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Phylogenetic analysis and higher classification of the tribe Mecinini (Coleoptera: Curculionidae, Curculioninae)

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Abstract

A phylogenetic analysis of the Mecinini (Coleoptera: Curculionidae, Curculioninae) was performed to verify the systematic validity of this tribe, to determine its sister group, and to attempt a classification based on the inferred phylogenetic relationships of the included genera and subgenera. From the results obtained by this analysis Cionini are the sister group of Mecinini, whereas Miarini are synonymous with Mecinini. The tribe Mecinini includes the genera *Mecinus* GERMAR, 1821, *Gymnetron* SCHÖNHERR, 1825, *Rhinusa* STEPHENS, 1829, *Rhinumiarus* gen.n., *Cleopomiarus* PIERCE, 1919, and *Miarus* SCHÖNHERR, 1826. *Gymnetron* subgen. *Aprinus* DESBROCHERS DES LOGES, 1893 is a junior synonym of *Mecinus*, and *Colabus* SCHÖNHERR, 1843 is synonymized with *Gymnetron*. The following new taxa are described: *Rhinumiarus* gen.n. and *R. lyali* sp.n. from central Argentine, *Miarus praecursor* sp.n. from Greece (Rhodes), Turkey, and Jordan. The following species are newly transferred from *Gymnetron* to *Mecinus*: *M. aestivus* (HOFFMANN, 1956) comb.n., *M. alboscuteallatus* (HUSTACHE, 1913) comb.n., *M. bonnairei* (DESBROCHERS DES LOGES, 1898) comb.n., *M. caucasicus* (REITTER, 1907) comb.n., *M. concaviostris* (STÖCKLEIN, 1950) comb.n., *M. crassifemur* (ARZANOV, 1991) comb.n., *M. desertorum* (KOROTYAEV, 1994) comb.n., *M. elongatus* (BRISOUT DE BARNEVILLE, 1862) comb.n., *M. henrici* (ARZANOV, 1991) comb.n., *M. ictericus* (GYLLENHAL, 1838) comb.n., *M. labilis* (HERBST, 1795) comb.n., *M. latiusculus* (JACQUELINE DU VAL, 1855) comb.n., *M. linnavuorii* (KOROTYAEV, 1994) comb.n., *M. longirostris* (PIC, 1921) comb.n., *M. longulus* (DESBROCHERS DES LOGES, 1893) comb.n., *M. ludyi* (REITTER, 1907) comb.n., *M. marina* (KOROTYAEV, 1984) comb.n., *M. marmota* (FAIRMAIRE, 1883) comb.n., *M. nigronotatus* (PIC, 1906) comb.n., *M. paratychioides* (HOFFMANN, 1965) comb.n., *M. pascuorum* (GYLLENHAL, 1813) comb.n., *M. pipistrellus* (MARSEUL, 1876) comb.n., *M. pirazzolii* (STIERLIN, 1867) comb.n., *M. plantaginis* (EPPELSHEIM, 1875) comb.n., *M. sanctus* (DESBROCHERS DES LOGES, 1893) comb.n., *M. seriatus* (JACQUET, 1888) comb.n., *M. simus* (MULSANT & REY, 1859) comb.n., *M. tychioides* (BRISOUT DE BARNEVILLE, 1862) comb.n., *M. variabilis* (ROSENHAUER, 1856) comb.n., *M. zherichini* (KOROTYAEV, 1994) comb.n. The two following species are newly transferred from *Gymnetron* to *Rhinusa*: *R. algericum* (BRISOUT DE BARNEVILLE, 1862) comb.n. and *R. mauritii* (DESBROCHERS DES LOGES, 1898) comb.n. The Brazilian species *Gymnetron kerhaletii* BUQUET, 1842 does not belong to Mecinini; although now lacking a proper generic assignation it must be placed in Curculionidae incertae sedis.

Key words: Coleoptera, Curculionidae, Curculioninae, Mecinini, *Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus* gen.n., *Cleopomiarus*, *Miarus*, new species, phylogenetic analysis.

Introduction

The interpretation of the systematics of the tribe Mecinini (= Gymnetrini) and the relationships among the taxa included in it is not unequivocal. The tribe is presently composed of about 150 Palaearctic species, a dozen Afrotropical species and two Nearctic species, which are usually included in the genera *Mecinus* GERMAR, 1821, *Gymnetron* SCHÖNHERR, 1825 and *Miarus* SCHÖNHERR, 1826 (DESBROCHERS DES LOGES 1893; REITTER 1907; HUSTACHE 1931;

HOFFMANN 1958; SMRECZYNSKI 1976). Some authors have raised this tribe to subfamilial rank (PASCOE 1870; MORIMOTO 1962; PESARINI 1978; O'BRIEN & WIBMER 1982; THOMPSON 1992), sometimes including also the tribe Cionini (LOHSE & TISCHLER 1983; ABBAZZI & OSELLA 1992), presently composed of the genera *Cionellus* REITTER, 1904, *Cionus* CLAIRVILLE, 1798, *Cleopus* DEJEAN, 1821, *Nanomicrophytes* PIC, 1908, *Patialus* PAJANI, KUMAR & ROSE, 1991, *Stereonychidius* MORIMOTO, 1962, and *Stereonychus* SUFFRIAN, 1854 (for details see ALONSO-ZARAZAGA & LYAL 1999).

Gymnetron includes the subgenera *Gymnetron* s.str. and *Rhinusa* STEPHENS, 1829, which was originally described as a distinct genus but has always been treated as a subgenus. Of the other three subgenera, *Aprinus* DESBROCHERS DES LOGES, 1893 and *Aprinodactylus* STÖCKLEIN, 1950 are generally considered as synonyms of *Gymnetron* s.str. and *Eutemnoscelus* DESBROCHERS DES LOGES, 1893 as synonymous with *Rhinusa*.

Miarus is usually divided into two subgenera, *Miarus* s.str. and *Cleopomiarus* PIERCE, 1919 (= *Miaromimus* SOLARI, 1947; = *Hemimiarus* FRANZ, 1947) (FRANZ 1947; ROUDIER 1966; SMRECZYNSKI 1976). ZHERIKHIN & EGOROV (1991) followed SOLARI (1947) and considered *Cleopomiarus* as a good genus. ZHERIKHIN (1991) also included the two genera in the new tribe Miarini, although this was synonymized with Mecinini by ALONSO-ZARAZAGA & LYAL (1999).

Most of the taxa included in the groups have been examined in the course of a species-level revision. From the arguments used by the various authors cited above, no clear choice could be made between the different systematic concepts. In order to resolve this problem a phylogenetic analysis is attempted here, the first time this technique has been applied to these insects.

Although Curculioninae is one of the largest subfamilies in Curculionidae (O'BRIEN & WIBMER 1978; THOMPSON 1992), the relationships of its numerous tribes are poorly studied. To date, the tribes of this subfamily studied phylogenetically are Tychiini (CLARK et al. 1977) and Rhamphini (KOJIMA & MORIMOTO 1996).

The aim of the present study is:

1. To verify the systematic validity of the proposed tribes Mecinini and Miarini and of the genera and subgenera included in them.
2. To determine the relative positions of the included genera and subgenera and between them and Cionini and other weevils.
3. To produce a classification of these taxa based on phylogenetic relationships.

Material and Methods

I studied about 80 % of Palaearctic taxa currently included in the tribe Mecinini and Miarini, the two representatives of the tribes from North America (*Miarus hispidulus* LECONTE, 1876 and *M. erebus* CASEY, 1910), many species from the Afrotropical region (which are mostly undescribed), and one undescribed species from South America.

To determine the relationships among these taxa and the relationships between them and other weevils, I examined many representatives of the following tribes, which are generally included in the subfamily Curculioninae together with Mecinini, Miarini and Cionini (THOMPSON 1992; ALONSO-ZARAZAGA & LYAL 1999): Acalyptini, Anthonomini, Curculionini, Derelomini, Ellescini, Rhamphini, Smicronychini, Storeini and Tychiini.

Phylogenetic reconstruction

A phylogenetic approach (HENNIG 1966), as discussed by WILEY (1981), was used in reconstructing phylogeny. The outgroup criterium was used to polarize character states (WATROUS & WHEELER 1981). Unfortunately, in weevils as well as in many other groups of organisms, one of the main difficulties is the search for appropriate outgroups. The confidence in phylogenetic relationships among Curculionidae at suprageneric level is very low, as clearly suggested by many divergent hypotheses presented in recent works dealing with weevil systematics (MORIMOTO 1962; THOMPSON 1992; KUSHEL 1995; ALONSO-ZARAZAGA & LYAL 1999), and this is true in particular for the relationships among the various tribes of Curculioninae (MORIMOTO 1962; CLARK et al. 1977; THOMPSON 1992; KOJIMA & MORIMOTO 1996).

During my studies of Curculioninae, it turned out that Ellescini and Tychiini share a higher number of characters with Cionini and Mecinini than other tribes. Unfortunately, due to the lack of studies on the polarity of the characters at subfamily level, no reliable synapomorphy was identified to unite Ellescini and Tychiini to Cionini and Mecinini as a monophyletic group, and indeed the group may prove to be paraphyletic. Nevertheless, the use of the former tribes as outgroups seems justified as they share at least one possible apomorphic feature with Cionini + Mecinini (posterior margin of ventrites 3 and 4 straight medially and curved posteriorly laterally).

Phylogenetic reconstruction was undertaken manually and with the help of the cladistic computer program Hennig86 (FARRIS 1988), using the implicit enumeration option (ie-). Manual reconstruction preceded the computer-aided reconstruction. The former method has the advantage of retraining the intuition of the systematist, whose accumulated knowledge is not necessarily explicitly brought to bear during the process of decision-making. The computer-aided reconstruction has the alleged advantage of objectivity in character assessment and calculation of tree length, with the added benefit of capacity to readily analyze a large data set.

The presumably plesiomorphic state of each character was coded as 0 and the apomorphic states as 1 or 1-2. Autapomorphies were also included, although they obviously contribute nothing to the resolution of relative relationships of tribes and genera considered. However one of the aims of this study was to find characters to be used for systematics of genera, which were obtained after a careful study at species level and therefore their inclusion appeared necessary (for a more extensive discussion about use of autapomorphies see YEATES 1992). Character weighting was not employed for computer analysis, since manual reconstruction, which generally requires extensive character weighting implicit in this method, did not reveal the necessity to force results strongly because of a scarce number of homoplasies.

Acronyms

CBN	Coll. Borovec, Nechanice
CCM	Coll. Caldara, Milano
CGV	Coll. Gillerfors, Varberg
CRM	Coll. Riedel, München
DEI	Deutsches Entomologisches Institut, Eberswalde (L. Behne)
NHML	The Natural History Museum, London (C.H.C. Lyal)
ZISP	Zoological Institute, St. Petersburg (B.A. Korotyaev)

Characters used for phylogenetic reconstruction

1. Relative width of eye to width of head: 0. Less wide than half the width of head; 1. Greater than half the width of head.

Relatively large eyes are present in the outgroup taxa; however, their width is always less than half the width of the head. *Mecinus*, *Gymnetron* and *Rhinusa*, as well as Cionini share the plesiomorphic condition, whereas *Rhinumiarus*, *Cleopomiarus* and *Miarus* have very large eyes, which occupy more than half of the width of head.

2. Relative width of gula between eyes to rostrum at base: 0. Slightly narrower than base of rostrum; 1. Less than half width of rostrum.

In most species of the outgroup taxa, the gula is slightly narrower than the base of the rostrum. This state is considered as plesiomorphic. The gula between the eyes is distinctly narrower than the base of the rostrum in *Rhinumiarus*, *Cleopomiarus* and *Miarus*. This is not due to the fact that the eye is enlarged in species of these genera (see character state 1.1), but a result of its unusual elongation (length/width at least 1.7 instead at most 1.5). In Curculioninae, character state 2.1 has evolved independently in Smicronychini. In species of this tribe, the gula is less than one quarter the width of the rostrum and the eye is small but elongate.

3. Ventral margin of scrobe in dorsal view: 0. Parallel to longitudinal axis of rostrum; 1. Convex and slightly protruding.

In Cionini and in species of the outgroup taxa, the scrobe is slightly visible in dorsal view, because the upper part of the lateral margin of the rostrum is gradually convergent from the base to the antennal insertion. In *Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus*, *Cleopomiarus* and *Miarus* the scrobe is more visible in dorsal view because the ventral margin of the scrobe protrudes outwards.

4. Antennal funicle: 0. Six- to seven-segmented; 1. Five-segmented.

In Curculionidae the antennal funicle is usually seven-segmented. However, in some genera belonging to unrelated tribes there is a reduction of the number of the segments of the funicle to six. In *Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus*, *Cleopomiarus*, *Miarus* and in Cionini the number of the segments of the funicle is further reduced to five. This is a condition which occurs very seldom in other Curculionidae, i.e. few genera of Cossoninae and Molytinae (Phoenicobatini), as reported by KOJIMA & MORIMOTO (1995), and two Ceutorhynchinae, *Oxyonyx pentarthrinus* KOROTYAEV, 1982 and *Tatyanina succinea* KOROTYAEV, 1987 (Korotyaev pers. com.). To my knowledge, in Curculioninae only *Ergania* PASCOE, 1882 (Curculionini) from Southeastern Asia, and few Tychiini, *Eugryporrhynchus* KOJIMA & MORIMOTO, 1995 and *Heterimerodes* KOJIMA & MORIMOTO, 1995 (Ochyromerina) from Malaysia and *Sibinia tanneri* CLARK, 1978 (Tychiina) from northern America, have an antennal funicle with five segments.

5. Segment 2 of antennal funicle: 0. Clearly to slightly shorter than segment 1; 1. As long as or longer than segment 1.

In the outgroup taxa segment 2 of the antennal funicle is more or less distinctly shorter than segment 1. *Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus*, *Cleopomiarus* and *Miarus* possess the plesiomorphic state, whereas only in Cionini the apomorphic condition 5.1 is present.

6. Prosternal sulcus: 0. Absent; 1. Present but weak; 2. Present and deep.

A prosternal sulcus anterior to the coxae, into which the rostrum fits in repose, occurs independently in several subfamilies of Curculionidae. Among the Curculioninae, *Rhinumiarus* and Smicronychini possess the condition 6.1, whereas *Cleopomiarus*, *Miarus* and part of

Rhamphini have the condition 6.2. Interestingly, in Cionini all three character states are present: 6.0 in *Cleopus*, 6.1 in *Stereonychus* and 6.2 in *Cionus* and *Cionellus*.

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

Usually the cavities of the forecoxae are contiguous. On the contrary in all the above mentioned taxa with a deep prosternal sulcus (6.2), except *Cionus*, the coxal cavities are separated.

8. Mesosternal process: 0. As wide as 1/4-1/3 of coxa; 1. As wide as 1/2 of coxa; 2. As wide as coxa.

In the outgroup taxa the mesosternal process is distinctly narrower than a coxa. In *Rhinusa*, *Rhinumiarus*, *Cleopus* and some species of Rhamphini and Curculionini (*Curculio* LINNAEUS, 1758) the mesosternal process is slightly wider in relation to the width of a coxa (8.1). In many taxa with a prosternal sulcus, such as *Cleopomiarus*, *Miarus* and Cionini (except *Cleopus*), but also in some taxa lacking a prosternal sulcus, such as Acalyptini, Curculionini (*Archarius* GISTEL, 1856) and Derelomini the mesosternal process is very large (8.2).

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

In the outgroup taxa and also in *Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus* and most Cionini the metasternum is medially flat to slightly concave. In some taxa with a prosternal sulcus (*Cleopomiarus*, *Miarus* and *Cionellus*) the anterior 2/3 of metasternum are distinctly concave.

10. Shape of scales covering part of prosternum, mesosternal process and sides of metasternum: 0. Entire to slightly plumose; 1. Distinctly plumose, forked to five-forked.

In the outgroup taxa and also in *Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus* and Cionini the scales covering the venter are of various shapes, from seta-like to subquadrate, but are all nearly entire at their apex. In *Cleopomiarus* and *Miarus* some of the scales covering portions of the thorax end in a fork.

11. Relative width of prothorax to base of elytra: 0. Slightly (at most 1/3) narrower than base of elytra; 1. Distinctly (at least 1/2) narrower than base of elytra.

In most species of the outgroup taxa as well as in *Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus*, *Cleopomiarus* and *Miarus*, the prothorax is more or less transverse but only slightly narrower than the elytra. In Cionini, as well as in some Tychiini (Ochyromerina), the prothorax, which is often conical, is distinctly narrower than the base of elytra, which usually bears prominent humeri.

12. Elytral stria 3 at apex: 0. Joined to stria 8 (Figs. 31, 32); 1. Joined to stria 6 (Fig. 33).

In the species of the outgroup taxa and generally in *Gymnetron*, *Mecinus*, *Cleopus*, *Stereonychus* and *Cionus*, elytral striae 3 and 8 are joined at apex. In *Rhinusa*, *Rhinumiarus*, *Cleopomiarus* and *Miarus*, as well as in Curculionini, elytral striae 3 and 6 converge apically, joining each other. This character, which has always been used to separate *Gymnetron* from *Rhinusa* at subgeneric rank, is not easy to examine in species with dense and elongate usually seta-like scales. Even apart from the vestiture, in some specimens it is very difficult to establish the true character state. For these reasons I do not know whether this character has been studied in all species of *Rhinusa*. Certainly it has not been studied in *Mecinus*, *Cleopomiarus* and *Miarus*, since no author has reported that in at least one species of *Mecinus*, *M. janthinus* (GERMAR, 1817), both states are present and that *Cleopomiarus* and *Miarus* have the same state as *Rhinusa*. Moreover, some species usually included in *Gymnetron* s.str. (i.e. *G. algericum* BRISOUT DE BARNEVILLE, 1862 and *G. mauritii* DESBROCHERS DES LOGES, 1898) possess the apomorphic condition, but close examination has shown these to belong to *Rhinusa*. Consequently, despite the difficulty in seeing the cha-

racter, and the possibility of homoplasy in *Mecinus*, I consider the character valuable for phylogenetic analysis. In *Cionellus* the elytral striae are markedly confused, due to the large punctures of the interstriae, which are similar to those of the striae. Therefore for this genus it is not possible to establish the character state, which is represented by a question mark in the data matrix.

13. Margin of elytra at apex: 0. Transverse to moderately directed outwards (Fig. 31); 1. Moderately directed inwards (Figs. 32, 33).

This character is most easily visible by observing the specimen in ventral view after the removal of the abdomen. In most species of the outgroup taxa, especially in those where the elytra conceal the tergite VII (e.g. Cionini), but also where the tergite VII is partially visible (*Mecinus*), the apical margin is transverse to moderately acute. In *Gymnetron*, *Rhinusa*, *Rhinumiarus*, *Cleopomiarus* and *Miarus*, as well as in unrelated tribes of Curculioninae (Acalyptini and Curculionini), which include most taxa with tergite VII broadly visible, the apical margin of the elytra is moderately directed inwards.

14. Tarsal socket of protibia observed in ventral view: 0. Completely visible (Fig. 21); 1. Obscured partially by an extension of ventral face of protibia (Figs. 22-25).

In most species of the outgroup taxa the tarsal socket of the protibia is completely visible, observing the tibiae in ventral view. The derived state is possessed by *Mecinus*, *Gymnetron* (except for few taxa from South Africa), *Rhinusa*, *Rhinumiarus*, *Cleopomiarus*, *Miarus* and Cionini, and also by other tribes of Curculioninae such as Curculionini and Derelomini.

15. Apical portion of ventral face of protibia: 0. Not directed outwards (Fig. 26); 1. Directed outwards (Figs. 27-30).

In all the species of the outgroup taxa as well as in *Gymnetron*, *Rhinusa*, *Cleopomiarus*, *Miarus* and Cionini, the apical portion of the ventral face of the protibia is on the same plane as the remaining part (this character is more clearly visible observing the protibia in lateral view). On the contrary in *Mecinus* and *Rhinumiarus* the apical portion of the ventral face of the protibia protrudes more or less distinctly. It is worth noting that this character state is also seen in one undescribed *Gymnetron* from South Africa, currently in study.

16. Mucro: 0. Present at least on protibia and mesotibia in both sexes; 1. Lacking on all tibiae at least in female.

Curculionidae in general possess well developed mucrones on all tibiae. Most Curculioninae have imperfect mucrones at least on the metatibiae and this is also true for the outgroup taxa and *Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus*, *Cleopomiarus* and *Miarus*. The females of *Cleopus* completely lack mucrones, whereas in *Stereonychus*, *Cionus* and *Cionellus*, as well as in other tribes (Acalyptini and some Rhamphini), the mucrones are absent from all three tibiae in both sexes. This character might be broken down coding each tibia and each sex separately. However this procedure seems here superfluous, useful for the phylogenetic analysis of Cionini, which is not the aim of this study, but not of Mecinini.

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

The claws of Curculioninae are variously shaped, often bearing inner appendiculi, but are usually completely separated from each other from the base. In *Mecinus*, most *Gymnetron*, *Rhinusa*, *Rhinumiarus* and Cionini, as well as in Smicronychini, the claws are close and distinctly fused at the base. Interestingly, in *Cleopomiarus* and *Miarus* and a few *Gymnetron* (one group of species from southern Africa and two unrelated Russian species) the claws are free as in the plesiomorphic condition. On the basis of other characters, there is strong evidence that in these species this character state represents a "reversal". However, this theoretical interpretation does not appear so easy to explain. Alonso-Zarazaga (pers. com.) pointed out that the reverse from a

fused state to a free state of the claws needs the growth of new muscles and joints, which disappeared when the fusion happened. Therefore one can hypothesize that this character state only resembles the plesiomorphic state, but is actually a new condition. O'BRIEN & ASKEVOLD (1992) and ASKEVOLD et al. (1994) resolved similar situations by considering these characters as independent apomorphic character states, which they named "in transitu", because their actual state is assessed during the phylogenetic analysis and not a priori, and treated them as 0-1-2. However, as pointed out by Lyal (pers. com.), incorporation of so-called "in transitu" apomorphies will improve the consistency index of a tree, although with addition of no new evidence. Logically one can treat all homoplasies as individual apomorphies in the same way, but to do so would be falsely increasing the support for the tree itself. Therefore, Lyal (pers. com.) believes, that, if there are no discernible differences from the plesiomorphic state, there cannot be a great deal of support for treating them as novel. On this occasion I agree with Lyal's opinion and treat the character state of *Cleopomiarus* and *Miarus* as 17.0.

18. Claws: 0. Of same length each other; 1. Outer one reduced or absent.

In Curculionidae in general and in the outgroup taxa the two claws are of the same length. This is also true for *Cleopus*. In *Cionus*, *Cionellus* and apparently in parallel in a few *Mecinus* (*M. heydeni* WENCKER, 1866 and related species) the outer claw is more or less distinctly shorter than the inner one. Most *Stereonychus* have a single claw, with the exception of at least one species, *S. rufobrunneus* (LINDBERG, 1953) from the Canary Islands which possesses a short outer claw (Alonso-Zarazaga pers. com.).

19. Relative length of ventrites 1 and 2 to ventrites 3 and 4: 0. Moderately longer, at most 2.2 X; 1. Distinctly longer, at least 2.6 X.

In primitive Curculionidae and in most Curculioninae, including the outgroup taxa, the length of the two first ventrites is only moderately greater than that of ventrites 3 and 4. *Mecinus*, *Gymnetron* and *Rhinusa* possess this character state, which is here considered as plesiomorphic. On the contrary in *Rhinumiarus*, *Cleopomiarus*, *Miarus* and Cionini, as well as in other unrelated tribes of Curculioninae (Derelomini, Smicronychini and Storeini), the first two ventrites taken together are distinctly longer than ventrites 3 and 4 taken together.

20. Posterior margin of ventrites 3 and 4: 0. Straight at least medially (Figs. 5, 9-20); 1. Concave (Figs. 1-4, 6-8).

The species belonging to Cionini and various tribes of Curculioninae (outgroup taxa and also Rhamphini, Smicronychini and Storeini) possess the plesiomorphic condition. In *Mecinus*, *Gymnetron*, *Rhinusa*, *Cleopomiarus* and *Miarus*, ventrites 3 and 4 are more or less markedly concave posteriorly like a semicircle (20.1). *Rhinumiarus* possesses the character state 20.0, probably as a reversal. The character state 20.1 appears independent from the generally distinct convexity of the abdomen in these taxa, which is in fact like in *Rhinumiarus* and some other Curculioninae with the plesiomorphic condition.

21. Pygidium: 0. Absent; 1. Present.

In most species of Curculionidae and in most curculionines, the pygidium is lacking in both sexes or at least in females (Acalyptini and Tychiini). In *Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus*, *Cleopomiarus* and *Miarus* tergite VIII in males and tergite VII in females are more or less uncovered, forming a pygidium. This character state is also present in Curculionini, apparently homoplastically.

22. Pygidium in male: 0. Without fovea; 1. With fovea (Fig. 8).

In most males of Curculionidae with character state 21.1, the pygidium lacks a fovea. It is present in *Miarus*, with the exception of *M. praecursor*.

23. Apex of median lobe: 0. Forming a more or less obtuse angle with body of median lobe (Figs. 34-45); 1. Curved downwards and perpendicular to body of median lobe (Figs. 46-48).

Character state 23.1 is only present in *Miarus* except for *M. praecursor* and *M. stoeckleini* FRANZ, 1947, which have the plesiomorphic condition as other curculionines.

24. Apex of median lobe: 0. Without setae (Figs. 34-40); 1. With numerous setae (Figs. 41-48).

The presence of setae at the apex of the median lobe is probably a derived condition in Curculionidae. In Curculioninae it is only present in *Miarus* and Tychiina (Tychiini).

25. Internal sac: 0. Without elongate, thin, dorsal median sclerite in apical half (Figs. 34-36, 38-40); 1. With a more or less elongate, thin, dorsal median sclerite in apical half (Figs. 37, 41, 43, 46, 51).

In *Rhinumiarus* and *Miarus*, the internal sac possesses a more or less elongate thin dorsal median sclerite in its apical half. This structure is uncommon in the outgroup taxa and other weevils in general.

26. Internal sac: 0. Without elongate, thin, ventral median sclerite in apical half (Figs. 34-40); 1. With an elongate, thin, ventral median sclerite in apical half (Figs. 49, 50, 52).

In *Miarus*, the internal sac possesses an additional elongate, thin ventral median sclerite, which is similar in shape to the dorsal one (see character state 25.1). This structure occurs only in few species of the outgroup taxa and is uncommon in weevils in general. Its presence is probably apomorphic.

27. Internal sac: 0. Without horse-shoe shaped basal sclerite; 1. With small horse-shoe shaped basal sclerite (Figs. 49, 52).

At the base of the internal sac of *Miarus* (except *M. stoeckleini*) a small, horseshoe-shaped sclerite is present. It is absent in other Curculioninae examined.

28. 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 (Figs. 49, 50, 52).

All the species possessing character state 26.1 have also character state 28.1.

29. Internal sac: 0. Without pair of sclerites positioned caudally to dorsal elongate median sclerite; 1. With a pair of sclerites positioned caudally to the dorsal elongate median sclerite (Fig. 51).

Most species possessing character state 28.1 (*Miarus* excluding *M. praecursor* and *M. stoeckleini*) have another pair of sclerites placed dorsally to the first pair.

30. Suboval sclerites of internal sac: 0. Without spines (Fig. 49); 1. With spines (Figs. 50-52).

The sclerites recorded in character states 28.1 and 29.1 are covered with more or less numerous small spines in *Miarus* excluding *M. praecursor*.

31. Spermatheca: 0. With body not globose and ramus pronounced (Figs. 56-62); 1. With body markedly globose and ramus very short (Fig. 55).

In the outgroup taxa the spermatheca, although variously shaped, does not have a globose body and the ramus is more or less pronounced. Conversely, Cionini and several Anthonomini examined possess a spermatheca with a markedly globose body and very short ramus.

32. Body of spermatheca: 0. Regularly hook-shaped (Figs. 55-59, 61, 62); 1. Sinuate, not hook-shaped (Fig. 60).

In the outgroup taxa and other curculionines the spermatheca, even though variously shaped, is characterised by a regularly hook-shaped body. In *Cleopomiarus*, the body of the spermatheca is sinuate.

33. Body of spermatheca: 0. Of same width to gradually reduced from base to apex (Figs. 55-60); 1. Expanded in median portion (Figs. 61, 62).

The body of the spermatheca is gradually narrowed from base to apex in most species of the outgroup taxa. In *Miarus* the median portion of the body is conspicuously expanded.

34. Bursa copulatrix: 0. Without sclerites; 1. With two semilunate sclerites (Fig. 63).

In the outgroup taxa and generally in Curculioninae the bursa copulatrix lacks sclerites. In *Miarus* (except *M. praecursor*) two semilunate sclerites are present in this membranous structure.

	1										2										3											
	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0		
Ellescini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Tychiini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
<i>Cleopus</i>	0	0	0	1	1	0	0	1	0	0	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	
<i>Stereonychus</i>	0	0	0	1	1	0	2	0	0	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
<i>Cionus</i>	0	0	0	1	1	2	0	2	0	0	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	
<i>Cionellus</i>	0	0	0	1	1	2	1	2	1	0	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
<i>Mecinus</i>	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<i>Gymnetron</i>	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<i>Rhinusa</i>	0	0	1	1	0	0	0	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
<i>Rhinumiarus</i>	1	1	1	1	0	1	0	1	0	0	0	1	1	1	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
<i>Cleopomiarus</i>	1	1	1	1	0	2	1	2	1	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0
<i>M. praecursor</i>	1	1	1	1	0	2	1	2	1	1	0	1	1	1	0	0	0	1	1	0	0	1	1	1	1	1	0	0	0	1	0	0
<i>M. stoeckleini</i>	1	1	1	1	0	2	1	2	1	1	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	1	0	1	0	1	1	1
other <i>Miarus</i>	1	1	1	1	0	2	1	2	1	1	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1

Table 1: Data matrix for genera and species belonging to Cionini and Mecinini.

Results

Phylogenetic analysis

I examined the state distribution of 34 characters, of which I could hypothesize the polarity at a level of reasonable probability. On the basis of the characters considered, I observed that all the species examined can be included in six monophyletic taxa (*Mecinus*, *Gymnetron*, *Rhinusa*, *Rhinumiarus*, *Cleopomiarus* and *Miarus*), forming several monophyletic groups within these (the relationships of these species groups are not discussed in the present study).

Moreover, it appeared that Cionini represent the tribe more closely related to these taxa and Ellescini and Tychiini the tribes of Curculioninae more closely related to Cionini and these taxa. Therefore I reported the four examined genera of Cionini (*Cleopus*, *Stereonychus*, *Cionus* and *Cionellus*) in my data matrix and considered Ellescini and Tychiini as outgroups.

With regard to *Miarus*, two species (*M. praecursor* and *M. stoeckleini*) lack many character states which usually define all other species included in this taxon. Therefore they are also treated separately in my data matrix to demonstrate these differences.

The computer-aided analysis with unweighted 34 characters and using Ellescini and Tychiini as outgroups produced a single tree of 47 steps in length with consistency and rescaled consistency indices 76 and 85 respectively (Fig. 64). This tree agrees completely with the tree reconstructed manually, probably because of the relatively low number of taxa and characters considered; the level of resolution is high due to the low level of homoplasy (six in total) and reversal (four in total).

Phylogenetic relationships

The two outgroups used, Ellescini and Tychiini, share identical states in all the characters examined and therefore they result at the same level in the tree. This is not surprising since usually these two taxa are considered closely related each other. CLARK et al. (1977) hypothesized even that Ellescini belong to the subfamily Tychiinae and represent the sister-group of Endaeini (= Ochyromerini) + Lignyodini + Tychiini on the basis of two synapomorphies: sides of abdominal sterna curved posteriorly and scales on pronotum with apices directed toward middle. However, recently both ZHERIKHIN & EGOROV (1991) and ALONSO-ZARAZAGA & LYAL (1999) did not accept this opinion and treated Ellescini, in which they inserted also the subtribe Dorytomina (previously considered as Eirrhiniinae), as separate tribe. I have followed this latter opinion in the present paper.

The results of the present phylogenetic analysis suggest Cionini to be the sister group of Mecinini. This relationship is supported by three synapomorphies: antennal funicle five-segmented (character 4), tarsal socket obscured partially by an extension of the ventral face of the protibia (character 14), and claws fused at base (character 17).

The monophyly of the Cionini has never been doubted, and is strongly supported by many synapomorphies (six in my tree, two of which homoplastic with some "advanced" mecinines). The four genera of the tribe studied (I have not examined *Nanomicrophyes* from Caucasus, *Patialus* from India, and *Stereonychidius* from Japan and Siberia) can be related each other mainly by some ventral characters, such as the presence of a prosternal sulcus and the shape of the mesosternum (characters 6-9), and the shape of the claws (character 18).

The monophyly of the Mecinini is based upon three synapomorphies: ventral margin of scrobe in dorsal view convex and slightly protruding (character 3), posterior margins of ventrites 3 and 4 curved also medially (character 20) and pygidium present (character 21).

The supposition that *Gymnetron* represents the sister group of the *Rhinusa* + *Rhinumiarus* + *Cleopomiarus* + *Miarus* lineage is weaker and based only on a single synapomorphy, the elytral margin at its apex moderately directed inwards (character 13).

Two synapomorphies support the monophyly of the *Rhinusa* + *Rhinumiarus* + *Cleopomiarus* + *Miarus* lineage: mesosternal process at least half as wide as a coxa (character 8) and elytral stria 3 joined to stria 6 at apex (character 12).

Rhinumiarus appears to be the sister group of the *Cleopomiarus* + *Miarus* lineage on the basis of large and elongate eyes (characters 1 and 2), presence of a distinct, although weak, prosternal sulcus (character 6), ventrites 1 and 2 distinctly longer than ventrites 3 and 4 (character 19), and the internal sac with a more or less elongate, thin, dorsal median sclerite in the apical half (character 25).

The monophyly of *Cleopomiarus* and *Miarus* is not contentious and is based on many synapomorphies (see tree). However, whereas the species of *Cleopomiarus* have only one synapomorphy (character 32), the species belonging to *Miarus* have several, although fewer than

previously supposed because two taxa, *M. praecursor* and *M. stoeckleini*, lack many apomorphies possessed by all other species of *Miarus*.

Proposed classification of Mecinini

Mecinini Gistel

Mecinidae GISTEL 1848a: cover page; 1856: 369 (type genus: *Mecinus* GERMAR).

Mecinini; BEDEL 1883: 69. DESBROCHERS DES LOGES 1893: 1; REITTER 1907: 7; HUSTACHE 1931: 399; HOFFMANN 1958: 1264; SMRECZYNSKI 1976: 22; PESARINI 1978: 4; LOHSE & TISCHLER 1983: 259; ABBAZZI & OSELLA 1992: 378; ALONSO-ZARAZAGA & LYAL 1999: 80.

Mecininae; WINKLER 1932: c. 1619.

Gymnetrina THOMSON 1859: 143 (non SWAINSON 1839) (type genus: *Gymnetron* SCHÖNHERR) (unavailable name).

Gymnetrini; STEIN 1868: 107.

Gymnetrinae; PASCOE 1870: 437 (non SWAINSON 1839); MORIMOTO 1962: 42; O'BRIEN & WIBMER 1982: 121; THOMPSON 1992: 878.

Miarides TOURNIER 1874: 66 (type genus: *Miarus* SCHÖNHERR).

Miarinae; PIERCE 1919: 30.

Miarini ZHERIKHIN 1991: 123 (non TOURNIER 1874) (type genus: *Miarus* SCHÖNHERR).

AUTAPOMORPHIES: Ventral margin of scrobe in dorsal view convex and slightly protruding (character 3), posterior margin of ventrites 3 and 4 generally curved (character 20), tergite VII more or less uncovered (character 21).

INCLUDED TAXA: *Mecinus* SCHÖNHERR, *Gymnetron* SCHÖNHERR, *Rhinusa* STEPHENS, *Rhinumiarus* gen.n., *Cleopomiarus* PIERCE and *Miarus* SCHÖNHERR.

SYNONYMIES: On the basis of the present phylogenetic analysis, the tribe Miarini is shown as paraphyletic to Mecinini. I therefore consider it as synonymous with Mecinini as also recently reported by ALONSO-ZARAZAGA & LYAL (1999) in their catalogue. With regard to this, ZHERIKHIN (1991) included *Cleopomiarus* and *Miarus* in a separate tribe, affirming that their previous attribution to Mecinini was based mainly upon one "weak" reductive character, the antennal funicle with only five segments, which "can arise easily and independently in phylogenetically unrelated taxa due to external environmental conditions". Actually, this is so for a reduction in segment number from seven to six, but not for a further reduction to five. In fact, this character is possessed only by the genera usually included in Mecinini and in very few other Curculionidae, according to my present knowledge. Moreover, the new genus *Rhinumiarus* appears to partially reduce the undoubtedly large gap existing between *Cleopomiarus* + *Miarus* and other Mecinini, also emphasized by the ZHERIKHIN (1991).

DISCUSSION AND DIFFERENTIAL DIAGNOSIS: The results of the present phylogenetic analysis seem to confirm the opinion of previous authors (LOHSE & TISCHLER 1983; ABBAZZI & OSELLA 1992), who considered the tribe Mecinini more closely related to Cionini than all other Curculioninae on the basis of some structural affinities. These are in particular the antennal funicle with five segments, and the claws joined at base, both characters uncommon in Curculionidae in general. However, this opinion was contested by other authors (VAN EMDEN 1938; MORIMOTO 1962), who considered cionines very far from Mecinini on the basis of deep biological differences. Larvae of Cionini are ectophagous and can be observed moving on and eating leaves, flowers and other portions of the host plant, whereas pupation takes place in a cocoon fixed to various parts of the plant. On the contrary, the immatures of Mecinini live inside various structures of the host plant, sometimes producing galls.

Also the study of the larval morphology does not provide evidence of close relationships between Mecinini and Cionini. VAN EMDEN (1938) observed that larvae of Mecinini are among the few Curculionidae, including also Rhamphini, *Stenopelmus* SCHÖNHERR, [1835] and *Orobittis*

GERMAR, 1817, which possess two (instead of three) tergal folds, which is a primitive condition present in Apionidae. However, it is important to emphasize the close relationships in larval morphology between the genera here included within Mecinini (*Mecinus*, *Gymnetron*, *Rhinusa*, *Cleopomiarus* and *Miarus*). These seem to be closer to each other than to other Curculionidae on the basis of some apomorphies (VAN EMDEN 1938).

MORIMOTO (1962) considered cionines related to hyperines on the basis of "the often similar general body form", probably also observing similarities in the biology of the two groups, particularly the construction of a cocoon.

The Cionini *Cionus* and *Cleopus* (but not *Stereonychus* and *Cionellus*) utilize Scrophulariaceae (mainly *Scrophularia* and *Verbascum*) as host plants. These plants are also parasitized only by *Gymnetron*, *Rhinusa* and a few species of *Mecinus*. Although this curious similarity might represent only a parallelism, I think that it is interesting to emphasize: one might speculate that for example some species of *Cionus* and *Rhinusa*, which are often collected together on the same plant, would have modified their biology in such a way as to occupy different niches. The host plant distribution might equally suggest that the clade was ancestrally associated with Scrophulariaceae, with movement to other hosts in *Stereonychus*, *Cionellus*, some *Mecinus* and the *Cleopomiarus*-*Miarus* clade.

Of the six taxa included in Mecinini, *Mecinus*, *Gymnetron* and *Rhinusa* appear very closely related to each other, and *Cleopomiarus* is very closely related with *Miarus*; *Rhinumiarus* occupies an intermediate position. As reported in the following treatment of every single genus, presently it may be difficult to separate some species of *Mecinus* from species of *Gymnetron* and some species of *Gymnetron* from species of *Rhinusa* and also species of *Cleopomiarus* from species of *Miarus*, because of few or even no autapomorphies. However, the present phylogenetic analysis gives some data in favour of their treatment as separate genera and actually this appears the most logical and homogeneous decision also on the basis of a traditional systematic approach.

DISTRIBUTION: Palaearctic Region from the Iberian Peninsula to Japan, Afrotropical Region, North and South America.

Mecinus Germar

Mecinus GERMAR 1821: 315 (type species: *Curculio pyrauster* HERBST, 1795; subsequent designation by SCHÖNHERR 1825: 587); SCHÖNHERR 1826: 321; 1838: 776; STEPHENS 1831: 275; BEDEL 1883: 68; DESBROCHERS DES LOGES 1893: 5, 18; REITTER 1907: 7, 15; HUSTACHE 1931: 400; HOFFMANN 1958: 1265; SMRECZYNSKI 1976: 23; LOHSE & TISCHLER 1983: 259, 260; ABBAZZI & OSELLA 1992: 378; ALONSO-ZARAZAGA & LYAL 1999: 8.

Hexaphyllus DEJEAN 1821: 98 (type species: *Curculio haemorrhoidalis* HERBST, 1784 (non FABRICIUS, 1775) = *Curculio pyrauster* HERBST, 1795; by monotypy).

Macipus [FISCHER DE WALDHEIM] 1829: 102 (type species: *Mecinus collaris* GERMAR; by present designation).

Mecinopsis ESCALERA 1914: 468 (type species: *Mecinopsis lixoides* ESCALERA, 1914; by monotypy); KLIMA 1934a: 11 (*Mecinops* err.); ALONSO-ZARAZAGA & LYAL 1999: 15, 80.

Gymnetron subgen. *Aprinus* DESBROCHERS DES LOGES 1893: 5 (type species: *Gymnetron simum* MULSANT & REY, 1859; by present designation) (**syn.n.**).

Gymnetron subgen. *Aprinodactylus* STÖCKLEIN 1950: 278; ALONSO-ZARAZAGA & LYAL 1999: 80 (unavailable name).

AUTAPOMORPHIES: Lateral margin of protibia at apex directed outwards (homoplastic with *Rhinumiarus*) (character 15). Moreover, the taxa belonging to this genus appear to be characterized also by the following characters: pronotum only slightly narrower than the base of elytra, median lobe usually short (length/width < 3) and parallel-sided (Figs. 38, 39) with sclerotized part of the ejaculatory duct folded like a curl proximally.

INCLUDED SPECIES: All taxa generally included in *Mecinus* (WINKLER 1932; KLIMA 1934a) plus the following species currently included in *Gymnetron*: *M. aestivus* (HOFFMANN, 1956) comb.n., *M. alboscuteellatus* (HUSTACHE, 1913) comb.n., *M. bonnairei* (DESBROCHERS DES LOGES, 1898) comb.n., *M. caucasicus* (REITTER, 1907) comb.n., *M. concaviostris* (STÖCKLEIN, 1950) comb.n., *M. crassifemur* (ARZANOV, 1991) comb.n., *M. desertorum* (KOROTYAEV, 1994) comb.n., *M. elongatus* (BRISOUT DE BARNEVILLE, 1862) comb.n., *M. henrici* (ARZANOV, 1991) comb.n., *M. ictericus* (GYLLENHAL, 1838) comb.n., *M. labilis* (HERBST, 1795) comb.n., *M. latiusculus* (JACQUELINE DU VAL, 1855) comb.n., *M. linnavuorii* (KOROTYAEV, 1994) comb.n., *M. longirostris* (PIC, 1921) comb.n., *M. longulus* (DESBROCHERS DES LOGES, 1893) comb.n., *M. ludyi* (REITTER, 1907) comb.n., *M. marina* (KOROTYAEV, 1984) comb.n., *M. marmota* (FAIRMAIRE, 1883) comb.n., *M. nigronotatus* (PIC, 1906) comb.n., *M. paratychioides* (HOFFMANN, 1965) comb.n., *M. pascuorum* (GYLLENHAL, 1813) comb.n., *M. pipistrellus* (MARSEUL, 1876) comb.n., *M. pirazzolii* (STIERLIN, 1867) comb.n., *M. plantaginis* (EPPELSHEIM, 1875) comb.n., *M. sanctus* (DESBROCHERS DES LOGES, 1893) comb.n., *M. seriatus* (JACQUET, 1888) comb.n., *M. simus* (MULSANT & REY, 1859) comb.n., *M. tychioides* (BRISOUT DE BARNEVILLE, 1862) comb.n., *M. variabilis* (ROSENHAUER, 1856) comb.n., *M. zherichini* (KOROTYAEV, 1994) comb.n.

SYNONYMS: *Hexaphyllus* and *Macipus* are considered synonyms of *Mecinus*, as reported by ALONSO-ZARAZAGA & LYAL (1999) and also in my present classification. Although the type of *Macipus* was not designated prior to this paper, all the three species originally included (*Curculio semicylindricus* MARSHAM, 1802, *Mecinus collaris* GERMAR, and *Rhynchaenus pascuorum* GYLLENHAL, 1813) are now included in *Mecinus*.

DESBROCHERS DES LOGES (1893) created *Aprinus* as subgenus of *Gymnetron* for the taxa *G. pirazzolii*, *G. simum*, *G. seriehirtum* FAIRMAIRE, 1883 (= *G. simum*), *G. hircinum* DESBROCHERS DES LOGES, 1893 (= *G. marmota*) and *G. pipistrellus*, without designating the type species. The species are characterized by a very short (only as long as the head) and conical rostrum. Subsequently REITTER (1907), HUSTACHE (1931), HOFFMANN (1958) and LOHSE & TISCHLER (1983) considered *Aprinus* as synonymous with *Gymnetron*. The species originally included in *Aprinus* form a paraphyletic group with respect to *Mecinus*, and therefore *Aprinus* is removed from synonymy with *Gymnetron* and synonymised with *Mecinus*.

STÖCKLEIN (1950) created the new subgenus *Aprinodactylus* for two taxa considered by DESBROCHERS DES LOGES as *Aprinus* (*G. marmota* and *G. pipistrellus*) and *G. concaviostre*. However, no type species was designated and, since the description of this new taxon was published after 1930, this name must be considered unavailable (INTERNATIONAL COMMISSION OF ZOOLOGICAL NOMENCLATURE 1999).

DISCUSSION AND DIFFERENTIAL DIAGNOSIS: *Mecinus* has generally been considered closely related to *Gymnetron*, BEDEL (1883) treated the two even as synonyms. Desbrochers des Loges (1893) and REITTER (1907), although recognizing that it is difficult to put some species into one or other of the two genera, treated them as separate taxa mainly on the basis that generally *Mecinus* has an elongate body, the prothorax only slightly narrower than the elytra and ventrites 1-4 all nearly of the same length. All other authors followed this opinion, but probably placed species on the basis of body form without testing the pronotal ratio or ventrite lengths.

There are in fact no significant differences in either character between those species usually considered as *Mecinus* and those treated as *Gymnetron*. Moreover, I examined a group of closely related South African species which differ in body form, ranging from short and oval to very elongate. None of the three characters proposed by DESBROCHERS DES LOGES (1893) and REITTER (1907) can be reliably used. Furthermore, apomorphies considered above for the first time demonstrate, that *Gymnetron* sensu auctorum is polyphyletic. Because of this, several

groups of *Gymnetron* are here transferred to *Mecinus*. Unfortunately it must be worth noting that there are no apomorphies presently known for *Gymnetron*.

The relationship proposed here, which is based on characters of the male genitalia and external morphology, reveals a monophyletic group previously obscured by the characters generally used in the separation of *Mecinus* from *Gymnetron*. This system also appears to have an ecological basis, because it assembles all the species living on *Plantago* in the same lineage.

DISTRIBUTION: Palaearctic Region. New Zealand (*M. pascuorum* imported; see KUSCHEL 1972). Presently no undescribed species of Mecinini, among the numerous ones which I have examined from the Afrotropical Region, belong to this genus.

ECOLOGY: Except for the species related to *M. janthinus*, which live on Scrophulariaceae (*Linaria*, *Anarrhinum*, *Antirrhinum*), the species for which the host plants are known live on *Plantago* (Plantaginaceae) and occasionally (*M. alboscuteatus* and *M. atratulus*) on *Helianthemum* (Compositae) (HUSTACHE 1913; HOFFMANN 1958; Osella pers. com.). In Curculionidae, *Plantago* appears exclusive to *Mecinus* as host plant. Larvae of some species cause galls on the collar and roots of the host plant.

Gymnetron SCHÖNHERR

Gymnetron SCHÖNHERR 1825: c. 587 (type species: *Curculio beccabungae* LINNAEUS, 1761; subsequent designation by SCHÖNHERR 1826: 23); 1826: 319 (*Gymnaetron* err.); 1838: 743; STEPHENS 1829: 13; BRISOUT DE BARNEVILLE 1862: 625; BEDEL 1884: 144; DESBROCHERS DES LOGES 1893: 5, 22; REITTER 1907: 7, 15; HUSTACHE 1931: 399, 407; HOFFMANN 1958: 1265, 1276; SMRECZYNSKI 1976: 22, 26; LOHSE & TISCHLER 1983: 259, 262; ABBAZZI & OSELLA 1992: 379; ALONSO-ZARAZAGA & LYAL 1999: 80.

Gymnetrum AGASSIZ 1846: 168 (unnecessary emendation of *Gymnetron* and *Gymnaetron*); ALONSO-ZARAZAGA & LYAL 1999: 80.

Carpolinus GISTEL 1848b: IX (unnecessary replacement name for *Gymnetron*); ALONSO-ZARAZAGA & LYAL 1999: 80.

Colabus SCHÖNHERR 1843: 146 (type species: *Colabus scalptus* BOHEMAN, 1843; by monotypy); ALONSO-ZARAZAGA & LYAL 1999: 80 (syn.n.).

AUTAPOMORPHIES: None. However, the taxa belonging to this genus appear to be characterized by the overall characters shared partly with *Rhinusa* and partly with *Mecinus*: elytral stria 3 joined at apex with the stria 8 (character 12), elytral margin at apex moderately directed inwards (character 13), tergite VII distinctly uncovered (character 21), lateral margin of protibia at apex directed inwards (character 15), pygidium distinctly uncovered (character 21), and moreover elytra usually moderately wider than the prothorax, median lobe distinctly elongate and with long and straight flagellum.

INCLUDED TAXA: All taxa generally included in *Gymnetron* s.str. (DESBROCHERS DES LOGES 1893; REITTER 1907; WINKLER 1932; KLIMA 1934a) except the species now transferred to *Mecinus* (see above), a few described and about 50 undescribed species from the Afrotropical Region.

SYNONYMS: During study of taxa included in Errirrhinae by KLIMA (1934b), I examined the type species of the monobasic genus *Colabus* SCHÖNHERR, 1843 from South Africa, *C. scalptus* BOHEMAN, 1843. I observed that this taxon is characterized by a five-segmented antennal funicle and by claws joined at the base. In addition it does not show substantial differences from the Palaearctic *Gymnetron* in the shape of the genitalia. Therefore I consider *Colabus* as a new synonym of *Gymnetron*, in which *G. scalptum* comb.n. forms a monophyletic group together with a dozen of undescribed South African species.

DISCUSSION AND DIFFERENTIAL DIAGNOSIS: Authors gave no specific characters to the species generally included in *Gymnetron* s.str.: they are only the species which do not possess the peculiar "derived" characters which permit definition of *Mecinus* (elongate body) and *Rhinusa*

(elytral stria 3 joined at apex with stria 6). Unfortunately this is true also after my examination, in which I did not find autapomorphies for this genus.

DISTRIBUTION: Palaearctic and Afrotropical Regions.

ECOLOGY: The Palaearctic species for which the biology is known live on *Veronica* (Scrophulariaceae), a genus parasitized neither by *Mecinus* nor by *Rhinusa*. I examined South African species collected on *Anastrabe*, *Diascia*, *Hebenstreitia*, *Hemimeris*, *Selago* and *Sutera* (Scrophulariaceae) and *Buddleia* (Buddleiaceae). Larvae of many Palaearctic species cause galls on the ovary of the flowers or on the roots of the host plant.

Rhinusa STEPHENS

Rhinusa STEPHENS 1829: 12 (type species: *Curculio antirrhini* PAYKULL, 1800; subsequent designation by WESTWOOD 1838: 39); BEDEL 1884: 144.

Gymnetron subgen. *Rhinusa*; DESBROCHERS DES LOGES 1893: 22; REITTER 1907: 16, 33; HUSTACHE 1931: 407, 425; HOFFMANN 1958: 1277; SMRECZYNSKI 1976: 27, 32; LOHSE & TISCHLER 1983: 263; ABBAZZI & OSELLA 1992: 380; ALONSO-ZARAZAGA & LYAL 1999: 80.

Gymnetron subgen. *Eutemnoscelus* DESBROCHERS DES LOGES 1893: 5, 35 (type species: *Curculio linariae* PANZER, 1795; by monotypy); ALONSO-ZARAZAGA & LYAL 1999: 80.

AUTAPOMORPHIES: None. However, the taxa belonging to this genus appear to be characterized by the overall characters shared partly with *Gymnetron* and partly with *Cleopomiarus* and *Miarus*: mesosternal process half as wide as coxa (character 8), elytral striae 3 and 6 joined at apex (character 12), elytral margin at apex moderately directed inwards (character 13), lateral margin of protibia at apex directed inwards (character 15), tergite VII distinctly uncovered (character 21), elytra usually moderately wider than prothorax, median lobe distinctly elongate with long and straight flagellum.

INCLUDED TAXA: All the taxa generally included in *Gymnetron* subgen. *Rhinusa* (REITTER 1907; WINKLER 1932; KLIMA 1934a), and *Gymnetron algericum* BRISOUT DE BARNEVILLE, 1862 and *G. mauritii* DESBROCHERS DES LOGES, 1898 usually considered as *Gymnetron* s.str.

SYNONYMS: DESBROCHERS DES LOGES (1893) described *Eutemnoscelus* as a subgenus of *Gymnetron* for a single species *G. linariae* (PANZER, 1792), characterizing it by the markedly curved rostrum (as in some *Mecinus* related to *M. heydeni*) and the tibiae expanded and truncate apically. REITTER (1907) considered this subgenus as synonymous with *Gymnetron* subgen. *Rhinusa* although he put *G. linariae* in a separate group. Apart from ALONSO-ZARAZAGA & LYAL (1999), this synonymy was also accepted by HUSTACHE (1931), HOFFMANN (1958), SMRECZYNSKI (1976) and LOHSE & TISCHLER (1983). I also consider *Eutemnoscelus* as synonymous with *Rhinusa*, because the *R. linariae* group is paraphyletic with respect to other *Rhinusa* on the basis of the shape of the male genitalia (unpublished data).

DISCUSSION AND DIFFERENTIAL DIAGNOSIS: As with *Gymnetron*, I have not found autapomorphies for this taxon, since it shares some characters not possessed by *Gymnetron* with *Rhinumiarus*, *Cleopomiarus* and *Miarus*. *Rhinusa* is generally separated from *Gymnetron* at subgeneric level on the basis of the different disposition of the elytral striae, but usually their characteristic habitus allows to distinguish them from *Gymnetron* quite easily. At species level there are very few characters which allow to differentiate most taxa (e.g. the shape of the rostrum, disposition of the dorsal vestiture and shape of the median lobe). Nevertheless, the present phylogenetic approach appears to show that this taxon must be considered as a distinct genus, since it does not form a monophyletic lineage with *Gymnetron*. The larval morphology appears to emphasize this opinion, since VAN EMDEN (1938) observed differences in some larval characters between *Gymnetron* and *Rhinusa*.

DISTRIBUTION: Palaearctic Region. Presently no described or undescribed species of the numerous Afrotropical Mecinini belong to this genus.

ECOLOGY: All species with known biology live on *Linaria*, *Verbascum*, *Scrophularia* and *Antirrhinum* (Scrophulariaceae). Larvae grow inside the capsules, stems or roots of these plants, sometimes producing galls.

***Rhinumiarus* gen.n.**

TYPE SPECIES: *Rhinumiarus lyali* sp.n.

DESCRIPTION: Male. Length of pronotum and elytra mm 1.7 - 2.2.

Body short-oval, mainly reddish, covered with moderately dense seta-like scales.

Rostrum short, subconical, with basal portion of scrobes slightly visible in dorsal view. Frons slightly narrower than rostrum at base. Eyes large, wider than half width of head. Gula between eyes narrower than half width of rostrum. Antennae short, inserted just behind middle of rostrum; funicle 5-segmented, segments 2-5 distinctly transverse.

Pronotum transverse, not abruptly constricted at apex. Prosternum with anterior margin distinctly emarginate at middle, with moderately deep longitudinal sulcus medially.

Elytra short, broad, subquadrate, with striae 3 and 6 joined at apex, margin at apex moderately directed inwards.

Legs short; forecoxae contiguous; femora unarmed; tibiae ventrally with outer margin directed outwards at apex, with distinct mucro; tarsi with claws joined at base and symmetrical.

Mesosternal process convex, half as wide as coxa. Median portion of metasternum slightly concave. Abdomen with ventrites 1 and 2 medially flat to concave, posterior margin of ventrites 3 and 4 straight, ventrites 1 and 2 2.6 X as long as ventrites 3 and 4, pygidium largely uncovered.

Median lobe of aedeagus with internal sac with moderately elongate, thin, dorsal median sclerite in apical half, with ejaculatory duct sclerotized in apical portion.

Female. Same as male except rostrum slightly longer, abdomen with ventrites 1 and 2 distinctly convex, mucro of hind tibiae lacking. Spermatheca with body nearly of same width from base to apex, with small horse-shoe shaped sclerotized piece near point of origin of spermathecal gland.

AUTAPOMORPHIES: Lateral margin of protibia directed outwards at apex (homoplastic with *Mecinus*) (character 15), posterior margin of ventrites 3 and 4 straight (reversal) (character 20), spermatheca with body nearly of same width from base to apex, with small horse-shoe shaped sclerotized piece near point of origin of spermathecal gland.

INCLUDED SPECIES: *Rhinumiarus lyali* sp.n.

DISCUSSION AND DIFFERENTIAL DIAGNOSIS: Due mainly to the presence of a moderately deep prosternal sulcus, this genus appears to be intermediate between *Cleopomiarus* and *Miarus*, which possess a very deep prosternal sulcus, and other Mecinini lacking a prosternal sulcus. However, several other characters relate *Rhinumiarus* more to other Mecinini (especially *Rhinusa*) than *Cleopomiarus* and *Miarus*. For instance *Rhinumiarus* shares the shape of the tibiae with *Mecinus* (especially *M. comosus* BOHEMAN, 1845, *M. simus* and related species), the width of the mesosternal process with *Rhinusa* and again the subconical and subulate rostrum with *R. antirrhini* and related species and the subquadrate elytra with *R. netum* and related species. The

shape of the spermatheca of *Rhinumiarus* is surely uncommon in Curculioninae and apparently shows no relationships with that of other Mecinini.

Rhinumiarus is the only genus of Mecinini known to live in South America, since *Gymnetron kerhaleti* BUQUET, 1842, described from Brasil, does not belong to this tribe as is clearly shown by the original description (BUQUET 1842). However I do not know to which subfamily of Curculionidae this last species belongs and therefore I include it in Curculionidae incertae sedis.

DISTRIBUTION: Central Argentine.

ECOLOGY: No data are known.

ETYMOLOGY: The name is an arbitrary combination of *Rhinusa* and *Miarus* and is intended to emphasize the hypothesized intermediate phylogenetic position of the new genus between these two genera. Gender: masculine.

***Rhinumiarus lyali* sp.n.**
(Figs. 5, 25, 30, 37, 53, 59)

TYPE LOCALITY: Estancia la Noria, Rio San Javier, Santa Fe, Argentine.

TYPE MATERIAL: **Holotype** ♂ (NHML) "Estancia la Noria, Rio San Javier, Santa Fe, Argentine, G. E. Bryant, 16.XII.1911 / G. Bryant Coll. 1919-147". **Paratype** ♀ (CCM) same data as holotype.

DESCRIPTION: ♂ (holotype). Length of pronotum and elytra 2.2 mm.

Body short, oval, reddish, prothorax and rostrum in basal 2/3 brown, covered with moderately dense trichoid withish scales.

Rostrum short, 0.54 X as long as pronotum, subconical, in lateral view slightly curved along dorsal margin and straight along ventral margin, gradually narrowing from base to apex; in dorsal view with sides gradually convergent from base to apex, with sculpture composed of punctures and longitudinal striae, one of which notably wider than others and clearly visible along midline at middle third, with recumbent to suberect scales in basal half. Frons slightly narrower than rostrum at base. Eyes large, nearly flat. Antennae inserted just behind middle of rostrum; scape short, 3 X as long as wide, funicle with segment 1 distinctly more robust and 2.5 X as long as segment 2, segments 2-5 transverse and equal in width, club globose, short, oval.

Pronotum distinctly transverse, 1.41 X as wide as long, with sides distinctly rounded, widest at middle, moderately convex on disc, not abruptly constricted at apex; densely punctate, intervals between punctures smooth and shining and clearly visible between subrecumbent to erect scales. Prosternum with anterior margin strongly and acutely emarginate medially, with moderately deep median sulcus.

Elytra short, subquadrate, 1.10 X as long as wide, 1.25 X as wide as pronotum; sides weakly rounded, widest at middle; base weakly concave, not sinuate at level of interstria 5; nearly flattened on disc, interstriae clearly visible between subrecumbent to erect scales, which are arranged in 2-3 irregular rows on each interstria; striae clearly visible, as wide as 1/3 of interstria, with scarcely evident scales smaller than those of interstriae.

Legs short; femora subclavate, unarmed; tibiae moderately short, gradually widening from base to apex, ventrally with outer margin distinctly and arcuately directed outwards at apex (Figs. 25, 30), protibiae dorsally with lateral margin obtusely restricted at apex; mucrones moderately robust, those of metatibiae smaller than others; tarsi short, segment 1 1.5 X as long as wide, segment 2 1.2 X as long as wide, segment 3 bilobed, distinctly wider than segment 2, claw segment slightly shorter than segments 1-3 together; claws similar in length.

Metasternum flattened along middle. Abdomen (Fig. 5) moderately convex, with punctures moderately dense and moderately regular, intervals between punctures partly wider than width of punctures and clearly visible between subrecumbent to suberect scales; ventrites 1 and 2 medially nearly flat; posterior margin of ventrite 5 subrectilinear; ventrites 1 and 2 2.6 X longer than ventrites 3 and 4. Pygidium distinctly convex.

Median lobe (Fig. 37) of aedeagus moderately elongate, in dorsal view with sides sinuate and narrowest between middle and apical third, in lateral view subcylindrical in apical half.

♀ (paratype). As male except rostrum very slightly longer, 0.59 X as long as pronotum, and in dorsal view with sides gradually narrowing from antennal insertion to apex. Spermatheca small, hook-shaped (Fig. 59). Sternite VIII with apical portion very weakly and uniformly sclerotized and with apodeme robust and moderately elongate (Fig. 53).

Variability. The paratype is smaller than the holotype (length of pronotum and elytra 1.7 mm) and has the prothorax, the basal 2/3 of the rostrum and the base of the elytra blackish brown.

DISCUSSION AND DIFFERENTIAL DIAGNOSIS: In the shape of the rostrum this species is similar to *Rhinusa antirrhini* and *Mecinus simus*; with the latter it shares also the general habitus and the shape of the tibiae.

DISTRIBUTION: Central Argentina (Province of Santa Fe).

ECOLOGY: No data are available.

ETYMOLOGY: This species is named after my friend and colleague, Chris Lyal, who gave me the possibility of studying the specimens of the type series.

Cleopomiarus PIERCE

Cleopomiarus PIERCE 1919: 34 (type species: *Miarus erebus* LECONTE; subsequent designation by CALDARA 1999: 80).

Miaromimus SOLARI 1947: 73 (type species: *Rhynchaenus graminis* GYLLENHAL, 1813; by original designation); ZHERIKHIN & EGOROV 1991: 123; CALDARA 1999: 80.

Miarus subgen. *Miaromimus*; HOFFMANN 1958: 1312; ROUDIER 1966: 276, SMRECZYNSKI 1973: 167; 1976: 42; LOHSE & TISCHLER 1983: 271.

Miarus subgen. *Hemimiarus* FRANZ 1947: 237 (type species: *Rhynchaenus graminis* GYLLENHAL; by original designation); CALDARA 1999: 80.

AUTAPOMORPHIES: Internal sac without elongate thin dorsal median sclerite (reversal) (character 25), body of the spermatheca sinuate and of the same width from base to apex (character 32). They share the shape of the male genitalia with *Gymnetron* and *Rhinusa*.

INCLUDED TAXA: Two species from the Nearctic Region (*C. erebus* and *C. hispidulus*), all the Palaearctic species currently included in *Miaromimus*, and all taxa from the Afrotropical region described as *Miarus* as well as many undescribed species from this last region.

SYNONYMS: Originally *Cleopomiarus* included *Miarus erebus*, *M. hispidulus*, *M. micros* (GERMAR, 1821), *M. puritanus* CASEY, 1910, *M. nanus* CASEY, 1910, and *M. illini* CASEY, 1910, the last three of which are currently reported as synonyms of *M. hispidulus* (O'BRIEN & WIBMER 1982). The genus *Miaromimus* (= *Hemimiarus*) was synonymized with *Cleopomiarus* by CALDARA (1999), and all species previously assigned to it are also included in the genus.

DISCUSSION AND DIFFERENTIAL DIAGNOSIS: The general habitus of all the species belonging to the two closely related genera, *Cleopomiarus* and *Miarus*, is very uniform and external characters allowing differentiation of many taxa are few; often species recognition is possible only by the careful examination of the male genitalia. In contrast, two easily observed external characters, the presence of a deep prosternal sulcus and of free claws, immediately allow to separate these two genera from other Mecinini. A third character, more difficult to observe

(metepimera exposed), is also unique among Mecinini. However, this character was not reported in the present phylogenetic study, since its polarity remained ambiguous. Also the biology and the host plants easily differentiate *Cleopomiarus* and *Miarus* from other Mecinini.

The species belonging to *Cleopomiarus* appear more plesiomorphic than those of *Miarus*, sharing the shape of the median lobe with many other Mecinini. They are also more widely distributed, being present not only in the Palaearctic Region but also in the Afrotropical and Nearctic Regions. After a preliminary study of the sclerites of the internal sac, the Palaearctic species seem to form a single lineage, which is also present in the Afrotropical Region, where however there is also another lineage. *Cleopomiarus erebus* and *C. hispidulus*, the only two species presently known from North America, probably belong to a third lineage.

DISTRIBUTION: Palaearctic, Nearctic and Afrotropical Regions.

ECOLOGY: The Palaearctic species live on *Campanula*, *Jasone* and *Phyteuma* (Campanulaceae), in the capsules of which larvae grow, without producing visible damage. Some species from South Africa were collected on Campanulaceae, of the genus *Lobelia*.

Miarus SCHÖNHERR

Miarus SCHÖNHERR 1826: 320 (type species: *Curculio campanulae* LINNAEUS, 1767; by original designation); STEPHENS 1829: 15; BEDEL 1883: 65; DESBROCHERS DES LOGES 1893: 15, 51; REITTER 1907: 2, 43; HUSTACHE 1931: 399, 430; SOLARI 1947: 72; FRANZ 1947: 210; HOFFMANN 1958: 1264, 1311; ROUDIER 1966: 276; SMRECZYNSKI 1973: 167; 1976: 22, 41; LOHSE & TISCHLER 1983: 259, 271; ABBAZZI & OSELLA 1992: 378; ALONSO-ZARAZAGA & LYAL 1999: 80.

AUTAPOMORPHIES: Apex of median lobe with numerous setae (character 24), internal sac with a thin elongate ventral median sclerite, one dorsal (character 25) and one ventral (character 26), with a small horse-shoe shaped basal sclerite (character 27) and a pair of small suboval sclerites placed caudally to the ventral elongate median sclerite (character 28), spermatheca with body expanded medially (character 33).

INCLUDED TAXA: All Palaearctic species currently included in this taxon and also *M. praecursor* sp.n.

SYNONYMS: None.

DISCUSSION AND DIFFERENTIAL DIAGNOSIS: The species of this genus share the following characters with *Cleopomiarus*: prosternal sulcus present and markedly deep, coxal cavities of prothorax separate, mesosternal process as wide as coxa and concave, median portion of metasternum with distinct fovea in anterior 2/3, shape of scales covering part of prosternum, mesosternal process and sides of metasternum distinctly plumose, forked to five-forked; claws separated from base (reversal), internal sac with lateral margin sclerotized. There are no external characters which permit separation of all species of *Miarus* from those belonging to *Cleopomiarus*.

Miarus was initially well characterized by SOLARI (1947) on the basis of the markedly peculiar shape of the median lobe, which appears unique in Curculionidae, and of the characteristic presence of fovea on ventrite 5 and pygidium and of two teeth on male ventrite 5. However, FRANZ (1947) observed that one species of *Miarus* (*M. stoeckleini*), lacks teeth on male ventrite 5 and part of the peculiarities of the median lobe possessed by other species of the genus. Subsequently, DIECKMANN (1978) found that there are other species included in *Miarus* (*M. rotundicollis* DESBROCHERS DES LOGES, 1893 and *M. hellenicus* DIECKMANN, 1978), the males of which do not possess (first species) or have only weakly pronounced (second species) fovea and teeth on ventrite 5, although the shape of the median lobe is similar to that of other *Miarus* except for *M. stoeckleini*.

Interestingly, the new species here described (*M. praecursor*) completely lacks peculiar characters on the male ventrite 5, similarly to *M. rotundicollis*, but moreover possesses a median lobe with only a part of the characters distinctive to this genus and presently appears the most "basal" species of this group, since more closely related to *Cleopomiarus*, especially to *C. plantarum* (GERMAR, 1821), than all other *Miarus*. Since the relative phylogenetic position of *C. plantarum* within *Cleopomiarus* is presently unclear, it might result that *Miarus* forms a clade of the so called *Cleopomiarus* and therefore it might be paraphyletic.

As recently discussed by ANDERSON (1988), there are no univocal criteria for recognition of genus-group taxa and this remains often subjective also after a phylogenetic approach. I think that this is what happens in the case of *Cleopomiarus* and *Miarus*. Must they be considered at generic or subgeneric rank? At the present, I decided to consider them at generic level and to postpone a final decision after the careful revision of all the species included into these two taxa.

DISTRIBUTION: Palaearctic Region. All taxa from the Afrotropical Region described as *Miarus* belong to *Cleopomiarus*.

ECOLOGY: The species live on *Campanula* and *Phyteuma* (Campanulaceae), in the capsules of which larvae develop, sometimes producing a swelling in the ovary.

***Miarus praecursor* sp.n.**
(Figs. 7, 41, 42, 49, 54, 62)

TYPE LOCALITY: Sálakos, Profitis Ilias Mountains, Rhodes, Greece.

TYPE MATERIAL: **Holotype** ♂ (CBN) [Greece] "Rhodes, 6.5.1996, Profitis Ilias Mts., 700 m, Sálakos env., R. Borovec lgt.". **Paratypes:** 3 ♂♂ and 6 ♀♀ (CBN) same data as holotype; 6 ♂♂ and 5 ♀♀ (CBN; CCM) same data as holotype except "Ing. K. Schön lgt."; 1 ♂ and 1 ♀ (ZISP) "Turkey, Bozdag, 24.V.1978, N. Lodos"; 1 ♂ (ZISP) [Turkey] "Bozdag, 24.5.978, Gü1"; 1 ♂ (DEI) "Tur. Elmali, 28.5.1991, leg. I. Rydh"; 2 ♂♂ and 2 ♀♀ (CCM; CRM) "Anatolien, Çankiri, Ilgaz, ca 1000 m, 28.V.1989, leg. A. Riedel"; 1 ♂ (DEI) "TR - 34 km nw. Antalya, Termessos, 1991.05.21, leg. W. Suppantischitsch"; 1 ♂ (DEI) "TR: Pisi, 8.5.1966, leg. T.-E. Leiler"; 1 ♂ (DEI) "Tur. Antalya, Korkuteli, 1000 m, 20-28/5-91, leg. I. Rydh"; 1 ♂ (CGV) "Tur. Akseki, 4.6.1992, leg. Gillerfors"; 1 ♂ and 1 ♀ (ZISP) [Turkey] "Kayseri, 1.6.1973, Kayisi"; 1 ♀ (ZISP) [Turkey] "Kayseri, 1.6.1973, Erik"; 1 ♂ (DEI) "TR or.: Kaukasus Daghi, NE Senirkant, 26.VI.2000, leg. M. Snizek"; 1 ♂ and 1 ♀ (DEI) "Ost-Jordanien, leg. J. Klapperich / Amman, 800 m, 29.4.1962".

DESCRIPTION: ♂ (holotype). Length of pronotum and elytra 2.2 mm.

Body moderately elongate, oval, black, antennae and tarsi dark brown.

Rostrum moderately elongate, 0.60 X as long as pronotum, in lateral view weakly arcuate, of same width from base to apex; in dorsal view sides slightly convergent from base to antennal insertion, then parallel to apex, with scrobes slightly visible at base; punctures weak, small; sparse recumbent whitish and light brown moderately elongate seta-like scales in basal third. Frons as wide as rostrum at base. Eyes moderately convex, not prominent. Antennae inserted at middle of rostrum; scape elongate, 6 X as long as wide, funicle with segment 1 2.5 X as long as wide, moderately more robust and slightly longer than segment 2, which is 2.5 X as long as wide, segments 3-4 as long as wide, segment 5 moderately transverse, club elongate, oval.

Pronotum weakly transverse, 1.31 X as wide as long, with sides moderately rounded, widest at basal 1/3, moderately convex, moderately constricted at apex, punctures moderately dense and regular, with intervals between punctures narrow, smooth and shining, clearly visible between sparse, elongate, whitish and light brown subrecumbent to suberect seta-like scales. Prosternum with anterior margin moderately and roundly emarginate medially.

Elytra moderately elongate, subrectangular, 1.28 X as long as wide, 1.35 X as wide as pronotum, with sides subparallel in basal 2/3, at base transverse in median 1/2 and markedly directed

forwards in lateral 1/2, weakly convex on disc, but flattened in periscutellar portion, interstriae clearly visible between suberect whitish, elongate, seta-like scales, which are arranged in one, partly two, regular rows on each interstria; striae clearly visible, half as wide as interstria, with scarcely evident scales smaller than those of interstriae.

Legs moderately elongate; femora subclavate, unarmed; tibiae elongate, ventrally with outer margin not directed outwards at apex, protibiae dorsally with lateral margin obtusely restricted at apex; mucrones moderately robust, those of metatibiae smaller than others; tarsi moderately long, segment 1 2.5 X longer than wide, segment 2 1.5 X longer than wide, segment 3 bilobed, distinctly wider than segment 2, claw segment slightly shorter than segments 1-3 together; claws similar in length.

Abdomen (Fig. 7) distinctly convex, punctures moderately dense and regular, intervals between punctures partly wider than width of punctures and clearly visible between subrecumbent to suberect scales; ventrites 1 and 2 medially moderately impressed; ventrite 5 regularly convex; ventrites 1 and 2 2.9 X as long as ventrites 3 and 4. Pygidium regularly convex.

Median lobe (Figs. 41, 42) of aedeagus moderately elongate, with sides moderately restricted in median portion, with apex narrow, moderately elongate, with extreme apex truncate, internal sac (Fig. 49) with sclerite complex common to other species of genus plus elongate, recurved tooth-like sclerite and smaller subtriangular sclerite.

♀ (paratype). As male except rostrum very slightly longer, 0.67 X as long as pronotum, sparsely punctate, smooth and shining especially in apical 1/3; mucro of pro- and mesotibiae small, that of metatibiae very small; abdomen with ventrites 1 and 2 convex medially. Spermatheca (Fig. 62) enlarged at middle, then gradually narrowing to apex. Sternite VIII (Fig. 54) apically with narrow elongate sclerotized arms, with thin elongate apodeme.

Variability. Length 1.9 - 2.5 mm. The pronotum varies moderately in width. The scales of the elytral interstriae are sometimes more numerous and arranged mostly in two rows, and may be partly light brown.

DISCUSSION AND DIFFERENTIAL DIAGNOSIS: This species appears most closely related to *M. stoeckleini*, from which it can be distinguished by ventrite 5 and tergite VII lacking fovea in male, the more elongate elytra and the thinner and subrecumbent to suberect (vs. recumbent) scales of pronotum and elytra, apart from the distinctly different shape of the median lobe. However, in the external morphology this species appears markedly similar to *C. plantarum*, with which it shares the elongate elytra, the lack of a fovea on ventrite 5 and tergite VII of the male, and from which it differs only by the unarmed and not clavate femora and the shorter and not erect scales of the pronotum and the elytra.

DISTRIBUTION: Greece (Rhodes), Turkey, Jordan.

ECOLOGY: This species was collected on Rhodes on *Campanula* sp. (Borovec, pers. com.).

ETYMOLOGY: The Latin masculine noun emphasizes that presently the taxon is hypothesized to be the most basal species of *Miarus*.

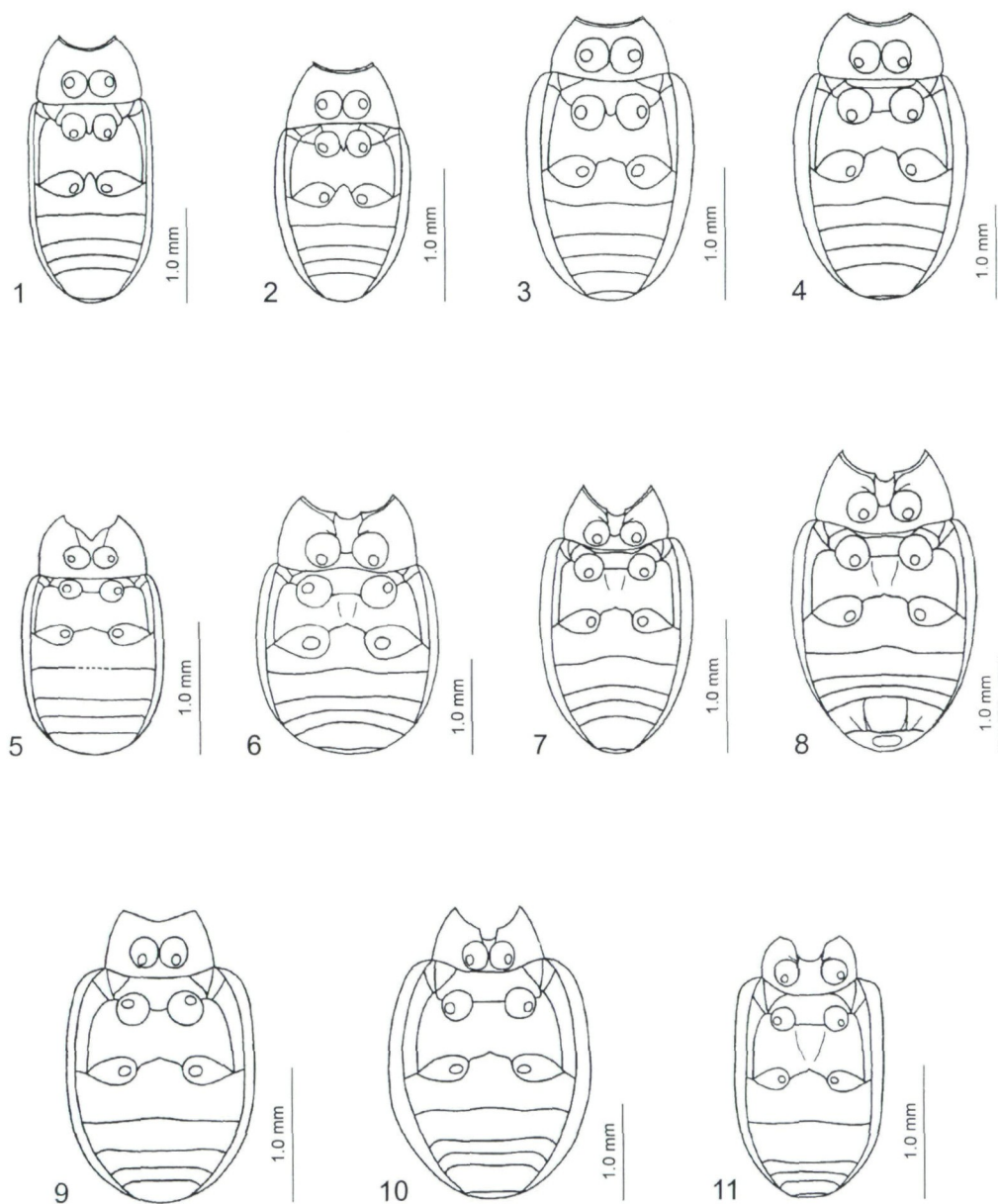
Key to genera of Mecinini

- 1 Antennal funicle five-segmented; tarsal socket of protibia only partially visible because covered by extension of ventral face of protibia (Figs. 22 - 25); claws free or fused at base 2
- Antennal funicle six- to seven-segmented; tarsal socket of protibia often completely visible (Fig. 21); claws usually separated at base..... other Curculioninae
- 2 Forehead between eyes a little narrower than rostrum at base; inner margin of eye parallel to longitudinal axis of head; direction of antennal scrobes on rostrum lateral to slightly oblique,

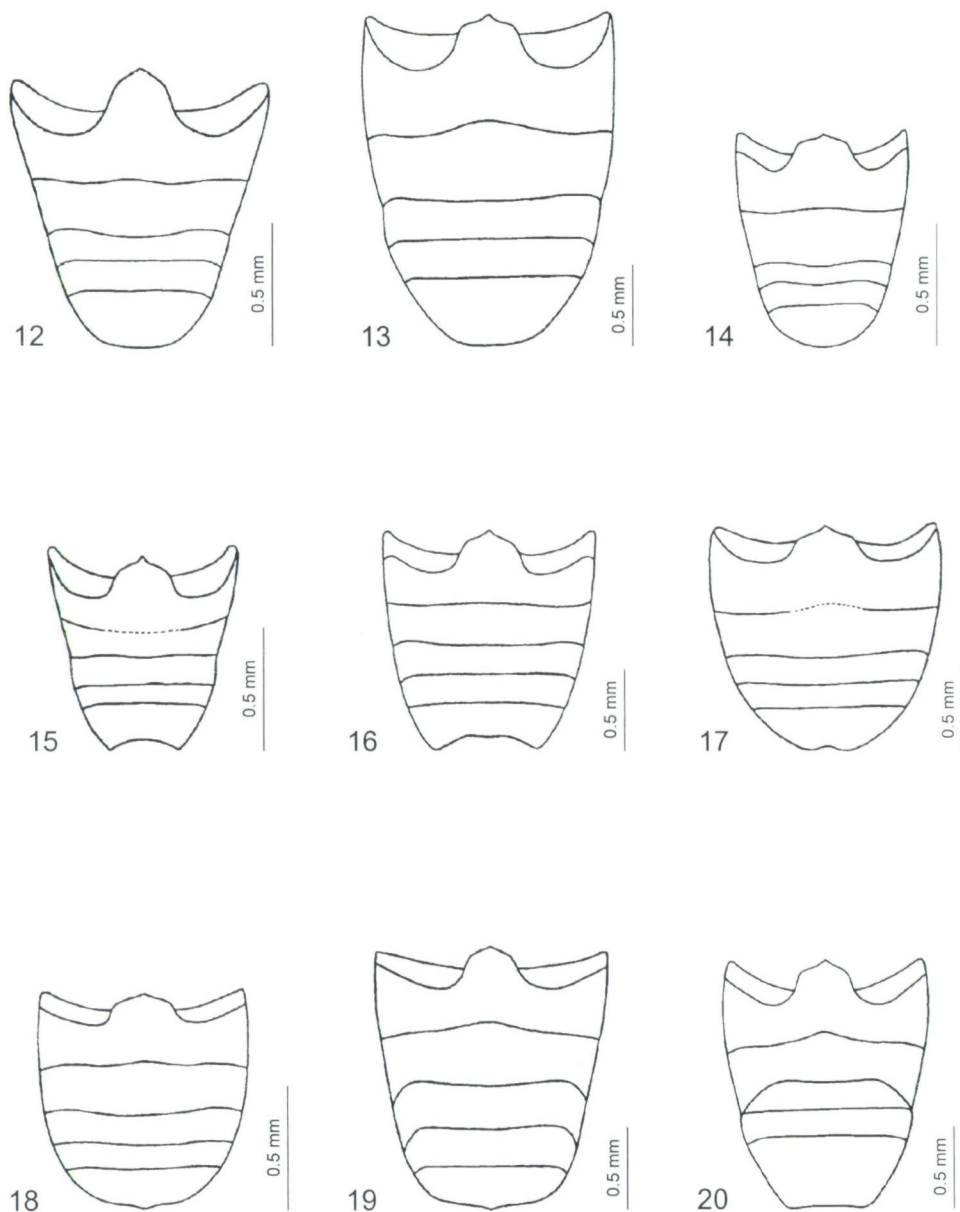
- running to lower part of eye; ventral margin of scrobe in dorsal view convex and slightly protruding; segment 2 of antennal funicle more or less shorter than segment 1; prothorax slightly to moderately narrower than base of elytra; mucro present at least on protibia and metatibia; pygidium present; spermatheca with body not globose and ramus more or less pronounced (Figs. 56 - 62)..... *Mecini* 3
- Forehead between eyes less than half width of rostrum at base; inner margin of eye divergent from head to base of rostrum; direction of antennal scrobes on rostrum oblique, running directly toward base of rostrum ventrally; ventral margin of scrobe in dorsal view parallel to longitudinal axis of rostrum; segment 2 of antennal funicle as long as or slightly longer than segment 1; prothorax distinctly narrower than base of elytra; mucro lacking on all tibiae; pygidium absent; spermatheca with body markedly globose and ramus very short (Fig. 55).... *Cionini*
- 3 Prosternum without median sulcus; eyes moderately large, less than half width of head; gula between eyes slightly narrower than rostrum at base; ventrites 1 and 2 at most 2.3 X as long as ventrites 3 and 4..... 4
- Prosternum with median sulcus; eyes large, more than half width of head; gula between eyes more than half width of rostrum; ventrites 1 and 2 at least 2.6 X as long as ventrites 3 and 4..... 6
- 4 Elytral margin at apex transverse to moderately directed outwards (Fig. 31) and covering large portion of pygidium; apical portion of ventral face of protibia directed outwards at apex (Figs. 27 - 29); median lobe usually short (length/width < 3) and with flagellum curled proximally (Figs. 38, 39)..... *Mecinus*
- Elytral margin at apex moderately directed inwards (Figs. 32, 33) and leaving pygidium mostly uncovered; apical portion of ventral face of protibia not directed outwards at apex (Fig. 26); median lobe usually long (length/width > 3) and with flagellum straight to S-shaped proximally (Figs. 35, 36)..... 5
- 5 Elytral striae 3 and 8 joined at apex (Fig. 32)..... *Gymnetron*
- Elytral striae 3 and 6 joined at apex (Fig. 33)..... *Rhinusa*
- 6 Claws fused at base; coxal cavities of prothorax contiguous (Fig. 5); prosternal sulcus moderately deep, its width about 3-4 X height of its borders; mesosternal process half as wide as coxa (Fig. 5); median portion of metasternum flat..... *Rhinumiarus*
- Claws free; coxal cavities of prothorax separated (Figs. 6 - 8); prosternal sulcus distinctly deep, its width about 2 X height of its borders; mesosternal process as wide as coxa (Figs. 6 - 8); median portion of metasternum concave..... 7
- 7 Usually male with ventrite 5 with median fovea and sublateral tubercles and pygidium with fovea (Fig. 8); median lobe short, apex with numerous setae, internal sac with two thin elongate median sclerites, one ventral and one dorsal, with a pair of small suboval sclerites placed caudally to ventral elongate median sclerite (Figs. 41 - 52); body of spermatheca expanded in median portion (Figs. 61, 62)..... *Miarus*
- Ventrite 5 and pygidium of male, and median lobe without peculiar features (Figs. 6, 40); body of spermatheca sinuate and of same width from base to apex (Fig. 60)..... *Cleopomiarus*

Acknowledgments

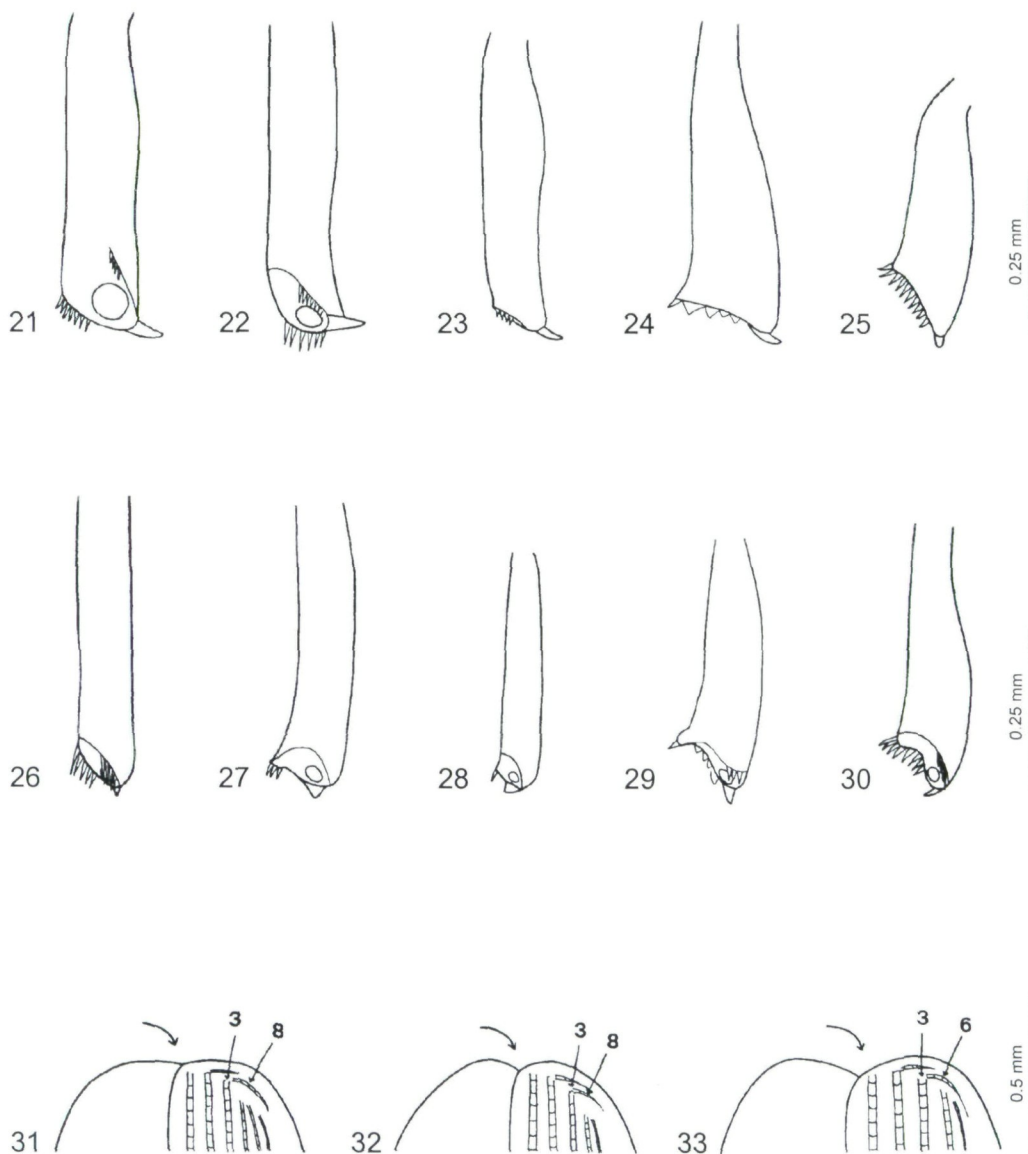
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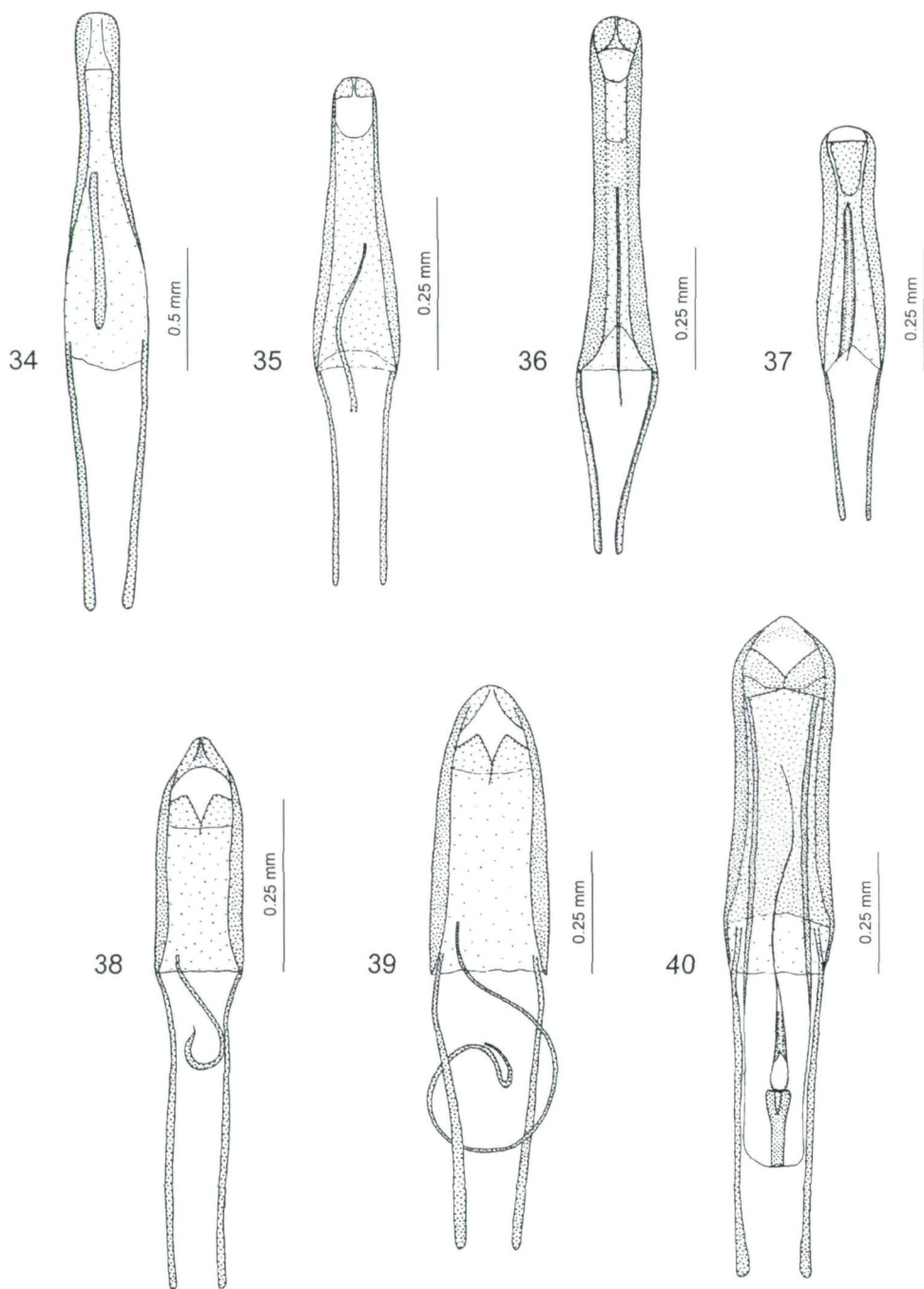
Figs. 1 - 11: Venter of: 1) *Mecinus pyraeaster*; 2) *M. pascuorum*; 3) *Gymnetron villosulum* (GYLLENHAL, 1838); 4) *Rhinusa tetrum* (FABRICIUS, 1792); 5) *Rhinumiarus lyali*; 6) *Cleopomiarus graminis*; 7) *Miarus praecursor*; 8) *Miarus campanulae*; 9) *Cleopus solani* (FABRICIUS, 1792); 10) *Cionus hortulanus* (FOURCROY, 1785); 11) *Cionellus gibbifrons* (KIESENWETTER, 1851).



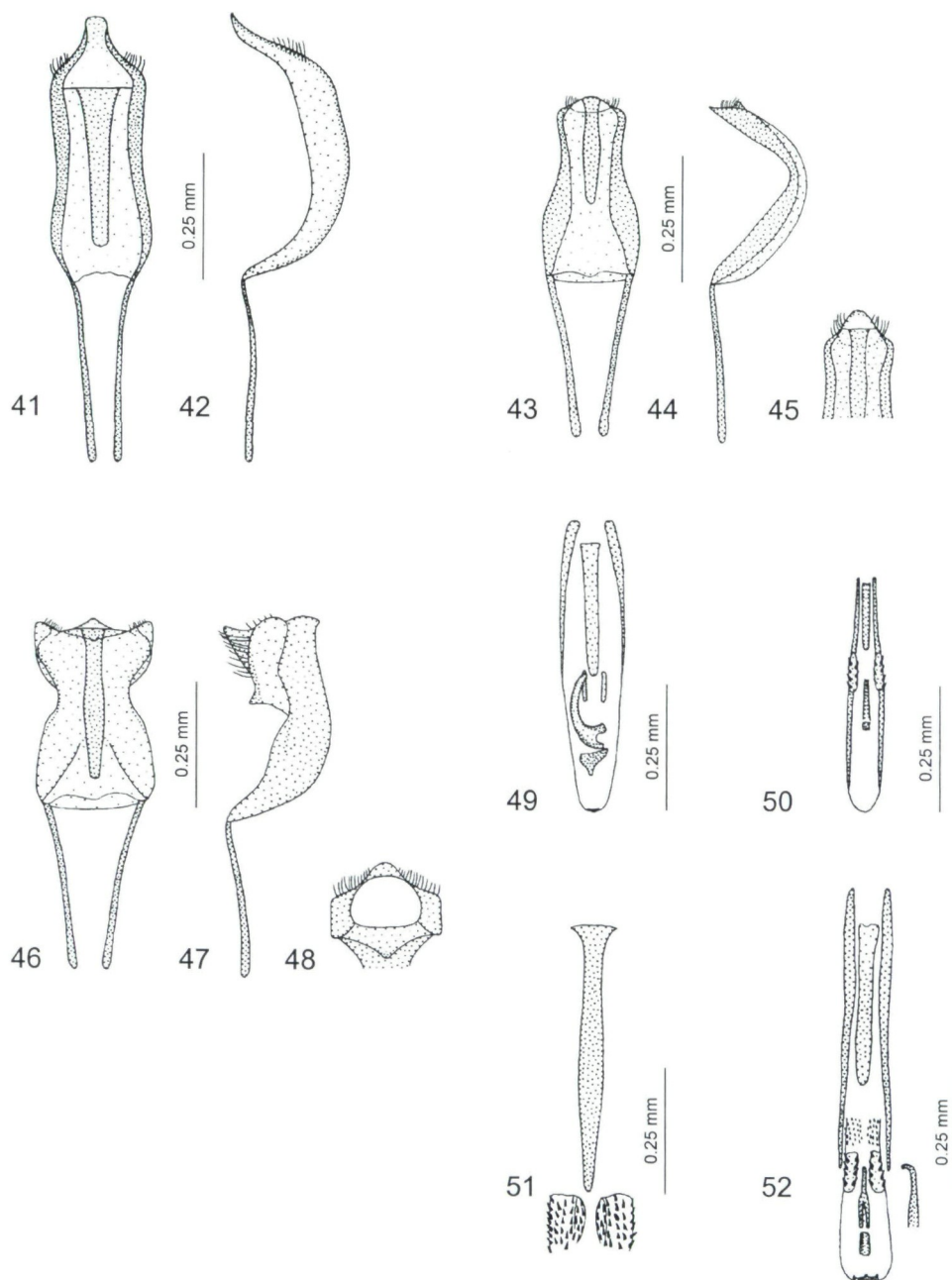
Figs. 12 - 20: Abdomen of: 12) *Pachytychius hordei* (BRULLÉ, 1832) (Storeini); 13) *Dorytomus filirostris* (GYLLENHAL, 1836) (Ellescini); 14) *Smicronyx jungermanniae* (REICH, 1797) (Smicronychini); 15) *Archarius salicivorus* (PAYKULL, 1792) (Curculionini); 16) *Anthonomus conspersus* DESBROCHERS DES LOGES, 1868 (Anthonomini); 17) *Derelomus chamaeropsis* (FABRICIUS, 1793) (Derelomini); 18) *Acalyptus carpini* (HERBST, 1795) (Acalyptini); 19) *Orchestes rufus* (SCHRANK, 1781) (Rhynchaenini); 20) *Tychius tridentinus* PENECKE, 1922 (Tychiini).



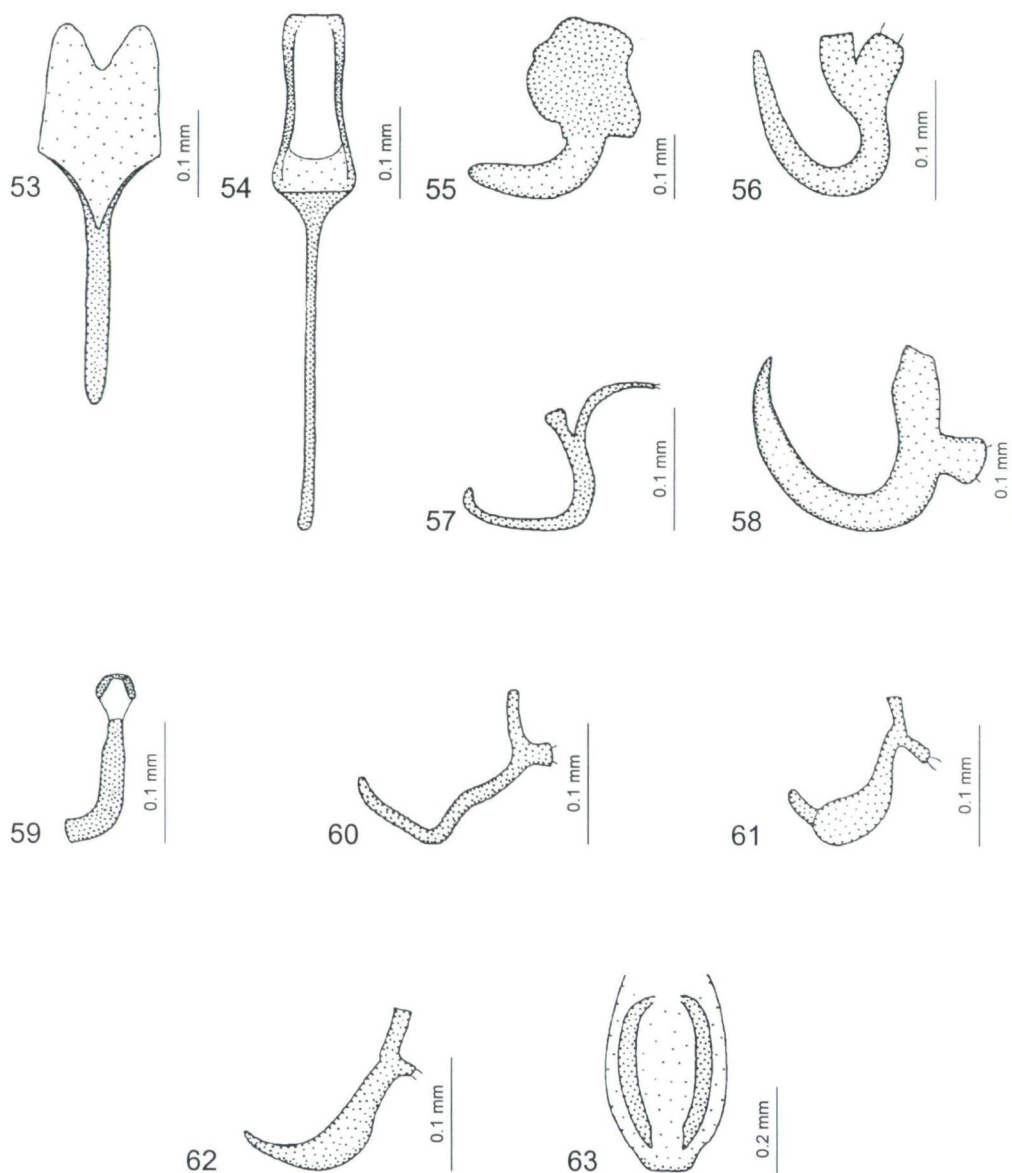
Figs. 21 - 33: Right protibia in ventral view (21-25) of: 21) *Ellescus bipunctatus* (LINNAEUS, 1758) (Ellescini); 22) *Gymnetron villosulum*; 23) *Mecinus pyraeter*; 24) *M. comosus*; 25) *Rhinumiarus lyali*. Right protibia in lateral view (26-30) of: 26) *Gymnetron villosulum*; 27) *Mecinus pyraeter*; 28) *M. pascuorum*; 29) *M. comosus*; 30) *Rhinumiarus lyali*. Elytral apex in ventral view of: 31) *Mecinus pascuorum*; 32) *Gymnetron villosulum*; 33) *Rhinusa bipustulatum* (ROSSI, 1794).



Figs. 34 - 40: Median lobe of: 34) *Cionus hortulanus*; 35) *Gymnetron veronicae* (GERMAR, 1821); 36) *Rhinusa bipustulatum*; 37) *Rhinumiarus lyali*; 38) *Mecinus variabile*; 39) *M. comosus*; 40) *Cleopomiarus graminis*.



Figs. 41 - 52: Median lobe in dorsal (41, 43, 46, with dorsal sclerite) and lateral view (42, 44, 47), and apex (45, 48) of: 41-42) *Miarus praecursor*; 43-45) *M. stoeckleini*; 46-48) *M. ajugae* (HERBST, 1795). Ventral (49, 50 and 52) and dorsal (51) sclerites of the endophallus of 49) *Miarus praecursor*; 50) *M. stoeckleini*; 51-52) *M. ajugae*.



Figs. 53 - 63: Sternite tegmen VIII of: 53) *Rhinumiarus lyali*; 54) *Miarus praecursor*. Spermatheca of: 55) *Cionus hortulanus*; 56) *Mecinus pyraeaster*; 57) *Gymnetron villosulum*; 58) *Rhinusa netum* (GERMAR, 1821); 59) *Rhinumiarus lyali*; 60) *Cleopomiarus graminis*; 61) *Miarus campanulae*; 62) *M. praecursor*. Sclerites of the bursa copulatrix of: 63) *Miarus campanulae*.

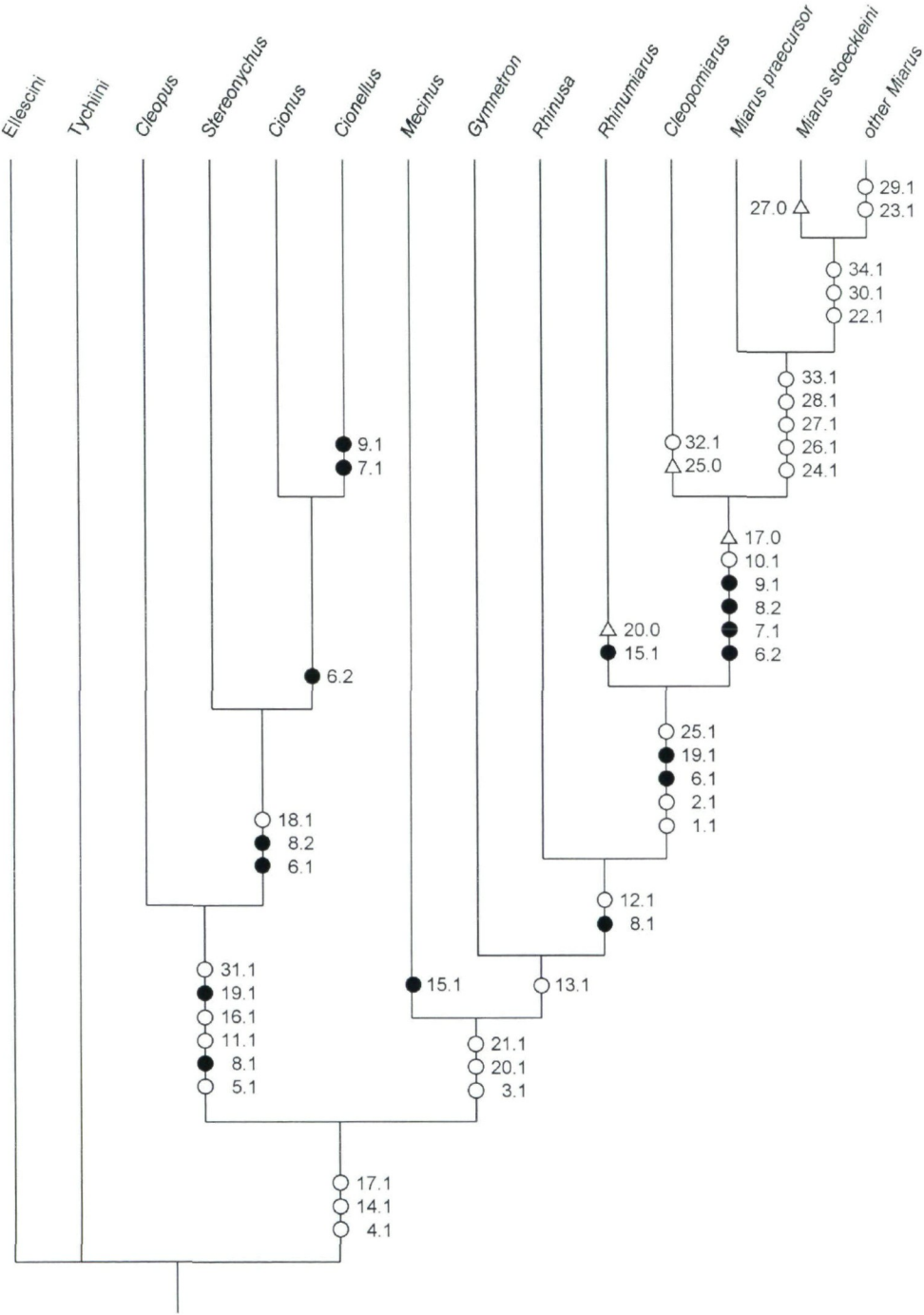


Fig. 64: Reconstructed phylogeny illustrating hypothesized phylogenetic relationships among genera and species belonging to Cionini and Mecinini. Open circles indicate apomorphic character states, dots homoplastic occurrences of derived character states and open triangles reversals.

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