Tosevskiana Pavićević, 1985, an enigmatic genus of European Melolonthinae Rhizotrogini removed from Pachydeminae (Coleoptera: Melolonthidae)

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Abstract – On the consideration of the morphological characters of its type-species, especially the shape and structure of the aedeagus, the genus *Tosevskiana* Pavicevic, 1985, is removed from the subfamily Pachydeminae, in which it was originally described, to the subfamily Melolonthinae. The new combination *Tosevskiana sithoniensis* (Král, 1998) **comb. n.** is also proposed. Thus, the genus *Tosevskiana* is now composed of two species localized in the south east of the Balkan Peninsula. In addition, the restoration of the combination *Rhizotrogus camusi* Antoine, 1959, is based on the examination of the genital segment of the type-specimen.

Résumé – ***Tosevskiana* Pavicevic, 1985, genre énigmatique européen, transféré des Pachydeminae aux Melolonthinae Rhizotrogini (Coleoptera: Melolonthidae)**. – Sur la base de caractères morphologiques observés chez l'espèce-type, en particulier la forme et la structure de l'édéage, le genre *Tosevskiana* Pavicevic, 1985 est transféré de la sous-famille des Pachydeminae, dans laquelle il fût décrit originalement, aux Rhizotrogini de la sous-famille des Melolonthinae. Par ailleurs, la nouvelle combinaison *Tosevskiana sithoniensis* (Král, 1998) est proposée. Le genre *Tosevskiana* est ainsi composé de deux espèces étroitement localisées dans la Péninsule balkanique. La combinaison *Rhizotrogus camusi* Antoine, 1959, est également restaurée après examen du segment génital du spécimen-type.

The tribe Rhizotrogini groups together about 1400 species from the Palaearctic, Nearctic, Neotropical and Oriental regions (Sabatinelli & Pontuale 1998). The subtribe Rhizotrogina, suggested by Nonveiller (1960, 1965) and more recently by Coca Abia & Martín Piera (1991) and by Baraud (1992) [see also Coca Abia (1995)], includes about 200 species from the Occidental Mediterranean Basin. These species are arranged in five genera and one species-group: *Amadotrogus* Reitter, 1902 (*sensu* Coca Abia & Martín Piera 1998), *Amphimallon* Berthold, 1827 (*sensu* Montreuil 2000), *Geotrogus* Guérin, 1842 [= senior synonym of *Pseudoapterogyna* Escalera, 1914, according to Coca Abia (1995)], *Monotropus* Erichson, 1848, *Rhizotrogus* Berthold, 1827 (*sensu* Coca Abia 1995; Coca Abia & Martín Piera 1998), and the *scutellaris*-group (see Montreuil 2000). The phylogenetic relationships within *Rhizotrogus* and *Amphimallon* have been recently studied, but the phylogenetic relationships between genera and group within Rhizotrogina are not yet clearly established (Coca Abia 1995; Montreuil 2000).

In 1985, Pavićević described a new species, belonging to a new genus of Melolonthinae from Macedonia: *Tosevskiana inexpectata.* Although the author admitted an undeniable resemblance to *Rhizotrogus*, this species was placed in Pachydeminae because of the particularly elongated last five segments of its antennae (fig. 4). As it was noticed by Krell (1993), the genus *Tosevskiana* was ignored by Baraud in his Fauna of Europe (1992), explaining probably the fact that it was not treated in the following works on palaearctic Pachydeminae (Sanmartín 1998; Sanmartín & Martín Piera 1999).

In this paper, comparing *Tosevskiana inexpectata* with specimens of different genera of Rhizotrogina, I establish that it belongs to the Rhizotrogina (see Baraud 1992), add to this genus a second species previously described in *Amphimallon*, bring arguments to hypothesise the monophyly of the genus *Tosevskiana* Pavićević, 1985. In addition, I give first hypotheses on its probable phylogenetic relationships with related circum-Mediterranean Rhizotrogina genera, and on its origin.

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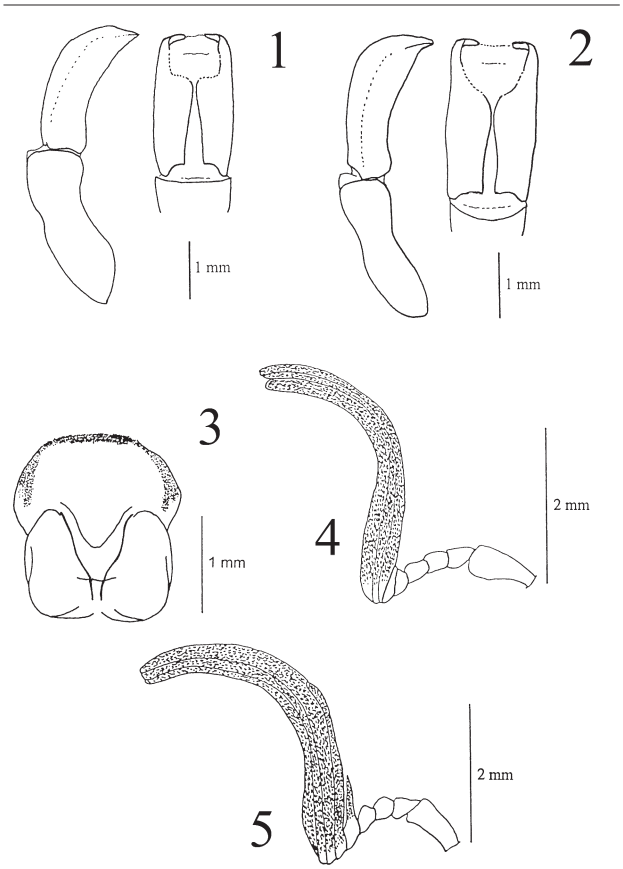
I could not study the type of *Tosevskiana inexpectata* Pavićević, 1985, which is conserved in the author's collection in Belgrade. However, according to the original description, I have identified a specimen with this rare and very curious species, conserved in the Baraud collection (Paris, MNHN). This specimen, collected in Mavrovo (Macedonia), was formerly wrongly identified with *Amphimallon solstitiale* (Linnaeus, 1758) by Petrovitz, and illustrated afterwards by Baraud (1977a) in his paper dealing with antennal aberrations in Melolonthinae.

In addition, on the occasion of a taxonomic and nomenclatural revision of the chafers of the genus *Amphimallon* Berthold, 1827 (Montreuil, in prep.), I had an opportunity to study a paratype of a recently described species from Greece, *Amphimallon sithoniense* Král, 1998. The shape and structure of the aedeagus of this species (fig. 1), especially the parameres ventrally and dorsally joined to form a simple cover, allow its attribution to the Rhizotrogina. Because of its nine antennomera, this species was described in the genus *Amphimallon*. In addition, the sclerotized apophyses [also named *tigilla* (Martín Piera & Coca Abia 1992)] in endophallus are weakly developed, such as in *Amphimallon* (Coca Abia 1995; Montreuil 2000), and also suggest that this species might belong to this genus. Another specimen has been collected in Sarti (Greece, Sithonia, VI-2001, O. Montreuil leg).

These specimens were compared with representatives of Rhizotrogina (genera *Amphimallon* Berthold, 1827, *Rhizotrogus* Berthold, 1827, *Monotropus* Erichson, 1848, *Geotrogus* Guérin, 1824).



Figures 1-5
Aedeagus (a, lateral view; b, dorsal view) and endophallus (c, lateral view) of *Tosevskiana* species – 1, *T. sithoniensis*. – 2, *T. inexpectata*. – 3, Inflated endophallus of *T. sithoniensis* (dorsal view). – 4-5, Antennae (dorsal view) of *Tosevskiana* species. – 4, *T. sithoniensis*. – 5, *T. inexpectata*.

RESULTS AND DISCUSSION

Systematic position of *Tosevskiana* Pavićević, 1985

Comparing *Tosevskiana inexpectata* with *Amphimallon sithoniense*, it appears that both species are very closely related, presenting in particular the antennomera of the antennal club totally and densely punctated, without smooth areas (fig. 3-4). Such degree of development of punctation has never been observed in *Amphimallon*, not even in species which have a similar habitus to these species [*A. naceyroi* Mulsant, 1859; *A. vulpecula* (Peyerimhoff, 1931)…] while it is typical in species of the genus *Monotropus* Erichson. Moreover, the antennal club antennomera of these species are extremely elongated. Similar lengthening of club antennomera is shown in species belonging to one of the most typical groups of *Amphimallon*, the *Amphimallon pini*-group *sensu* Montreuil (2000), but it is not possible to place this species in this group because they do not show the other synapomorphies which define this *Amphimallon*-group (i.e. elevation of odd elytral interstriae, transversal ridges on odd elytral interstriae, colour pattern of head and abdominal sterna, median furrow on pronotum; see Montreuil, 2000). Such lengthening of the antennal club is also shown, at a lesser stage, in the species of the genus *Monotropus*.

On the consideration of these characters, both species can be grouped together in the same group: the genus *Tosevskiana*. In addition, the structure and the shape of the aedeagus (fig. 1-2) support undeniably the removal of the genus *Tosevskiana* from the Pachydeminae to the Melolonthinae. More exactly, it is possible to place it in the Rhizotrogina. In addition, antennal characters of the genus *Tosevskiana* question its possible sister-group relationships with *Monotropus*.

Although it is not the purpose of this article to reconstruct the phylogeny of the Rhizotrogina (see Coca Abia & Martín Piera 2002), it is possible to propose here the following preliminary evolutionary hypothesis (see fig. 5) in relation with the hypothesis of sister-group relationships between *Tosevskiana* and *Monotropus*.

In opposition to the strongly developed sclerotized apophyses in endophallus of the other genera of Rhizotrogina, the apophyses are weakly developed in the clade *Amphimallon-Tosevskiana-Monotropus* and even totally reduced in many *Monotropus*. Furthermore, this clade is supported by the reduction of the number of antennomera, from ten to nine (*Amphimallon*, *Tosevskiana*) [position of the *Amphimallon scutellaris*-group *sensu* Montreuil (2000) in Rhizotrogina will not be discussed in this article (see Montreuil 2000)], to seven (*Monotropus*) [exceptionally only to eight (*Monotropus staudingeri* v. *octus* Báguena, 1960)]. Sister-groups relationships between *Tosevskiana* and *Monotropus* could be supported by the antennal club totally and densely punctated and by the lengthening of the club antennomera, which is much more stronger in *Tosevskiana*.

The new systematic position and new composition of the genus *Tosevskiana* I propose in this paper imply to give a redescription of this genus.

Genus ***Tosevskiana*** Pavićević

Tosevskiana Pavičevič, 1985. *Entomologische Zeitschrif*, 95: 334.

Type-species: *Tosevskiana inexpectata* Pavićević, 1985, by monotypy.

Redescription – Size: 13-16 mm. Habitus of Rhizotrogini. Yellow-brown or red-brown. Antennae with 9 antennomera, at least the three last strongly elongated and curved, forming a club which is totally and densely punctated, without smooth area. Frons of male with a vague transverse elevation. Border of basal margin of pronotum entire. Odd interstriae vaguely elevated. Sides of sternites without dense inclined short setae forming white spots. Ventral edge of claws with a basal tooth. Parameres dorsally and ventrally joined forming a simple cover. Basal part of phallobase of normal shape, not strongly enlarged. Lateral sclerotized apophyses of endophallus reduced, thin and short.

Female unknown.

There are at present two species in the genus *Tosevskiana*:

– ***Tosevskiana inexpectata*** Pavićević, 1985: 334.
Type locality: Macedonia, Stojakovo.

– ***Tosevskiana sithoniensis*** (Král, 1998) **n. comb.**
Amphimallon sithoniense Král, 1998. *Acta Societatis zoologicae bohemoslovenicae*, 62: 41.
Type locality: Greece, Chalkidiki, Sithonia peninsula, Vourvourou.

Both species can be easily separated, in particular by the 5th and 6th antennomera elongated in *Tosevskiana inexpectata*; by the external edge of male protibiae tridentated in *T. sithoniensis*, unidentated in *T. inexpectata*; by the pronotal disc glabrous in *T. sithoniensis*, with setae in *T. inexpectata*. Females of both species are still unknown.

Biogeography

The genus *Tosevskiana* is narrowly localized in the south-east of the Balkan Peninsula (fig. 6). According to Medvedev (1951) and Baraud (1977b, 1985, 1992), the genus *Monotropus* Erichson, 1848 groups together a few species localized in the Iberian Peninsula (five species), North Africa (one species) and Southern Russia (two species).

We have examined the genital segment of the type of *Monotropus camusi* (Antoine, 1959), the sole species of this genus cited from North Africa. Contrary to Baraud (1985), the long and strongly developed sclerotized apophyses in endophallus allow the conclusion that this species does not belong to the genus *Monotropus* but to the genus *Rhizotrogus*, as it was originally described. Thus, the combination *Rhizotrogus camusi* Antoine, 1959, is restored.

Another species, *Monotropus jeannei* Baraud, 1971, was described from Greece. It has been considered an intermediary link between the *Monotropus* of the Iberian Peninsula and those of southern Russia, until we established (Montreuil 2000) that it should be excluded from *Monotropus*, and that it belongs in fact to the *A. fuscum*-group *sensu* Montreuil (2000) in *Amphimallon*.

Tosevskiana and *Monotropus* belong to the Rhizotrogina originating and differentiated from the

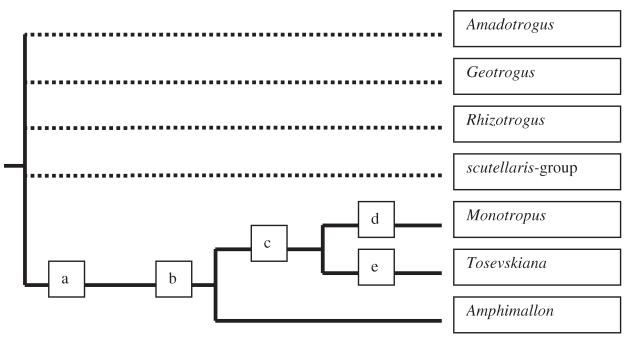


Figure 6
Preview of the phylogenetic relationships hypothesis in the Rhizotrogina. – **a**) 10 → 9 antennomera. – **b**) reduction of the sclerotized apophyses in endophallus. – **c**) club antennomera totally and densely punctated; feeble lengthening of the club antennomera. – **d**) 9 → 8 or 7 antennomera; basal part of phallobase strongly enlarged; sclerotized apophyses in endophallus totally reduced. – **e**) club antennomera strongly elongated.

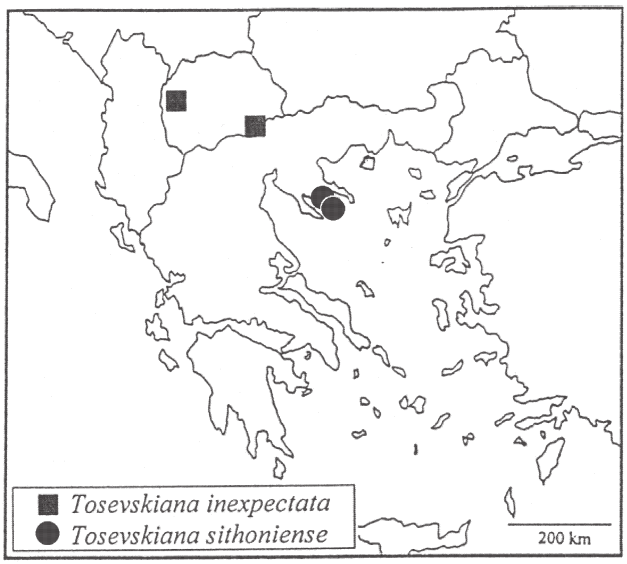


Figure 7
Distribution map of *Tosevskiana* species, according to Pavićević (1985) and Král (1998).

Occidental Mediterranean Basin (Late Palaeogene, 30 MYBP) (Coca Abia 1995; Montreuil, in prep.). The current distribution of the *Monotropus* in the Iberian Peninsula and Southern Russia and that of *Tosevskiana* in the Balkan Peninsula supports the hypothesis of a former transmediterranean distribution of the representatives of the group *Monotropus* + *Tosevskiana*, probably across southern Europe (Late Oligocene-Early Miocene, 25-20 MYBP). Later on (Middle Miocene, 17-13 MYBP), marine connections between Tethys and Paratethys have induced the isolation of the Balkan Peninsula in the Oriental Mediterranean Basin (Rögl & Steininger 1983; Oosterbroek & Arntzen 1992; Robertson & Grasso 1995). The separation of the genus *Tosevskiana*, isolated and then differentiated from the *Monotropus*, could have occurred at that time.

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