

A new species of *Catomus* Allard, 1876 (Coleoptera: Tenebrionidae: Helopini) from the Aeolian archipelago (Sicily, Italy)

PHILIPPE PONEL^{1,4}, PIETRO LO CASCIO² & FABIEN SOLDATI³

¹Institut Méditerranéen de Biodiversité et d'Ecologie marine et continentale (IMBE), Aix Marseille Univ, Univ Avignon, CNRS, IRD, Technopôle Arbois-Méditerranée, Bât. Villemain, BP 80, F-13545 Aix-en-Provence cedex 04, France. E-mail: philippe.ponel@imbe.fr

²Associazione “Nesos”, via Vittorio Emanuele 24, I-98055 Lipari (ME), Italy. E-mail: plocascio.nesos@gmail.com

³Office National des Forêts, Laboratoire National d'Entomologie Forestière, 2 rue Charles Péguy, F-11500 Quillan, France.

E-mail: fabien.soldati@onf.fr

⁴Corresponding author. E-mail: philippe.ponel@imbe.fr

Catomus aeolicus **sp. nov.** is described from the Aeolian archipelago (Sicily, Italy). The new species differs from the other European *Catomus* by having distinctly bent tibiae, longer antennae (especially in males), and strongly highlighted sexual dimorphism. The shape of the aedeagus also seems diagnostic for this new species.

Key words: Coleoptera, Tenebrionidae, Helopini, *Catomus aeolicus*, new species, Aeolian archipelago, Sicily

The Tenebrionid genus *Catomus* was created by Allard (1876). The Palaearctic *Catomus* species have been studied by several authors (Reitter 1922; Vauloger 1900; Antoine 1949; Ardoin 1958; Español & Viñolas 1986; Nabozhenko 2006, 2007; Liu & Ren 2010; Nabozhenko 2015a, 2015b; Castro Tovar 2015; Nabozhenko & Ando 2018). The genus includes four subgenera with 72 species and subspecies, and is widespread in the Palaearctic region, from Spain and Morocco to China (Castro Tovar 2015; Liu & Ren 2010; Nabozhenko 2007, 2015b; Nabozhenko & Löbl 2008; Nabozhenko & Ando 2018). Two species were also reported from the afrotropical region. *Catomus* sensu lato is especially diversified in North Africa, with about 40 species (Nabozhenko & Löbl 2008).

The presence of only four species have been confirmed for Europe. Two of them, *Catomus rotundicollis* (Guérin-Méneville, 1825) and *C. consentaneus* (Küster, 1851), are respectively widespread in the western and the whole Mediterranean basin, while the other two species (*C. liliputanus* (Reitter, 1906) and *C. lopezi* Castro Tovar, 2015) show more restricted distribution in Spain. According to Castro Tovar (2015), *C. walkeri* (Champion, 1891) from Gibraltar, included in the genus *Catomus* by Nabozhenko & Löbl (2008), is a junior synonym of *Stenohelops villosus* Schaufuss, 1861.

Only two species are currently reported from Italy (see Aliquò & Soldati 2007, 2010, 2014). *Catomus consentaneus* is a psammophilous species associated with coastal dunes and sandy shores (Ardoin 1958, Aliquò & Soldati 2007, 2010, 2014) recorded from the southern regions (Apulia and Calabria) and the main islands (Sicily and Sardinia); it has not been found in the circum-Sicilian islands, including the Aeolian archipelago, probably due to the scarcity of favourable habitats in these volcanic rocky islands (pers. obs.). *C. rotundicollis* is much more common and widespread; it inhabits the dead wood and dehiscent barks of many plant species (both trees and shrubs) and its distribution covers most parts of Italy, where it appears more frequent in the coastal areas. In Sicily and the circum-Sicilian islands it is extremely common. Within the Aeolian archipelago it has been recorded for Stromboli, Filicudi, Alicudi, Panarea (Focarile 1969), Lipari (Marcuzzi 1970), Vulcano and Bottaro Islet (Aliquò *et al.* 2006). However, possibly, some of these records should be attributed to the new species, which is being described below.

Material and methods

Field investigations carried out, in November 2015 and November 2016, by two of the authors (PP and PLC), in the framework of the “École de terrain” of Master Environnement (Aix-Marseille Université—AMU) on several islands of the Aeolian archipelago, have revealed the occurrence of a new species belonging to the genus *Catomus* that is described

hereafter. The majority of the specimens are preserved in private collections, however the name-bearing types were deposited in the public institutions listed below. Male genitalia were dissected, then glued on white mounting cards. Photographs were taken with a Canon macro photo lens MP-E 65 mm mounted on a Canon EOS 1100D. For each specimen, about 10 focal planes were superimposed with the “stacking” software Helicon Focus version 6.7.1 Pro (May 27, 2016) (www.heliconsoft.com/heliconsoft-products/helicon-focus). Photographs were processed using Adobe Photoshop CS5 version 12.0 software. Measurements were made with a 10x eyepiece grid mounted on a stereo-microscope.

Taxonomy

Catomus aeolicus sp. nov. (Figs 1A, 1B, 1C)

Description. Male (Fig 1A). Body length from epistome to elytral apex 4.0–7.3 mm. Entirely black brown, without any metallic shine, antennae and legs paler; entirely glabrous on dorsal side, ventrites covered with very short, scattered, whitish setae, antennae and legs with dense, whitish pubescence; head and pronotum shiny although densely punctate, elytra dull and alutaceous; body elongated, pterothorax oval; wingless.

Head. Strongly and densely punctate, punctures as large as or larger than areas between them, elongated, sometimes almost confluent and forming short striae, subrounded on head sides and behind vertex, intervals with fine microreticulation visible at strong magnification (x50); epistome straight, truncate, separated from vertex by a transverse depression, eyes prominent, appearing rounded when viewed from above, oval in lateral view, not notched by epistome or by antennal insertion; without short vertical groove from bottom edge of the eyes; last maxillary palpomere strongly securiform; labial palpi with last palpomere enlarged but not securiform; antennae long, exceeding posteriad the middle of elytra by at least one antennomere, first antennomere strongly clavate, second transverse, third to seventh elongated, especially the third which is three times longer than broad, slightly enlarged from base to apex, eighth to eleventh distinctly flattened, enlarged from base to apex, last one reniform.

Pronotum. 1.2 times broader than long, anterior angles rounded but marked, posterior angles completely obsolete, totally rounded, pronotum widest prior middle, puncturation coarse and dense on disc (similar to that of the head), less dense and coarse laterally; punctures elongated, sometimes almost confluent and forming short striae, space between them with fine microreticulation visible at higher magnification (x50), similar to that on head; pronotum entirely and finely rimmed, the middle third of front margin excepted.

Elytra. Oval, looking more dull and alutaceous than head and pronotum due to a finer and denser microreticulation; humeri entirely rounded, humeral callus absent; all striae narrow and deep, deeper at base, punctate, punctures slightly broader than striae, slightly notching interstriae; the latter regularly convex from base to apex; cuticle on interstriae surface apparently smooth but, at higher magnification (x50), covered with sparse superficial punctures; scutellum broad, dull and smooth.

Ventral side. Prohypomera dull, impunctate, with longitudinal wrinkles; head, prosternum, mesoventrite and meta-ventrite punctate, punctures stronger and denser on mesoventrite; all ventrites finely punctate, each puncture bearing a fine and short whitish seta.

Legs. All tibiae bent, mesotibiae stronger so; male protarsi strongly widened, first to third tarsomeres, taken together, two times longer than broad and much wider than apex of protibiae; mesotarsi less widened, first to third tarsomeres, taken together, almost three times longer than broad; metatarsi simple; all tarsomeres with sparse whitish setae on upper surface, first to fourth tarsomeres of protarsi and mesotarsi covered with a dense whitish pubescence on inferior surface, tarsomeres of metatarsi simple; onychium simple.

Aedeagus (Fig 1C). Parameres four times shorter than phallobase, tapering from base to apex, acuminate, without constriction between phallobase and parameres; inner margin of parameres very slightly sinuate, phallus very parallel with simple rounded apex.

Female (Fig 1B). Body length from epistome to elytral apex 4.8–8.2 mm. Pronotum less shiny, more strongly microreticulate, punctures finer, punctation sparser; antennae shorter, hardly reaching the anterior fifth of elytra, eighth to eleventh antennomeres indistinctly flattened, slightly enlarged from base to apex; all tibiae bent as in males; pro-, meso- and metatarsi simple, not widened, lower surface without any thick whitish pubescence sole.

Diagnosis. *Catomus aeolicus* sp. nov. can be easily separated from the other European *Catomus* species by its strongly bent mesotibiae, unusually widened male protarsi, long male antennae and shape of its aedeagus (Fig. 1C). By its long antennae this species most closely resembles *C. fallax* (Vauloger, 1900) from Tunisia and Libya, which belongs to the same group. But the latter differs by having less punctate pronotum, smooth and hardly punctate striae on elytra,

more plane interstriae in both sexes, prohypomera with scarce and large punctures. Furthermore, male protarsi are not so enlarged as in the new species.

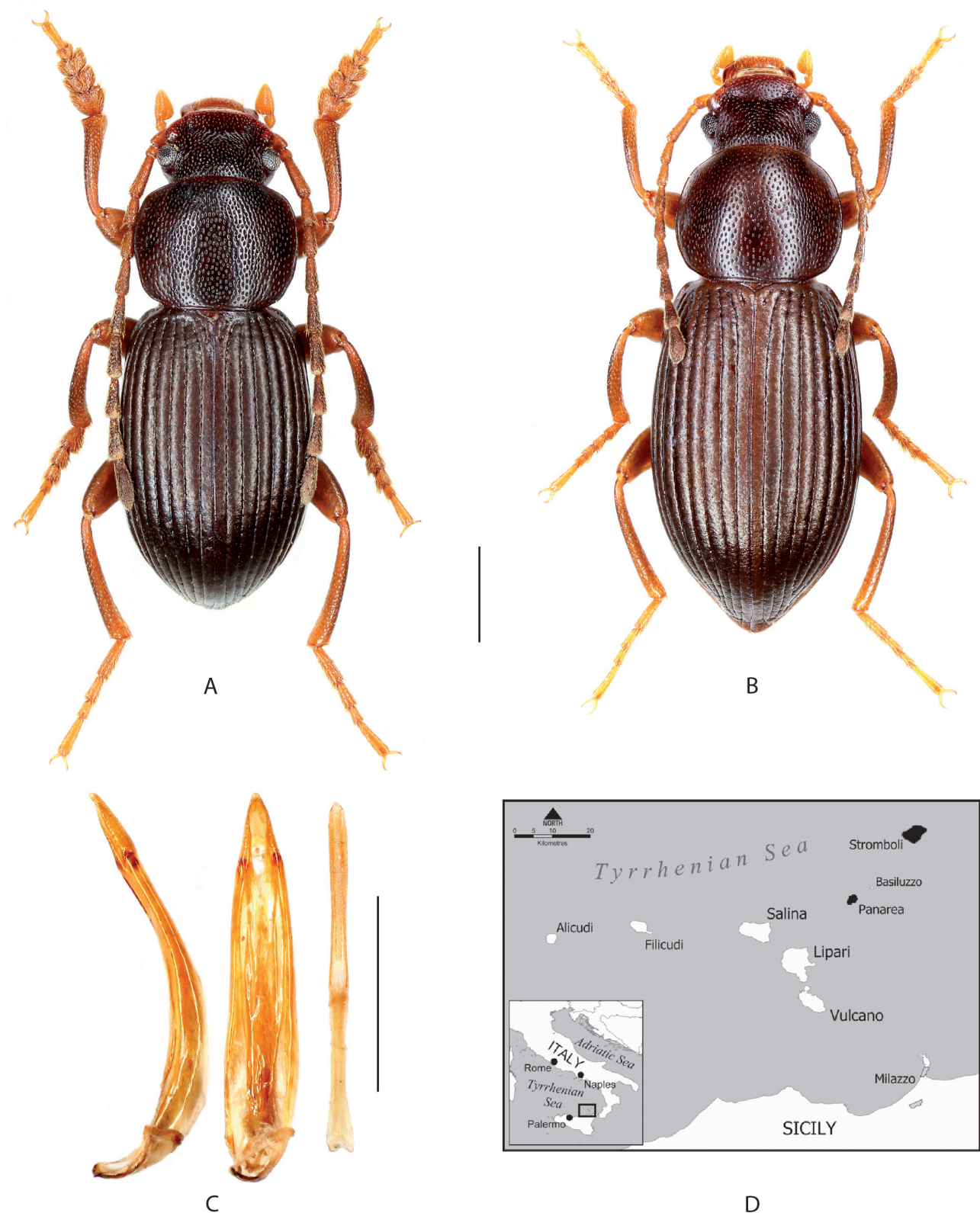


FIGURE 1. *Catomus aeolicus* sp. nov. from Panarea, Aeolian archipelago, Sicily. A, habitus, male holotype, length: 5.3 mm. B, habitus, female allotype, length: 5.5 mm. C, aedeagus in lateral view (left) and ventral view from below (middle), right: phallus separated from the tegmen. D, the Aeolian archipelago, in black: islands occupied by *Catomus aeolicus* sp. nov. (from Wikimedia, modified). Scale bars: 1 mm.

Variability. The new species displays well marked sexual dimorphism in morphology of antennae and legs. The size of specimens is extremely variable: in the studied material the smaller ♂ is only 4.0 mm long, whereas the larger ♀ reaches 8.2 mm. The color ranges from very dark to reddish, the latter probably corresponding to teneral specimens. Furthermore, the average size in the specimens from Stromboli (9 ♂♂ : $m = 6.03$ mm, $s.d. = 0.95$; 6 ♀♀ : $m = 7.21$ mm, $s.d. = 0.72$) is larger than in those from Panarea (28 ♂♂ : $m = 5.05$ mm, $s.d. = 0.69$; 11 ♀♀ : $m = 6.05$ mm, $s.d. = 1.15$).

Type material. Holotype ♂, labelled: “SICILE-EOLIENNES, île Panarea, 7-XI-2015, P. Ponel leg.” (white label); “Holotype ♂, *Catomus aeolicus* sp. nov., P. Ponel, P. Lo Cascio & F. Soldati” (red label), Muséum National d’Histoire Naturelle, Paris.

Allotype ♀, labelled: “SICILE-EOLIENNES, île Panarea, 7-XI-2015, P. Ponel leg.” (white label); “Allotype ♀, *Catomus aeolicus* sp. nov., P. Ponel, P. Lo Cascio & F. Soldati” (red label), Muséum National d’Histoire Naturelle, Paris.

Paratypes: 6 ♂♂ and 3 ♀♀, same data as Holotype; 3 ♂♂ and 2 ♀♀, “SICILE-EOLIENNES, île Stromboli, 8-XI-2015, P. Ponel leg.”; 21 ♂♂ and 7 ♀♀, “SICILE-EOLIENNES, île Panarea, 7-XI-2016, P. Ponel leg.”; 6 ♂♂ and 4 ♀♀, “STROMBOLI: Nel Cannestrà, beating *Spartium junceum*, XII-2016 leg. P. Lo Cascio”. All paratypes have a red label: “Paratype ♂ (or ♀), *Catomus aeolicus* sp. nov., P. Ponel, P. Lo Cascio & F. Soldati”. Paratypes are deposited in the author’s collections P. Ponel, P. Lo Cascio and F. Soldati, as well as in the Piero Leo collection (Cagliari) and the Zoological Museum of the Università degli Studi di Firenze “La Specola”.

Etymology. The name *aeolicus* is an adjective derived from this group of islands, named after Aeolus (in ancient Greek Αἰολός), the god of the winds.

Ecology. All the specimens of *Catomus aeolicus* sp. nov. were collected by beating old woody shrubs with dehiscent bark, especially the Spanish broom *Spartium junceum* L. and other Fabaceae, but the species has been found also on old branches of lentisk *Pistacia lentiscus* L.

Discussion

Catomus aeolicus sp. nov. is considered as endemic to at least two of the Aeolian Islands, namely Panarea and Stromboli (Fig 1D), that belong to the north-eastern sector of the archipelago and are separated by a sea channel of 18 km. Field investigations carried out on the other islands were unsuccessful or found exclusively *C. rotundicollis*. Both species seem to be sympatric only on Stromboli.

The Aeolian archipelago lies in the southern Tyrrhenian Sea, 20 km from Sicily and 55 km from Calabria. It has a volcanic origin and the age of the islands ranges from 300,000 (Lipari) to 85,000 years B.P. (Stromboli) (Lucchi *et al.* 2013). This young geological age and the proximity with the Sicily mainland may explain the low rate of endemism within the 600 species of Coleoptera so far recorded for the archipelago (Lo Cascio *et al.* 2006), a number that seems however underestimated (P. Lo Cascio and P. Ponel, unpublished data). Currently nine species (including *Catomus aeolicus* sp. nov.) are known as endemics of the Aeolian islands (see Muscarella & Baragona 2017 and references therein), equal to about 1.5% of the whole Coleopteran fauna.

This percentage increases remarkably (up to 6.4%) when considering the family Tenebrionidae separately, which includes 47 species and, among them, the two endemics *Nalassus pastai* Aliquò, Leo & Lo Cascio, 2006 and *Leptoderis zelmeloewae* Ferrer, 2015. *Nalassus pastai* seems strictly localized on the island of Vulcano and also belongs to the tribe Helopini while *Leptoderis zelmeloewae* is described on two specimens from “Isole Eolie” and “Lipari” (Ferrer 2015).

Many darkling beetles, such as members of the genus *Catomus*, are wingless and their dispersal is therefore substantially reduced, a peculiar condition that may promote their differentiation processes (Ikeda *et al.* 2012). Moreover, the probable occurrence of “bottle-neck effects” within the Aeolian islands’ populations, due to volcanic disturbances, has already been proposed by Aliquò *et al.* (2006) as a possible explanation for the rapid speciation of local endemics; this same model may be hypothetically extended to the origin of the new *Catomus* species.

Acknowledgments

This work was carried out as part of the BEE/Bioeffect Master 2 within the course “Ecole de terrain” of the Aix Marseille University (France). We thank the university foundation Amidex (“Initiative d’excellence d’Aix-Marseille Université”), the Mednet programme (“Mediterranean Network of environmental training sites supporting OSU Institut Pythéas master’s degrees and international academic partnerships”), the Labex OTMED, the BiodivMex Programm (<http://biodivmex.imbe.fr/>) of the French initiative MISTRALS (Mediterranean integrated studies at regional and local scales) for their

financial support and Frédéric Médail for providing the opportunity to develop a research program in the Aeolian archipelago; the students of the Master 2 classes 2015/2016, 2016/2017 and 2017/2018 are also acknowledged for help in the field and in the laboratory. We are also grateful to Gianfranco Liberti who reviewed the first version of the manuscript, to Maxim Nabozhenko and Marcin Jan Kamiński who improved considerably the text, and to Belinda Gambin for checking the English.

- Aliquò, V., Leo, P. & Lo Cascio, P. (2006) I Tenebrionidi dell'Arcipelago Eoliano: nuovi dati faunistici e zoogeografici con descrizione di una nuova specie di *Nalassus* Mulsant, 1854 (Coleoptera, Tenebrionidae). *Naturalista siciliano*, 30, 293–314.
- Aliquò, V., Rastelli, M., Rastelli, S. & Soldati, F. (2007) *Coleotteri Tenebrionidi d'Italia - Darkling Beetles of Italy. Piccole Faune II*. Museo Civico di Storia Naturale di Carmagnola, Torino, Associazione Naturalistica Piemontese, Torino and Progetto Biodiversità, Comitato Parchi, Roma. [CD-Rom]
- Aliquò, V. & Soldati, F. (2010) *Coleotteri Tenebrionidi di Sicilia (Insecta: Coleoptera Tenebrionidae)*. *Monografie Naturalistiche I*. Edizioni Danaus, Palermo, 176 pp.
- Aliquò, V. & Soldati, F. (2014) Updating the CD-rom on Coleoptera Tenebrionidae of Italy and the check-list of the same family. *Biodiversity Journal*, 5 (3), 429–442.
- Allard, M.E. (1876) Revision des Hélopides vrais de Lacordaire. *L'Abeille*, 14, 1–80.
- Antoine, M. (1949) Notes d'entomologie marocaine XLIV. Matériaux pour l'étude des Helopinae du Maroc (Coleoptera, Tenebrionidae). *Bulletin de la Société des Sciences Naturelles du Maroc*, 25–27, 123–162. [1945–1947]
- Ardoin, P. (1958) Contribution à l'étude des Helopinae de France (Col. Tenebrionidae). *Annales de la Société entomologique de France*, 127, 9–49.
- Castro Tovar, A. (2015) Una especie nueva de *Catomus* Allard, 1876 de España: *Catomus lopezi* n. sp. (Coleoptera, Tenebrionidae). *Boletín de la Sociedad entomológica aragonesa*, 57, 185–188.
- Champion, G.C. (1891) A list of the Coleoptera collected by Mr. J.J. Walker, R.N., F.L.S., in the region of the Straits of Gibraltar, with descriptions of four new species. *Transactions of the Entomological Society of London*, 1891, 375–401. <https://doi.org/10.1111/j.1365-2311.1891.tb01655.x>
- Español, F. & Viñolas, A. (1986) Revisión de los *Catomus* Ibéricos (Col. Tenebrionidae). *Miscellánea Zoológica*, 10, 181–184.
- Ferrer, J. (2015) Revisión del género *Leptoderis* Billberg, 1820 y comentarios sobre el origen, composición, anatomía y necrofagia de la tribu Elenophorini (Coleoptera, Tenebrionidae). *Boletín de la Sociedad entomológica aragonesa*, 57, 19–38.
- Focarile, A. (1969) Sintesi preliminare delle attuali conoscenze sui coleotteri tenebrionidi delle piccole isole circum-siciliane (Coleoptera Tenebrionidae). *Memorie della Società entomologica italiana*, 48, 402–416.
- Guérin-Ménéville, F.E. (1825) Helops. In: Bory de Saint-Vincent, J.B.G.M. (Ed.), *Dictionnaire classique d'histoire naturelle, par Messieurs Audoin, Isid. Bordon, Ad. Brongniart, De Candolle, Daubebard de Férussac, A. Desmoulins, Drapiez, Edwards, Flourens, Geoffroy de Saint-Hilaire, A. de Jussieu, Kunth, G. de Lafosse, Lamouroux, Latreille, Lucas fils, Presle-Duplessis, C. Prévost, A. Richard, Thiébaud de Berneaud, et Bory de Saint-Vincent. Ouvrage dirigé par ce dernier collaborateur, et dans lequel on a ajouté, pour le porter au niveau de la science, un grand nombre de mots qui n'avaient pu faire partie de la plupart des dictionnaires antérieurs. Tome huitième*. Ray et Gravier [et] Beaudoin Frères, Paris, pp. 111–112.
- Ikeda, H., Nishikawa, M. & Sota, T. (2012) Loss of flight promotes beetle diversification. *Nature Communications*, 3 (648), 1–8. <https://doi.org/10.1038/ncomms1659>
- Küster, H.C. (1851) *Die Käfer Europa's. Nach der Natur Beschrieben. Heft 22*. Bauer & Raspe, Nürnberg, [4] + 100 sheets, 3 pls.
- Liu, H.Y. & Ren, G.D. (2010) A new species of the genus *Catomus* Allard from China (Coleoptera, Tenebrionidae). *Acta Zootaxonomica Sinica*, 35 (1), 71–73.
- Lo Cascio, P., Cecchi, B., Abbazzi, P. & Arnone, M. (2006) A contribution to the knowledge of the Coleoptera of the Aeolian Archipelago (S Tyrrhenian) (Insecta, Coleoptera). *Naturalista siciliano*, 30, 91–116.
- Lucchi, F., Peccerillo, A., Keller, J., Tranne, C.A. & Rossi, P.L. (2013) *The Aeolian Islands Volcanoes. Geological Society Memoirs No. 37*. The Geological Society, London, 520 pp. <https://doi.org/10.1144/M37.0>
- Marcuzzi, G. (1970) I tenebrionidi (Col. Heteromera) delle Isole Eolie e di Ustica. *Atti dell'Accademia gioenia di Scienze naturali*, 7, 161–184.
- Muscarella, C. & Baragona, A. (2017) The endemic fauna of the Sicilian islands. *Biodiversity Journal*, 8, 249–278.
- Nabozhenko, M.V. (2006) A revision of the genus *Catomus* Allard, 1876 and the allied genera (Coleoptera, Tenebrionidae) from the Caucasus, Middle Asia, and China. *Entomological Review*, 86 (9), 1024–1072. <https://doi.org/10.1134/S0013873806090065>
- Nabozhenko, M.V. (2007) Taxonomic notes on the genus *Catomus* Allard, 1876 (Coleoptera, Tenebrionidae: Helopini) with description of a new species from Afghanistan. *Caucasian Entomological Bulletin*, 3 (1), 41–45. <https://doi.org/10.23885/1814-3326-2007-3-1-41-45>

- Nabozhenko, M.V. (2015a) Review of the genus *Catomus* Allard, 1876 (Coleoptera: Tenebrionidae) in Iran. *Zoology in the Middle East*, 61 (1), 64–68.
<https://doi.org/10.1080/09397140.2014.994307>
- Nabozhenko, M.V. (2015b) To the knowledge of Helopini (Coleoptera: Tenebrionidae) of Morocco. *Caucasian Entomological Bulletin*, 11 (1), 33–37.
<https://doi.org/10.23885/1814-3326-2015-11-1-33-37>
- Nabozhenko, M.V. & Löbl, I. (2008) Family Tenebrionidae, tribe Helopini. In: Löbl, I. & Smetana, A. (Eds.), *Catalogue of Palaearctic Coleoptera. Vol. 5. Tenebrionoidea*. Apollo Books, Stenstrup, pp. 241–257.
- Nabozhenko, M. & Ando, K. (2018) Subtribal, generic and subgeneric composition of darkling beetles of the Tribe Helopini (Coleoptera: Tenebrionidae) in the Eastern Palaearctic Region. *Acta Zoologica Academiae Scientiarum Hungaricae*, 64, 277–327.
<https://doi.org/10.17109/AZH.64.4.277.2018>
- Reitter, E. (1906) Neue Coleopteren aus Spanien. *Boletín de la Real Sociedad Española de Historia Natural*, 6, 375–380.
- Reitter, E. (1922) Bestimmungstabelle der palaarktischen Helopinae (Col. Tenebrionidae). I. Teil. *Wiener Entomologische Zeitung*, 39 (1/4), 1–44.
<https://doi.org/10.5962/bhl.part.2572>
- Schaufuss, L.W. (1861) Ueber 22 zum Theil neue Käferarten. *Sitzungsberichte der Naturwissenschaftlichen Gesellschaft Isis zu Dresden*, 1861, 47–51.
- Vauloger, M. de (1900) Contribution au Catalogue des Coléoptères du Nord de l’Afrique. Helopini. *Annales de la Société entomologique de France*, 68, 669–722. [1899]