

Supplemental comments on *Scarabaeus* Linné (Scarabaeinae: Scarabaeini)

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Abstract. *Scarabaeus morbillosus* Fabricius 1792 and *Ateuchus morbillosus* Fabricius 1801 are the same species synonymous with *Scarabaeus palemo* Olivier 1789.

Of the six species of *Scarabaeus* introduced by Motchoulsky (1849) only *S. acuticollis* is valid. *Scarabaeus digitatus* is a synonym of *S. pius* Illiger 1803, and *S. nigrociliatus*, *S. opacus*, *S. sericeus* and *S. tauricus* are nomina nuda.

The type species of *Ateuchetus* Bedel 1892 is *Ateuchus cicatricosus* Lucas 1846 by subsequent designation in Kabakov (1980).

Ateuchus Fabricius 1801 is a junior homonym of *Ateuchus* Weber 1801 (Dichotomiini), which has no place in the synonymy of *Scarabaeus* Linné. The type species of *Ateuchus* Fabricius is "*Ateuchus sacer*, Fab." (= *Scarabaeus sacer* Linné 1758) by subsequent designation in Latreille (1810).

Actinophorus Creutzer 1799 and *Heliocantharus* Macleay 1821 are junior synonyms of *Scarabaeus* Linné 1758. Their type species is *Scarabaeus sacer* Linné 1758, designated for *Actinophorus* by Ádám (2003) and for *Heliocantharus* in this paper.

The type species of *Scarabaeus* Linné 1758 is "*Ateuchus sacer*, Fab." (= *Scarabaeus sacer* Linné 1758) by subsequent designation in Latreille (1810).

Key words. *Scarabaeus*, species-group taxa, generic synonymy, type species.

Introduction

The purpose of this paper is to provide corrections and additions to our recently published checklist of the genus (Zídek & Pokorný 2004). Subsequent reactions concerned the generic synonymy including type species and an entry in the species-group catalog, to which we respond below. Additional comments are made on several names introduced by Motchoulsky (1849).

Species-group taxa

General opinion has been that *Scarabaeus morbillosus* Fabricius really is two species, one described in 1792 (p. 63) from Germany and the other described as *Ateuchus* in 1801 (p. 56) from Guinea. This was assumed already by Macleay (1821: 501), but we can find no evidence of two species. The five syntypes of *S. morbillosus* preserved at the University of Copenhagen Zoological Museum (seen) all are *S. palemo* Olivier 1789 from Guinea and doubtless are the specimens on which Fabricius based

the 1792 description, as is evidenced by his “Quadruplo minor *Sc. sacer*” remark (all Palearctic species of *Scarabaeus* are much larger). Since our search for types of a “different” *S. morbillosus* produced nothing, we believe the notion of two species to stem from Fabricius’ corrections, namely changing the provenance from Germania (1792) to Guinea (1801), modifying the description from “Elytra atra striis punctisque numerosis exarata” (1792) to “... striis elevatis undatis” (1801) and transferring the species to his new genus *Ateuchus*. For the record, the syntypes show no morphological variation, are 10.2, 10.6, 11.0, 11.5 and 11.7 mm in standard length, and all bear red TYPE labels and tiny green squares. As far as we can tell from the shape of the last abdominal sternite, they all are females. Only one of them (the one 11.0 mm in standard length) is mounted with the head extended in horizontal position and bears a locality label (Fig. 1).



Fig. 1. A syntype of *Scarabaeus morbillosus* Fabricius 1792 (= *Scarabaeus paleo* Olivier 1789) and its locality label. The specimen is 11.0 mm in standard length.

Because of the preparation, an imperfection on the right side of the pronotal disc and the locality label, this specimen would make an easily recognizable lectotype. However, at present we see no purpose its designation would serve.

One species-group name that we missed entirely is *Scarabaeus opacus* Motchoulsky 1849, whose type is deposited at the University of Moscow Zoological Museum (ZMUM). According to the ZMUM curator A.A. Gusakov (in litt.) it bears two white labels in Motschulsky's handwriting, "Hispania" and "Scarabaeus opacus Motsch Hispania"; a red rectangle; and another white label, "Scarabaeus pius Illig. [handwritten] Det. VI. Malý [printed] 1996 [handwritten]". However, in Motchoulsky's 1849 paper this taxon appears on p. 107 among species collected not in Spain but in southern Russia, and apart from the remark "voisin du *Sc. pius*" no description, diagnosis or indication are provided anywhere else in that paper or in any subsequent publication by that author. It thus is a nomen nudum, and to those wishing to add it to our checklist the status notwithstanding, we suggest the entry "*-opacus* Motchoulsky 1849: 107, ht - ZMUM, n. nudum; =*pius*".

Five other species of *Scarabaeus* introduced by Motchoulsky (1849) merit comments.

Scarabaeus acuticollis apparently is based on several ZMUM syntypes, one of which bears the following labels: pink with handwritten "Khiva", white with "Scarabaeus acuticollis Motsch Buhara" in Motschulsky's handwriting, a red rectangle, and red "Lectotypus [printed] *Scarabaeus acuticollis* Motsch. VI. Malý des. 10. 1996 [handwritten]". The lectotype selection has not been published and therefore does not constitute a valid designation. Khiva is on the Turkmenistan border some 300 km nnw. of Bukhara. Since Bukhara ("Buhara") appears on the label written by Motschulsky whereas the author of the "Khiva" label is not known, we consider Bukhara (sc. Uzbekistan) to be the type locality.

Scarabaeus digitatus from an unspecified location in the Caucasus was properly described by Motchoulsky (1849: 105), but its type(s?) cannot be located at ZMUM. From the original description it appears to be a synonym of *S. pius* Illiger 1803.

The type of *S. sericeus* from "Armenia" is preserved at ZMUM, but in Motchoulsky's (1849: 107) paper it is only a name accompanied by "voisin du *Sc. armeniacus* mais opaque." Since it lacks a description or a clear indication, it is a nomen nudum. In 1996 VI. Malý examined the type and labeled it *Scarabaeus armeniacus* Ménétriés 1832.

The types of *S. nigrociliatus* from Mongolia and n. China, and of *S. tauricus* from "de la Tauride" (e. Turkey), cannot be located at ZMUM. Motchoulsky

(1849) provided neither descriptions nor indications for these taxa, and the names thus are nomina nuda. *Scarabaeus tauricus* does not appear in our checklist and may be added as “-*tauricus* Motchoulsky 1849: 107, t - ?, n. nudum”.

Generic synonyms

The purpose of our checklist was to compile a so-far unavailable comprehensive catalog of species-group names, not to delve into generic-level synonyms. However, in order to publish it we had to satisfy the formal requirement of presenting also a generic synonymy, and some of the secondary sources used have subsequently turned out to be either inadequate or unreliable. Therefore, we feel compelled to correct some of the statements and to comment on others.

Pachysoma Macleay 1821 was left out of the synonymy because following its revision by Harrison & al. (2003) we recognized it as a subgenus. On the other hand we included *Ateuchetus* Bedel 1892 and *Scarabaeolus* Balthasar 1965, because in our opinion their validity as subgenera remains to be demonstrated.

Bedel (1892) proposed *Ateuchetus* and *Neoctodon* as replacement names, the latter because he was unaware that *Octodon* Lansberge 1874 (n. praeocc., Mammalia) had already been replaced by *Mnemadidum* Ritsema 1889. *Ateuchetus* apparently was to replace *Actinophorus* Creutzer 1799 sensu Erichson (1848), as they are the only other genus and author mentioned by Bedel, but no reason for replacing a good (not preoccupied) name, moreover in a sense other than Creutzer's, can be discerned from his writing. Erichson (1848) treated *Actinophorus* as a subgenus of *Ateuchus* (see below for authorship) and included five species (*S. laticollis* Linné 1767, *S. puncticollis* Latreille 1819, *Ateuchus parumpunctatus* Klug 1845 [= *S. puncticollis*], *S. semipunctatus* Fabricius 1792 and *S. variolosus* Fabricius 1787), of which *S. laticollis* is not among the species originally included by Bedel (1892). In contrast, Bedel included also *Ateuchus cicatricosus* Lucas 1846, which was either not known to Erichson or regarded by him as a synonym of *S. variolosus*. Bedel did not designate a type species for *Ateuchetus*, and our listing of *Ateuchus cicatricosus* Lucas as the type species followed Kabakov (1980: 820, 825), who did not state whether the designation was his. We have not been able to find an earlier reference that would cite this or another designation, and Ziani (2002), who also lists *A. cicatricosus* as the type species, does not cite its provenance either. To our knowledge Kabakov (1980) and to some extent Ziani (2002) are the only available reviews of *Ateuchetus*. Therefore,

in absence of another indication, we attribute the designation to Kabakov (1980).

Ateuchus was proposed independently by Weber (1801: 10) and Fabricius (1801: 54) in works issued by the same publisher, and Chapin (1946) established priority of Weber's genus from the dates of introductions in those works. Weber's introduction is dated August 1800 whereas Fabricius' is of April 1801, and Fabricius (p. 47) refers to Weber but not vice versa. *Ateuchus* Fabricius thus is a junior homonym of *Ateuchus* Weber, whose type species by monotypy is *A. histeroides* Weber 1801: 37 and which is an exclusively New World dichotomiine genus today comprising ca. 80 species, all of them small (5-7 mm) and with unarmed heads and pronota. In contrast, Fabricius included in his *Ateuchus* 44 Old World species (today referred mostly to *Scarabaeus*) and 14 New World species (today referred to *Ateuchus* sensu Weber) (see Kohlmann 1984). Fabricius' *Ateuchus* was widely accepted during the 19th century because the issue of priority went unnoticed and his authorship attracted more attention due to the visibility of his works and the genus size, 58 species as compared to only one of Weber. Since *Ateuchus* Weber has no place in the synonymy of *Scarabaeus* but the name had nonetheless been applied to a number of *Scarabaeus* species, we followed Ziani (2002) in using the formulation "*Ateuchus* auct. (nec Weber 1801: 10)". An alternative formulation could be "*Ateuchus* Fabricius 1801: 54, partim (junior homonym of *Ateuchus* Weber 1801: 10, Dichotomiini), type sp. '*Ateuchus sacer* Fab.' (= *Scarabaeus sacer* Linné 1758) by subsequent designation in Latreille 1810: 428", which is more revealing and bears on the type species of *Scarabaeus* (see below).

Heliocantharus was proposed by Macleay (1821: 497) as a subgenus of *Scarabaeus*, not as a separate genus (as assumed by Janssens 1940: 4). This was noted already by Hope (1837), and it is apparent from Macleay's table on p. 521 and Addenda and Corrigenda on p. 524 (for p. 497, ln. 17). Macleay used the name *Sacer* in the diagnosis and listed the species first, which provides an indication (of preference or significance afforded) but does not meet the criteria of original designation set by ICZN (1999) Article 68.2. To correct that and so to stabilize the originally intended subgeneric status of the name, we hereby designate *Scarabaeus sacer* Linné the type species of *Heliocantharus* Macleay.

Actinophorus Creutzer 1799 originally included *S. sacer* Linné 1758, *S. laticollis* Linné 1767, *S. impius* Herbst 1789, *S. semipunctatus* Fabricius 1792, *S. variolosus* Fabricius 1787, *S. morbillosus* Fabricius 1792 (= *S. palemo* Olivier 1789) and three species subsequently transferred, two to *Gymnopleurus* Illiger 1803 (Gymnopleurini) and one to *Sisyphus* Latreille 1807 (Sisyphini). Most authors treated this name as a synonym of

Scarabaeus, but Ádám (1994) revived *Actinophorus* and included in it two more species originally placed in *Ateuchus*, *A. pius* Illiger 1803 and *A. typhon* Fischer 1823. No justification was provided, and we can only assume that *Actinophorus* was resurrected not to separate a group of species from *Scarabaeus* but to serve as its substitute name, because Ádám's generic and suprageneric taxonomy is explicable only in terms of Direction 4 (ICZN 1954), further discussed below. Ádám's (2003: 130) tribe Actinophorini with the type genus *Actinophorus* Creutzer and *Scarabaeus sacer* designated its type species supports our contention, because although the tribe is called new rather than a substitute name for Scarabaeini, Ádám's definition of it is virtually identical with Mostert & Scholtz's (1986) definition of the subtribe Scarabaeina, implying avoidance of any name derived from *Scarabaeus* (viz also Ádám's reason on the same page for rejection of the family-group name Scaraboides Laicharting). Apart from the species today placed in *Gymnopleurus* and *Sisyphus*, all the species originally and newly included in *Actinophorus* clearly belong in *Scarabaeus*, and we therefore consider *Actinophorus* Creutzer a junior synonym.

Sebasteos Westwood 1844 was proposed for a single species, *Sebasteos galenus* Westwood, which thus is the type species by monotypy and not by original designation, as incorrectly stated in the checklist.

Type species of *Scarabaeus*

Mostert & Scholtz (1986: 14) wrote that "The formal use of *Scarabaeus* as a genus name dates from Linnaeus' *Systema Naturae* (Ed. X) of 1758, with *Scarabaeus sacer* recorded as the type-species. ... Shipp (1894) argued that the name *Ateuchus* Weber be used instead of *Scarabaeus*, ... However, as Linnaeus had designated a type-species, Shipp's reasoning was not valid." We uncritically accepted that statement, but by now we are convinced that it cannot be supported. The concept of type species did not exist in Linné's time, and there is nothing in the Code (ICZN 1999 or the previous edition) that would permit to attribute the designation to him. Although *Scarabaeus sacer* is the only Linnean (i.e. originally included) species left in the genus as presently delimited, it does not make it the type species because Article 69.4 disallows fixation of type species by elimination of all other originally included species from the genus.

Janssens (1940: 4) pointed out that *Actinophorus* Creutzer and *Ateuchus* Weber (in reality he meant *Ateuchus* sensu Fabricius) included widely disparate, unrelated species, and considered Macleay (1821) to be the first reviser who presented a coherent account of *Scarabaeus* and

designated *S. sacer* its type species. Macleay (1821) certainly made *S. sacer* pivotal to understanding of the genus, as he subtitled his work “An Attempt to ascertain the Rank and Situation which the celebrated Egyptian Insect, *Scarabaeus Sacer*, holds among Organized Beings” and in a discussion of Linné’s and Fabricius’ failures to establish natural genera (p. 493) set “... to ascertain the place of *Scarabaeus Sacer* in the smallest group to which it can be referred.” By so doing, listing *S. sacer* first and referring to it in the diagnosis, he came as close to designating it the type species as anyone could prior to the advent of the principle. It should be noted that Macleay was considered the designator of *S. sacer* as the type species of *Scarabaeus* already by Hope (1837) and again by Crotch (1870a, b), who cited part 1 (1819) rather than part 2 (1821) of the *Horae Entomologicae*. In part 1 Macleay dealt with *S. sacer* on p. 135 (the reference to p. 185 in part 2 is a typesetting error). Janssens (1940) presumably chose part 2 because of its expressive subtitle. Unfortunately, the Code does not support Hope’s, Crotch’s and Janssens’ opinion, and the subsequent designation therefore cannot be attributed to Macleay.

The above noted Direction 4 (ICZN 1954) is best outlined by quoting the following summary statement (ICZN 1987: 315): “under the rulings given in Opinions 11 & 136 the entries in the *Tableau Méthodique* at the end of this work [Latreille 1810] are to be accepted as constituting the selection, under Article 69, of type species for the genera concerned in those cases where Latreille cited one, and only one, of the species included in the genus in question by the original author, and provided that the type species had not already been determined under any of the provisions of Article 68 or by a previous designation under Article 69”. Ziani (2002: 29, footnote) discussed the deleterious effect that in his opinion Direction 4 has on nomenclature of the Scarabaeoidea, where “*Geotrupes Hercules*, Fab.” (= *Scarabaeus hercules* Linné 1758) becomes the type species of *Scarabaeus* and causes instability on the suprageneric level. We agree that Direction 4 does not appear to be a good ruling and some negative impact on arthropod nomenclature may result from it, but we see no such impact on scarabaeoid nomenclature because the designation of *Geotrupes hercules* the type species of *Scarabaeus* is demonstrably invalid.

Latreille’s (1810) work is divided into general considerations and the tableau méthodique, which first defines taxa down to numbered genera and gives the French and equivalent Latin names, and then tabulates the genera and their type species. In the table proper the numbers and Latin names of genera are not repeated, and taxonomic assignments that differ from those in previous works are denoted by asterisks. The scarabaeoid part of the table (pp. 428-429) is comprised of four families, XVI.

Coprophages, XVII. Géotrupins, XVIII. Scarabéides and XIX. Lucanides, of which XVI corresponds to today's Scarabaeinae, XVII to today's Geotrupidae, XVIII to today's Aegialiinae, Trogidae, Melolonthinae, Rutelinae, Dynastinae and Cetoniinae, and XIX to today's Lucanidae and Passalidae. The name of family XVIII thus is misleading, as it can be mistaken for today's Scarabaeinae to which it does not correspond. The author given for most species is Fabricius rather than the original describer who in most instances should be Linné, however it does not invalidate the type-species designations (ICZN Article 67.7). The entry "Scarabée. *Geotrupes Hercules*, Fab." is in the family XVIII. Scarabéides, and turning to p. 195 of the table narrative we find it listed a genus #134, "Scarabée. *Scarabaeus*", which eliminates any doubt about the meaning of "Scarabée" and seemingly makes "*Geotrupes Hercules*, Fab." (= *Scarabaeus hercules* Linné 1758) the uncontested type species of *Scarabaeus*. However, turning to the first scarabaeoid family, XVI. Coprophages, we find the first entry to be "Ateuchus. *Ateuchus sacer*, Fab.", which is genus #121 on p. 191 of the table narrative. This entry follows Fabricius (1801), who transferred *Scarabaeus sacer* Linné to his new genus *Ateuchus*. As explained in the above discussion of this generic name, *Ateuchus* Fabricius 1801 is a junior homonym of *Ateuchus* Weber 1801. Being unaware of the homonymy, Latreille designated *A. sacer* the type species of *Ateuchus* Fabricius, not of *Ateuchus* Weber, which is clear from the species authorship given in the table as well as from the fact that in 1810 *Ateuchus* Weber contained only one species, *A. histeroides* Weber. *Ateuchus sacer* of Fabricius (1801) is an objective junior synonym of *Scarabaeus sacer* Linné 1758 (as the two are based on the same name-bearing type), and Latreille's (1810: 428) designation of "*Ateuchus sacer*, Fab." therefore becomes subsequent designation of type species for *Scarabaeus* Linné 1758. There thus are two type-species designations for *Scarabaeus* on p. 428 of the table, *Ateuchus sacer* and *Geotrupes hercules*, of which the former has on-page precedence and amounts to a previously overlooked type-species fixation. According to ICZN (1999) Article 70.2 "If it is found that an earlier type species fixation has been overlooked, the overlooked fixation is to be accepted and any later fixations are invalid." This renders the designation of *Geotrupes hercules* invalid and makes *Ateuchus sacer* the type species of *Scarabaeus*.

To show that Latreille's action does make *Ateuchus sacer* the type species of *Scarabaeus* and not just of *Ateuchus* Fabricius, we cite from an ICZN (1999: 66) Example: "*Astacus marinus* Fabricius, 1775, one of the nominal species originally included in the decapod crustacean genus *Homarus* Weber, 1795, was subsequently designated by Fowler (1912) as

the type species of *Homarus*. The type species is, and should be cited as, *Astacus marinus* Fabricius, 1775.” Our case is analogous: *Scarabaeus sacer* Linné 1758, one of the nominal species originally included in the scarabaeoid genus *Ateuchus* Fabricius 1801, was subsequently designated by Latreille (1810) as the type species of *Ateuchus*. The type species is, and should be cited as, *Scarabaeus sacer* Linné 1758.

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