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The genus *Ochodaeus* in Italy: taxonomy and distribution
(Coleoptera: Scarabaeoidea: Ochodaeidae)

Stefano Ziani

GeoL@b APS, Via Laderchi, 3, 48018 Faenza (RA), Italy

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The genus *Ochodaeus* in Italy: taxonomy and distribution (Coleoptera: Scarabaeoidea: Ochodaeidae)

Stefano Ziani

GeoL@b APS, Via Laderchi, 3, 48018 Faenza (RA), Italy
stefanoziani@alice.it

Abstract. The author provides a taxonomic, nomenclatural and distributional review of the genus *Ochodaeus* Dejean, 1821 (Coleoptera: Scarabaeoidea: Ochodaeidae) in Italy. All Italian populations have been confirmed to belong to a single species, *O. chrysomeloides* (Schränk, 1781). After the study of a syntype, *O. cychramoides* Reitter, 1892, formerly considered an Italian endemic, is confirmed to be a junior synonym of *O. chrysomeloides*. Type material of *O. chrysomeloides* is believed to be destroyed, therefore a **neotype is here designated** and deposited at the Natural History Museum of Vienna, Austria. A **lectotype is here designated** for *O. cychramoides* and deposited in the Hungarian Natural History Museum of Budapest, Hungary. The Italian distribution of *O. chrysomeloides* is given in detail and illustrated by a map.

Key words. Review, nomenclature, synonymy, faunistic, designation, neotype, lectotype.

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Introduction

According to most checklists, catalogues and monographic volumes on the Italian Scarabaeoidea fauna (Luigioni 1929; Porta 1932; Baraud 1977; Baraud 1992; Carpaneto and Piattella 1995; López-Colón et al. 2006; Nikolajev and Bezděk 2016), two species of Ochodaeidae are considered to occur in Italy, both belonging to the genus *Ochodaeus* Dejean, 1821:

- *Ochodaeus chrysomeloides* (Schränk, 1781), widespread in Europe;
- *Ochodaeus cychramoides* Reitter, 1892, endemic to Italy.

Nevertheless, a high level of uncertainty occurred lately in my opinion on the validity of the second taxon, owing to the lack of a sound taxonomic study. The aim of the present paper is to review the taxonomic and distribution status of the Italian *Ochodaeus* species.

Materials and Methods

On the whole, 77 specimens of *Ochodaeus* (all collected in Italy), deposited in museum and private collections, were examined, as well as specimens from Austria, Czech Republic, Slovakia and Republic of North Macedonia.

Initialisms of collections:

| | |
|------|--|
| EAPN | Ente Autonomo Parco Nazionale d'Abruzzo, Pescasseroli, L'Aquila (Italy) |
| EBCT | E. Barbero private collection, Turin (Italy) |
| EPCG | E. Pulvirenti private collection, Guidonia Montecelio, Rome (Italy) |
| FACF | F. Angelini collection, Museo Zoologico de "La Specola", Florence (Italy) |
| FFCP | F. Fabbricani private collection, Pistoia (Italy) |
| GPCC | G. W. Pagliacci private collection, Villa Inferno di Cervia, Ravenna (Italy) |
| HNHM | Hungarian Natural History Museum, Budapest (Hungary) |
| LBCV | L. Beretta private collection, Vicenza (Italy) |
| LCCB | L. Colacurcio private collection, Zola Predosa, Bologna (Italy) |
| LICP | L. Innocenti private collection, Pisa (Italy) |
| LSCC | L. Saltini private collection, Carpi, Modena (Italy) |
| MBCG | Museo Civico di Scienze Naturali "E. Caffi", Bergamo (Italy) |

| | |
|-------------|--|
| MCSF | Museo Civico di Scienze Naturali, Faenza, Ravenna (Italy) |
| MCNV | Museo Civico di Storia Naturale, Venice (Italy) |
| MCSN | Museo Civico di Storia Naturale “Giacomo Doria”, Genoa (Italy) |
| MCZR | Museo Civico di Zoologia, Rome (Italy) |
| MRCC | M. Rastelli private collection, Casalgrasso, Cuneo (Italy) |
| MUCP | M. Uliana private collection, Rosara di Codevigo, Padoa (Italy) |
| MZUF | Museo Zoologico de “La Specola”, Florence (Italy) |
| NHMW | Natural History Museum, Vienna (Austria) |
| PMCR | P. Maltzeff private collection, Rome (Italy) |
| RPCM | R. Pittino private collection, Milan (Italy) |
| SZCM | S. Ziani private collection, Meldola, Forlì (Italy) |
| VACP | V. Aliquò private collection, Palermo (Italy) |
| VGCS | V. Gallerati private collection, San Pietro in Casale, Bologna (Italy) |
| VSCB | V. Salami private collection, Brescia (Italy) |

Authors' name spelling and years of publication of older books cited in the text are taken from Schmitt et al. (1998) and Bousquet (2016). Family-group names nomenclature is according to Bouchard and Bousquet (2020).

Methods and terminology follow Paulsen (2019). Due also to the bad condition of the neotype of *O. chrysomeloides*, characters related to the shape of the stridulatory peg are not discussed here.

Systematic Account

Superfamily Scarabaeoidea Latreille, 1802

Family Ochodaeidae Streubel, 1846

Subfamily Ochodaeinae Streubel, 1846

Tribe Ochodaeini Streubel, 1846

Genus *Ochodaeus* Dejean, 1821

Ochodaeus Dejean 1821: 56. Ádám 1980: 187; Burakowski et al. 1983: 27; Koch 1991: 356; Král 1993: 67; López-Colón 1993: 289; Krell and Fery 1998: 210; Bunalski 1999: 9; Martín-Piera and López-Colón 2000: 100; López-Colón 2003: 140; Gueorguiev and Bunalski 2004: 269; López-Colón et al. 2006: 95; Smith 2006: 155; Bouchard et al. 2011: 235; Nikolajev and Bezděk 2016: 67.

Psephus Kirby and Spence 1826: 678. Erichson 1848: 922 (as synonym of *Ochodaeus* Megerle); Westwood 1852: 61 (attributed to Macleay, as synonym of *Ochodaeus* Megerle); Gemminger and Harold 1869: 1073 (attributed to Kirby alone, as junior synonym of *Ochodaeus* Serville); Arrow 1912: 21 (as junior synonym of *Ochodaeus* Serville); Nikolajev and Bezděk 2016: 67 (as junior synonym of *Ochodaeus* Dejean).

Type species.

- *Ochodaeus* Dejean, 1821: *Melolontha chrysomelina* Fabricius, 1792 (under Article 67.7 of the International Code of Zoological Nomenclature (ICZN 1999) – cited as “*Ochodaeus Chrysomelinus*”), junior synonym of *Scarabaeus chrysomeloides* Schrank, 1781, by monotypy.
- *Psephus* Kirby and Spence, 1826: *Scarabaeus chrysomeloides* Schrank, 1781 (under Article 67.7 of the International Code of Zoological Nomenclature (ICZN 1999) – cited as “*Melolontha chrysomeloides* Schrank [!]”) by monotypy.

Historical review. The name *Ochodaeus* was first used by Dejean (1821), without a description, to include the single species *O. chrysomeloides* (Schrank, 1781). Subsequently, Le Peletier de St. Fargeau and Serville (1828) provided a description of the genus. Dejean's name was considered “*nomen nudum*” by all the authors who during the next 150 years and more, dealt with the subject, and *Ochodaeus* was therefore considered available from Le Peletier de St. Fargeau and Serville (1828). After Reitter (1892), nearly all the authors simply quoted the genus as “*Ochodaeus* Serville” which was maintained until Ádám (1980) who recognized the authorship of Dejean. As explained by López-Colón (1993), even if Dejean (1821) did not describe the genus, he included under it an

available specific name. For this, and for Article 12.2.5. of the International Code of Zoological Nomenclature (ICZN 1999), the generic name is available from Dejean (1821). After Ádám (1980), virtually all the subsequent authors cited the right authorship and year for the genus.

Some old authors, as Dejean (1821) himself, attributed the authorship of *Ochodaeus* to Johann Carl Megerle von Mühlfeld, an Austrian entomologist who lived between 18th and 19th century. According to Woodruff (1973), Megerle used the name in a manuscript that was never published. *Ochodaeus* Megerle is a “*nomen in litteris*”, hence not available.

For a short time, *Ochodaeus* has been considered as junior synonym of *Codocera* Eschscholtz, 1821 (Reitter 1883; Baudi di Selve 1889), until Reitter (1891) who deemed *Ochodaeus* a valid name again.

The name *Psephus* is available from Kirby and Spence (1826) (Article 12.2.5. of the International Code of Zoological Nomenclature (ICZN 1999)), but having as type species *Scarabaeus chrysomeloides* Schrank, the same of *Ochodaeus* Dejean, 1821, is a junior objective synonym of the latter.

Natural history. As happens with some other Scarabaeoidea, such as Glaresidae, little is known about the biology of the Ochodaeidae. The genus *Ochodaeus* is definitively not coprophagous, either in larval or adult stages. Adults fly at sunset and night-time and are usually attracted to light in small numbers. Nevertheless, several dozen specimens were collected at sunset, netted on short grass in a meadow, as reported by Melloni and Landi (1997). Paulian (1959) supposed that *O. chrysomeloides* could feed on fungi, and Woodruff (1973) suggested the American species of Ochodaeidae could feed on subterranean fungi. According to Griffini (1896), *O. chrysomeloides* can be collected in carrion, which was confirmed by Ádám (1979) who reported an unidentified *Ochodaeus* species being collected in a trap baited with rotten meat in Tunisia.

Ochodaeus chrysomeloides (Schrank, 1781)

(Fig. 1–9)

Scarabaeus chrysomeloides Schrank, 1781: 16. Olivier 1789: 52 (as junior synonym of *Melolontha variabilis* Fabricius, 1777); Villers 1789: 39; Fabricius 1792: 175 (as synonym of *Melolontha chrysomelina* Fabricius, 1792); Sturm 1800: 62; Fabricius 1801: 179 (as synonym of *Melolontha chrysomelina*); Illiger 1802: 74 (as junior synonym of *Melolontha variabilis*); Dufschmidt 1805: 192 (as junior synonym of *Melolontha variabilis*); Illiger 1805: 82 (as junior synonym of *Melolontha variabilis*); Panzer 1805: 102 (as synonym of *Melolontha chrysomeloides* Fabricius, 1792); Sturm 1843: 113 (as synonym of *Ochodaeus chrysomelinus* Fabricius); Erichson 1848: 923 (as synonym of *O. chrysomelinus* Fabricius); Gemminger and Harold 1869: 1073 (as synonym of *O. chrysomelinus*); Dalla Torre 1912: 17 (as junior synonym of *Maladera holosericea* (Scopoli, 1772)); López-Colón et al. 2006: 236 (as junior synonym of *M. holosericea*).

Scarabaeus chrysomelinus Schrank, 1781. Fabricius 1787: 24 (subsequent incorrect spelling, as synonym of *Melolontha variabilis* Fabricius, 1777).

Scarabaeus chrysomelinus Fabricius, 1792. Illiger 1805: 82; Panzer 1813: 2.

Melolontha chrysomelina Fabricius, 1781. Gmelin 1790: 1566 (wrong authorship).

Melolontha chrysomelina Fabricius, 1792: 175. Panzer 1795: 226; Fabricius 1796: 99; Panzer 1796: 34 (11) (“*Melolontha chrysomeloides* Fabr.” in the figure); Borkhausen 1797: 50; Sturm 1800: 62 (as junior synonym of *Scarabaeus chrysomeloides* Schrank); Fabricius 1801: 179; Illiger 1802: 74 (attributed to Schrank 1798, as junior synonym of *Melolontha variabilis* Fabricius, 1777); Mulsant 1842: 341 (as junior synonym of *Ochodaeus chrysomeloides* Schrank, 1781); Zimsen 1964: 238 (as junior synonym of *S. chrysomeloides*); Nikolajev and Bezděk 2016: 67 (as junior synonym of *Ochodaeus chrysomeloides*).

Melolontha chrysomelina Schrank, 1781. Schrank 1798: 412; Illiger 1802: 75 (as junior synonym of *Melolontha variabilis* Fabricius, 1777); Dalla Torre 1912: 17 (as junior synonym of *Maladera holosericea* (Scopoli 1772)); López-Colón et al. 2006: 236 (as junior synonym of *M. holosericea*).

Melolontha chrysomeloides Fabricius, 1792. Panzer 1805: 102.

Ochodaeus chrysomelinus (Fabricius, 1792). Dejean 1821: 56 (without specific authorship); Eschscholtz 1822: 117; Sturm 1826: 174; Le Peletier de St. Fargeau and Serville 1828: 360; Latreille 1829: 544; Dejean 1833: 149; Dejean 1836: 165; Laporte 1840: 104; Mulsant 1842: 341; Sturm 1843: 113; Guérin-Méneville 1844: 83; Redtenbacher 1847: 440; Erichson 1848: 923; Küster 1849: 58; Westwood 1852: 63; Marseul 1857: 83; Jacquelin du Val 1859: 32; Motschulsky 1860b: 159; Motschulsky 1860a: 133; Disconzi 1865: 55; Marseul 1866: 53; Gemminger and Harold 1869: 1073; Mulsant and Rey 1870: 238; Bargagli 1872: 282; Bertolini 1874: 108; Seidlitz 1875: 91; Solsky 1876: 349 [footnote]; Kittel 1879: 39; Marseul 1886: 224; Seidlitz 1891a: 145 (as junior synonym of *O. chrysomeloides*); Seidlitz 1891b: 153 (as junior synonym of *O. chrysomeloides*); Semenov 1891: 313 (footnote, as synonym of *O. chrysomeloides*); Reitter 1892: 255 (as junior

synonym of *O. chrysomeloides*); Griffini 1896: 149; Reitter 1906: 724 (as junior synonym of *O. chrysomeloides*); Monnot et al. 1912: 157.

Ochodaeus chrysomelinus (Schränk, 1781). Bertolini 1898: 100; Olsoufieff 1918: 31.

Codocera chrysomelina (Fabricius, 1792). Reitter 1883: 96; Baudi di Selve 1889: 110.

Ochodaeus chrysomeloides (Schränk, 1781). Gemminger and Harold 1869: 1073 (as synonym of *O. chrysomelinus* Fabricius, 1792); Bertolini 1874: 108 (as synonym of *O. chrysomelinus*); Kittel 1879: 39 (as synonym of *O. chrysomelinus*); Marseul 1886: 224 (as synonym of *O. chrysomelinus*); Reitter 1891: 183; Seidlitz 1891a: 145; Seidlitz 1891b: 153; Semenov 1891: 313; Reitter 1892: 255; Hildt 1896: 208 (as *Ochodeus*); Bertolini 1899: 61; Semenov 1900: 93; Reitter 1906: 724; Reitter 1909: 320; Gerhardt 1910: 410; Bedel 1911: 96; Arrow 1912: 21; Schmidt 1913: 54; Luigioni 1929: 388; Winkler 1929: 1063; Gridelli 1930: 320; Porta 1932: 399; Medvedev 1933: 90; Sainte-Claire Deville 1935: 200; Roubal 1936: 337; Paulian 1941: 155; Paulian 1945: 184; Novak 1952: 260; Endrödi 1955: 47; Endrödi 1956: 24; Mikšić 1956: 123; Petrovitz 1956: 23; Panin 1957: 219; Tesař 1957: 108; Horion 1958: 175; Paulian 1959: 188; Medvedev 1965: 171; Petrovitz 1965: 682; Iablokoff-Khnzorian 1967: 64; Petrovitz 1968: 16; Machatschke 1969: 293; Allenspach 1970: 89; Mikšić 1970: 31; Stebnicka 1976: 44; Baraud 1977: 151; Peez and Kahlen 1977: 353; Dzhambazishvili 1979: 71; Endrödi 1979: 26; Ádám 1980: 187; Paulian and Baraud 1982: 86; Burakowski et al. 1983: 27; Angelini and Montemurro 1986: 587; Dzhambazishvili 1990: 23; Lumaret 1990: 346; Baraud 1992: 97; Král 1993: 67; López-Colón 1993: 293; Ádám 1994: 12; Carpaneto and Piattella 1995: 5; Alexandrovitch et al. 1996: 29; Kahlen and Hellrigl 1996: 474; Carpaneto and Piattella 1997: 155; Melloni and Landi 1997: 27; Carpaneto et al. 1998: 20; Bunalski 1999: 9; Martín-Piera and López-Colón 2000: 102; Mitter 2000: 72; Bunalski 2001: 167; López-Colón 2003: 140; Guéorguiev and Bunalski 2004: 269; Pesarini 2004: 15; Colacurcio 2005: 13; López-Colón et al. 2006: 95; Pittino 2006: 75; Branco 2007: 16; Paulsen 2007: 9; Gobbi and Piattella 2008: 16; Nikolajev 2009: 207; Rozner and Rozner 2009: 59; Ballerio et al. 2010; Brelih et al. 2010: 155; Martynov 2012: 15; Montreuil 2014: 378; Tauzin 2015: 174; Huchet 2016: 48; Nikolajev and Bezděk 2016: 67; Cosandey et al. 2017: 62; Lencina Gutiérrez et al. 2018: 293; Samin et al. 2018: 268; Shokhin 2019: 67; Angelini 2020: 140.

Ochodaeus scymnoides Mulsant, 1842: 342. Semenov 1891: 313 (footnote, as junior synonym of *O. chrysomeloides*); Arrow 1912: 22 (as junior synonym of *O. chrysomeloides*); Schmidt 1913: 55 (as junior synonym of *O. chrysomeloides*); Tesař 1957: 108 (as junior synonym of *O. chrysomeloides*); Baraud 1992: 98 (as synonym of *O. chrysomeloides*); López-Colón 2003: 140 (as junior synonym of *O. chrysomeloides*); López-Colón et al. 2006: 95 (as junior synonym of *O. chrysomeloides*); Pittino 2006: 75 (as junior synonym of *O. chrysomeloides*); Nikolajev and Bezděk 2016: 67 (as junior synonym of *O. chrysomeloides*).

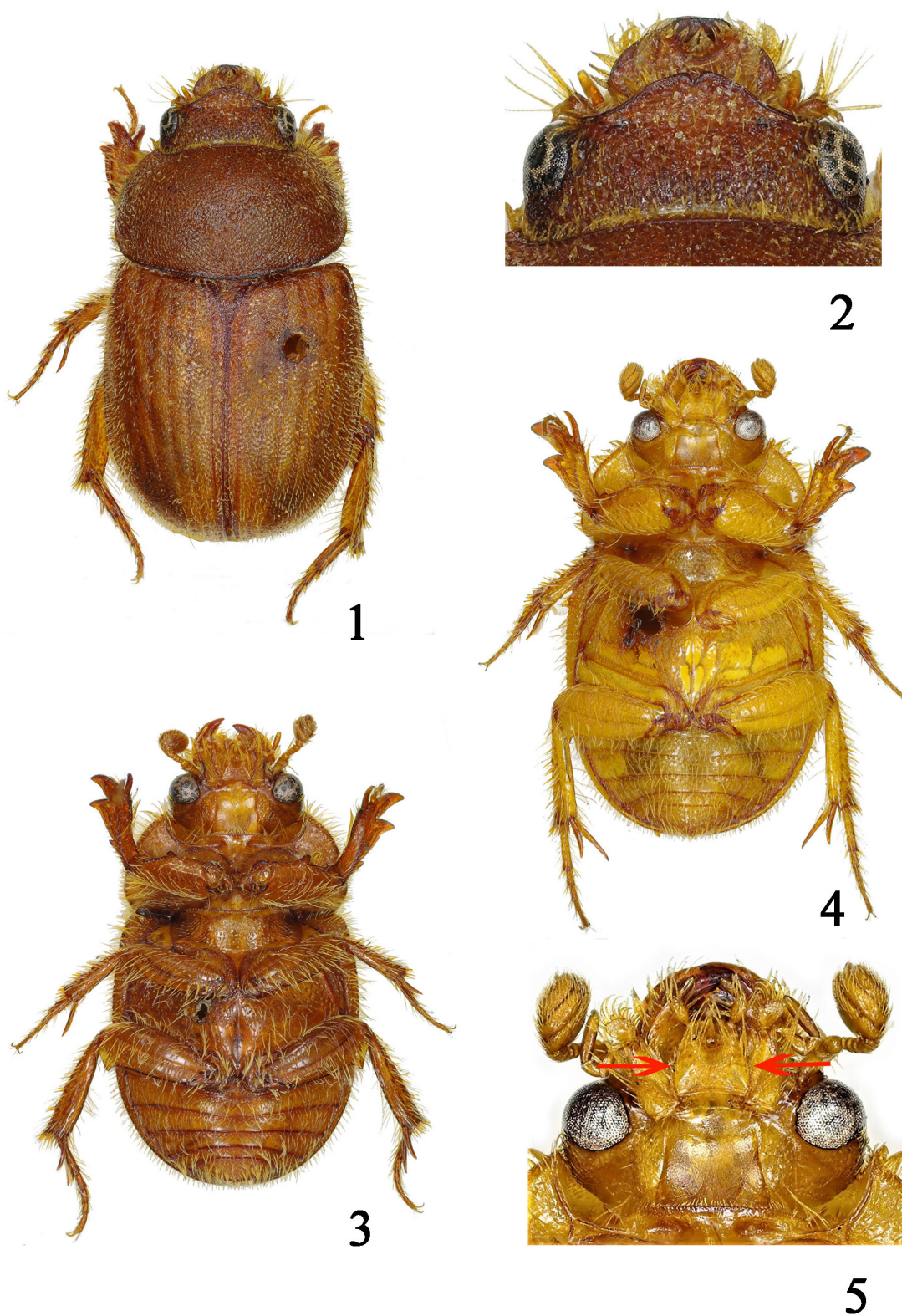
Ochodaeus clypeatus Motschulsky, 1860: 133. Mulsant and Rey 1870: 240; Seidlitz 1891a: 145 (as junior synonym of *O. chrysomeloides*); Seidlitz 1891b: 153 (as junior synonym of *O. chrysomeloides*); Semenov 1891: 313 (footnote, as junior synonym of *O. chrysomeloides*); Reitter 1892: 255 (as junior synonym of *O. chrysomeloides*); Reitter 1906: 724 (as junior synonym of *O. chrysomeloides*); Arrow 1912: 22 (as junior synonym of *O. chrysomeloides*); Schmidt 1913: 55 (as junior synonym of *O. chrysomeloides*); Tesař 1957: 108 (as junior synonym of *O. chrysomeloides*); Baraud 1992: 98 (as synonym of *O. chrysomeloides*); López-Colón 2003: 140 (as junior synonym of *O. chrysomeloides*); Guéorguiev and Bunalski 2004: 269 (as junior synonym of *O. chrysomeloides*); López-Colón et al. 2006: 95 (as junior synonym of *O. chrysomeloides*); Pittino 2006: 75 (as junior synonym of *O. chrysomeloides*); Tauzin 2015: 174 (as junior synonym of *O. chrysomeloides*); Nikolajev and Bezděk 2016: 67 (as junior synonym of *O. chrysomeloides*).

Ochodaeus cychramoides Reitter, 1892: 255. Bertolini 1899: 62; Reitter 1906: 724; Bedel 1911: 96 (as doubtful synonym of *O. chrysomeloides*); Arrow 1912: 22; Schmidt 1913: 55; Luigioni 1929: 388; Winkler 1929: 1063; Porta 1932: 399; Endrödi 1955: 47 (as junior synonym of *O. chrysomeloides*); Endrödi 1956: 24 (as junior synonym of *O. chrysomeloides*); Tesař 1957: 108 (as junior synonym of *O. chrysomeloides*); Papini 1966: 31; Zangheri 1969: 1404; Baraud 1977: 151; Aliquò 1990: 83; Baraud 1992: 98; Carpaneto and Piattella 1995: 5; Ziani 1995: 202; Carpaneto and Piattella 1997: 155; Ádám 2003: 127; López-Colón 2003: 140; Pesarini 2004: 15; Carpaneto et al. 2005 (as junior synonym of *O. chrysomeloides*); López-Colón et al. 2006: 95; Pittino 2006: 76; Gobbi and Piattella 2008: 16; Nikolajev 2009: 207; Ballerio et al. 2010 (as junior synonym of *O. chrysomeloides*); Martynov 2012: 15; Tauzin 2015: 174; Nikolajev and Bezděk 2016: 68; Lencina Gutiérrez et al. 2018: 293; Angelini 2020: 140.

Type locality. “Wien, Prater” (Vienna, Austria) for *O. chrysomeloides* Schränk. “Piedmont (Italy)” for *O. cychramoides* Reitter.

Type material. Types for *S. chrysomeloides* Schränk were probably destroyed (see below). A male (Fig. 1–2) **neo-type is herein designated** (NHMW).

Types for *O. cychramoides* Reitter are mostly destroyed, but one female syntype still exists from Reitter’s original type series (Otto Merkl, pers. comm.). This female (Fig. 8–9) is **herein designated as the lectotype** (HNHM).



Figures 1–5. *Ochodaeus chrysomeloides* (Schrank, 1781). 1) Neotype, habitus. 2) Neotype, head. 3) Male, underside (Vienna, Austria). 4) Female, underside (Vienna, Prater, Austria). 5) Mentum, shown by red arrows (Vienna, Prater, Austria). Photos by A. Degiovanni.

Type labelling. The neotype of *S. chrysomeloides*: 1st, white, printed in black: “Wien / Prater”; 2nd, red, printed in black: “Neotype / *Ochodaeus* / *chrysomeloides* (Schränk, 1781) / S. Ziani des., 2020” (NHMW).

The lectotype of *O. cychramoides*: 1st, white, handwritten in black: “*cychramoides* / m. Pedem. Baudi”; 2nd, white, with red frame, printed in red and handwritten in black: “*Holotypus* 1891 / *Ochodaeus* / *cychramoides* / Reitter”; 3rd, white, printed in black: “*Ochodaeus chryso- / meloides* (Schränk) / det. : Ádám, 1992”; 4th, white, printed in black: “*Ochodaeus* / *chrysomeloides* (Schr.) / det. S. Ziani 2000”; 5th, red, printed in black: “lectotype *Ochodaeus* / *cychramoides* Reitter, 1892 / S. Ziani des. 2020” (Reitter collection, HNHM).

Neotype designation. Notwithstanding inquiries in several European museums, I was not able to find type material of *Scarabaeus chrysomeloides* Schränk, described from Vienna (Austria). According to H. Schoenmann (pers. comm.), former curator of the Natural History Museum of Vienna, Schränk’s type was lost during Austrian Empire revolutions of 1848, together with other type species of the same author, when the old museum collection burnt. No name-bearing type specimen is hence believed to be extant. To define the taxon objectively, clarifying its taxonomic status and also for potential synonymic problems, it is necessary to designate a neotype. To satisfy article 75.3.6 of the International Code of Zoological Nomenclature (ICZN 1999), the neotype has to come as nearly as practicable from the original type locality, namely Vienna (Austria) in this case. For this purpose, I have chosen an Austrian specimen, coming from the Prater, the large public park of Vienna. The specimen is as much as possible consistent with the original description and is deposited in the collections of the Natural History Museum of Vienna.

Lectotype designation. Despite the fact that, as said, only one syntype is known of the whole original type series of *O. cychramoides*, I prefer to fix such specimen as lectotype, for preserving nomenclatural stability of this taxon. The specimen is preserved in Reitter collection, Hungarian Natural History Museum of Budapest.

Diagnostic features. Length from 3 to 6 mm. Body convex, shiny. Pale testaceous to dark reddish-brown, sometimes pronotum darker on disc; antennal scape light red, segments pale yellow and club yellowish grey. Upper side densely setose, setae pale yellow.

Head (Fig. 2) transverse; clypeus triangular, almost three times wider than long; anterior clypeal margin with a sub-triangular incision in the middle; clypeal surface coarsely granulate, setigerous; eyes large, globose, not or weakly produced laterally; mandibles subequal, basal angle subrounded; mentum trapezoidal, deeply emarginate and depressed anteriorly (Fig. 4), with some granules, each one bearing a very long setae; antennal scape expanded, carinate laterally.

Pronotum convex, coarsely granulate, setigerous, completely distinctly bordered on all margins; lateral margin ciliate.

Scutellum triangularly elongate, sides arcuate, apically sub-acuminate, irregularly punctate.

Elytral striae formed by distinct punctures, sometimes sutural one crenulate; interstriae flat or slightly convex, subregularly granulate, granules not forming rows, each granule bearing a seta.

Protibiae tridentate externally, inner angle of protibial apex with a tooth obvious in males, shorter in females; posterior margin of male profemur with a medial tooth, turned inward and a subtriangular plate distally, females only with the distal plate; middle and hind femora distally with a small projecting triangular plate, both in males and females; longer mesotibial spur crenulate.

Aedeagus weakly sclerotized; internal sac with three main jagged sclerites, the larger elongate and serrate at one apex, the second one triangular shaped with one side dentate, and the smaller, oval, with two obvious teeth at one end.

Variability. In addition to the difference in length, intraspecific variations can be mainly observed in femoral teeth, less developed and apically blunt in minor specimens, in more or less distinct elytral striae, often indicated only by separated punctures, sometimes more marked, and in color, from light yellow to dark brown.

General distribution. Central and southern Europe, from north eastern Spain and France to Balkan Peninsula (Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Albania, Republic of North Macedonia, Greece) through Germany, Poland, Switzerland, Austria, Italy, Czech Republic, Slovakia, Hungary, Romania, Ukraine, Moldova, central and south European Territory of Russia, Belarus; eastward to Armenia, Azerbaijan, Georgia; Algeria (Nikolajev and Bezděk 2016). Bulgaria (Bunalski 2000). Turkey (Carpaneto et al. 2000, with a question mark). Lithuania (Ferenca et al. 2018). Iran (Samin et al. 2018).



Figures 6–7. *Ochodaeus chrysomeloides* (Schrank, 1781), aedeagus of the neotype. **6)** Dorsal view. **7)** Ventral view. Photos by A. Degiovanni.



Figures 8–9. *Ochodaeus cychramoides* Reitter, 1892, syntype. **8)** Habitus. **9)** Head. Photos by Tamás Németh.

Italian distribution. Piedmont (Reitter 1892, as *Ochodaeus cychramoides*); Trentino (Halbherr 1892); Lombardy, Veneto, Abruzzo, Lazio, Campania, Sardinia, Emilia (as *O. cychramoides*), Calabria (as *O. cychramoides*) (Luigioni 1929); Romagna (Zangheri 1969, as *O. cychramoides*; Melloni and Landi 1997); South Tyrol (Peez and Kahlen 1977); Basilicata (Angelini and Montemurro 1986); Apulia (Aliquò 1990, as *O. cychramoides*); Umbria (Melloni and Landi 1997).

Material examined (Fig. 10). **Aosta Valley:** AO, Ozein, 1000m, 8.vii.1994, V. Rosa leg. 1 ex. (EBCT). **Piedmont:** “Pedin.”, F. Baudi leg. 1 ex. (Reitter collection, HNHM); VB, Crodo, 2.vii.1922, 1 ex. (Binaghi collection, MCSN); TO, Bosco del Gerbasso–Carmagnola, 18.vi.1999, M. & S. Rastelli leg. 1 ex. (MRCC); *ibidem*, 21.vi.2000, M. Rastelli leg. 2 exx. (MRCC); TO, Torino, Po River flood, 14.v.1890, M. Demarchi leg. 4 exx. (Binaghi collection, MCSN; Dodero collection, MCSN); TO, V. Pellice–Teynaud, 13.viii.1959, G. Bartoli leg. 1 ex. (EAPN); Ped[emontium]/Piemonte, V. Ghiliani leg. 1 ex. (MCSN); Piemonte, 1 ex. (MZUF). **Lombardy:** BG, Mozzanica, 100 m, Serio River, light traps, 12.vii.1996, Demi leg. 1 ex. (MBCG). **Veneto:** PD, Rosara di Codevigo, at light,



Figure 10. Italian revised distribution of *Ochodaeus chrysomeloides* (Schrank, 1781).

30.v.1999, M. Uliana leg. 1 ex. (MUCP); *ibidem*, 15.vii.2000, M. Uliana leg. 1 ex. (MCNV); *ibidem*, 18.viii.2001, M. Uliana leg. 1 ex. (SZCM); VI, Vivaro-Dueville, Bacchiglione River, 50m, 18.iv.1968, S. Beretta leg. 1 ex. (LBCV). **Emilia:** PC, Piacenza, Po and Trebbia Rivers flow, 8.v.1975, G. Mariani leg. 1 ex. (RPCM); BO, Lavino di Mezzo, 9.v.1993, L. Colacurcio leg. 1 ex. (LCCB); BO, Sasso Marconi – P.zzo Rossi, 2.vii.2011, L. Colacurcio leg. 1 ex. (SZCM); *ibidem*, 28.vi.2015, L. Colacurcio leg. 1 ex. (FFCP); BO, Pieve di Cento, loc. Cantone f.me Reno,

13.vi.2018, V. Gallerati leg. 2 exx. (SZCM); *ibidem*, 13.vi.2018, V. Gallerati leg. 2 exx. (LICP); *ibidem*, 10.v.2019, V. Gallerati leg. 4 exx. (FFCP); *ibidem*, 28.v.2019, V. Gallerati leg. 2 exx. (VSCB); *ibidem*, 14.vi.2020, V. Gallerati leg. 4 exx. (VGCS). **Romagna:** RA, Vitisano–Brisighella, 14.vi.1917, D. Malmerendi leg. 1 ex. (Malmerendi collection, MCSF). **Tuscany:** LU, Lucca, 1 ex. (MZUF); PI, Gombo, 1 ex. (MZUF); FI, Firenze-Isolotto, 1 ex. (MZUF). **Marche:** AP, S. Giorgio, 17.v.1935, G. Binaghi leg. 1 ex. (Binaghi collection, MCSN). **Umbria:** TR, Cascate delle Marmore (Marmore Falls), 23.vi.1991, 6.vii.1991, 2.vii.1993 and 29.vi.1997, G. W. Pagliacci leg. 20 exx. (GPCC; SZCM; VACP). **Lazio:** Roma, Via Panisperna, 22.v.1891, Salustri leg. 1 ex. (Luigioni collection, MCZR); Roma, Colosseo, 1900, 1 ex. (D. Vita collection, MCZR); Roma, Castelporziano, 13.vi.1997, P. Maltzeff leg. 1 ex. (PMCR), *ibidem*, 4 ix.1998, P. Maltzeff leg. 1 ex. (PMCR); VT, Farnese, 28.iv.2018, E. Pulvirenti leg. 1 ex. (EPCG). **Abruzzo:** AQ, S. Vincenzo Valle Roveto, D'Amore leg. 4 exx. (Luigioni collection, MCZR). **Apulia:** FG, Varano Lake, 26.vi.1987, T. Lisa leg. 1 ex. (VACP); FG, Varano Lake-L'Isola, 9.vii.1988, L. Saltini leg. 1 ex. (LSCC). **Basilicata:** PT, M. Vulture-Monticchio Lake, 19.vi.1966, F. Hartig leg. 1 ex. (EAPN); MT, Policoro, 2.v.1976, F. Angelini leg. 1 ex. (RPCM); MT, Oasi WWF S. Giuliano Lake, Ponte Cagnolino, 100 m, at light, 11-12.vi.1993, F. Angelini leg. 1 ex. (FACF). **Calabria:** CS, Morano Calabro, v.2018, V. Gallerati leg. 2 exx. (VGCS).

Remarks. The nomenclatorial history of this taxon is remarkably complicated, as can be seen by the long list of references, names and authors below the name of the taxon.

Described first by Schrank (1781) as *Scarabaeus chrysomeloides*, then by Fabricius (1792) as *Melolontha chrysomelina*, deemed for long time to be a synonym of *Melolontha variabilis* Fabricius, 1777 (presently *Maladera holosericea* (Scopoli, 1772)), in the first century of its existence the taxon changed specific name, generic name, authorship and year of description several times. The breakthrough came at the end of the 19th century with Reitter (1891), Seidlitz (1891a, 1891b) and Semenov (1891) who considered *Ochodaeus chrysomeloides* (Schrank, 1781) both a good species and a valid name. Nearly all subsequent authors followed this taxonomic and nomenclatural act, even though there have been some oversights, such as in the palaearctic catalogue by López-Colón et al. (2006) in which the taxon is cited three times, as *Ochodaeus chrysomeloides* (Schrank, 1781) good species, and as *Scarabaeus chrysomeloides* Schrank, 1781 and *Melolontha chrysomelina* Schrank, 1781, both junior synonyms of *Maladera holosericea* (Scopoli, 1772).

Ochodaeus scymnoides was described by Mulsant (1842) as a variety of *Ochodaeus chrysomelinus* (Fabricius, 1792), differentiated by having the whole body reddish yellow. The taxon was synonymized with *O. chrysomeloides* by Semenov (1891) and afterward it was always considered its junior synonym.

Ochodaeus clypeatus was described by Motschulsky (1860a) from southern Russia and distinguished from *Ochodaeus chrysomelinus* (Fabricius, 1792) by the clypeal anterior margin being deeply bidentate. The taxon was synonymized with *O. chrysomelinus* by Seidlitz (1891a, 1891b) and Semenov (1891), and afterward always considered its junior synonym.

Reitter (1892) described *Ochodaeus cychramoides* on an undetermined number of specimens (but more than one) from Piedmont (Italy). Later the species was quoted from Emilia Romagna and central and southern Italy (Luigioni 1929, Zangheri 1969, Aliquò 1990; Ziani 1995).

The first who, albeit with a question mark, suggested that *Ochodaeus cychramoides* Reitter, 1892 was a junior synonym of *O. chrysomeloides* (Schrank, 1781) was Bedel (1911). He specified the development of the femoral teeth was very variable in *O. chrysomeloides* and wondered whether a specific discrimination based on this character could be correct. Later, Endrödi (1955; 1956) and Tesai (1957) stated officially the synonymy.

Despite this, during the 20th century, all catalogues and faunistic works reported both species for the Italian fauna. More recently, only Carpaneto et al. (2005) and Ballerio et al. (2010) agree with the synonymy and considered only one species to occur in Italy, namely *O. chrysomeloides*.

A charming systematic conjecture was provided by Pittino (2006), according to which, all the Italian *Ochodaeus* specimens belong to *O. cychramoides*, whereas *O. chrysomeloides* does not occur in Italy.

The morphological characters used by Reitter (1892) to distinguish *O. cychramoides* from *O. chrysomeloides* were as follows:

- 1) all elytral striae crenulated (only the sutural one crenulated in *O. chrysomeloides*);
- 2) setigerous granules on alternate elytral interstriae arranged in 3–4 rows on disc (setigerous granules not forming rows in *O. chrysomeloides*);

- 3) middle femoral posterior margin with or without a distal triangular tooth in both sexes (middle femoral posterior margin always with a distal tooth in *O. chrysomeloides*);
- 4) small body size (greater in *O. chrysomeloides*);
- 5) body color light yellow (rusty red to brown reddish in *O. chrysomeloides*).

The study of the lectotype of *O. chycramoides* allowed me to recognize the following characters status:

- 1) 2nd to 6th elytral striae not crenulated on disc;
- 2) setae of elytral interstriae not forming distinct rows;
- 3) middle femoral posterior margin with a small and blunt projection;
- 4) length 4.0 mm;
- 5) color light yellow.

The conclusion is that the lectotype specimen of *Ochodaeus cychramoides* is a small, minor, teneral individual of *O. chrysomeloides*, with morphological characters not well defined. All Italian specimens of *Ochodaeus* examined belong to a single, variable species, which can be referred to *Ochodaeus chrysomeloides*.

Therefore, in agreement with Bedel (1911) and Endrödi (1955), the synonymy of *O. cychramoides* with *O. chrysomeloides* can be definitively established. There is only one species of *Ochodaeus* in Italy and it must be called *O. chrysomeloides*.

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