



Updated checklist of the Cantharidae, Lampyridae, and Lycidae of the Grand Duchy of Luxembourg (Coleoptera: Elateroidea)

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Abstract

Here we present a checklist of the families Cantharidae, Lampyridae, and Lycidae of Luxembourg. The earlier references are summarized and new information on the some species is reported. Furthermore, *Cantharis* (s. str.) *paludosa* Fallén, 1807, *Cantharis* (s. str.) *terminata* Faldermann, 1835, *Erotides cosnardi* (Chevrolat, 1831), and *Lopheros rubens* (Gyllenhal, 1817) are cited for the first time for Luxembourg based on specimens preserved in the National Museum of Natural History or on a photo reported on the iNaturalist platform.

Key words: scientific heritage, museum collections, soldier beetles, fireflies, net-winged beetles

Introduction

Despite the basic importance of national checklists, it has been well known since Mousset's (1977) times that Luxembourg has not a complete faunistic knowledge of its territory yet. Only in recent years, a more careful management of economic and human resources has allowed the realization of these fundamental studies. Though atlases or checklists on Heteroptera (Reichling 2001), Orthoptera (Proess 2004), Odonata (Proess 2006), Auchenorrhyncha (Niedringhaus *et al.* 2010), Hymenoptera (Chevin *et al.* 2011; Wegnez *et al.* 2021) and many families of Lepidoptera (Meyer & Pelles 1981, 1989; Hellers 2016, 2017, 2018, 2019, 2020) were realised, Coleoptera were rarely studied (Mousset 1969; Braunert 1996, 2009; Braunert & Gerend 1997; Gerend 2003, 2006; Vitali 2012, 2018).

The cantharoid families, and in particular the soldier beetles (Cantharidae), have been little taken into account throughout Europe and only recently, some countries have seen the drafting of catalogues or checklists: Russia (Kazantsev 2004), Spain (Diéguez-Fernández 2011, 2012, 2014), United Kingdom (Alexander 2012), Italy (Fanti 2014) and France (Constantin 2014).

However, only sparse short notes (Magis 1956, 1970, 1971, 1972, 2005; Meyer 1977; Mousset 1981a, 1981b; Gerend 2000; Bretzendorfer 2002; Gerend *et al.* 2007; Köhler 2009, 2011, 2013) can be found for Luxembourg. The checklist of the Palearctic fauna of Cantharidae (Kazantsev & Brancucci 2007) reported for this country only 27 species, and that list is incomplete as we could see after a check of the local literature.

Lampyridae in Luxembourg have been similarly poorly studied. The recent Palearctic catalogue (Geisthardt & Satō 2007) mentions only two species, overlooking past records (Magis 1976, 1977; Gerend 2000) of *Lamprohiza splendidula* (Linnaeus, 1767).

Finally, Bocakova & Bocak (2007) based on the primary source of Bocak & Bocakova (1987) mentioned no species of Lycidae for Luxembourg in the Palearctic catalogue, though at least two species were known (Mousset 1981b; Magis 1976, 1977).

The aim of this publication is to assess the situation of these families in the Grand Duchy of Luxembourg in order to attract the interest of local and international collaborators. The final goal is the realisation of a colour atlas focused on these families, including distribution maps, phenology of the local species and analyses of the faunistic changes.

Materials and Methods

The present study is based on the literature records concerning Luxembourg (including hunting notes and published meeting relations of the Luxembourg Naturalist Society), the beetle collection deposited in the National Museum of Natural History, Luxembourg (MNHNL), the authors' collections and the photographs obtained from the citizen science platform iNaturalist (<https://www.inaturalist.org>). All species are reported in alphabetical-systematic order, with the binomial in use accompanied by author and year of description, as well as the full reference works for Luxembourg.

Photographs of the specimens were taken with a CMOS Camera mounted on a Keyence VHX 6000 digital microscope equipped with a VHX-S660E free-angle observation system, a VH-ZST 20-2000x double zoom objective, 2D/3D image stitching system and stacking system taking to 200 images at 2 million pixels of resolution, owned by the MNHNL. All photographs were enhanced with the Ulead PhotoImpact SE software.

Results

FAMILY Cantharidae Imhoff, 1856

Ancistronycha abdominalis (Fabricius, 1798)
Magis 2005.

Ancistronycha violacea (Paykull, 1798)
Ferrant 1917; Magis 1956, 1968, 1971; Kazantsev & Brancucci 2007; Kazantsev 2012.

Cantharis (s. str.) cryptica Ashe, 1947
Magis 1968; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Köhler 2009, 2011, 2013; Švihla & Dvořák 2009 [Kazantsev & Brancucci 2007]; Kazantsev 2012.

Cantharis (s. str.) decipiens Baudi di Selve, 1872
Magis 1968; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Köhler 2009, 2011, 2013; Kazantsev 2012.

Cantharis (s. str.) figurata Mannerheim, 1843
Magis 1968; Kazantsev & Brancucci 2007; Kazantsev 2012.

Cantharis (s. str.) flavilabris Fallén, 1807
Köhler 2009, 2011 (sub *Cantharis fulvicollis*).

Cantharis (s. str.) fusca Linnaeus, 1758
Olm 1892; Ferrant 1917; Magis 1956, 1968, 1970, 1972; Mousset 1981a; Gerend 2000; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Köhler 2011, 2013; Kazantsev 2012.

Cantharis (s. str.) livida Linnaeus, 1758
Magis 1956, 1968, 1971; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Silkin 2008; Kazantsev 2012; Köhler 2013.

Cantharis (s. str.) nigra (De Geer, 1774)
Köhler 2013 (sub *Cantharis thoracica*).

Note. *C. nigra* is often and easily confused with *Cantharis flavilabris*. The presence and distribution in Luxembourg need to be further studied.

Cantharis (s. str.) nigricans (O. F. Müller, 1776)
Magis 1956, 1968, 1971; Kazantsev & Brancucci 2007; Köhler 2009, 2011; Kazantsev 2012.

Cantharis (s. str.) obscura Linnaeus, 1758

Magis 1956, 1968; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Köhler 2009; Kazantsev 2012.

Cantharis (s. str.) pallida Goeze, 1777

Mousset 1981a; Köhler 2009, 2011, 2013.

Cantharis (s. str.) paludosa Fallén, 1807 (Fig. 1)

Material. Wincrange, Hoffelt, 8.VI.2000, A. Mousset leg. [MNHNL].

Note. *C. paludosa* is a hygrophilous species, not rare in humid environments.



FIGURE 1. *Cantharis paludosa* Fallén, 1807. Specimen preserved at the National Museum of Natural History of Luxembourg, scale bar = 1.0 mm.

Cantharis (s. str.) paradoxa Hicker, 1960

Gerend *et al.* 2007; Köhler 2009; Zagatti & Mériguet 2014 (Benelux).

Cantharis (s. str.) pellucida Fabricius, 1792

Magis 1956, 1968, 1971; Mousset 1981a; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Köhler 2009, 2011, 2013.

Cantharis (s. str.) pulicaria Fabricius, 1781

Magis 1956; Kazantsev & Brancucci 2007; Silkin 2008; Kazantsev 2012.

Note. *C. pulicaria* is a rather rare species throughout the distributional range. We do not know any collection specimen from Luxembourg, so the actual distribution in the Grand Duchy must be confirmed.

Cantharis (s. str.) rufa Linnaeus, 1758

Olm 1892; Magis 1956, 1968; Mousset 1981a; Gerend 2000; Kazantsev & Brancucci 2007; Silkin 2008; Kazantsev 2012; Köhler 2011, 2013.

Note. Reported as *Cantharis (s. str.) darwiniana* (Sharp, 1867): Kazantsev & Brancucci 2007; Kazantsev 2012.

Cantharis (s. str.) rustica Fällén, 1807

Magis 1956, 1968, 1971, 1972; Kazantsev & Brancucci 2007; Silkin 2008; Kazantsev 2012; Köhler 2013.

Cantharis (s. str.) terminata Faldermann, 1835 (Fig. 2)

Material. Luxembourg Hollerich, 10.VI.1975, C. Hahn leg., 1 spec. [MNHN]; Strassen, 13.IX.1998, A. Mousset leg., 1 spec. [MNHN]; Strassen, Ruderlech, on *Tilia*, 24.V.2009, F. Vitali leg., 1 spec. [coll. F. Vitali]; Luxembourg Bambesch, 17.V.2014, F. Vitali, 1 spec. [coll. F. Vitali].

Note. *C. terminata* is a rare montane species, similar to *Cantharis quadripunctata* (O. F. Müller, 1776) and *C. montana* Stierlin, 1898 but basically with a black elytral margin. The species is widespread in Europe and the Middle East, and common in Belgian Luxembourg (Everts 1922; Horion 1953).

Cantharis (Cyrtomoptila) lateralis Linnaeus, 1758

Magis 1968, 1971; Kazantsev & Brancucci 2007; Silkin 2008; Kazantsev 2012; Köhler 2013.

Cantharis (Cyrtomoptila) pagana Rosenhauer, 1847

Magis 1968, 1971; Švihla 2006; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Köhler 2009; Kazantsev 2012; Fanti 2014.

Cratosilis denticollis (Schummel, 1844)

Magis 1968, 1971; Kazantsev & Brancucci 2007; Köhler 2011; Kazantsev 2012.

Metacantharis clypeata (Illiger, 1798)

Köhler 2011.

Podistra (Absidia) rufotestacea (Letzner, 1845)

Gerend *et al.* 2007 (sub *Absidia rufotestacea*); Köhler 2009, 2011 (sub *Absidia rufotestacea*), 2013 (sub *Absidia rufotestacea*).

Rhagonycha (s. str.) elongata (Fällén, 1807)

Magis 1956; Kazantsev & Brancucci 2007; Kazantsev 2012.

Note. This species is often confused with *Rhagonycha gallica* Pic, 1923 and *Rhagonycha atra* (Linnaeus, 1767). We do not know collection specimens from Luxembourg; therefore, its actual presence must be verified.



FIGURE 2. *Cantharis terminata* Faldermann, 1835. Specimen preserved at the National Museum of Natural History of Luxembourg, scale bar = 1.0 mm.

- Rhagonycha (s. str.) fulva*** (Scopoli, 1763)
Magis 1956, 1968, 1971; Meyer 1977; Mousset 1981a (sub *Cantharis fulva*); Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Silkin 2008; Köhler 2009, 2011, 2013; Kazantsev 2012.
- Rhagonycha (s. str.) gallica*** Pic, 1923
Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Köhler 2009, 2011; Kazantsev 2012.
- Rhagonycha (s. str.) lignosa*** (O. F. Müller, 1764)
Magis 1956, 1968, 1971; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Köhler 2009, 2011, 2013; Kazantsev 2012.
- Rhagonycha (s. str.) lutea*** (O. F. Müller, 1764)
Magis 1956, 1971; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Silkin 2008; Köhler 2011, 2013.
- Rhagonycha (s. str.) nigriventris*** Motschulsky, 1860
Magis 1956 (sub *limbata*), 1968 (sub *limbata*), 1971 (sub *limbata*); Mousset 1981a (sub *limbata*); Gerend 2000 (sub *limbata*); Gerend *et al.* 2007 (sub *limbata*); Kazantsev & Brancucci 2007; Köhler 2011 (sub *limbata*), 2013 (sub *limbata*); Kazantsev 2012.
- Rhagonycha (s. str.) testacea*** (Linnaeus, 1758)
Magis 1968, 1971; Kazantsev & Brancucci 2007; Köhler 2009, 2011, 2013; Kazantsev 2012.
- Rhagonycha (s. str.) translucida*** (Krynicky, 1832)
Köhler 2011.
- Podabrus alpinus*** (Paykull, 1798)
Magis 1956, 1968, 1970; Gerend *et al.* 2007; Kazantsev & Brancucci 2007; Köhler 2009; Kazantsev 2012.
- Malthinus (s. str.) balteatus*** Suffrian, 1851
Köhler 2009.
- Malthinus (s. str.) bilineatus*** Kiesenwetter, 1852
Kazantsev & Brancucci 2007; Kazantsev 2012; Chittaro *et al.* 2021.
- Malthinus (s. str.) facialis*** C. G. Thomson, 1864
Gerend *et al.* 2007; Köhler 2009.
- Malthinus (s. str.) fasciatus*** (A. G. Olivier, 1790)
Gerend *et al.* 2007.
- Malthinus (s. str.) flaveolus*** (Herbst, 1786)
Gerend *et al.* 2007 (sub *Malthinus punctatus*); Köhler 2009, 2011 (sub *Malthinus punctatus*), 2013 (sub *Malthinus punctatus*).
- Malthinus (s. str.) frontalis*** (Marsham, 1802)
Köhler 2009, 2011.
- Malthinus (s. str.) glabellus*** Kiesenwetter, 1852
Köhler 2011, 2013.
- Malthinus (s. str.) seriepunctatus*** Kiesenwetter, 1852
Köhler 2011, 2013.

Malthodes (s. str.) alpicola Kiesenwetter, 1852
Bretzendorfer 2002.

Malthodes (s. str.) fuscus (Waltl, 1838)
Gerend *et al.* 2007.

Malthodes (s. str.) guttifer Kiesenwetter, 1852
Gerend *et al.* 2007.

Malthodes (s. str.) marginatus (Latreille, 1806)
Gerend *et al.* 2007; Köhler 2009, 2011, 2013.

Malthodes (s. str.) maurus (Laporte de Castelnau, 1840)
Magis 1971.

Malthodes (s. str.) minimus (Linnaeus, 1758)
Magis 1956, 1971; Kazantsev & Brancucci 2007; Köhler 2011, 2013; Kazantsev 2012.

Malthodes (s. str.) misellus Kiesenwetter, 1852
Magis 1956 (sub *Malthodes maurus* var. *misellus*); Kazantsev & Brancucci 2007.

Malthodes (s. str.) mysticus mysticus Kiesenwetter, 1852
Gerend *et al.* 2007.

Malthodes (s. str.) pumilus (Brébisson, 1835)
Köhler 2013.

Malthodes (s. str.) spathifer Kiesenwetter, 1852
Magis 1968, 1971; Kazantsev & Brancucci 2007; Köhler 2011, 2013.

Malthodes sp.
Gerend *et al.* 2007; Köhler 2009, 2011, 2013.

Note. Female specimens cannot be reliably identified as the diagnostic characters are limited to the shape of the terminal male tergites and sternites.

FAMILY Lampyridae Rafinesque, 1815

Lamprohiza splendidula (Linnaeus, 1767)
Magis 1976, 1977; Gerend 2000; Gerend *et al.* 2007; Köhler 2009, 2013.

Lampyris noctiluca (Linnaeus, 1758)
Magis 1956, 1976, 1977; Geisthardt & Satō 2007; Geisthardt 2012 [2007]; Köhler 2013.

Phosphaenus hemipterus (Goeze, 1777)
Geisthardt & Satō 2007; Majka & MacIvor 2009; Köhler 2011; Geisthardt 2012 [2007].

FAMILY Lycidae Laporte, 1836

Lygistopterus sanguineus (Linnaeus, 1758)
Fanti & Vitali 2013.

Dictyoptera aurora (Herbst, 1784)

Mousset 1981b; Köhler 2009, 2013.

Erotides cosnardi (Chevrolat, 1831) (Fig. 3)

Material. Ahn, VII.[~1900], V. Ferrant leg., 2 specimens [MNHNL].

Lopheros rubens (Gyllenhal, 1817)

Material. Boevange-sur-Attert, Rue Knäppchen, 9.V.2020, haeau979_5c2, 1 specimen, (<https://www.inaturalist.org/observations/45360773>).

Platycis (s. str.) *minuta* (Fabricius, 1787)

Magis 1976, 1977; Gerend *et al.* 2007; Köhler 2011, 2013.

Pyropterus nigroruber (De Geer, 1774)

Köhler 2009, 2011.

Discussion

The first observations of the soldier beetles of the Grand Duchy of Luxembourg were reported by Olm (1892) and Ferrant (1917), but the local fauna of the family was thoroughly studied only in the second half of the 20th century (Magis 1956, 1968, 1970, 1971), sometimes only marginally (Mousset 1981a; Gerend *et al.* 2007; Köhler 2013). Currently, 51 species of Cantharidae are known for the Grand Duchy of Luxembourg. Indeed, 22 species overlooked (Magis 1971, 2005; Mousset 1981a; Bretzendorfer 2002) or published later (Gerend *et al.* 2007; Köhler 2009, 2011, 2013), as well as others reported here, must be added to the 27 species reported by the most recent list of Palaearctic fauna (Kazantsev & Brancucci 2007).

Cantharis pulicaria and *Rhagonycha elongata* were mentioned for Luxembourg (Magis 1956) but being difficult to recognize or with many problematic data along the range, their records must be verified and their present distribution studied in detail. Furthermore, *Cantharis nigra*, recently added to the Luxembourg fauna (Köhler 2013), must be verified with specimens identified by the careful study of male genitalia to avoid the confusion with *C. flavilabris*. In addition, we have not seen any specimen of some species (*Malthinus balteatus*, *Malthinus bilineatus*, *Malthodes alpicola*, *Malthodes misellus*, *Malthodes mysticus*, *Malthodes pumilus*), which putatively occur in Luxembourg and might be preserved in private collections. In this case, however, authors' determination and their presence in Luxembourg are not in question, being also well distributed in the neighboring territories.

Many species have been cited for Luxembourg after the 2000s, indicating that the local fauna of Cantharidae is still unsatisfactorily studied. In fact, other species, e.g., *Cantharis quadripunctata*, *Cantharis montana*, *Metacantharis discoidea*, *Rhagonycha nigriceps*, *Malthinus biguttatus*, *Malthodes dispar*, could be found and listed in the future.

Concerning Lampyridae, the knowledge is complete, with the recent mention of *Phosphaenus hemipterus* (Geisthardt & Satö 2007; Majka & MacIvor 2009; Köhler 2011; Geisthardt 2012). *Phosphaenus hemipterus* was probably overlooked to the small body size and biology. The species is found under stones and on walls in wooded and rural areas. In addition, the males communicate by pheromones and not by the bioluminescence.

Finally, no Lycidae species was reported for Luxembourg in the Palaearctic catalogue (Bocakova & Bocak 2007), although the species known from western Europe are widely distributed (Bocak & Bocakova 1987). Only in recent years or with the present work, some species have been reported from Luxembourg and the knowledge is almost complete. It should be noted that the record of *Erotides cosnardi* from Luxembourg is based on two specimens collected around 1900 but that the species has never been mentioned in the literature. This underlines the importance of the collections, their preservation and their study with modern criteria.

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FIGURE 3. *Erotides cosnardi* (Chevrolat, 1831). Specimen preserved at the National Museum of Natural History of Luxembourg, scale bar = 1.0 mm.

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