnik], Carniola [Kranjska], southern Slovenia.

TYPE SERIES: At MSNM I examined two male specimens labelled “Schneeberg, Carniola, ex Emm. Reitter / campanulae ex Emm. Reitter 1935”. Moreover, one of these (lectotype, by present designation) is also labelled “*Miarus abnormis* m. ♂, holotypus! det. Solari 1947”.

SYNONYMS: *Miarus zoufali* was described from specimens from Monti Beschidi (north-western Italy, Friuli-Venezia Giulia), of which I examined three males and one female labelled “Beschiden, V. Zoufal / campanulae ex Emm. Reitter 1935” (MSNM). One of these (lectotype, by present designation) is also labelled “*Miarus Zoufali* m. ♂, holotypus! det. Solari 1947”.

Miarus muelleri was described from specimens from Trebinje (Dalmatia, Croatia), of which I examined one male (lectotype, by present designation) labelled “Trebinje, Dalmazia, Vasicek / *Miarus Müller* m. ♂, holotypus! det. Solari 1947” (MSNM).

Miarus phyteumatis was described from specimens from Austria (type locality: Hohe Tauern, Glocknergruppe; holotype not designated), Italy (Trentino Alto Adige) and Croatia. I examined 13 syntypes: 11 in NMW labelled as follows: “Guttal, hochalpin Glocknergruppe, leg. H. Franz / G329 / Typus / *Miarus phyteumatis* Franz Type ♂” (♂, lectotype, by present designation); “Guttal, hochalpin Glocknergruppe, leg. H. Franz / Typus / *Miarus phyteumatis* Franz Type ♀” (♀); “Guttal, hochalpin Glocknergruppe, leg. H. Franz / G329 / Cotypus / *Miarus phyteumatis* m. = *abnormis* Sol., det. H. Franz” (♂); “Guttal, hochalpin Glocknergruppe, leg. H. Franz / G329 / Cotypus” (2 ♀ ♀); “Hochschwab, Steiermark / 1.8.1919, 1500 m. Seehöhe / J. Mariani, Hirtenberg, N.O. / Paratypus / ♀” (♀); “Kalblinggatterl Gesäusealpen, leg. H. Franz / Paratypus” (2 ♂ ♂); “Kalblinggatterl Gesäusealpen, leg. H. Franz / K14 / Paratypus” (♂); “Kalblinggatterl Gesäusealpen, leg. H. Franz / K14 / Paratypus / *Miarus phyteumatis* m., det. H. Franz” (♂); “Kalblinggatterl Gesäusealpen, leg. H. Franz / K29 / Paratypus” (♀); one specimen at MSNM labelled “Tirol m., Coll. Korb” (♂) and one at SMTD labelled “Kärnten, Lessach-T. / *Miarus campanulae ursinus*, ♂, Penecke det. / Samml. K.A. Penecke Geschenk 1940.20 / Cotypus / *Miarus phyteumatis* m., det. H. Franz” (♂).

Miarus phyteumatis ssp. *imitator* was described from specimens collected in Italy (Friuli-Venezia Giulia), Croatia and Montenegro (holotype not designated and type locality not reported). I examined seven syntypes: five in NMW labelled “G. Müller, Cro, Cirkwenitza / [an illegible handwritten label] / Typus / *Miarus phyteumatis* ssp. *imitator* m., det. H. Franz” (♂, lectotype, by present designation); same label data as lectotype except “Cotypus / ♂” (♂); “Crivoscie, Süd-Dalmat. / ♂ / Paratypus / *Miarus phyteumatis* ssp. *imitator* m., det. H. Franz” (♂); “Apfelb. Gravosa / Sammlung Apfelbeck” (♂); “Crkvice, 6.1918 / Krivoršcije, Dalmatia / Sammlung Apfelbeck” (♂); and two specimens at SMTD labelled “Dalmatien, Perasto / *Miarus Abeillei* Desbr., Penecke det. / Samml. K.A. Penecke Geschenk 1940.20, Cotypus / *Miarus phyteumatis* ssp. *imitator* m., det H. Franz” (1 ♂, 1 ♀).

There are no significant differences between any of these taxa and *M. abnormis*, as already reported, at least in part, by HOFFMANN (1958) and ROUDIER (1966).

DIAGNOSIS: Length 2.4–3.0 mm; dorsal vestiture of brownish scales; pronotum moderately transverse (Pw/Pl 1.25–1.30), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra fairly short (El/Ew 1.10–1.16), weakly curved at sides, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum moderately long (Rl/Pl 0.82–0.89), on dorsum distinctly striate-punctate in basal 2/3, sparsely punctate and shining in apical 1/3, in lateral view distinctly curved; uncus of protibia moderately large; ventrite 5 with moderately shallow median fovea, with two small teeth posterolaterally to fovea, slightly more shining and covered with finer scales than other ventrites in median part, pygidium weakly gibbous in upper half and with fovea in lower half; median lobe of aedeagus (Fig. 21a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a short tongue with apex in lateral view distinctly protruding posteriorly, with lateral flanges, with short mitre and very small auricles, with endophallus containing a complex of two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to the ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.94–1.02) than in male, sparsely punctate in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This species is easily distinguishable from all other species of *Miarus* by the shape of the median lobe of the aedeagus, which is characterized by the presence of two lateral flanges at its apex. However, in the external morphology *M. abnormis* is very similar to several other species such as *M. monticola*, from which it can be distinguished only by the brownish colour of the scales of the dorsal vestiture (whitish in *M. monticola*), and *M. ajugae* and *M. campanulae*, from which it can be distinguished only by the characters of the male ventrite 5 (fovea usually less deep, teeth usually less robust). Unfortunately, the females of these three species appear not to be distinguishable.

BIOLOGICAL NOTES: Tomasi (pers. comm.) observed that this species lives in Friuli-Venezia Giulia (Italy) on *Campanula pyramidalis* L., where larvae cause a distinct swelling of the calix of the flowers, which remain closed.

DISTRIBUTION: South-eastern Poland, Austria, north-eastern Italy, Slovenia, Croatia, Serbia, Montenegro, Macedonia (FRANZ 1947, PETRYSZAK 1979). Its presence in southern France (HOFFMANN 1958) needs confirmation.

ADDITIONAL MATERIAL EXAMINED: About 200 specimens from various countries.

7. *Miarus monticola* PETRI

Miarus campanulae var. *monticola* PETRI, 1912: 337.

Miarus monticola PETRI, 1912. – FRANZ 1947: 220. LOHSE & TISCHLER 1983: 276.

Miarus campanulae ssp. *monticola* PETRI, 1912. – SMRECZYŃSKI 1973: 176; 1976: 44.

Miarus fennicus KANGAS, 1978: 118. – LOHSE & TISCHLER 1983: 276 (syn.n.).

TYPE LOCALITY: Siebenbürgen (Bucsecs, Frecker env., Borszék, Balánbánya, Schässburg), Romania.

TYPE SERIES: PETRI (1912) described this taxon as a variety of *M. campanulae* from Siebenbürgen, which are probably in his collection (Sibiu, Romania). Like FRANZ (1947), who elevated this taxon to species rank, I also examined some specimens from Siebenbürgen (among which were two male topotypes from Bucsecs; DEI, NMW), which correspond very well with the original description.

SYNONYMS: *Miarus fennicus* was described from specimens collected at Juupajoki (Finland). I did not examine specimens of the type series, but I did see two specimens (MNHN) from other localities in Finland (Luopioinen and Karstula) collected and labelled as *M. fennicus* by Kangas. I have not found differences from the two above mentioned topotypes of *M. monticola* in the external morphology and in the shape of the aedeagus.

DIAGNOSIS: Length 2.6–3.0 mm (Fig. 46); dorsal vestiture of unicolorous whitish scales; pronotum moderately transverse (Pw/Pl 1.27–1.33), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra short to fairly short (El/Ew 1.08–1.13), weakly curved at sides, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum moderately long (Rl/Pl 0.85–0.93), strongly striate-punctate on dorsum in basal 2/3, sparsely punctate and shining in apical 1/3, in lateral view moderately curved; uncus of protibia large; ventrite 5 with moderately shallow median fovea, with two moderately robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and with fovea in lower half; median lobe of aedeagus (Fig. 22a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a short tongue with apex in lateral view not protruding, with very small mitre and very small auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.97–1.03) and more curved than in male, sparsely punctate and shining in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: In the external morphology (large body, ventrite 5 of male with moderately deep fovea and moderately robust teeth, *M. monticola* appears very similar to *M. abnormis*, from which it differs by the median lobe of the aedeagus without apical lateral flanges and usually by the dorsal vestiture formed of white scales.

BIOLOGICAL NOTES: SMRECZYŃSKI (1957) collected this species at Komancza (Poland) on *Campanula patula* L., whereas KANGAS (1978) reported *C. patula* L. and *C. rotundifolia* L. as host plants of *M. monticola* (sub *M. fennicus*) in Finland.

DISTRIBUTION: Finland, north-western Russia (Karelia, Arkhangel'sk Prov., Leningrad Prov., Kirovsk Prov., Bryansk, Moscow Prov.; ZISP), Ukraine, Poland, Germany, Czech Republic, Slovakia, Austria, Bosnia and Herzegovina, Serbia, Albania, Montenegro, Bulgaria, Greece (FRANZ 1947; SMRECZYŃSKI 1973). Previously not reported from Finland and Russia.

ADDITIONAL MATERIAL EXAMINED: About 100 specimens from various countries.

8. *Miarus solarii* SMRECZYŃSKI

Miarus solarii SMRECZYŃSKI, 1957: 251.

Miarus campanulae ssp. *solarii* SMRECZYŃSKI, 1957. – SMRECZYŃSKI 1973: 177; 1976: 43.

TYPE LOCALITY: Zaleszczyki, Ukraine.

TYPE SERIES: Holotype, allotype and five paratypes are in Smreczyński's collection (Museum of Crakow, Poland). I examined three specimens of *M. solarii* (2 ♂♂, 1 ♀; MSNM) collected by Smreczyński at the type locality and on the same day as the holotype, but they are not labelled as paratypes.

DIAGNOSIS: Length 2.1–2.6 mm (Fig. 47); dorsal vestiture of unicolorous whitish scales; pronotum moderately transverse (Pw/Pl 1.28–1.32), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra fairly short (El/Ew 1.10–1.15), weakly curved at sides, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent to subrecumbent, arranged in 1–3 irregular rows. Male: rostrum moderately long (Rl/Pl 0.87–0.93), on dorsum moderately striate-punctate in basal 2/3, sparsely punctate and shining in apical 1/3, in lateral view moderately curved and distinctly tapered in apical 1/3 (Fig. 2); uncus of protibia large; ventrite 5 with moderately shallow median fovea and with two moderately robust teeth posterolaterally to fovea, as shining as and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 23a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a short tongue with apex in lateral view slightly protruding posteriorly, with small mitre and small auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.96–1.05) than in male, weakly curved in lateral view (Fig. 3), sparsely punctate in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This small species (among the species with short elytra only specimens of *M. ursinus* and sporadic specimens of other species are similarly small) is characterized by the shape of the rostrum, which in both sexes is curved in lateral view, robust in basal 2/3 and distinctly tapered in apical 1/3. The shape of ventrite 5 and median lobe of aedeagus is similar to that of *M. monticola*; however, in the median lobe the tip of the apex and the tongue (as well seen in lateral view) and the mitre are more pronounced.

The specimens collected in Turkey differ from the Ukrainian ones only by the slightly thinner rostrum in both sexes.

BIOLOGICAL NOTES: No data are available.

DISTRIBUTION: Ukraine, Turkey. Previously reported only from Ukraine.

ADDITIONAL MATERIAL EXAMINED:

UKRAINE: Zaleszczyki, 8.VII.1932 (3, MSNM).

TURKEY: Sivas, Çamlıbel geçidi, 1650 m, 24.V.1975, leg. Osella (10, COA).

9. *Miarus araxis* REITTER

Miarus araxis REITTER, 1907: 47. – SOLARI 1947: 74; FRANZ 1947: 235.

TYPE LOCALITY: "Araxesthal" [Aras Valley], probably in Armenia.

TYPE SERIES: I examined two male syntypes (HNHM) labelled "Caucasus, Araxesthal, Leder, Reitter". One was also arbitrarily labelled "Holotypus, 1907, *Miarus araxis* Reitter" (lectotype, by present designation).

DIAGNOSIS: Length 2.3–2.8 mm (Fig. 48); dorsal vestiture of whitish to brown scales; pronotum moderately transverse (Pw/Pl 1.31–1.35), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra fairly short (El/Ew 1.10–1.16), weakly curved at sides, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum long (Rl/Pl 0.95–1.01), on dorsum distinctly striate-punctate in basal 2/3, moderately punctate in apical 1/3, in lateral view moderately curved; uncus of protibia large; ventrite 5 with shallow median fovea, with a very small median tooth at base and two moderately robust teeth posterolaterally to the fovea, bearing sparse scales, pygidium weakly gibbous in upper half and with fovea in lower half; median lobe of aedeagus (Fig. 19a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a short tongue with apex in lateral view slightly protruding, with small mitre and small auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.99–1.06) than in male, sparsely punctate and shining in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This taxon was not considered by other authors since its description except for FRANZ (1947). Due to the moderately elongate elytra and to the shape of ventrite 5 in male, it seems intermediate between *M. hellenicus* and *M. dentiventris*. From the first taxon it differs by ventrite 5 with moderately deeper fovea, moderately more robust posterolateral teeth and very small shining median tooth, pronotum usually less rounded at sides, and the shape of the median lobe of the aedeagus. From *M. dentiventris* it can be distinguished by the scales of the dorsal vestiture, which are brown and recumbent on the elytral interstriae, the rostrum curved in lateral view, the elytra slightly rounded at sides, and the shallower fovea of ventrite 5.

BIOLOGICAL NOTES: Colonnelli (pers. comm.) collected this species on *Campanula* sp. in Armenia.

DISTRIBUTION: Armenia, Georgia, Turkey. Previously reported only from Armenia.

ADDITIONAL MATERIAL EXAMINED:

ARMENIA: Artavaz, 2300 m, 29.VI.2005, leg. Colonnelli (2, CCR); Cachkadzor, 1900 m, 8.VI.1988, leg. Strejček (1, CSP); Gocht near Garni, River Azat valley, 1600 m, 28.V.1988, leg. Strejček (2, CSP); near Sevan Lake, 2400 m, 2.VI.1989, leg. Jindra (1, CSP); Syunik region, env. Shumukh, 17.V.2001, leg. Kalashian (1, CWB).

GEORGIA: Arachlo near Bolnisi River Chrami, 27.VI.1986, leg. Wrase & Schülke (1, DEI); Mzcheta near Tbilisi, 23.VI.1988, leg. Wrase & Schülke (1, DEI).

TURKEY: Erzurum, 16 km E of Tortum, 1270 m, 9.VI.2003, leg. Colonnelli (1, CCR).

10. *Miarus dentiventris* REITTER

Miarus dentiventris REITTER, 1907: 47. – SOLARI 1947: 74; FRANZ 1947: 246.

Miarus armenus IABLOKOFF-KHNZORIAN, 1967: 89 (syn.n.).

TYPE LOCALITY: "Araxesthal" [Aras Valley], probably in Armenia.

TYPE SERIES: I examined two syntypes, one male and one female (HNHM) labelled "Caucasus, Araxesthal, Leder, Reitter". The male (lectotype, by present designation) is also labelled arbitrarily "Holotypus, 1907, *Miarus dentiventris* REITTER".

SYNONYMIES: *Miarus armenus* was described from specimens from Armenia (type locality: Khosrov). By the description and the illustration of the habitus, the abdomen of the male and its aedeagus, I consider this taxon as synonymous with *M. dentiventris*.

DIAGNOSIS: Length 2.6–3.1 mm (Fig. 49); dorsal vestiture of unicolorous whitish scales; pronotum weakly transverse (Pw/Pl 1.21–1.26), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra fairly short to moderately long (El/Ew 1.16–1.22), weakly curved at sides, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and suberect to erect, arranged in 2–3 irregular rows. Male: rostrum moderately long (Rl/Pl 0.86–0.91), on dorsum moderately striate-punctate in basal 2/3, sparsely punctate and shining in apical 1/3, in lateral view weakly curved; uncus of protibia moderately large; ventrite 5 with moderately shallow median fovea, with a very small median tooth at base and with two moderately robust teeth posterolaterally to the fovea, more shining and covered with thinner scales than other ventrites in median part, with pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 20b, d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a short tongue with the apex in lateral view slightly protruding, with small mitre and short auricles, with long apical tip, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to the ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum somewhat longer (Rl/Pl 0.97–1.05) than in male and nearly straight in lateral view (Fig. 1), sparsely punctate and shining in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This taxon is easily distinguished from all other species by the suberect to erect scales covering the elytral interstriae. It seems related to *M. araxis*, with which it shares the very small median tooth on ventrite 5 but from which it differs by the colour of the scales of the vestiture, which is entirely white, the rostrum, which is weakly curved in male and nearly straight in female in lateral view, and the deeper fovea of ventrite 5, and to *M. monticola*, from which it differs by the elongate elytra. The median lobe of the aedeagus is very similar to that of *M. araxis*: it differs by the distinctly longer tip of the apex, which is still clearly visible in dorsal view.

BIOLOGICAL NOTES: No data are available.

DISTRIBUTION: Armenia, Iran. Previously reported only from Armenia.

ADDITIONAL MATERIAL EXAMINED:

ARMENIA: Erevan, 3.VII.1988 (1, ZISP); Khosrov reserve, 7.VI.2001, leg. Kalashian (2, CWB).

IRAN: Zanzan, Mt. Kūhha-ye Tales (2, CPB); Zanzan, Mt. Sendan, Gilvan env. (1, CPB).

11. *Miarus simplex* SOLARI

Miarus simplex SOLARI, 1947: 78.

Miarus alzonae SOLARI, 1947: 75. – ROUDIER 1966: 286; TEMPÈRE & PÉRICART 1989: 292 (syn.n.).

Miarus portae SOLARI, 1947: 76. – HOFFMANN 1953: 62; 1958: 1326; ROUDIER 1966: 284; TEMPÈRE & PÉRICART 1989: 291 (syn.n.).

Miarus campanulae ssp. *simplex* SOLARI, 1947. – SMRECZYŃSKI 1973: 178.

TYPE LOCALITY: Comana Vlasca, Romania.

TYPE SERIES: I examined four syntypes (MSNM), all labelled “Roumanie, Comana Vlasca, A.L. Montandon”; I here designate one male, which is also labelled “*Miarus simplex* m. 1947, ♂, holotypus!, det. Solari”, as lectotype.

SYNONYMS: *Miarus alzonae* was described from specimens collected at Piobbico (Marche, central Italy), of which I examined one male and one female (MSNM) labelled “Marche, Piobbico, VI.1933, C. Alzona”; the male (lectotype, by present designation) is also labelled “*Miarus Alzonae* m. 1947, ♂, holotypus!, det. Solari”.

Miarus portae was described from male specimens collected at Alassio (Liguria, northern Italy), of which I examined one male (MSNM) labelled “Alassio, Liguria occ., 28.V.1943, Solari / *Miarus Portae* m. ♂, holotypus, det Solari 1947” (lectotype, by present designation). I consider both taxa as synonyms of *M. simplex* (see remarks for details).

DIAGNOSIS: Length 2.5–3.4 mm; dorsal vestiture of whitish to brown scales; pronotum moderately transverse (Pw/Pl 1.24–1.30), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra short (El/Ew 1.05–1.10), weakly curved at sides, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum moderately long (Rl/Pl 0.83–0.88), on dorsum distinctly striate-punctate in basal 2/3, punctate in apical 1/3, in lateral view moderately curved; uncus of protibia large; ventrite 5 with deep median fovea and with two robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 24a–d) short, in dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a short tongue with apex in lateral view slightly protruding posteriorly; mitre indistinct, auricles very small; endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.95–1.03) than in male, distinctly curved in lateral view; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This taxon was placed by SOLARI (1947) in a group with *M. alzonae*, *M. portae*, *M. ajugae* (sub *M. rotundicollis*) and *M. longicollis* and characterized by the lack of mitre, auricles and flanges. ROUDIER (1966) studied syntypes of *M. alzonae* and *M. portae*, but not *M. simplex*, and emphasized the close relationships between these two taxa, which differ only in the shape of the median lobe of the aedeagus. On the contrary, SMRECZYŃSKI (1973) examined specimens of *M. simplex*, but not of *M. alzonae* and *M. portae*, and concluded that this species should be placed between *M. monticola* and *M. ajugae* (sub *perjuratus*). My opinion agrees very well with those of Roudier and Smreczyński; however, since I had the opportunity to study syntypes of *M. simplex*, *M. portae* and *M. alzonae* I could conclude that the feeble differences in the median lobe of the aedeagus must be included in the range of variability of a single species, with the aedeagus of *M. portae* intermediate between those of *M. simplex* and *M. alzonae* and that of the last species more closely related to that of *M. ajugae*.

BIOLOGICAL NOTES: In the Pyrenees, Tempère collected this species on *Campanula persicifolia* L. (ROUDIER 1966, sub *M. portae*).

DISTRIBUTION: Spain, France, northern and central Italy, Serbia, Romania, Bulgaria, European Turkey, Georgia. Previously this species was reported only from Romania.

ADDITIONAL MATERIAL EXAMINED:

SPAIN: Huesca, Jaca, 1100 m, 2.VI.1988, leg. Warchalowski (1, DEI).

FRANCE: Alpes-Maritimes, Blayeul, 29.VI.1951, leg. Ochs (4, MSNM).

ITALY: Liguria, Spotorno, VII.1938, leg. Moltoni (2, MSNM); Liguria, Tovo near Cervo, 5.VI.1997 (1, DEI); Lombardia, Castellina (Sondrio), 14.V.1974, leg. Dioli (1, COA); Veneto, Colli Euganei (PD), Cava di Batt. Terme, 6.V.2004, leg. Uliana (2, CDM); Trentino Alto Adige, Lases (Trento), 28.V.1990, leg. Foddai (1, COA); Emilia Romagna, M. Adone, 27.V.1906, leg. Fiori (1, ZMHB); Molise, Matese, 1450 m, 24.VI.1988, leg. Osella (3, MSNV).

SERBIA: Serbia, leg. Haag (1, DEI).

ROMANIA: Transsylvania, Hargita M., Homoródkeményfalva, 24.V.1996, leg. Podlussány (1, CPB); Transsylvania, Hargita M., Zetevarálja, Szencsed-patak, 22.V.1996, leg. Podlussány (1, CPB); Transsylvania, Kovászna megye, Szacsva, 30.V.1992, leg. Podlussány (1, CPB); Baile Herculane, river valley, 11.V.1994, leg. Strejček (1, CSP); Orsova, Alion, 7.V.1995, leg. Adám (1, CPB).

BULGARIA: Sofja, Nnjazevo, 28.V.1908, leg. Rambousek (1, DEI); Strandja, Veleka, leg. Donev, 27.VI.1980 (1, COA); Rodopi, 700 m, 26.V.1978, leg. Angelov (1, CMT); Rhodop. Pamporovo, 1500 m, 1.VI.1984, leg. Schulze (1, DEI); Slavianska (Ali-Botush), S. Goleschovo, NW Mt. Gozev Vrach, 1955 m, 6.V.2000, leg. Zerche (2, DEI); Ropotamo River, VI.1966, leg. Ermisch (1, DEI).

TURKEY: Eur. Turkey, Yenice env. (pass), NE Pinarhisar, 4.VI.2003, leg. Białooki (3, CBI).

GEORGIA: W Abchazia, Mcara, Baybskij Khrebet, 22.VI.1973, leg. Voříšek (1, CVK).

12. *Miarus ajugae* (HERBST)

Curculio ajugae HERBST, 1795: 172.

Miarus ajugae (HERBST, 1795). – LOHSE & TISCHLER 1983: 276; CALDARA 1985: 91; TEMPÈRE & PÉRICART 1989: 291.

Miarus rotundicollis sensu SOLARI 1947 (not DESBROCHERS DES LOGES, 1893). – SOLARI 1947: 77; HOFFMANN 1953: 61; ROUDIER 1966: 283; SMRECZYŃSKI 1973: 176.

Miarus campanulae sensu FRANZ (not LINNAEUS). – FRANZ 1947: 215; ROUDIER, 1966: 284.

Miarus campanulae var. *ursinus* sensu FRANZ (not ABEILLE). – FRANZ 1947: 219.

Miarus campanulae ab. *pseudoursinus* SMRECZYŃSKI, 1957: 249; 1976: 46 (as ab. of *M. campanulae* ssp. *perjuratus*) (unavailable name).

Miarus portae SOLARI var. *confusus* STRAND, 1962: 29. – KANGAS 1980: 111 (unavailable name).

Miarus portae SOLARI ssp. *confusus* ROUDIER, 1966: 285 (syn.n.).

Miarus perjuratus ROUDIER, 1966: 284. – TEMPÈRE & PÉRICART 1989: 291; EGOROV et al. 1996: 482; HONG et al. 2000: 53.

Miarus campanulae ssp. *perjuratus* ROUDIER, 1966. – SMRECZYŃSKI 1973: 176; 1976: 46.

Miarus thuleus KANGAS, 1980: 113 (syn.n.).

TYPE LOCALITY: Germany.

TYPE SERIES: Dieckmann (pers. comm. 1982) was the first author to examine the type of *M. ajugae* (ZMHB). He realized that this taxon is the same as *M. perjuratus* and *M. rotundicollis* sensu SOLARI (1947) (CALDARA 1985; TEMPÈRE & PÉRICART 1989). I also examined this male specimen labelled “*Ajugae* Hbt.* / Lectotypus, *Curculio ajugae* Herbst, Design. Dieckmann 1978 / *campanulae* Sch., *Curc. campanulae* Lin., *Rh. campan.*, *Curc. ajugae* Hbt.*, *Curc. linariae* Pz.* / *Ajugae* n., *Curc. ajugae* Ht.*, *Curc. linariae* Pz.* / Genitalpraeparat, Dieckmann 1978” (lectotype here designated; the designation by Dieckmann was never published).

SYNONYMS: This species erroneously considered by FRANZ (1947) as *M. campanulae* and *M. campanulae* var. *ursinus* corresponds to *M. ajugae* as reported by ROUDIER (1966; sub *M. perjuratus*). The new name *pseudoursinus* for *M. campanulae* var. *ursinus* sensu FRANZ (not ABEILLE) must be considered unavailable, because it was clearly proposed by SMRECZYŃSKI (1957) at infrasubspecific rank (ICZN 1999, Art. 45.5).

STRAND (1962) cited *M. portae* var. *confusus* (SOLARI in litteris) for specimens from Norway (Nordreisa) reporting some characters of the aedeagus; therefore this can be considered as a description (ICZN 1999, Art. 13). Unfortunately this name is unavailable because it was first published after 1960 using the term “variety” (ICZN 1999, Art. 15.2, Art. 45.6.3). However, ROUDIER (1966) at first considered “*confusus*” as a subspecies of *M. portae* and therefore he became the effective author of this taxon (ICZN 1999, Art. 45.5.1). He reported the indications of the labels of nine specimens (eight collected in France and one in Norway), classified as “*M. Portae* var. (*confusus* m.)” by Solari (MSNM), and concluded that only the specimen from Norway belongs to the ssp. *confusus*. Therefore this male specimen labelled “Storslett, Nordreisa, Strand / *Portae* var, det. 1952”, which I examined, must be considered as the holotype of this taxon.

According to ROUDIER (1966) the holotype of *M. perjuratus* is a male of *M. rotundicollis* sensu SOLARI 1947 (not DESBROCHERS DES LOGES, 1893) labelled "Paskau, Dr. Graf / *Miarus rotundicollis* Desbr. ♂, neotypus, det. Solari 1947 / *linariae* / *G. linariae*, ex Emm. Reitter 1935" (MSNM). However this specimen, which I examined, has no label written by Roudier.

Miarus thuleus was described from Finland (type locality: Naantali). I examined two specimens collected at Lojo and labelled as *M. thuleus* by Kangas.

Examination of the rich material examined revealed that the small differences in the shape of the median lobe of the aedeagus, which were illustrated by ROUDIER (1966) and KANGAS (1978, 1980), fall within the range of variability of *M. ajugae*.

DIAGNOSIS: Length 2.5–3.1 mm; dorsal vestiture of whitish to brown scales; pronotum moderately wider than long (Pw/Pl 1.27–1.34), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra short (El/Ew 1.05–1.10), weakly curved at sides, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum moderately long (Rl/Pl 0.85–0.92), on dorsum distinctly striate-punctate in basal 2/3, moderately punctate in apical 1/3, in lateral view moderately curved; uncus of protibia large (Fig. 10); ventrite 5 with deep median fovea and with two robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 25a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a short tongue with apex in lateral view slightly protruding posteriorly, with small mitre and small auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to the ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and the other subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.92–0.99) than in male, distinctly curved in lateral view, sparsely punctate in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This species is very closely related to *M. simplex* and *M. atricolor*, between which it seems intermediate by the shape of mitre and auricles at the apex of the median lobe of the aedeagus, which are more developed than in *M. simplex* but less developed than in *M. atricolor*. Moreover, *M. ajugae* differs from *M. simplex* by the stronger anteapical stricture of the median lobe of the aedeagus as also reported by ROUDIER (1966; sub *M. portae* and *M. alzonae*). The constant presence of these differential characters in all of the specimens of an examined population persuaded me to consider them as distinct species. It is noteworthy that *M. ajugae* is sympatric with *M. simplex* and *M. atricolor* only near the western and the eastern limits of its range of distribution respectively.

BIOLOGICAL NOTES: SMRECZYŃSKI (1976) reported that *M. ajugae* was collected on various species of the genus *Campanula* (*C. carpathica* JACQ., *C. glomerata* L., *C. latifolia* L., *C. patula* L., *C. persicifolia* L., *C. rapunculoides* L., *C. rapunculus* L., *C. rhomboidalis* L., *C. rotundifolia* L., *C. trachelium* L.) and *Phyteuma* (*P. orbiculare* L., *P. spicatum* L.). I examined some specimens collected in the Bükki National Park (Hungary) on *Campanula persicifolia* L. In Italy, Pistarino (pers. comm.) collected this species at Monte Toraggio (Imperia, Liguria) on both *C. macrorrhiza* GAY ex DC and *C. media* L., and at Lago Moncenisio (2000 m, Piemonte) on *C. rhomboidalis* L.

DISTRIBUTION: France, Switzerland, Poland, Germany, Czech Republic, Slovakia, Hungary, Austria, Italy, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Macedonia, Armenia, Denmark, Sweden, Norway, Finland, Russia (from North West to Far East), Mongolia

(Ara-Changaj Aimak; 1, ZISP), Korea (HONG et al. 2000), Syria, Iran, north-western Africa (SMRECZYŃSKI 1973). This species was not reported previously from Middle East and Mongolia.

ADDITIONAL MATERIAL EXAMINED: About 300 specimens from the whole area of distribution except Africa.

13. *Miarus atricolor* MORIMOTO

Miarus atricolor MORIMOTO, 1983: 54. – HONG et al. 2000: 53.

Miarus vestitus sensu MORIMOTO 1959 (not ROELOFS, 1875). – MORIMOTO, 1959: 191.

TYPE LOCALITY: Central Japan (Shirahone, Nikko).

TYPE SERIES: MORIMOTO (1983) proposed the new name *atricolor* for *M. vestitus* sensu MORIMOTO, 1959 (not ROELOFS, 1875; presently *Cleopomiarus vestitus*), which he based on specimens from the prefectures of Nagano (Shirahone) and Tochigi (Nikko), without designating a holotype. I examined one specimen of these, a male labelled “(Honshu), Shirahone, Nagano Pref., 18.VII.1956, Col. S. Kimoto” (KUEC).

DIAGNOSIS: Length 2.5–3.1 mm; dorsal vestiture of whitish to brown scales; pronotum moderately transverse (Pw/Pl 1.27–1.33), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra short (El/Ew 1.05–1.10), weakly curved at sides, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum on dorsum distinctly striate-punctate in basal 2/3, moderately punctate in apical 1/3, in lateral view moderately curved; uncus of protibia large; ventrite 5 with deep median fovea and with two robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 26c–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a short tongue with apex in lateral view slightly protruding posteriorly, with moderately small mitre, directed posteriorly in lateral view, and small auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer than in male, distinctly curved in lateral view, sparsely punctate in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: *Miarus atricolor* appears very closely related to *M. ajugae*, from which it differs only by the median lobe of the aedeagus with a mitre more developed and more distinctly folded backwards, which is similar to that of *M. campanulae*. This species seems to be sympatric with *M. ajugae* in the eastern Palaearctic Region: presently no other species of *Miarus* are reported from this area.

BIOLOGICAL NOTES: No data are available.

DISTRIBUTION: Russia (Far East), Kazakhstan, Kyrgyzstan, China, Japan, Korea (HONG et al. 2000). Previously reported only from Japan and Korea.

ADDITIONAL MATERIAL EXAMINED:

RUSSIA: SE Transbaikalia, Nerchinsky Khrebet, 20 km NW Konduy, 10.VI.1995, leg. Kostyuk (4, CPB); Chita reg., Nerchenskiy region, 10 km N Kovyli, 1.–15.VI.2000, leg. Melnik (2, CMT).

KAZAKHSTAN: Transili-Alatau near Alma-Ata, Prochodnaja-Ufer near Alma-Arasan, 2000–2600 m, 26.VI.1979, leg. Hieke (1, DEI); Zailiyskiy Alatau Mts., S Almaty, 2400–2700 m, 23.VI.1989, leg. Weidlich (1, DEI).

KYRGYZSTAN: Sary-Dzhaz basin, 18 km E Enelohek, 25.VII.1999, leg. Klimenko (1, CMT).

CHINA: Zhejiang, Chusan [Zhoushan], 13.VII.1931 (2, MNHN); Heilongjiang, Ourga near Tsitsikhar [Qiqihar], 1896, leg. Chaffanjon (1, MNHN).

14. *Miarus longicollis* SOLARI

Miarus longicollis SOLARI, 1947: 77.

TYPE LOCALITY: Athos, Greece.

TYPE SERIES: I examined three syntypes: one male (MSNM) and two females (MSNG; MSNM), all labelled "Athos (Macedonien), A. Schatzmayr"; the male (lectotype, by present designation) is also labelled as holotypus by Solari.

DIAGNOSIS: Length 2.5–3.0 mm (Fig. 50); dorsal vestiture of unicolorous whitish scales; pronotum slightly wider than long (Pw/Pl 1.19–1.21), with weakly rounded sides, widest at basal 1/3, moderately convex; elytra fairly short (El/Ew 1.14–1.18), weakly curved at sides, with basal margin weakly convex in mesal half and distinctly directed forwards in lateral half, with scales of interstriae moderately long and recumbent to subrecumbent, whitish, arranged in 1–2 irregular rows. Male: rostrum long (Rl/Pl 1.03), on dorsum distinctly striate-punctate to near apex, in lateral view weakly curved; uncus of protibia large; ventrite 5 with deep median fovea and with two robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 27a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a moderately long tongue with apex in lateral view moderately protruding posteriorly, with very small mitre and small auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum very long (Rl/Pl 1.32), distinctly longer than in male, moderately curved in lateral view (Fig. 4), sparsely punctate in apical 2/3; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: Due to the shape of median lobe of aedeagus and ventrite 5 in male, this taxon appears closely related to *M. simplex* and *M. ajugae*. From both it differs by the rostrum of the female distinctly longer and nearly straight, the pronotum with sides weakly curved, the elytra slightly longer, the scales of the elytral interstriae sparser and arranged only in 1–2 rows. From the males of the two other species of *Miarus* females of which have long rostra, *M. banaticus* and *M. abeillei*, the male of *M. longicollis* can be easily separated by the shape of the median lobe of the aedeagus; in the female the rostrum is less long than in the other two species and in lateral view moderately curved from base to apex, whereas in *M. abeillei* it is completely straight and in *M. banaticus* it is straight in the basal 2/3 and curved in the apical 1/3.

BIOLOGICAL NOTES: No data are available.

DISTRIBUTION: Only known from the type locality.

ADDITIONAL MATERIAL EXAMINED: No other specimens examined in addition to the three specimens of the type series.

15. *Miarus banaticus* REITTER

Miarus banaticus REITTER, 1907: 48. – SOLARI 1947: 75; FRANZ 1947: 234.

TYPE LOCALITY: Herculesbad [= Baile Herculane], Mehadia, Romania.

TYPE SERIES: This species was described from one female (holotype by monotypy) labelled "Ganglb. 95, Herculesbad / banaticus m. ♀, typus, det. Reitter / *Miarus banaticus* m. ♀, typus" (NMW).

DIAGNOSIS: Length 2.4–3.1 mm (Fig. 51); dorsal vestiture of whitish to brown scales; pronotum moderately transverse (Pw/Pl 1.28–1.32), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra fairly short (El/Ew 1.09–1.16), weakly curved at sides, with basal margin weakly convex in mesal half and moderately directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum long (Rl/Pl 1.08–1.12), on dorsum distinctly striate-punctate to near apex, in lateral view moderately curved; uncus of protibia moderately large; ventrite 5 with deep median fovea and with two robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 28a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a long tongue with apex in lateral view slightly protruding posterventrally, with small to moderately small mitre and with large auricles usually bearing some minute denticles, endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum very long (Rl/Pl 1.94–2.04), distinctly longer than in male (Fig. 5); pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This species is strongly characterized by the very long rostrum of the female, which it shares only with *M. abeillei* and *M. longicollis*. It differs from both these species by the shape of the median lobe of the aedeagus with large auricles usually bearing minute denticles, which were not observed in other species of the genus. Moreover, apart from the distribution it differs from *M. abeillei* by the rostrum more curved in lateral view in both sexes and more strongly punctate in male and from *M. longicollis* by the rostrum of the female longer and in lateral view curved only in the apical 1/3.

BIOLOGICAL NOTES: No data are available.

DISTRIBUTION: Bosnia and Herzegovina, Romania.

ADDITIONAL MATERIAL EXAMINED:

BOSNIA AND HERZEGOVINA: Bjelašnica planina, leg. Leonhard (8, DEI; 2, MSNM; 3, NMW).

16. *Miarus ursinus* ABEILLE

Miarus campanulae var. *ursinus* ABEILLE, 1906: 172.

Miarus ursinus ABEILLE, 1906. – SOLARI 1947: 75; HOFFMANN 1953: 62; 1958: 1326; ROUDIER 1966: 281; TEMPÈRE & PÉRICART 1989: 291.

Miarus campanulae ssp. *ursinus* ABEILLE, 1906. – SMRECZYŃSKI, 1973: 177.

Miarus subseriatus SOLARI, 1947: 77. – ROUDIER 1966: 283; SMRECZYŃSKI 1973: 180; TEMPÈRE & PÉRICART 1989: 291.

Miarus ursinus ssp. *subseriatus* SOLARI, 1947. – HOFFMANN, 1953: 62; 1958: 1326.

Miarus italicus FRANZ, 1947: 231. – ROUDIER 1966: 287; SMRECZYŃSKI 1973: 180.

Miarus horni FRANZ, 1947: 232. – SMRECZYŃSKI 1973: 177.

TYPE LOCALITY: Hyères, France.

TYPE SERIES: The lectotype of this species (MNHN) was designated by ROUDIER (1966). Paralectotypes: Marseille (4 specimens), Friburg (1 ♂) (MNHN) (ROUDIER 1966).

SYNONYMS: *Miarus subseriatus* was described from specimens collected at Alassio (Liguria, northern Italy). I examined one male (MSNM) labelled "Alassio, Liguria occ., 28.V.1943, Solari

/ *Miarus subseriatus* m., ♂, holotypus!, det. Solari 1947” (lectotype, by present designation). It was considered to be a subspecies of *M. ursinus* by HOFFMANN (1953), but was placed in synonymy with this taxon by ROUDIER (1966); I agree with this latter opinion.

Miarus italicus was described from specimens collected in northern and central Italy (Capo Lago, Varese; Monte Bisbino, Como; Isola d’Elba, Toscana; Camerata Nuova, Lazio) and Corsica (Bocognano, type locality; holotype not designated). It was placed in synonymy with *M. ursinus* by ROUDIER (1966), although doubtfully, and SMRECZYŃSKI (1973). I agree with this opinion after the examination of 10 syntypes labelled: “Corsica, 1905, Bocognano, Coll. O. Leonhard / Typus / *Miarus italicus* m., type ♂, det. H. Franz” (♂, lectotype, by present designation; DEI); same label data except “♀” (♀, DEI); same label data except “Paratypus” (♂, NMW); “Como-See, 1908, M.te Bisbino, Coll. O. Leonhard / Paratypus / *Miarus italicus* m., paratype, det. H. Franz” (1 ♂, 5 ♀ ♀, DEI; 1 ♀, NMW).

Miarus horni was described from specimens collected in Spain (Andalusia; Ronda, Cardeñas; Cordoba) and Portugal (Evora, considered as type locality according to original description; holotype not designated). SMRECZYŃSKI (1973) synonymized this taxon with *M. ursinus* on the basis of the study of some syntypes. I examined five syntypes labelled “Evora, A. Schatzmayr / Typus / *Miarus Horni* m. Type ♂, det H. Franz” (lectotype, by present designation; DEI); “Andalus. / 54 / Coll. Kraatz / Paratypus / *Miarus Horni* m. ♀, det H. Franz” (♀, NMW); “Ronda, 6.6.11 / S.a de la Nieve” (♂, NMW); “Cordoba / 70 / Coll. Kraatz / campanulae / Paratypus / *Miarus Horni* m. Paratype ♂, det H. Franz” (♂, NMW); Alemtejo, Evora / Cotypus / *Miarus Horni* m., det H. Franz” (♂, SMTD) and agree with Smreczyński’s opinion.

DIAGNOSIS: Length 1.6–2.8 mm; dorsal vestiture of whitish to brown scales; pronotum moderately transverse (Pw/Pl 1.29–1.34), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra short (El/Ew 1.05–1.11), weakly curved at sides, with basal margin weakly convex in mesal half and moderately directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 1–3 irregular rows. Male: rostrum moderately long (Rl/Pl 0.80–0.86), on dorsum distinctly striate-punctate to apex, in lateral view moderately curved; uncus of protibia moderately large (Fig. 11); ventrite 5 with moderately deep median fovea and with two moderately robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 29a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a long tongue with apex in lateral view slightly protruding posteroventrally, with distinct mitre and moderately large auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.88–0.94) than in male, distinctly curved in lateral view, sparsely punctate in apical half; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This taxon appears closely related to *M. maroccanus*, which seems vicariant in western North Africa to *M. ursinus*. The two taxa share the usually small size, short protibiae with moderately robust unci, vestiture of elytral interstriae often in single rows and shape of ventrite 5 (with moderately deep fovea and moderately robust teeth). *Miarus ursinus* differs from *M. maroccanus* by the shape of the median lobe of the aedeagus, with auricles not uncinat and with a distinctly shorter tongue, and usually also by the less convex pronotal disc.

BIOLOGICAL NOTES: Adults were collected on *Campanula rapunculus* L. (HOFFMANN 1958).

DISTRIBUTION: Portugal, Spain, France (incl. Corsica), Switzerland, peninsular Italy, Croatia.

ADDITIONAL MATERIAL EXAMINED: About 200 specimens from various countries.

17. *Miarus maroccanus* SOLARI stat.n.

Miarus ursinus ABEILLE ssp. *maroccanus* SOLARI, 1947: 77.

Miarus italicus FRANZ ssp. *maroccanus* FRANZ, 1947: 232 (syn.n.).

TYPE LOCALITY: Tanger, Morocco.

TYPE SERIES: I examined one syntype labelled “1897, Tanger / Gymnetron sp. 2, ex Vaucher / *Miarus maroccanus* m., ♂, holotypus! det. Solari 1947” (MSNM, lectotype, by present designation).

SYNONYMS: FRANZ (1947) described *M. italicus* ssp. *maroccanus* after one male (NMW; holotype by monotypy) collected at Bou Scoura in Morocco, which I examined observing no differences between it and the lectotype of Solari's taxon.

DIAGNOSIS: Length 1.8–2.3 mm; dorsal vestiture of whitish to brown scales; pronotum moderately transverse (Pw/Pl 1.28–1.32), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra short (El/Ew 1.05–1.10), weakly curved at sides, with basal margin weakly convex in mesal half and moderately directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 1–3 irregular rows. Male: rostrum moderately long (Rl/Pl 0.83–0.87), on dorsum distinctly striate-punctate to apex, in lateral view moderately curved; uncus of protibia moderately large; ventrite 5 with moderately deep median fovea and with two moderately robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 30a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a very long tongue with apex in lateral view distinctly protruding posteroventrally, with distinct mitre and distinct and moderately uncinat auricles, with endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to the ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.94–0.98) than in male, distinctly curved in lateral view; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This taxon has been treated by no authors since its description. Here I consider it as a distinct species, which appears to be intermediate between *M. ursinus* and *M. campanulae* by the shape of the median lobe of the aedeagus with uncinat auricles (not present in *M. ursinus* and more pronounced in *M. campanulae*) and long tongue (as in *M. campanulae* and larger than in *M. ursinus*). The uncus of protibia and the fovea and the teeth of ventrite 5 are as in *M. ursinus* and therefore less pronounced than in *M. campanulae*.

BIOLOGICAL NOTES: No data are available.

DISTRIBUTION: Morocco, Algeria.

ADDITIONAL MATERIAL EXAMINED:

MOROCCO: Boulhaut, leg. Antoine (4, MNHN); Tanger, 1897 (1, DEI; 1, MSNM).

ALGERIA: Blidah, VI.1927 (1, MNHN); Teniet-el-Haad, VI.1893, leg. Chobaut (1, MNHN).

18. *Miarus campanulae* (LINNAEUS)

Curculio campanulae LINNAEUS, 1767: 607.

Miarus campanulae (LINNAEUS, 1767). – SOLARI 1947: 76; HOFFMANN 1953: 61; 1958: 1324; ROUDIER 1966: 279; SMRECZYŃSKI 1973: 176; 1976: 46; LOHSE & TISCHLER 1983: 276.

Miarus binaghii SOLARI, 1947: 75. – ROUDIER 1966: 280; SMRECZYŃSKI 1973: 180.

Miarus brevirostris SOLARI, 1947: 76. – ROUDIER 1966: 280; SMRECZYŃSKI 1973: 180.

Miarus moroi SOLARI, 1947: 76 (syn.n.).

Miarus frigidus FRANZ, 1947: 223. – ROUDIER 1966: 179; SMRECZYŃSKI 1973: 176.

Miarus campanulae ssp. *binaghii* SOLARI, 1947. – HOFFMANN 1953: 61; 1958: 1325.

Miarus campanulae ssp. *brevirostris* SOLARI, 1947. – HOFFMANN 1953: 61; 1958: 1324.

TYPE LOCALITY: Sweden.

TYPE SERIES: One male and one female (coll. Linnaeus, Linnean Society London) examined by R.T. Thompson, who dissected and illustrated the aedeagus (see KANGAS 1978).

SYNONYMS: *Miarus binaghii* was described from specimens collected at Genua (Liguria). At MSNM I have examined many syntypes collected at Genua, among which is one male (lectotype, by present designation) labelled “Piani di Creto (Genova), 9.V.1937, Solari / *Miarus Binaghii* m., holotypus!, ♂, det. Solari 1947”. I examined also two male syntypes labelled “Mt. Figogna, Genova, 5.V.1901, F. Solari / *Miarus Binaghii* m. paratypus, det. F. Solari” (NMW).

Miarus brevisrostris was described from specimens collected at Voralberg (Andelsbuch, Austria). At MSNM I examined five males labelled “Andelsbuch, 6.V.900 / Andelsbuch, Voralberg, 6.V.900 / *campanulae* ex Emm. Reitter 1935”, one of which is also labelled “*Miarus brevisrostris* ♂, holotypus! det. Solari 1947” (lectotype, by present designation). HOFFMANN (1953) considered *M. binaghii* and *M. brevisrostris* to be subspecies of *M. campanulae*, whereas both ROUDIER (1966) and SMREČZYŃSKI (1973) synonymized these taxa with *M. campanulae*; I agree with this latter opinion.

Miarus moroi was described from specimens collected at Cassano Spinola (Alessandria, Piemonte, northern Italy). I have examined two syntypes (MSNM): one male (lectotype, by present designation) labelled “Cassano Spinola, V.1930, G.B. Moro / *Miarus Moroi* m., ♂, holotypus!, det. Solari, 1947” and one female labelled as the male except “1930” and “allotypus”. I observed no differences between these specimens and *M. campanulae*.

Miarus frigidus was described from specimens from Austria and northern Europe (type locality: Glocknergruppe, Walcher Hochalm; holotype not designated). ROUDIER (1966) and SMREČZYŃSKI (1973) placed this taxon in synonymy with *M. campanulae*. I examined eight syntypes (NMW) labelled “Walcher Hochalm, Glocknergruppe, leg. H. Franz / G323 / *Miarus frigidus* m. Type ♂, det H. Franz / Typus” (♂, lectotype, by present designation); same label data as lectotype except “♀” (♀); “Walcher Hochalm, Glocknergruppe, leg. H. Franz / G323 / *Cotypus*” (1 ♂, 1 ♀); “Dänemark, Ins. Seeland / ♂ / Paratypus / *Miarus frigidus* m., det H. Franz” (♂); “Col Lautaret, Dauphine / ♀” (1 ♂, 1 ♀), and agree with their opinion.

DIAGNOSIS: Length 2.3–3.1 mm; dorsal vestiture of whitish to brown scales; pronotum moderately transverse (1.30–1.35), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra short to fairly short (El/Ew 1.06–1.12), weakly curved at sides, with basal margin weakly convex in mesal half and moderately directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum moderately long (Rl/Pl 0.87–0.95), on dorsum distinctly striate-punctate to apex, in lateral view distinctly curved; uncus of protibia moderately large (Fig. 12); ventrite 5 with deep median fovea and with two robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 31a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a long tongue with apex in lateral view distinctly protruding posteroventrally, with distinct mitre and distinct uncinate auricles; endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to the ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum slightly longer (Rl/Pl 0.93–1.00) than in male, moderately curved in lateral view; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: This species appears to be closely related to *M. abeillei* by the shape of the median lobe of the aedeagus, which is characterized by distinct mitre, uncinat auricles and long tongue. It differs mainly by the rostrum, which is shorter, especially in the female, and distinctly more curved in lateral view. In the external morphology *M. campanulae* is very similar to *M. ajugae*; only the examination of the median lobe of the aedeagus allows one to separate these two taxa easily. However, usually in the male, the uncus of *M. ajugae* is more robust than that of *M. campanulae*; unfortunately this difference is feeble and difficult to emphasize.

BIOLOGICAL NOTES: Larvae live and pupate in the calyx of the flowers of several species of *Campanula* (*C. patula* L., *C. rapunculoides* L., *C. rapunculus* L., *C. rotundifolia* L., *C. trachelium* L.), where they cause a distinct swelling (HOFFMANN 1958; Tomasi, pers. comm.). SMRECZYŃSKI (1976) reported that this species was collected on *Campanula persicifolia* L., *C. rotundifolia* L. and *Phyteuma spicata* L. I examined specimens collected in Italy by Pistarino on both *Campanula scheuchzeri* VILL. and *C. cochlearifolia* LAM. at Moncenisio (2600 m, Piemonte).

DISTRIBUTION: Great Britain, Ireland, Spain, France, Belgium, Holland, Poland, Germany, Hungary, Czech Republic, Slovakia, Austria, peninsular Italy, Denmark, Norway, Sweden, Finland, western Russia.

ADDITIONAL MATERIAL EXAMINED: About 500 specimens from various countries.

19. *Miarus abeillei* DESBROCHERS DES LOGES

Miarus abeillei DESBROCHERS DES LOGES, 1893: 52. – REITTER 1907: 48; SOLARI 1947: 76; HOFFMANN 1958: 1326; ROUDIER 1966: 281; SMRECZYŃSKI 1973: 176; TEMPÈRE & PÉRICART 1989: 292.

TYPE LOCALITY: Montagne de Lure, Alpes-de-Haute-Provence, France.

TYPE SERIES: I examined one specimen labelled “Abeillei, M.te de Lure, female / Ex Musaeo Desbrochers des Loges 1914 / Lectotypus, *Miarus abeillei* Desbrochers des Loges 1892, M. Košťál design. 1989” (coll. Desbrochers des Loges, MNHN). Since the designation by Košťál remained in litteris, I designate it here as lectotype.

DIAGNOSIS: Length 2.6–3.2 mm (Fig. 52); dorsal vestiture of whitish to brown scales; pronotum moderately transverse (Pw/Pl 1.22–1.28), with moderately rounded sides, widest at basal 1/3, moderately convex; elytra short to fairly short (El/Ew 1.07–1.14), weakly curved at sides, with basal margin weakly convex in mesal half and moderately directed forwards in lateral half, with scales of interstriae moderately long and recumbent, arranged in 3–4 irregular rows. Male: rostrum moderately long (Rl/Pl 0.90–0.95), on dorsum distinctly striate-punctate to apex, in lateral view weakly curved; uncus of protibia moderately large; ventrite 5 with deep median fovea and with two robust teeth posterolaterally to fovea, more shining and covered with thinner scales than other ventrites in median part, pygidium weakly gibbous in upper half and weakly depressed in lower half; median lobe of aedeagus (Fig. 32a–d) short, in both dorsal and lateral view distinctly narrowed in median 1/3, with ventral portion distinctly convex in basal and apical 1/3, where it forms a long tongue with apex in lateral view distinctly protruding posteroventrally, with distinct mitre and distinct globose uncinat auricles; endophallus containing two flat elongate sclerites (one dorsal and one ventral), two pairs of small suboval sclerites bearing spines and positioned caudally to the ventral and dorsal elongate sclerites, two other small median sclerites, one fork-shaped and one subcylindrical. Female: rostrum very long (Rl/Pl 1.48–1.57), distinctly longer than in male (Fig. 6), nearly straight in lateral view; pygidium with shallow fovea; bursa copulatrix with two lateral sclerites.

REMARKS: Due to the very long rostrum of the female this species might be confused with *M. banaticus*, from which however it has a different distribution. In *M. abeillei* the rostrum is

shorter and nearly straight in lateral view in both sexes and less punctate in male and the median lobe of the aedeagus possesses distinctly uncinatate auricles at apex. The shape of the rostrum in female and of the median lobe of the aedeagus allows one to distinguish *M. abeillei* easily from the closely related *M. campanulae*.

BIOLOGICAL NOTES: This species was collected in France on *Campanula glomerata* L. and *C. thyrsoides* L. (HOFFMANN 1958).

DISTRIBUTION: France (HOFFMANN 1958), Switzerland, north-western Italy.

ADDITIONAL MATERIAL EXAMINED:

FRANCE: Alpes-Maritimes, Caussols, 30.V.1939, leg. Ochs (2, MSNM); Alpes-Maritimes, St. Barnabé, 11.IV.1939, leg. Ochs (1, MSNM); Alpes-Maritimes, Thorenc, VI.05 (1, MNHN); Alpes-de-Haute-Provence, Thorame, V.1952, leg. Ochs (1, MSNM); Orival, 2.VIII.1909, on *C. glomerata* (2, MSNM).

SWITZERLAND: Vaud, Le Brassus, 23.VI.1971, leg. Scherler (1, DEI).

ITALY: Liguria, Monte Bignone (San Remo), m 1300, 28.V.1944, leg. Porta (2, MSNM); Liguria, Rocca Barbena (Savona), 5.VI.1952, leg. Franciscolo (1, COA; 1, MSNV); Liguria, Monte Penna, Passo Chiodo (Genova), 1465 m, 25.V.1999, leg. Angelini (1, CAF); Piemonte, Prade (Cuneo), 28.VI.1987, leg. Zoia (1, CVK).

Key to the species

- 1 Pygidium of male simple, without median gibbosity and fovea; ventrite 5 of male without fovea and teeth (Fig. 33); elytra somewhat long (Figs. 41–42); body length 1.9–2.5 mm; in female pygidium simple and bursa copulatrix without sclerites 2
- Pygidium of male with more or less pronounced median gibbosity and fovea; ventrite 5 of male without or with more or less deep fovea and two more or less robust teeth laterally to fovea (Figs. 34–40); elytra fairly short to short (Figs. 43–52); body length 1.6–3.5 mm; in female pygidium with fovea and bursa copulatrix with two semilunate sclerites 3
- 2 Basal margin of elytra nearly regularly and weakly concave (Fig. 41), scales of elytral interstriae nearly completely arranged in single regular rows; in male uncus of protibia small (Fig. 7); median lobe of aedeagus elongate and narrow, with short apex, endophallus with elongate flagellum and without elongate median ventral sclerite (Fig. 14a–b) 1. *afer*
- Basal margin of elytra weakly convex from suture to fifth interstria, then distinctly directed forwards (Fig. 42); scales of elytral interstriae arranged in 1–2 irregular rows; in male uncus of protibia robust (Fig. 8); median lobe of aedeagus shorter and wide, with long apex, endophallus with short flagellum and with elongate median ventral sclerite (Fig. 15a–b, e) 2. *praecursor*
- 3 Ventrite 5 of male at most with weak depression, covered with scarce to dense hair-like vestiture (Figs. 34–36) 4
- Ventrite 5 of male with fovea moderately shallow to deep, nearly glabrous (Figs. 37–40) 6
- 4 Body length 1.8–2.3 mm; protibiae short, in male with very robust uncus as long as 1/5 of tibia (Fig. 9); depression of ventrite 5 of male with scarce vestiture (Fig. 34); median lobe of aedeagus in dorsal view distinctly wider at base than at apex, in lateral view as thin at base as at apex, with orifice very small and narrow (Fig. 16a–c); habitus as in Fig. 43 3. *stoeckleini*
- Body length 2.0–2.8 mm; protibiae longer, in male with moderately robust uncus as long as 1/8 of tibia; depression of ventrite 5 of male with vestiture denser than at sides (Figs. 35–36); median lobe of aedeagus in dorsal view as wide at base as at apex, in lateral view distinctly robust at apex, with orifice larger (Figs. 17a, c–d, 18a, c–d) 5
- 5 Pronotum usually widest near middle; basal margin of elytra regularly concave (Fig. 44); ventrite 5 of male without posterolateral teeth; median lobe of aedeagus without distinct ventral tongue (Fig. 17a, c–d) 4. *rotundicollis*
- Pronotum widest at basal 1/3; basal margin of elytra usually weakly convex to fifth interstria then distinctly directed forwards (Fig. 45); ventrite 5 of male usually with two small

- posterolateral teeth; median lobe of aedeagus with distinct ventral tongue (Fig. 18a, c–d) 5. *hellenicus*
- 6 Ventrite 5 of male with fovea moderately shallow and teeth usually moderately robust (Figs. 37–38) 7
- Ventrite 5 of male with fovea deep and teeth usually very robust (Figs. 39–40) 11
- 7 Ventrite 5 of male with a very small shining median tooth anterior to fovea (Fig. 38). 8
- Ventrite 5 of male without tooth anterior to fovea 9
- 8 Scales of dorsal vestiture brown, those covering elytral interstriae recumbent (Fig. 48); rostrum in lateral view distinctly curved, in female only slightly longer than in male; ventrite 5 of male with shallower fovea; median lobe of aedeagus with tip short, not visible in dorsal view (Fig. 19) 9. *araxis*
- Scales of dorsal vestiture white, those covering elytral interstriae suberect to erect (Fig. 49); rostrum in lateral view in male weakly curved, in female nearly straight and somewhat longer than in male (Fig. 1); fovea of ventrite 5 deeper; median lobe of aedeagus with tip long, clearly visible in dorsal view (Fig. 20) 10. *dentiventris*
- 9 Rostrum in lateral view distinctly tapered in apical 1/3 (Figs. 2–3); body length 2.1–2.6 mm; scales of dorsal vestiture whitish (Fig. 47) 8. *solarii*
- Rostrum in lateral view nearly of same width from base to apex; body length 2.4–3.0; scales of dorsal vestiture whitish to brown. 10
- 10 Scales of dorsal vestiture whitish (Fig. 46); median lobe of aedeagus without flanges at apex laterally (Fig. 22) 6. *monticola*
- Scales of dorsal vestiture whitish to brown or of both colours intermixed; median lobe of aedeagus with distinct flanges at apex laterally (Fig. 21) 7. *abnormis*
- 11 Rostrum in female very long ($RI/PI > 1.30$) and distinctly longer than in male (Figs. 4–6) 12
- Rostrum in female only slightly longer than in male ($RI/PI < 1.05$) 14
- 12 Scales of elytral interstriae arranged in 1–2 irregular rows, subrecumbent; median lobe of aedeagus at apex with small auricles and very small mitre (Fig. 27); habitus of female as in Fig. 50 14. *longicollis*
- Scales of elytral interstriae mainly arranged in 3–4 irregular rows, recumbent; median lobe of aedeagus at apex with distinct auricles and mitre 13
- 13 Rostrum nearly straight in lateral view in both sexes (Fig. 6) and less punctate in male; scales of dorsal vestiture whitish to brown; median lobe of aedeagus with auricles distinctly uncinatate and without spines (Fig. 32); habitus of female as in Fig. 52. South-eastern France, north-western Italy 19. *abeillei*
- Rostrum moderately curved in lateral view in both sexes (Fig. 5) and more punctate in male; scales of dorsal vestiture usually brown or white and brown intermixed; median lobe of aedeagus with auricles not uncinatate but usually with some minute spines (Fig. 28); habitus of female as in Fig. 51. Bosnia and Herzegovina, Romania 15. *banaticus*
- 14 Median lobe of aedeagus with medium sized to large auricles (Figs. 29–31) 15
- Median lobe of aedeagus at most with small auricles (Figs. 24–26) 17
- 15 Ventrite 5 of male with fovea usually very deep and teeth distinctly robust (Fig. 40); median lobe of aedeagus with auricles large, distinctly uncinatate (Fig. 31); body medium to large sized (length 2.3–3.4 mm); scales of elytral interstriae arranged in more than one irregular rows; uncus of protibia in male moderately robust (Fig. 12) 18. *campanulae*
- Ventrite 5 of male with fovea usually moderately deep and teeth moderately robust (Fig. 39); median lobe of aedeagus with auricles smaller, not uncinatate to moderately uncinatate (Figs. 29–30); body small to medium sized (length 1.6–2.8 mm); scales of elytral interstriae often arranged in single regular rows; uncus of protibia in male small (Fig. 11) 16

- 16 Pronotum moderately convex on disc; median lobe of aedeagus with auricles not uncinat and with tongue distinctly shorter (Fig. 29). South-western Europe..... 16. *ursinus*
- Pronotum usually distinctly convex on disc; median lobe of aedeagus with auricles uncinat and with tongue distinctly longer (Fig. 30). North-western Africa 17. *maroccanus*
- 17 Median lobe of aedeagus with distinct mitre recurved posteriorly (Fig. 26).....13. *atricolor*
- Median lobe of aedeagus without or with very small mitre (Figs. 24–25)..... 18
- 18 Median lobe of aedeagus with mitre and auricles small but distinct, with antepical stricture very strong, with tongue larger in basal half and clearly visible in dorsal view (Fig. 25).. 12. *ajugae*
- Median lobe of aedeagus without mitre and auricles, with antepical stricture moderately strong, with tongue smaller in basal half and indistinct in dorsal view (Fig. 24)..... 11. *simplex*

Discussion of characters used in the systematics of *Miarus*

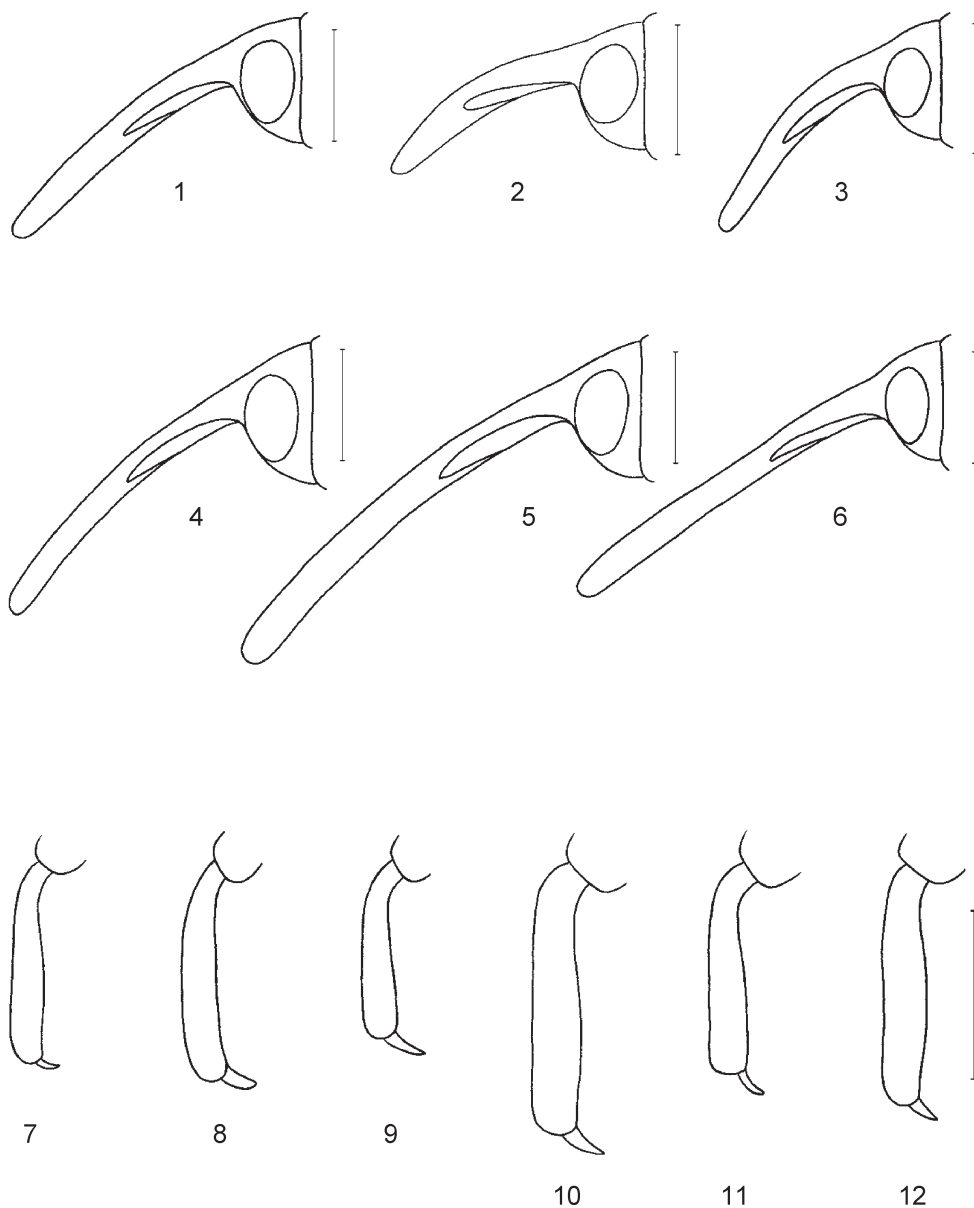
PRELIMINARY STATEMENT ON THE VARIABILITY OF CHARACTERS: This is a crucial argument in the systematics of the genus *Miarus*, which was not adequately considered by SOLARI (1947) and FRANZ (1947); SOLARI (1947) in particular described many new species on the basis of characters, such as the colour and the length of the scales of the dorsal vestiture and the sculpture of the pronotum, which are distinctly variable in many species not only between different populations but also in the same population as carefully noticed by ROUDIER (1966) and SMRECZYŃSKI (1973). Pronotum and elytra are also quite variable and therefore only sometimes useful in taxonomy. The shape of the rostrum is another character, which in many species varies more strongly than in other Mecinini, such as *Rhinusa* and *Gymnetron*, where many closely related taxa can be easily identified by this character. Also in *Cleopomiarus* the rostrum, although rather variable in shape, appears generally useful in the identification of several species.

Therefore most species of *Miarus* are presently identified only by a combination of the length of the elytra, the characters of male ventrite 5 and median lobe of the aedeagus. Unfortunately, although these characters generally show less variability than others, their differences between taxa are sometimes so feeble that even a low range of variability is sufficient to cause overlaps. With regard to the male ventrite 5 it is noteworthy that among species usually with a deep fovea and robust teeth there are specimens where these characters are less pronounced. However, in none of the studied species was the reverse noticed.

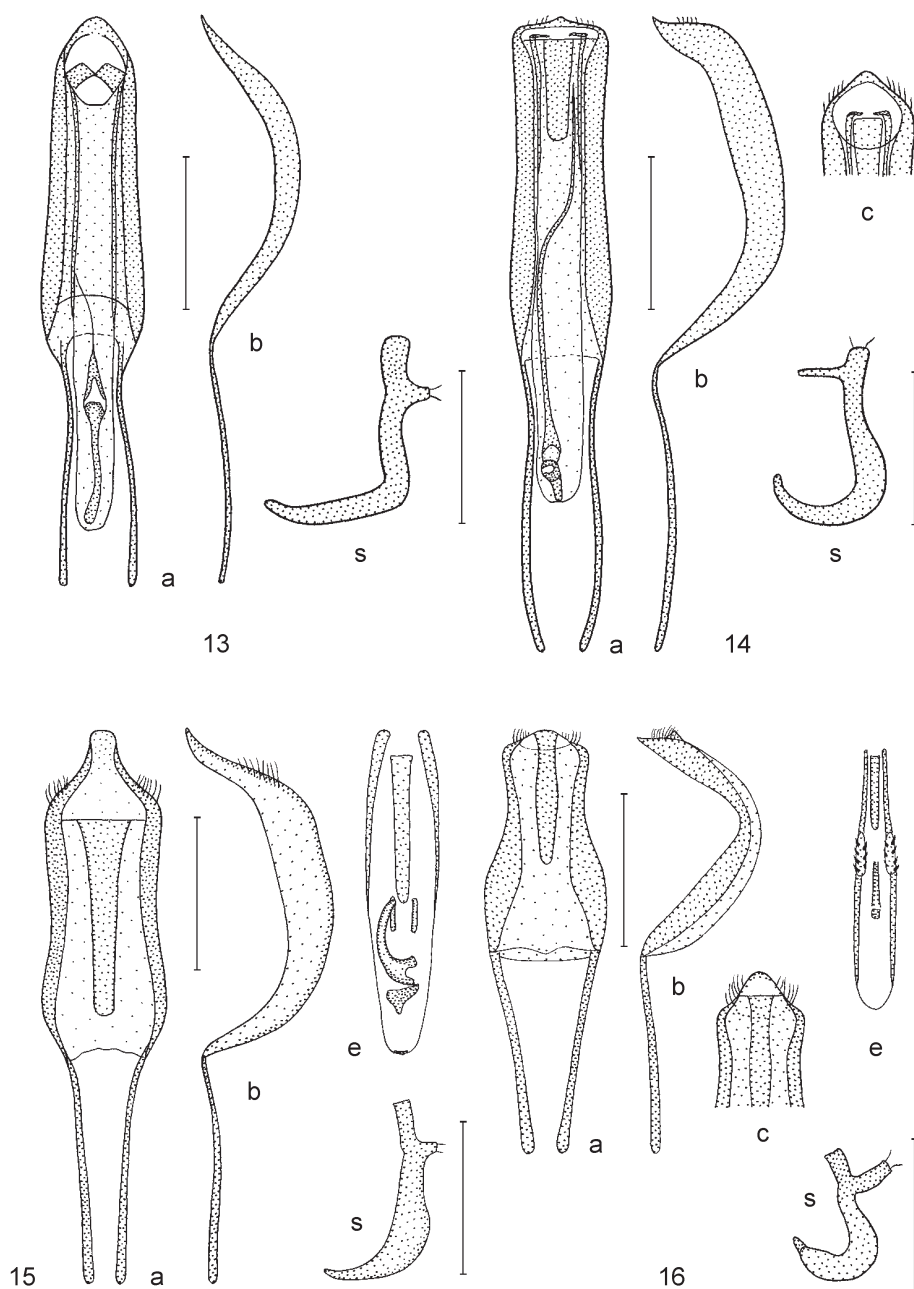
In spite of the difficulty in identifying several taxa due to their variability, I think that only two taxa among 19 presently considered as distinct species need further confirmation: *M. simplex* and *M. atricolor*, because their distinction from *M. ajugae* is based only on slight differences in the degree of prominence of the mitre at the apex of the median lobe of the aedeagus.

EXTERNAL MORPHOLOGY (Figs. 41–52). Whereas the primitive species (*M. afer*, *M. praecursor* and *M. stoeckleini*) are easy to identify, most of the other taxa are much more uniform externally. This uniformity did not allow to produce a workable key without using differences in the male genitalia or to identify all females unambiguously (ROUDIER 1966, SMRECZYŃSKI 1976). Presently, only the following external characters may be useful in order to distinguish at least some species from others:

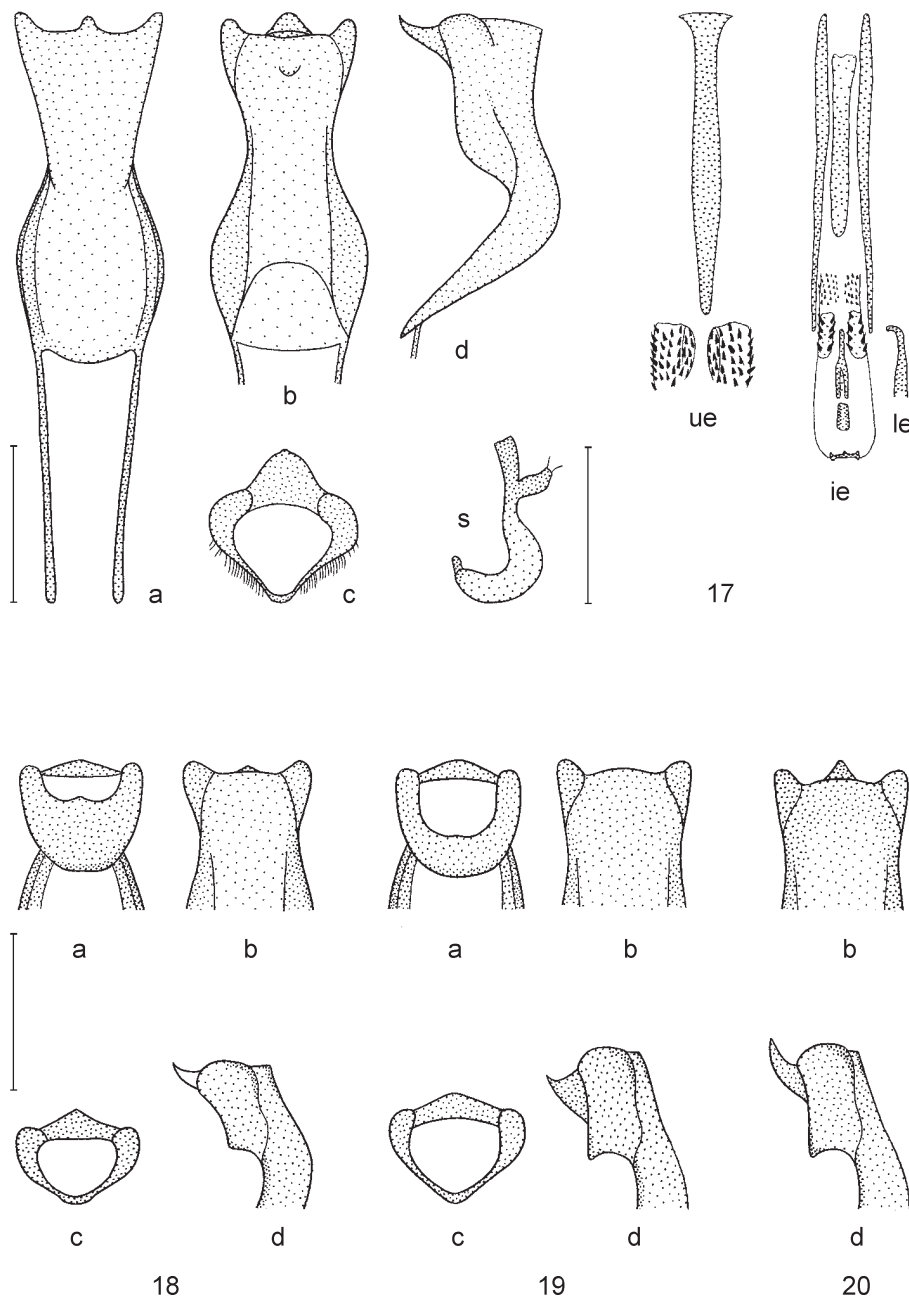
Size of body: some species (*M. afer*, *M. praecursor*, *M. stoeckleini*, *M. solarii*, *M. ursinus* and *M. maroccanus*) are small on average (length 1.8–2.6 mm); the other species are usually larger on average (length 2.4–3.0 mm), although sometimes there are smaller individuals such as in *M. hellenicus*.



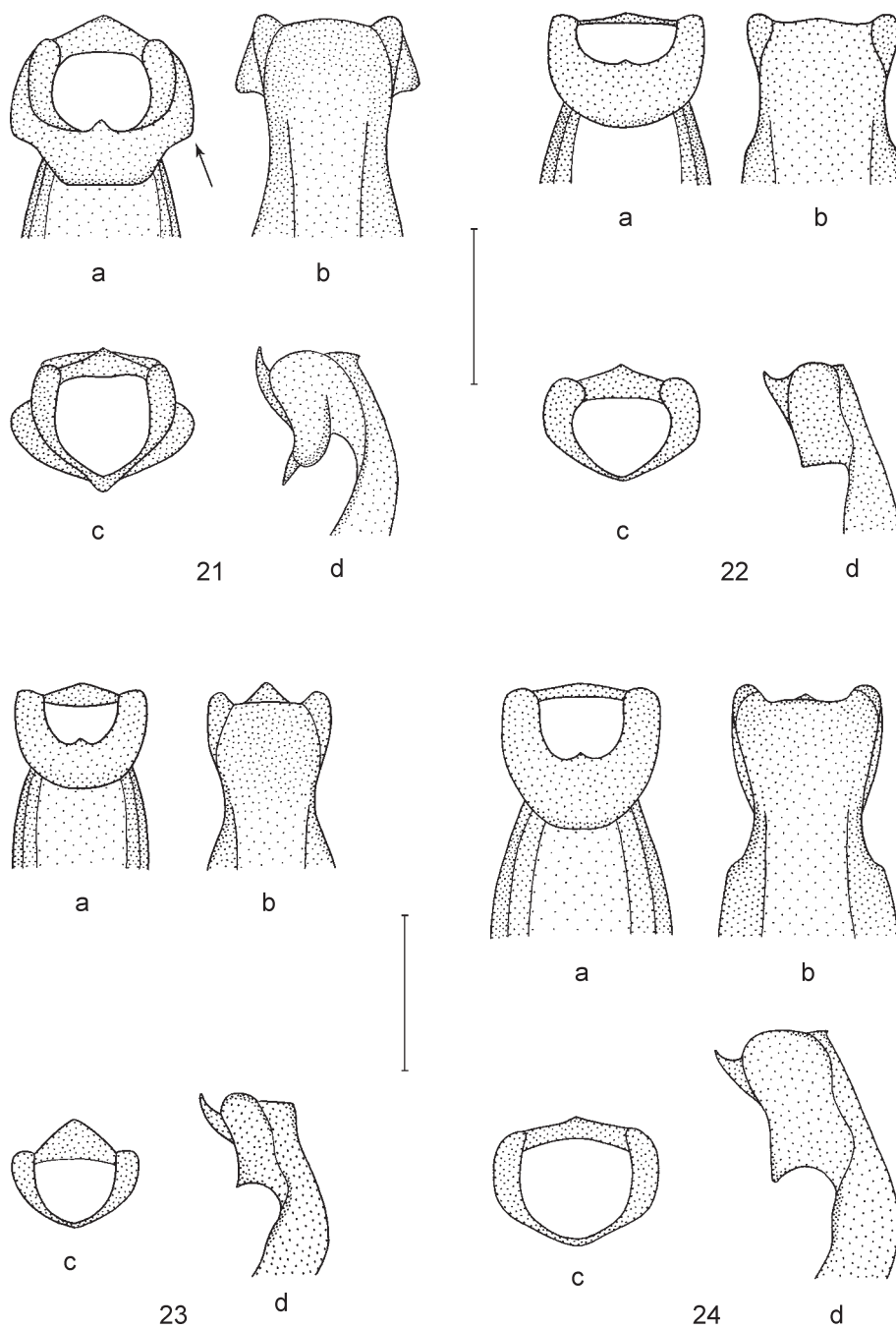
Figs. 1–12: Rostrum (1–6) of: 1) *Miarus dentiventris*, ♀; 2) *M. solarii*, ♂; 3) *M. solarii*, ♀; 4) *M. longicollis*, ♀; 5) *M. banaticus*, ♀; 6) *M. abeillei*, ♀. Male protibia (7–12) of: 7) *M. afer*; 8) *M. praecursor*; 9) *M. stoeckleini*; 10) *M. ajugae*; 11) *M. ursinus*; 12) *M. campanulae*. Scales: 0.5 mm.



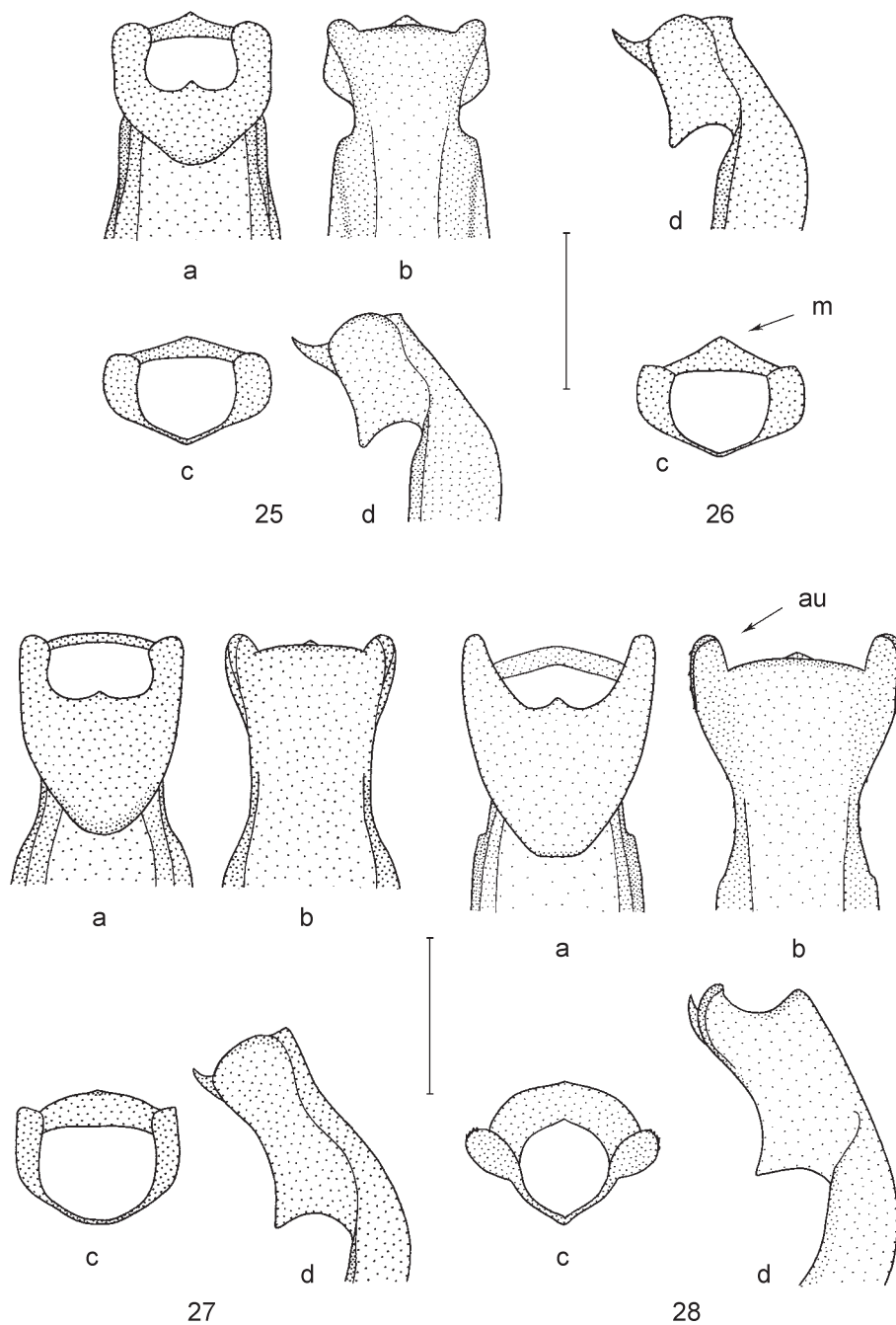
Figs. 13–16: Median lobe of aedeagus in dorsal (a), lateral (b), and apical (c) view, sclerites of the internal sac (e), and spermatheca (s) of: 13) *Cleopomiarus plantarum*; 14) *Miarus afer*; 15) *M. praecursor*; 16) *M. stoeckleini*. Scales: 0.25 mm (median lobe), 0.1 mm (spermatheca).



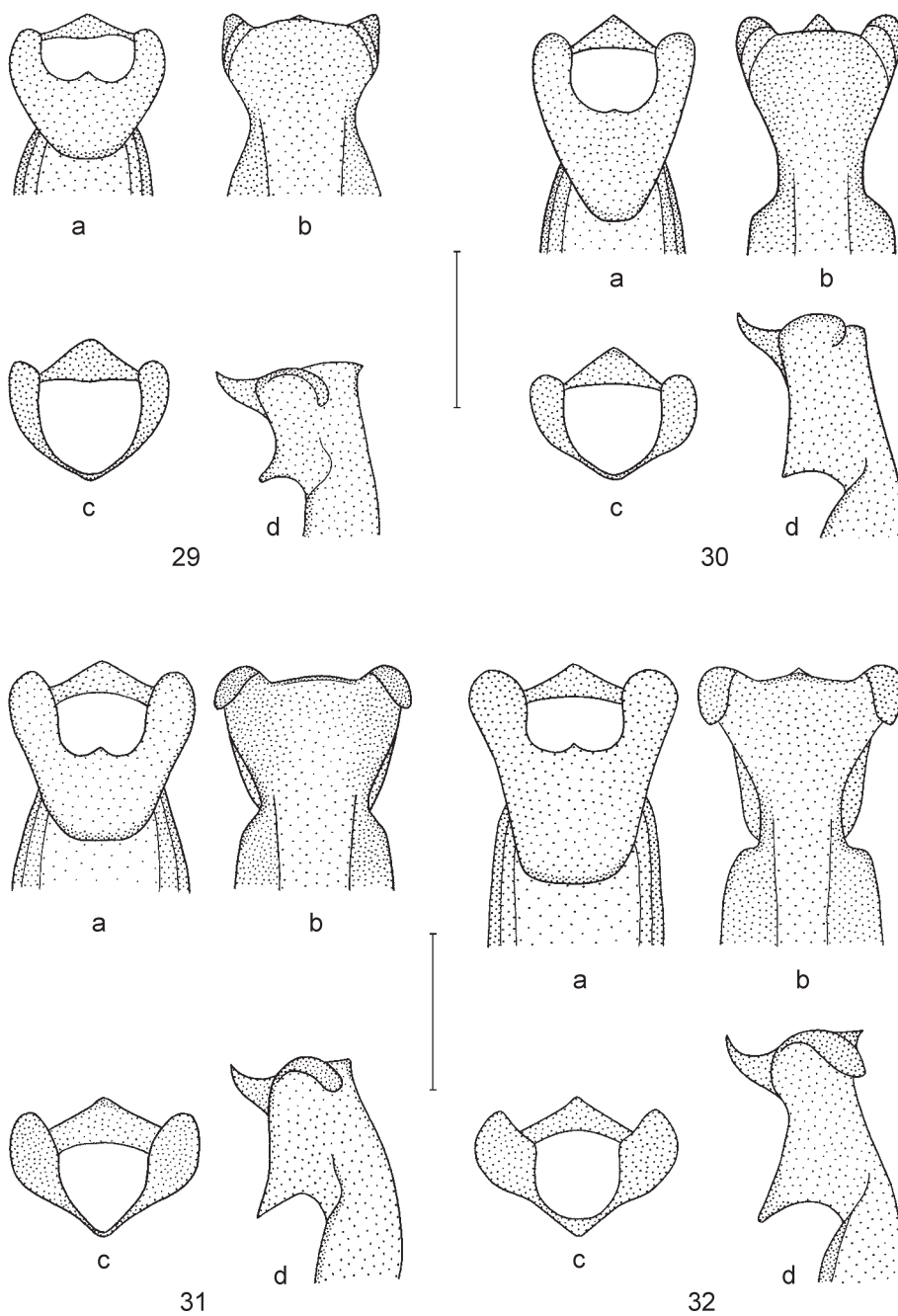
Figs. 17–20: Median lobe of aedeagus in ventral (a), dorsal (b), apical (c) and lateral (d) view, upper (ue) and inner (ie in dorsal and le in lateral view) sclerites of internal sac, and spermatheca (s) of: 17) *Miarus rotundicollis*; 18) *M. hellenicus*; 19) *M. araxis*; 20) *M. dentiventris*. Scales: 0.25 mm (median lobe), 0.1 mm (spermatheca).



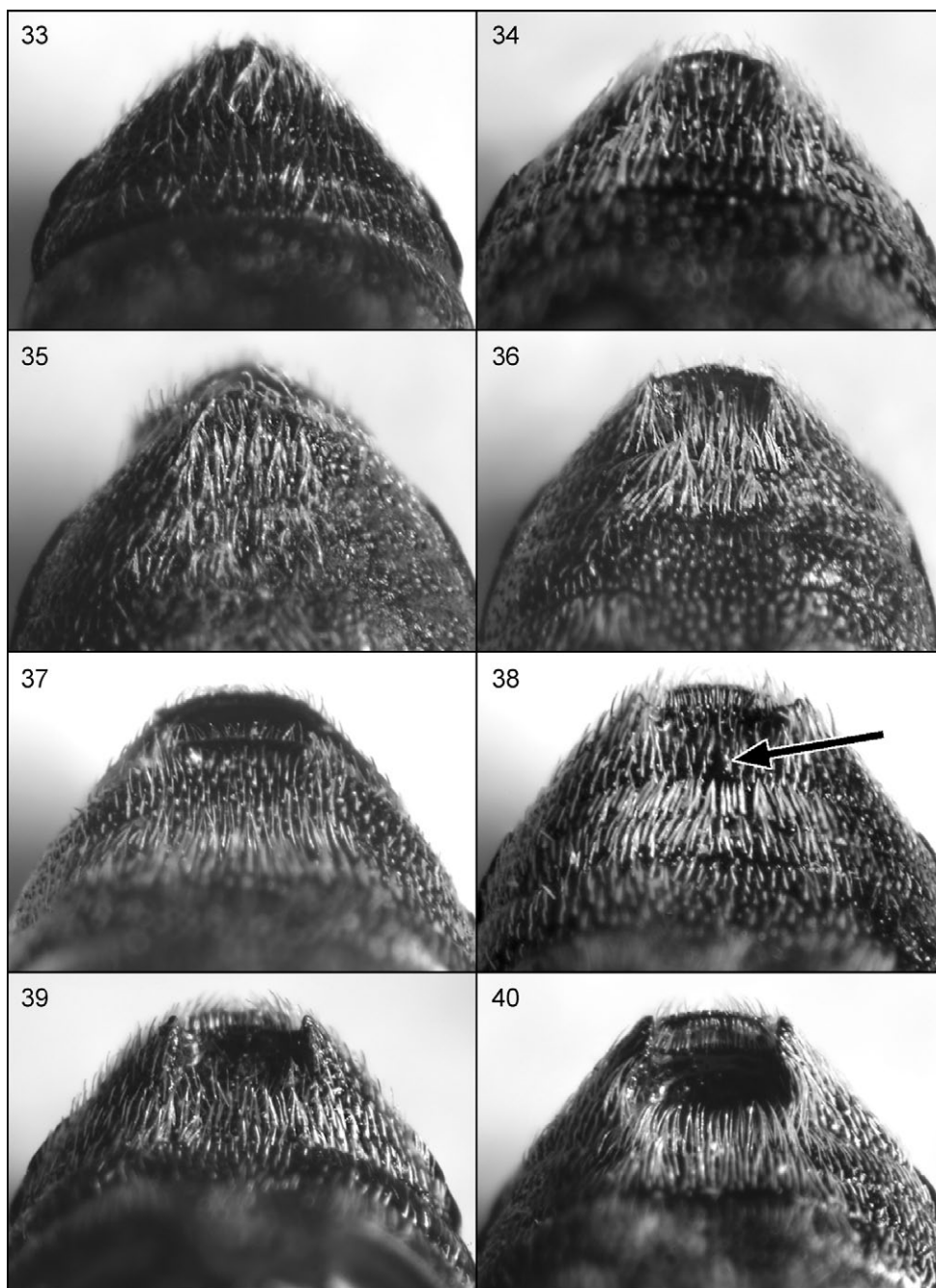
Figs. 21–24: Median lobe of aedeagus in ventral (a), dorsal (b), apical (c) and lateral (d) view of: 21) *Miarus abnormis* (arrow points at flange); 22) *M. monticola*; 23) *M. solarii*; 24) *M. simplex*. Scales: 0.25 mm.



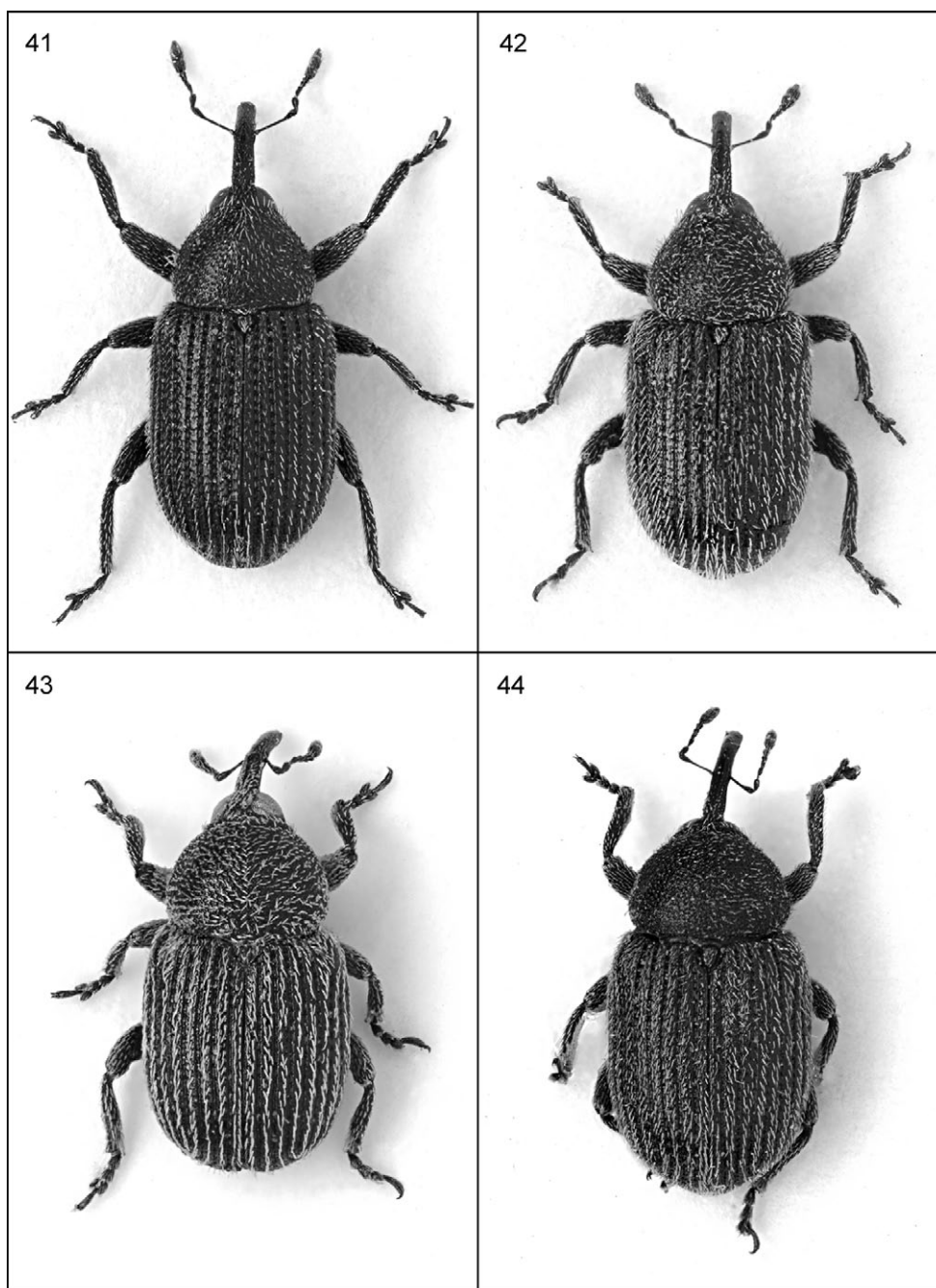
Figs. 25–28: Median lobe of aedeagus in ventral (a), dorsal (b), apical (c) and lateral (d) view of: 25) *Miarus ajugae*; 26) *M. atricolor*; 27) *M. longicollis*; 28) *M. banaticus*. Scales: 0.25 mm. au = auricle; m = mitre.



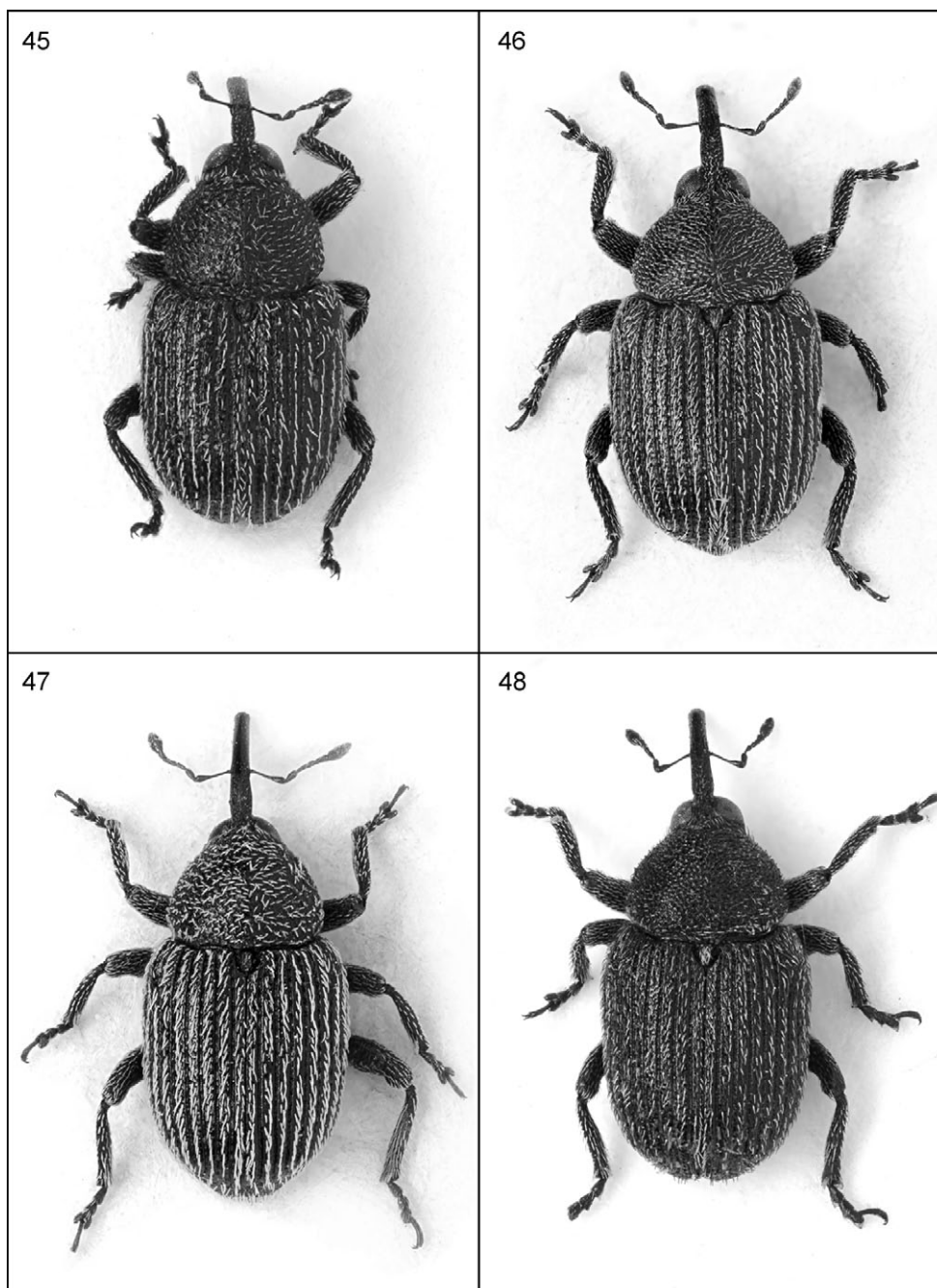
Figs. 29–32: Median lobe of aedeagus in ventral (a), dorsal (b), apical (c) and lateral (d) view of: 29) *Miarus ursinus*; 30) *M. maroccanus*; 31) *M. campanulae*; 32) *M. abeillei*. Scales: 0.25 mm.



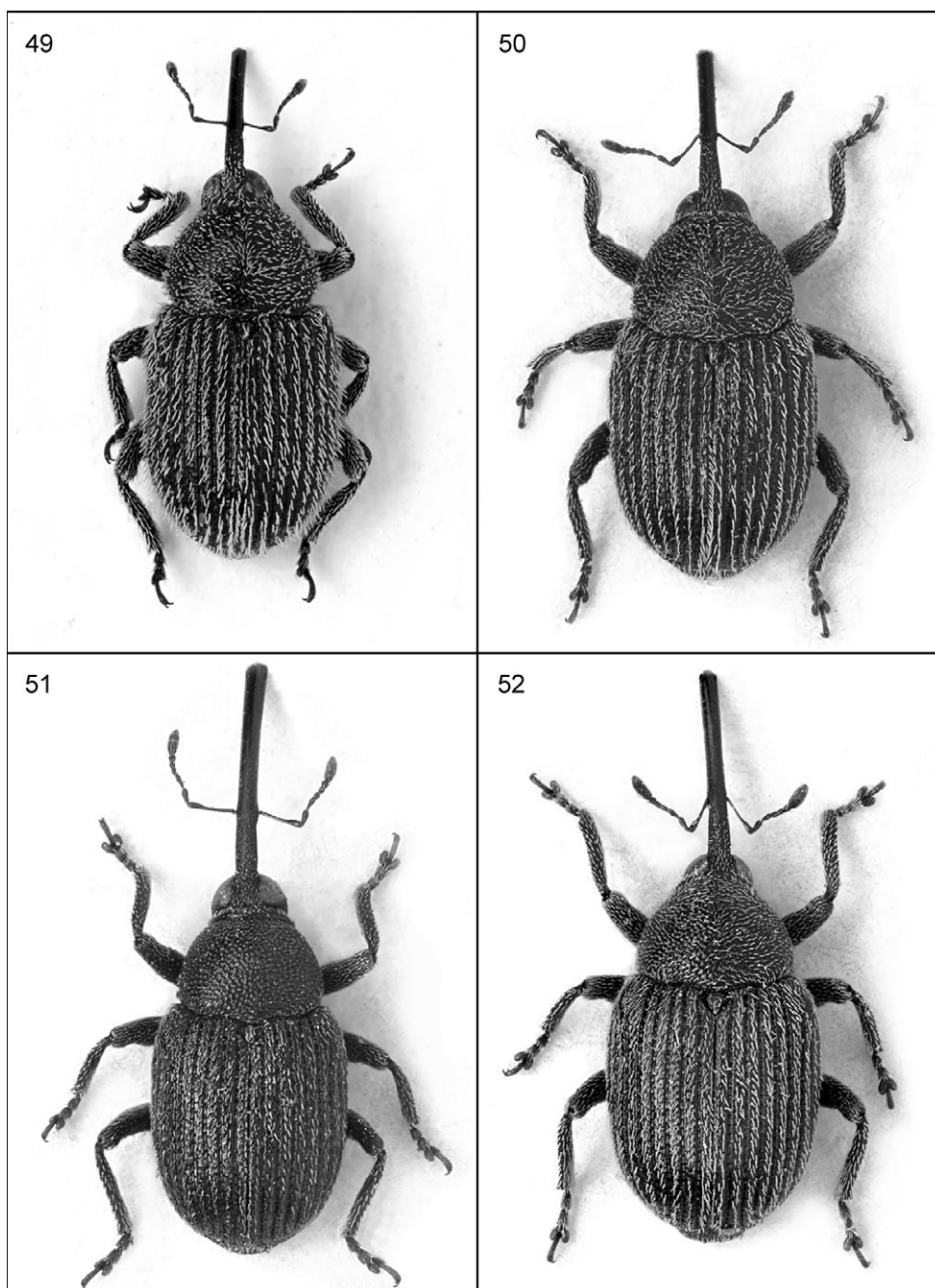
Figs. 33–40: Abdomen of male of: 33) *Miarus praecursor*; 34) *M. stoeckleini*; 35) *M. rotundicollis*; 36) *M. hellenicus*; 37) *M. abnormis*; 38) *M. araxis*; 39) *M. ursinus*; 40) *M. campanulae*. Arrow indicates very small median tooth of ventrite 5. Not to scale.



Figs. 41–44: Habitus of 41) *Miarus afer*, ♀; 42) *M. praecursor*, ♀; 43) *M. stoeckleini*, ♂; 44) *M. rotundicollis*, ♀. Not to scale.



Figs. 45–48: Habitus of: 45) *Miarus hellenicus*, ♂; 46) *M. monticola*, ♀; 47) *M. solarii*, ♀; 48) *M. araxis*, ♂. Not to scale.



Figs. 49–52: Habitus of: 49) *Miarus dentiventris*, ♀; 50) *M. longicollis*, ♀; 51) *M. banaticus*, ♀; 52) *M. abeillei*, ♀. Not to scale.

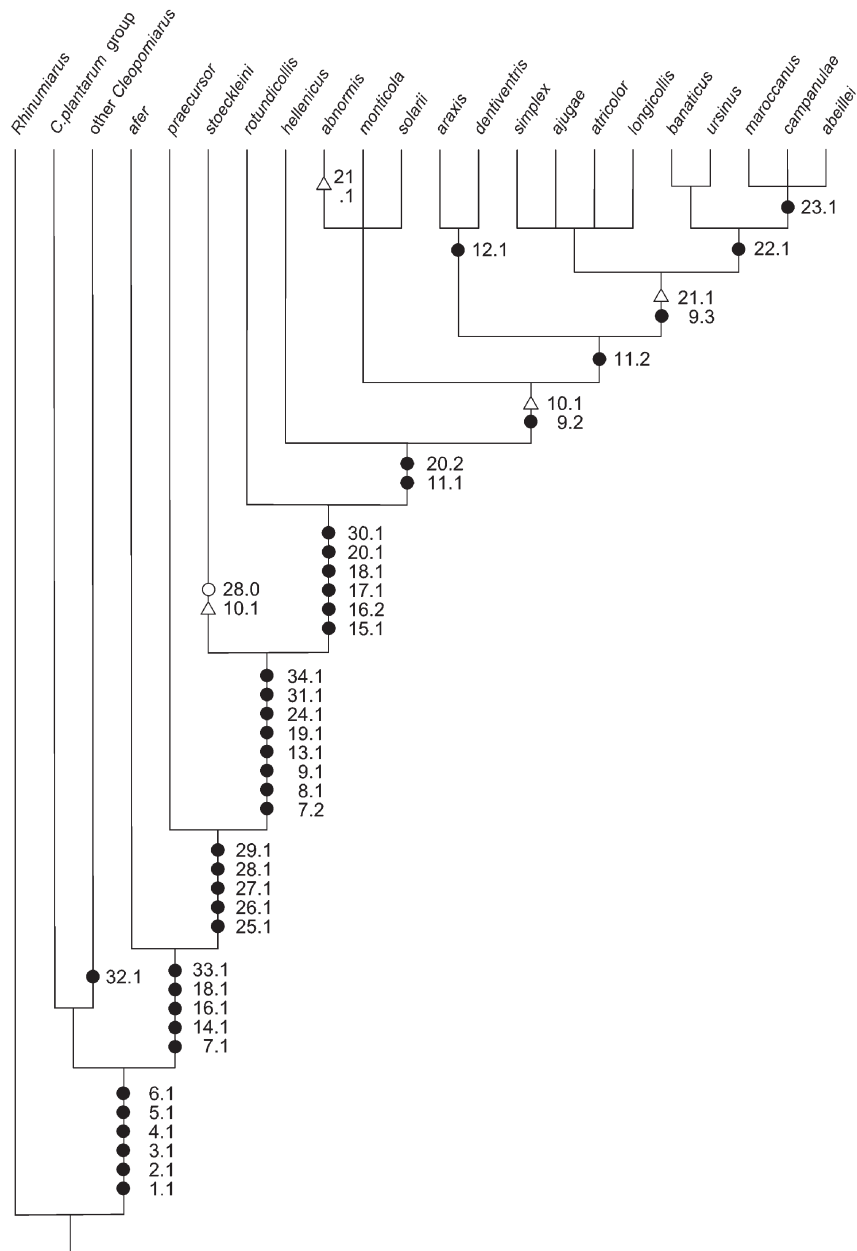


Fig. 53: Reconstructed phylogeny illustrating hypothesized phylogenetic relationships among *Rhinumiarus*, *Cleopomiarus* and species of *Miarus*. Dots indicate apomorphic character states, open circle reversal, open triangles homoplasy of character state.

Length of elytra: the elytra are moderately long in *M. afer* and *M. praecursor*, fairly short to moderately long in *M. dentiventris*, fairly short in *M. stoeckleini*, *M. rotundicollis*, *M. araxis*, *M. abnormis*, *M. monticola*, *M. solarii* and *M. banaticus* and short in all the other species.

Vestiture of elytral interstriae: as reported by ROUDIER (1966), the colour of the scales in the same species often varies from unicolorous, white or brown, to white and brown intermixed. In some taxa they seem to be always white (*M. afer*, *M. praecursor*, *M. stoeckleini*, *M. dentiventris*, *M. monticola*, and *M. solarii*). The scales are generally recumbent, sometimes subrecumbent (especially in *M. longicollis*, *M. ursinus* and *M. maroccanus*), suberect only in *M. dentiventris*. They are arranged usually in more irregular rows, but in single rows in *M. afer* and in many specimens of *M. ursinus* and *M. maroccanus*.

Male: Size of uncus of protibia: the taxonomical use of differences based on the size of structures is often difficult since there is no substantial gap between large- and small-sized ones especially when an intermediate condition also exists. However, after the examination of many specimens there is no doubt that in some taxa, such as *M. praecursor*, *M. stoeckleini*, *M. araxis*, *M. monticola*, *M. ajugae* and *M. solarii*, the uncus of the protibia is larger than in other species. By this character it is usually possible to distinguish *M. ajugae* from *M. campanulae*, *M. abnormis* and *M. ursinus*.

Rostrum: in *Miarus* this structure varies considerably in length, shape, curvature and sculpture in specimens of the same population. Its length is never useful for separating species, whereas a characteristic shape allows one to distinguish *M. solarii* (Fig. 2) from all other species. Although variable, the curvature in lateral view and the dorsal sculpture usually allow distinction of at least some species.

Fovea of pygidium: absent in *M. afer* and *M. praecursor*, but present in all other species of *Miarus*.

Fovea and teeth of ventrite 5 (Figs. 33–40): these two characters, although variable, allow not only to identify several taxa, which are difficult to distinguish without studying genitalia: this is especially true for separating *M. hellenicus* from *M. rotundicollis* and *M. monticola* and *M. abnormis* from *M. ajugae* and *M. campanulae*.

Female: Rostrum (Figs. 1, 3–6): in some species the rostrum is very long and much longer than in the male: this character allows one to easily distinguish *M. dentiventris*, *M. abeillei*, *M. banaticus* and *M. longicollis* from all other species. In some species the rostrum is distinctly more curved than in others. This character may be useful to separate *M. ajugae*, *M. abnormis* and *M. ursinus* from some specimens of *M. campanulae*. The shape of the rostrum allows separation of *M. solarii* from all other species.

Fovea of pygidium: absent in *M. afer* and *M. praecursor*, but present in all other species of *Miarus*.

Presently, females of *M. monticola*, *M. abnormis*, *M. simplex*, *M. ajugae* and *M. atricolor* cannot be distinguished externally.

GENITALIA: Male (Figs. 14–32). All species differ from each other by the shape of the median lobe of the aedeagus. However, sometimes the differences are very subtle and moreover subject to variability. This is especially true for *M. simplex* and *M. atricolor* vs. *M. ajugae*, and for *M. araxis* vs. *M. monticola*. Female (Figs. 14–17s). Only the primitive species, as *M. afer* and *M. praecursor*, can be separated from other species by the lack of sclerites in the bursa copulatrix. Spermatheca and spiculum ventrale do not substantially differ in all species of *Miarus*.

Characters used for cladistic analysis

1. Prosternal sulcus: 0. Weak; 1. Deep.

Among the Mecinini, *Rhinumiarus*, *Cleopomiarus* and *Miarus* are the only genera to possess a prosternal sulcus. In *Rhinumiarus* this sulcus is weak (character state 1.0), whereas *Cleopomiarus* and *Miarus* have the condition 1.1.

2. Coxal cavities of prothorax: 0. Contiguous; 1. Separated.

In *Cleopomiarus* and *Miarus* the cavities of the forecoxae are separated (character state 2.1), whereas in *Rhinumiarus* as well as in other Mecinini the coxae are contiguous.

3. Mesoventral process: 0. As wide as half of coxa; 1. As wide as coxa.

Among Mecinini *Rhinumiarus*, *Cleopomiarus* and *Miarus* are the only genera to have a large mesoventral process, which in *Rhinumiarus* is as wide as half of coxa (character state 3.0), whereas in *Cleopomiarus* and *Miarus* the mesoventral process is very large (character state 3.1).

4. Median portion of metaventrite: 0. Flat to slightly concave; 1. With distinct fovea in anterior 2/3.

In *Cleopomiarus* and *Miarus* the anterior 2/3 of metaventrite are distinctly concave (character state 4.1), whereas in *Rhinumiarus* as well as in other Mecinini the median portion of metaventrite is at most slightly concave.

5. Shape of scales covering part of prosternum, mesoventral process and sides of metaventrite: 0. Entire to slightly digitate; 1. Distinctly digitate, bifid to pentafig.

In *Cleopomiarus* and *Miarus* some of the scales covering portions of the thorax end in a fork (character state 5.1). In the out-group *Rhinumiarus* as well as in other Mecinini the scales covering the venter are of various shapes, from hair-like to subquadrate, but are nearly all entire at their apex.

6. Claws: 0. Fused at base; 1. Free.

In Mecinini including *Rhinumiarus* the presence of claws close and distinctly fused at the base represents the plesiomorphic state (CALDARA 2001a). In *Cleopomiarus* and *Miarus* and in the species belonging to the Afrotropical *G. bisignatum* group (CALDARA 2003) and two Russian species of *Mecinus* the claws are free and this must be considered here as the apomorphic condition, although most Curculionidae possess this character state.

7. Proximal half of pygidium in male: 0. Flat to moderately convex; 1. Distinctly convex; 2. Gibbous.

In *Cleopomiarus*, and generally in other Mecinini, the pygidium of the male is flat to moderately convex, whereas in *M. afer* and *M. praecursor* it is distinctly but regularly convex (character state 7.1). In all other *Miarus* the pygidium is distinctly gibbous (character state 7.2).

8. Pygidium in male: 0. Without fovea; 1. With fovea.

Usually the pygidium, in males of Curculionidae possessing this structure, lacks a fovea. It is present in *Miarus*, with the exception of *M. afer* and *M. praecursor*.

9. Ventrite 5 in male: 0. Without median fovea (Fig. 33); 1. With weak depression (Figs. 34–36); 2. With shallow to moderately shallow fovea (Figs. 37–38); 3. With moderately deep to deep fovea (Figs. 39–40).

In all species of *Miarus*, except *M. afer* and *M. praecursor*, at the middle of ventrite 5 there is a weak depression (character state 9.1) or a fovea, which in some species is only shallow (character 9.2), whereas in others is more pronounced (character state 9.3).

10. Ventrite 5 in male: 0. At middle as distinctly pubescent as ventrites 3 and 4 (Figs. 33, 35–36); 1. At middle scarcely pubescent to nearly glabrous (Figs. 34, 37–40).

In *M. stoeckleini* and species with fovea (character states 9.2 and 9.3) this hole appears shining and scarcely pubescent.

11. Ventrite 5 in male: 0. Without posterolateral teeth (Figs. 33–35); 1. With small posterolateral teeth (Figs. 36–38); 2. With moderately robust to robust posterolateral teeth (Figs. 39–40).

In *M. hellenicus* and in the species of *Miarus* with fovea this structure possesses one small (character state 11.1) or more or less robust (character state 11.2) posterior tooth on each side.

12. Ventrite 5 in male (Figs. 33–40): 0. Without mediobasal tooth; 1. With shining very small mediobasal tooth (Fig. 38).

In two species with fovea, *M. araxis* and *M. dentiventris*, at the base of fovea a very small shining median tooth is usually visible.

13. Pygidium in female: 0. Without fovea; 1. With fovea.

The pygidium of the female is distinctly foveate in *Miarus* (except *M. afer* and *M. praecursor*) but not in other Mecinini.

14. Apex of median lobe of aedeagus: 0. Without setae (Fig. 13); 1. With numerous setae (Figs. 14–16).

Setae at the apex of the median lobe of the aedeagus are present in all species of *Miarus*, but not in other Mecinini.

15. Apex of median lobe of aedeagus: 0. Forming a more or less obtuse angle with body of median lobe (Figs. 13–16); 1. Deflected ventrad and perpendicular to body of median lobe (Figs. 17–32).

Character state 15.1 is present in *Miarus* except for *M. afer*, *M. praecursor* and *M. stoeckleini*, which possess the plesiomorphic condition, but not in other Mecinini.

16. Orificial area with respect to plane of apical half of median lobe of aedeagus: 0. Placed at most at 45 degrees (Fig. 13); 1. Placed at about 60–75 degrees (Figs. 14–16); 2. Placed perpendicularly (Figs. 17–32).

In all Mecinini there is the plesiomorphic condition (character state 16.0). In *Miarus* the primitive species (*M. afer*, *M. praecursor* and *M. stoeckleini*) possess the character state 16.1, whereas all other species possess the character state 16.2.

17. Orifice of median lobe of aedeagus: 0. Narrow (Figs. 13–16); 1. Large (Figs. 17–32).

In the species of *Miarus* with apex of median lobe of aedeagus perpendicular to the body, the distal orifice is large and rounded.

18. Body of median lobe of aedeagus in lateral view: 0. With sides gradually tapering from middle to apex (Fig. 13); 1. With sides robust to near apex (Figs. 14–32).

In *Cleopomiarus*, as well as in other Mecinini, the median lobe of the aedeagus in lateral view tapers from middle or just in front of middle. In all *Miarus* the median lobe remains robust to near apex.

19. Body of median lobe of aedeagus in lateral and dorsal view: 0. In lateral view uniform in thickness or gradually narrowing towards apex in its middle 1/3, in dorsal view at least weakly narrowed (Figs. 13–15); 1. Abruptly narrowed near middle both in lateral and in dorsal view (Figs. 16–32).

In Mecinini only the species of *Miarus*, except *M. afer* and *M. praecursor*, possess the apomorphic condition.

20. Body of median lobe of aedeagus in ventral view: 0. Without tongue-like structure in apical half (Figs. 13–16); 1. With incomplete tongue-like structure (Fig. 17); 2. With complete tongue-like structure (Figs. 18–32).

In species of *Miarus* except for *M. afer*, *M. praecursor* and *M. stoeckleini*, there is a ventral structure which appears similar to a tongue. However in one species, *M. rotundicollis*, this tongue is not defined by thick margins in the middle (character state 20.1).

21. Body of median lobe of aedeagus in ventral view: 0. With short tongue-like structure in apical half, in lateral view only slightly protruding (Figs. 18–20, 22–23); 1. With long tongue-like structure in apical half, in lateral view distinctly protruding (Figs. 21, 25–32).

Among species of *Miarus* with a tongue-like structure in apical half, in those with some advanced features, and in *M. abnormis* due probably to homoplasy, the tongue is long and distinctly protruding, therefore this condition is considered the apomorphic one.

22. Apex of median lobe of aedeagus in dorsal view: 0. Without or with small lateral auricles; 1. With moderately large to large lateral auricles.

Some species of *Miarus* with large distal orifice possess two distinct auricle-like apical lateral expansions (character state 22.1).

23. Apical lateral auricle of median lobe of aedeagus: 0. Not uncinat; 1. More or less distinctly uncinat.

In some species with character 22.1 the lateral auricles of the apex of the median lobe of the aedeagus possess a further uncinat expansion.

24. Basal ventral margin of median lobe of aedeagus: 0. Concave to flat and poorly sclerotized; 1. Distinctly convex and distinctly sclerotized.

In Mecinini the apomorphic condition is present only in *Miarus* except *M. afer* and *M. praecursor*.

25. Internal sac: 0. With flagellum with long tube-like distal portion; 1. With short flagellum.

Many species belonging to all genera of Mecinini, all species of *Cleopomiarus* and *M. afer* possess a long tube-like flagellum. In *Miarus*, except *M. afer*, the flagellum is reduced to a short structure at the base of the ejaculatory duct (character state 25.1).

26. Internal sac: 0. Without elongate, thin, dorsal median sclerite in apical half; 1. With a more or less elongate, thin, dorsal median sclerite in apical half.

In “primitive” *Rhinumiarus* (CALDARA 2001b), *Cleopomiarus* and *M. afer*, as well as in most Mecinini, in the internal sac there are no elongate dorsal median sclerites in its apical half. An advanced group of *Rhinumiarus* and *Miarus* (except *M. afer*) possess the apomorphic character state 26.1.

27. Internal sac: 0. Without elongate, thin, ventral median sclerite in apical half; 1. With an elongate, thin, ventral median sclerite in apical half.

In *Miarus*, except *M. afer*, the internal sac possesses an additional elongate, thin ventral median sclerite, which is similar in shape to the dorsal one (see character state 26.1).

28. Internal sac: 0. Without horseshoe shaped basal sclerite; 1. With small horseshoe shaped basal sclerite.

At the base of the internal sac of *Miarus* (except *M. afer* and *M. stoeckleini*) a small, horseshoe shaped sclerite is present. This sclerite is absent in other Mecinini examined.

29. Internal sac: 0. Without pair of small suboval sclerites positioned caudally to ventral elongate median sclerite; 1. With pair of small suboval sclerites positioned caudally to ventral elongate median sclerite.

All species possessing character state 27.1 have also character state 29.1.

30. Internal sac: 0. Without pair of sclerites positioned caudally to dorsal elongate median sclerite; 1. With pair of sclerites positioned caudally to the dorsal elongate median sclerite.

The species of *Miarus*, excluding *M. afer*, *M. praecursor* and *M. stoeckleini*, have a pair of sclerites placed dorsally to the first pair.

31. Suboval sclerites of internal sac: 0. Without spines; 1. With spines.

The sclerites recorded in character states 29.1 and 30.1 are covered with more or less numerous small spines in *Miarus* excluding *M. praecursor*.

32. Body of spermatheca: 0. Regularly hook-shaped; 1. Sinuate, not hook-shaped.

In the *Cleopomiarus plantarum* group, as well as in most Mecinini and Curculioninae, the spermatheca, even though variously shaped, is characterised by a regularly hook-shaped body. In other *Cleopomiarus*, the body of the spermatheca is sinuate.

33. Body of spermatheca: 0. Of same width to gradually reduced from base to apex; 1. Moderately expanded in median part.

In all species of *Miarus* the median portion of the body is moderately expanded.

34. Bursa copulatrix: 0. Without sclerites; 1. With two semilunate sclerites.

In *Miarus*, except *M. afer* and *M. praecursor*, two semilunate sclerites are present in this membranous structure.

Phylogenetic analysis

In the present analysis 34 characters were included. Several of these characters were already used in the phylogenetic reconstruction of the tribe Mecinini by CALDARA (2001a).

The computer-aided analysis with unweighted characters and using *Rhinumiarus* and *Cleopomiarus* as outgroups produced one tree with consistency and rescaled consistency indices 78 and 88 respectively. This tree (Fig. 53) agrees completely with the tree reconstructed manually and shows a high level of resolution due to the presence of only two parallelisms and one reversal. Some branches remain unresolved due to lack of synapomorphism.

Discussion of phylogenetic relationships

The ancestor of the lineage *Cleopomiarus* + *Miarus* probably had a median lobe of the aedeagus similar to that of *C. plantarum*, which is presently considered the most primitive species of *Cleopomiarus* (CALDARA 2005) and which possesses a median lobe similar to that of other Mecinini, and male and female pygidium and male ventrite 5 without particular features.

The most primitive taxon of *Miarus*, *M. afer*, shares many characters of the median lobe of the aedeagus, including the sclerites of the endophallus, with the group of *Cleopomiarus plantarum*. These plesiomorphic characters are: the presence of two apical dorsolateral sclerites, even though reduced in *M. afer*, at the end of two elongate and thin lateral sclerites constituting the

margin of the endophallus from base to apex of the median lobe, and the presence of a long flagellum. However, the median lobe of *M. afer* possesses three conditions which are apomorphic for *Miarus*: presence of apical setae (character state 14.1), orificial area tipped forwards (character state 16.1), sides robust to near apex (character state 18.1). With regard to pygidium and ventrite 5, it must be noticed only an increase of the pygidium convexity at middle in male (character state 7.1), which is here considered as apomorphic state in the genus *Miarus*. Finally, the body of the spermatheca is expanded in its median portion and not gradually reduced in width from base to apex (character state 33.1).

	1	2	3
	1234567890123456789012345678901234		
<i>Rhinumiarus</i>	00000000000000000000000000000000		
<i>Cleopomiarus plantarum</i> group	11111100000000000000000000000000		
other <i>Cleopomiarus</i>	1111110000000000000000000000000100		
<i>Miarus afer</i>	1111111000000101010000000000000010		
<i>Miarus praecursor</i>	1111111000000101010000001111100010		
<i>Miarus stoeckleini</i>	1111112111001101011000011110101011		
<i>Miarus rotundicollis</i>	1111112110001112111100011111111011		
<i>Miarus hellenicus</i>	1111112110101112111200011111111011		
<i>Miarus abnormis</i>	1111112121101112111210011111111011		
<i>Miarus monticola</i>	1111112121101112111200011111111011		
<i>Miarus solarii</i>	1111112121101112111200011111111011		
<i>Miarus araxis</i>	1111112121211112111200011111111011		
<i>Miarus dentiventris</i>	1111112121211112111200011111111011		
<i>Miarus simplex</i>	1111112131201112111210011111111011		
<i>Miarus ajugae</i>	1111112131201112111210011111111011		
<i>Miarus atricolor</i>	1111112131201112111210011111111011		
<i>Miarus longicollis</i>	1111112131201112111210011111111011		
<i>Miarus banaticus</i>	1111112131201112111211011111111011		
<i>Miarus ursinus</i>	1111112131201112111211011111111011		
<i>Miarus maroccanus</i>	1111112131201112111211111111111011		
<i>Miarus campanulae</i>	1111112131201112111211111111111011		
<i>Miarus abeillei</i>	1111112131201112111211111111111011		

Table 1: Data matrix for the genera *Rhinumiarus* and *Cleopomiarus* and all species of *Miarus*.

Miarus praecursor shares the following four characters with other *Miarus*, which are absent only in *M. afer*: short flagellum (character state 25.1), elongate flat dorsal and ventral sclerites (character states 26.1 and 27.1), pair of small basoventral sclerites (character state 29.1).

Miarus stoeckleini is considered advanced with regard to *M. praecursor* by the pygidium with gibbosity at the middle in male (character state 7.2) and with small fovea in the distal portion in both sexes (character states 8.1 and 13.1), the ventrite 5 in male with weak depression (character state 9.1), the median lobe of the aedeagus with body abruptly narrowed at middle in both dorsal and lateral view (character state 19.1), with convex ventral basal margin (character state 24.1) and with dorsobasal sclerites of the internal sac with spines (character state 31.1), and partially sclerotized bursa copulatrix (character state 34.1). However, in this species the median lobe presents one noteworthy autapomorphy: a very small orifice.

All of the remaining species of *Miarus* are very closely related with each other, because the males show clear similarities in the strongly modified median lobe of the aedeagus and in the secondary sexual characters in the male ventrite 5. However, *M. rotundicollis* and *M. hellenicus* appear to be more primitive than the others because in the first one the ventral apical tongue is not yet complete (character state 20.1) and in both the median portion of male ventrite 5 is covered with dense hair-like pubescence as in the primitive species (character state 10.0).

Among the species with fovea of ventrite 5 of the male shallow and with scarce to nearly absent vestiture (character state 9.2), *M. araxis* and *M. dentiventris* appear to be sister species due to the presence of a very small shining tooth placed medially at the base of the fovea (character state 12.1), whereas the other three species, *M. monticola*, *M. solarii* and *M. abnormis* do not share synapomorphies. However it is noteworthy that both *M. solarii* and *M. abnormis* possess autapomorphies: rostrum distinctly tapered in apical 1/3 in *M. solarii*, tongue distinctly protruding in lateral view (homoplasy with some advanced species) (character state 21.1) and presence of flanges at the apex of the median lobe of the aedeagus in *M. abnormis* (Fig. 21).

It seems probable that all the species with the ventrite 5 of the male characterized by a deep fovea and robust teeth form a monophyletic lineage. Whereas four of them, *M. simplex*, *M. longicollis*, *M. ajugae* and *M. atricolor*, do not show synapomorphies, the other species (*M. banaticus*, *M. ursinus*, *M. maroccanus*, *M. campanulae* and *M. abeillei*) appear to form a monophyletically advanced group by the presence of large lateral auricles at the apex of the median lobe of the aedeagus (character state 22.1), with *M. maroccanus*, *M. campanulae* and *M. abeillei* characterized by the presence of one synapomorphy: uncinat auricles (character state 23.1). It is noteworthy that *M. banaticus* possesses one autapomorphy: the presence of minute teeth at sides of the median lobe in its apical part (Fig. 28).

Evolutionary trends and adaptations

After a careful study of *M. afer*, it seems possible to reconstruct in detail the steps of the extraordinary parallel evolution of the median lobe of the aedeagus (shape and sclerites of the internal sac) and ventrite 5 (fovea and teeth) from the simple to the complex in the males of *Miarus*.

The male genitalia of *Miarus* are the most complex in the tribe Mecinini. However the complexity of the structure of the median lobe and of the sclerites of the endophallus apparently increases markedly in a gradual manner from the primitive species to the more advanced ones.

Shape of the median lobe (Figs. 13–32). In *Miarus* it seems that a *C. plantarum*-like median lobe follows the modifications of a curved malleable cylindrical structure, which is subjected to a mechanical compression at apex: the length decreases and the thickness and the width increase, with the consequence of a curled up apex and an apical orifice enlarged and placed apically, whereas the more curved portion, which is subject to the major pressure, abruptly bends further on. Other gradual modifications in the median lobe seem to be: the forming of a complete and progressively longer ventral tongue, the forming of progressively larger apical lateral auricles,

the appearance of long ventral and dorsal flat sclerites, which replace the long flagellum in the possible protective function of the membranous ejaculatory duct, and of other sclerites.

Shape of ventrite 5 in the male (Figs. 33–40). This segment appears to lack particular characters in the ancestor of the lineage *Cleopomiarus* + *Miarus*, since in both *Cleopomiarus* and the primitive species of *Miarus* ventrite 5 is regularly convex as generally in other Mecinini. In advanced species of *Miarus*, however, at first there is the appearance of a pubescent shallow depression, which becomes a progressively deeper, shining and glabrous fovea, then also of two teeth placed laterally to the fovea which become progressively more robust.

Pygidium in male. The primitive species of *Miarus* already show a first modification of this structure: the increase of convexity in its basal portion, which further becomes gibbous. Afterwards there is also the appearance of a fovea in the apical portion.

Bursa copulatrix. Sclerites appear in the membranous bursa copulatrix of those species in which the median lobe of the aedeagus is strongly modified.

From an adaptive point of view it appears impossible to hypothesize which advantages might be derived in the species of *Miarus* with strongly modified aedeagus, which is so uncommon in Curculionidae where a cone-shaped median lobe with narrowed apex seems to have reached the major success. It might be suggested that a large and apically placed distal orifice might facilitate the evagination of the internal sac during the copula. The appearance of lateral auricles, which become further uncinat, at the apex as well as of spines in some sclerites of the internal sac, might be considered like an anchor in order to guarantee successful copulation. The same seems to apply to the fovea and the teeth of ventrite 5. In fact, I observed that during the copulation of *M. campanulae* the pygidium of the female is placed in the fovea of ventrite 5 of the male and held between the two lateral teeth; on the contrary I did not notice a function of the modified pygidium of the male during copulation. One might speculate that such an uncommon median lobe needs the parallel appearance of some uncommon characters both in male, like uncinat auricles, abdominal fovea and teeth, and in female, like a reinforced bursa copulatrix, in order to be functional.

Biological notes

Since the species of *Miarus* were carefully studied only during the last four decades, many old biological data, which are reported in some publications (HUSTACHE 1931, HOFFMANN 1958) are no more available and cited only if reported on the labels of specimens examined.

The species were usually collected from *Campanula* and *Phyteuma*, both belonging to Campanulaceae. Representatives of this family act as host plant also for the species of the closely related genus *Cleopomiarus*, but apparently for no other genus of weevils at least in the Palaearctic Region. However, it is noteworthy that the obviously more primitive *Miarus afer* was collected on *Fedia cornucopiae* (L.) GAERTNER (Valerianaceae) by Borovec (pers. comm.).

Larvae (for morphology see EMDEN 1938) live and pupate in the capsules of the flowers, sometimes inducing galls; this is true at least for *M. abnormis*, *M. ajugae* and *M. campanulae* (BUHR 1964, TOMASI 2005). Also other Mecinini, belonging to *Gymnetron*, *Mecinus* and *Rhinusa*, are known to induce galls (see KOROTYAEV et al. 2005 for review).

Zoogeographical notes

Presently the genus *Miarus* appears to be distributed only in the Palaearctic Region, whereas, on the contrary, the closely related genus *Cleopomiarus* has many representatives also in the

southern Afrotropical Region and two species in the New World (U.S.A. and Mexico). The species with primitive characters are distributed in North Africa (*M. afer*), Middle East, Anatolia and southern Balkans (*M. praecursor*, *M. stoeckleini*, *M. rotundicollis* and *M. hellenicus*), whereas those considered as more “advanced” have generally a more northerly distribution occurring for instance in the northern Balkans (*M. banaticus*), the Caucasus (*M. araxis*, *M. dentiventris*), and most parts of Europe. Of these last, apart for *M. abeillei*, which seems to be restricted to north-eastern France, Switzerland and north-western Italy, the others have wide areas of distribution in the central part of Europe, with *M. campanulae* and *M. ajugae* reaching northern Europe; the latter is the most widely distributed species, since it occurs also in the eastern Palaearctic Region excluding Japan, where it appears to be vicariated by the very closely related *M. atricolor*. In the Iberian Peninsula only three species of *Miarus* are presently known: *M. simplex*, *M. ursinus*, and *M. campanulae*. None of them is presently reported from Morocco, where only *M. maroccanus*, which is however closely related to the last two species, is recorded.

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