
**SILVANIDAE AND LAEMOPHLOEIDAE (COLEOPTERA: CUCUJOIDEA)
FROM THE MALTESE ISLANDS (CENTRAL MEDITERRANEAN)****David G. H. Halstead¹ and David Mifsud²**

ABSTRACT

The Silvanidae and Laemophloeidae of the Maltese archipelago are reviewed, based on literature records and, where available, examination of voucher material, as well as the study of additional material collected in recent years. A total of five species of Silvanidae are included of which, *Airaphilus nasutus* Chevrolat, 1860 and *Oryzaephilus mercator* (Fauvel, 1889) represent new records for the Maltese Islands. *Silvanus lewisi* Reitter, 1876, a tropical species, was collected alive from under bark of logs imported from Cameroon (intended for the timber industry). Six species of Laemophloeidae are also recorded from the Maltese Islands, of which, *Placonotus testaceus* (Fabricius, 1787), *Cryptolestes capensis* (Waltl, 1834), *C. pusilloides* (Steel & Howe, 1952) and *Leptophloeus juniperi* (Grouvelle, 1874) represent new records for the Maltese Islands. The record of *Leptophloeus hypobori* (Perris, 1855) by Cameron & Caruana Gatto (1907) was found to be incorrect as their material is *Cryptolestes capensis* (Waltl, 1834).

INTRODUCTION

The Silvanidae and Laemophloeidae are two relatively small families of beetles, with around 500 and 400 described species, respectively. Silvanidae are small to medium-sized beetles that have elongate-ovate or elongate, and moderately to strongly depressed bodies. The pronotum may have the lateral margins coarsely or finely serrate, or a row of obvious setae may be present at the sides. The anterior angles of the pronotum are frequently produced to form a prominent tooth or lobe. These pronotal characters are often indicative of the family.

Laemophloeidae are small to very small beetles, usually strongly depressed - appearing very flat - but sometimes sub-cylindrical. Unlike silvanids they have sublateral lines (carinae or grooves) on the pronotum and often on the head. Until the early 1990's, Laemophloeidae were placed as a subfamily of Cucujidae and, in the more distant past, Silvanidae were also regarded as being part of that family. The separate family status of both of these taxa is now well established.

Silvanidae commonly occur under bark of dead trees or in leaf litter where they principally feed on moulds and fungal spores, and dead plant material. Some species are said to be facultative predators. Laemophloeidae are also found under bark and in the galleries of scolytids. They are thought to be mainly mould feeders but are also predaceous in their natural habitats, and can be cannibalistic. Beetles belonging to both families, including certain species of *Oryzaephilus*, *Ahasverus* etc., (Silvanidae) and *Cryptolestes* (Laemophloeidae), are well known pests of stored products, infesting stored cereals, their products and a wide range of other commodities. These genera have been distributed throughout the world by commerce.

To our knowledge, the only references in which records of Silvanidae and Laemophloeidae are included from the Maltese Islands, are to be found in the following publications. In a work entitled "Common beetles of the Maltese Islands", Caruana Gatto (1893) cited "*Silvanus surinamensis* L." and "*Laemophloeus pusillus* Schr." and commented that these are "unfortunately almost constant guests of all grain and wheat stores". In a list of Coleoptera published in 1907 by Malcom Cameron and Alfredo Caruana Gatto (Cameron & Caruana Gatto, 1907) eight names were included under the family heading of "Cucujidae", but only four of these are referable to Silvanidae and Laemophloeidae. Luigioni (1929), in his work on the Italian Coleoptera, merely repeated their records. Andres (1916), published a list of Lepidoptera, Hemiptera and Coleoptera which he had collected from these islands during a period of almost two years that he spent in Malta as a prisoner of war. In this list he included a record of "*Silvanus surinamensis* L." from stored sugar.

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MATERIAL AND METHODS

Depositories for material examined include the following institutions and private collections:

BMNH The Natural History Museum, London, UK;
CHU private collection Halstead, UK;
CMM private collection, Mifsud, Malta;
FSCA Florida State Collection of Arthropods, USA.

The present work was undertaken to provide an overview of the Silvanidae and Laemophloeidae that occur in the Maltese Islands. Where possible, examination of the material recorded in the list of Cameron & Caruana Gatto (1907) was undertaken. The beetle material collected around the early 1900s from the Maltese Islands (presumably collected by Malcom Cameron and/or Alfredo Caruana Gatto), of which a substantial amount is conserved in the BMNH, is labelled as "Cameron Coll. B.M. 1936-555". This material is often accompanied by a unique reference number, which corresponds to a number in Cameron's private notes and in which the following information (partially or fully) may be included: date of collection, name of the species, name of person who identified it, locality name and ecological data. In the present work, the data as written in the private notes of Cameron is recorded between square brackets following his reference number. Cameron and Caruana Gatto also make reference to material collected in Malta between 1874-6 by Commander James John Walker (J.J.W.), and this is also conserved in the BMNH and labelled "G.C. Champion Coll. B.M. 1927-409". In their list, the basis on which the species names are included is indicated; those based on examination of material are asterisked or specifically noted as "Coll. J.J.W.", others as "teste J.J.W.". No precise locality or any other data is given for the Walker material, and there is none on the specimens except "Malta". Just 12 specimens referable to the 1907 list were found in the BMNH. Additional material of Silvanidae and Laemophloeidae was collected from the Maltese Islands between 1989 and 2003 (over 200 specimens), mainly by the second author. Most of the material was collected from the island of Malta but specimens were also collected on the nearby island of Gozo. The classification and species sequence follows the checklist of the Italian fauna (Angelini *et al.*, 1995). For each species, earlier cited references (works which repeated earlier references are not included e.g. Luigioni, 1929), material examined, global distribution and additional notes where relevant, are included.

CHECKLIST OF MALTESE SILVANIDAE AND LAEMOPHLOEIDAE

Silvanidae

Airaphilus nasutus Chevrolat, 1860
Ahasversus advena (Waltl, 1834)
Oryzaepphilus mercator (Fauvel, 1889)
Oryzaepphilus surinamensis (Linnaeus, 1758)
Silvanus lewisi Reitter, 1876

Laemophloeidae

Placonotus testaceus (Fabricius, 1787)
Cryptolestes capensis (Waltl, 1834)
Cryptolestes ferrugineus (Stephens, 1831)
Cryptolestes pusilloides (Steel & Howe, 1952)
Cryptolestes pusillus (Schönherr, 1817)
Leptophloeus juniperi (Grouvelle, 1874)

ANNOTATED LIST OF SPECIES

Identification keys for species regularly found associated with stored products (8 of the 11 listed) are provided in Halstead (1993).

SILVANIDAE

Airaphilus nasutus Chevrolat, 1860

Material examined: Gozo: Ramla, 8.xii.2002, 2 exs., at the base of dying plants in a coastal sand dune habitat, leg. D. Mifsud (CMM).

Distribution: Mediterranean Region.

Notes: New record for the Maltese Islands. The coastal sand dune habitat, from which these specimens were collected, is locally vulnerable. In general, little is known about the biology of *Airaphilus* species. In various parts of the Old World, to which this genus belongs, other species have been found in haystacks, dune grass and damp meadows.

Like a few other *Airaphilus*, *A. nasutus* has greatly reduced wings. On one occasion, a single specimen of *A. nasutus* was intercepted in the UK on currants from Greece (unpublished record), perhaps indicating the possibility of spread by commerce.

***Ahasversus advena* (Waltl, 1834)**

Common Name: Foreign Grain Beetle.

Previously recorded from Malta as "*Cathartus advena* Waltl" by Cameron & Caruana Gatto, 1907: 395.

Material examined: Malta: 1 ex., G. C. Champion Coll. B.M. 1927-409 (BMNH); Salina, 19.vii.1989, 1 ex., leg. D. Mifsud (CMM); Għadira, 23.v.1990, 1 ex., leg. D. Mifsud (CMM); Msida, Tal-Qroqq, 25.xi.1994, 1 ex., leg. C. Farrugia (CMM); Zejtun, 22.x.1997, 1 ex., leg. D. Mifsud (CMM); Buskett, 12.ii.2000, 26 exs., in decaying hay and vegetation, leg. D. Mifsud (CHU, CMM); Wied tal-Isqof, 16.vii.2002, 1 ex., attracted to UV light traps, leg. D. Mifsud (CMM).

Distribution: Cosmopolitan.

Notes: *A. advena* is frequently found in stored grains, nuts (including copra and groundnuts), beans, etc. It is a mould feeder requiring some factor which is not present in foodstuffs that are entirely free from moulds or yeasts. Thus its presence is usually indicative of damp storage conditions that allow growth of moulds etc. In open fields, this species is often found in or under decaying haystacks.

***Oryzaephilus mercator* (Fauvel, 1889)**

Common Name: Merchant Grain Beetle.

Material examined: Gozo: Ramla, 1.x.1995, 2 exs., at the base of coastal sand dune vegetation, leg. D. Mifsud (CMM).

Distribution: Virtually cosmopolitan. Except in artificially heated premises, *O. mercator* has not become established in cooler, temperate countries.

Notes: New record for the Maltese Islands. This is an interesting record adding support to the suggestion (see notes on *O. surinamensis*) that the leaf litter type of habitat is a natural one for *Oryzaephilus* species. *O. mercator* is a common pest of stored products although less important than the Saw-toothed Grain Beetle. It infests a wide range of commodities but is most frequently found as a pest of oil seeds and their derivatives.

***Oryzaephilus surinamensis* (Linnaeus, 1758)**

(including **O. surinamensis* var. *bicornis* Erichson, 1846 - see notes below)

Common Name: Saw-toothed Grain Beetle.

Previously recorded from Malta as "*Silvanus surinamensis* L." by Caruana Gatto, 1893: 449; Cameron & Caruana Gatto, 1907: 395; and Andres, 1916: 58.

Material examined: Malta: 5166 [= August 1901, *Silvanus surinamensis*, E.R. (determined by E. Reitter) Malta (on board)], 3 exs., M. Cameron Coll. B.M. 1936-555 (BMNH); Zejtun, 26.ix.1989, 28 exs., in raisins, leg. D. Mifsud (CMM); Chadwick Lakes, 19.v.1990, 1 ex., leg. D. Mifsud (CMM); Buskett, 9.xi.1993, 3 exs., under bark of *Fraxinus angustifolia*, leg. D. Mifsud (CMM), same locality but 11.i.1996, 1 ex., in leaf litter under *Pistacia* sp., leg. D. Mifsud, same locality but 13.i.1999, *16 exs., leg. D. Mifsud (CMM); Marsa, Għammieri, 7.xii.1993, 1 ex., under bark of *Eucalyptus* sp., leg. D. Mifsud (CMM), same data but 9.xii.1993, 1 ex. (CMM), same data but 28.xii.1993, *2 exs. (CMM); Marsa, 31.v.1995, 2 exs., near stored grains, leg. D. Mifsud (CMM); Luqa, Marina Milling, 3.x.1995, *22 exs., near stored barley, leg. D. Mifsud (CMM); Balluta, Wardija area, limits of San Pawl il-Baħar, 23.ii.2000, *4 exs., in leaf litter under *Quercus ilex*, leg. D. Mifsud (CMM); Ballut ta' l-Imgiebaħ, limits of Selmun, 23.ii.2000, 5 exs., in leaf litter under *Quercus ilex*, leg. D. Mifsud (CMM); Zejtun, 13.iv.2002, 3 exs., sifting leaf litter under *Ceratonia siliqua*, leg. D. Mifsud (CMM); Bidnija, 8.ix.1996, *3 ex., leg. D. Mifsud (CMM), same data but 23.ii.1997, 1 ex., (CMM), same data but 30.ix.1997, 1 ex., (CMM), same data but 1.iv.2002, 1 ex., (CMM).

Distribution: Cosmopolitan in association with stored food products.

Notes: Cameron & Caruana Gatto (1907) recorded this species as common throughout the year. *O. surinamensis* is a very common and economically important pest of stored products throughout the world. It attacks many commodities including dried fruits and oil seeds, but is especially common on cereals and cereal products.

There are three strains of this beetle, Small Strain - found in the Far East; Normal Strain; and Horned Strain, *O. surinamensis* var. *bicornis* Erichson, common in the Mediterranean Region. The Horned Strain can be recognised only by the presence of backwardly curved horns that are of variable development and occur on the front of the head of larger males of the strain. Series of specimens in the above list denoted by an asterisk contain males with horns.

In the field, this species has occasionally been recorded from under bark and it has been suggested that humus, fallen seeds and dead plant material in general may be a more important natural habitats for species of *Oryzaephilus* (Halstead, 2000). The above records from leaf litter show that this type of habitat is utilized by *O. surinamensis*.

***Silvanus lewisi* Reitter, 1876**

Material examined: Malta: Zebbug, 3.v.1994, 2 exs., under bark of logs imported from Cameroon, leg. D. Mifsud (CMM).

Distribution: Widely distributed in tropical regions of the Old World (and possibly also occurs in South America).

Notes: New record for the Maltese Islands. The two specimens cited above were found alive under bark of very large logs imported from Cameroon and intended for the timber industry. So far, in Malta there have been no records of this tropical species in the wild. This species is sometimes found in small numbers on stored products (e.g. desiccated coconut), timber and dunnage imported to various countries, particularly from the Orient but also, as in this case, from Africa.

LAEMOPHLOEIDAE

***Placonotus testaceus* (Fabricius, 1787)**

Material examined: Malta: Rabat, Tal-Virtu, 16.xi.1996, 1 ex., in *Laetoporus sulphureus* on *Ceratonia siliqua*, leg. D. Mifsud (CMM); Fawwara, 4.ix.2001, 1 ex., in branches of *Ficus* sp., leg. D. Dandria (CMM); Wied tal-Isqof, 16.vii.2002, 2 exs., attracted to UV light traps, leg. D. Mifsud (CMM); Hal-Farrug, limits of Qormi, 5.i.2003, 11 exs., under bark of dead branches of *Ceratonia siliqua*, leg. D. Mifsud (CHU, CMM), 33 exs., same data as before but 26.ii.2003 (CMM).

Distribution: Palaearctic.

Notes: New record for the Maltese Islands. *P. testaceus* is a common species on mainland Europe and has been recorded from beneath the bark of various trees, including, *Tilia*, *Fagus*, *Corylus*, *Aesculus*, *Quercus*, *Ulmus* etc., and also from the galleries of various scolytids including, *Scolytus*, *Drycoetes* and *Pteleobius*.

***Cryptolestes capensis* (Waltl, 1834)**

Previously recorded from Malta as "*Laemophloeus hypobori* Perr." by Cameron & Caruana Gatto, 1907: 395 (misidentification).

Material examined: Malta: 2 exs., G.C. Champion Coll. B.M. 1927-409 (BMNH); 3 exs., 8076 [= May 1903, *Laemophloeus hypobori*, Imtahleb, (?) (illegible) faggots], M. Cameron Coll. B. M. 1936-555 (BMNH); 3 exs., M.C., v.1903/4, M. Cameron Coll. B.M. 1936-555 (BMNH); Luqa, 18.x.1989, 2 exs., under bark of *Acacia* sp., leg. D. Mifsud (CMM); Delimara, 25.x.1989, 1 ex., under bark of *Acacia* sp., leg. D. Mifsud (CMM); Ghajn Rihana, 1.viii.1993, 3 exs., between leaf-sheaths and the stem of the reed, *Arundo donax* L. and possibly in association with *Aclerda berlesii* Buffa (Coccoidea, Acleridae), leg. D. Mifsud (CMM); Buskett, 12.ii.2000, 5 exs., leg. D. Mifsud (CMM), same locality but 19.ii.2002, 1 ex., in bracket fungus, leg. D. Mifsud (CMM); Bahrija, 20.iv.2002, 3 exs., leg. D. Mifsud (CMM); Hal-Farrug, limits of Qormi, 5.i.2003, 1 ex., under bark of a dead branch of *Ceratonia siliqua*, leg. D. Mifsud (CMM); Girgenti, 17.v.2003, 2 exs., reared from dead branches of *Morus* sp., leg. D. Mifsud (CMM).

Distribution: Europe (most common in the South), western Central Asia and Africa (North and probably also South Africa).

Notes: New record for the Maltese Islands but previously, erroneously recorded as *Laemophloeus hypobori* Perr. by Cameron & Caruana Gatto (1907).

C. capensis occurs in flour and provender mills but it is regarded as of minor significance as a pest. It has also been found on almond residues in the UK, and on carobs imported to the UK from Portugal.

***Cryptolestes ferrugineus* (Stephens, 1831)**

Common Name: Rust-red Flour Beetle

Previously recorded as "*Laemophloeus ferrugineus* Steph." by Cameron & Caruana Gatto, 1907: 395.

Material examined: Malta: Delimara, 25.x.1989, 3 exs., under bark of *Acacia* sp., leg. D. Mifsud (CMM); Marsa, Għammieri, 28.xii.1993, 2 exs., under bark of *Eucalyptus* sp., leg. D. Mifsud (CMM); Marsaskala, 5.v.1998, 1 ex., leg. D. Mifsud (CMM); Wied tal-Isqof, 2.viii.2002, 1 ex., attracted to UV light trap, leg. D. Mifsud (CMM); Ħal-Farrug, limits of Qormi, 26.ii.2003, 5 exs., under bark of dead branches of *Ceratonia siliqua*, leg. D. Mifsud (CHU, CMM).

Distribution: Cosmopolitan.

Notes: *C. ferrugineus* was recorded by Cameron & Caruana Gatto (1907) as a very common species throughout the year. However, no material attributed to this species from the Maltese Islands was found in the BMNH collections. This species is a very common pest in granaries. It attacks various commodities but is most often found infesting stored cereal grains. In tropical countries it is also commonly found on oilseeds and cocoa beans. In the field, this cold hardy species is well known from under bark, particularly of *Quercus* but also of *Fagus*, *Pinus* etc.

***Cryptolestes pusilloides* (Steel & Howe, 1952)**

Material examined: Malta: Zejtun, 16.xii.1989, 1 ex., leg. D. Mifsud (CMM).

Distribution: Widespread in stored products but most frequently found in the Southern Hemisphere. In Africa it is commonest in the south. It occurs in Portugal where it was probably introduced from Mozambique. The knowledge of the distribution of this species is largely based on storage records. It has been suggested that it may have originated in Australia.

Notes: New record for the Maltese Islands. This species requires warm and moist conditions for development. Although it mainly infests cereals, it has been found infesting a vast range of commodities, including such exotic items as dried aniseed, chilli pods, mushrooms and seaweed from the Orient.

***Cryptolestes pusillus* (Schönherr, 1817)**

Common name: Flat Grain Beetle.

Previously recorded as "*Laemophloeus pusillus* Schr." by Caruana Gatto, 1893: 449.

Material examined: Malta: Zejtun, 5.vi.1989, 1 ex., leg. D. Mifsud (CMM); Marsa, Ħal-Borg, 3.x.1995, 2 exs., in flat hard wheat storage, leg. D. Mifsud (CMM).

Distribution: Widely distributed throughout the world on stored products, although predominantly a tropical species. It is commonest in wet tropical and warmer temperate regions and unable to survive in unheated premises in cooler temperate parts of the world.

Notes: This species was recorded by Caruana Gatto (1893) but his record was not repeated in the coleoptera list of 1907 (Cameron & Caruana Gatto, 1907). *C. pusillus*, occurs on a wide range of stored cereals and other commodities in the warmer parts of the world. In the cooler parts of the world it is most frequently found on cereals and cereal products.

***Leptophloeus juniperi* (Grouvelle, 1874)**

Material examined: Malta: Dingli, 14.ii.2000, 21 exs., under bark of a large chopped branch of a cultivated (?) *Prunus*, leg. D. Mifsud (CHU, CMM, FSCA); Wied tal-Isqof, 16.vii.2002, 2 exs., attracted to UV light trap, leg. D. Mifsud (CHU, CMM), same data but 2.viii.2002, 1 ex. (CMM).

Distribution: Central and Southern Europe.

Notes: New record for the Maltese Islands. This species has been recorded from under the bark of several trees etc., including *Juniperus*, *Cupressus*, *Thuja*, *Morus*, *Ulmus*, *Ficus* and *Olea*, in the galleries of scolytids. In some cases it has been recorded as feeding on the larvae of these beetles.

The species of *Leptophloeus* can be quite difficult to identify. Karner (1996) examined the genital characters of four species found in Central Europe and produced useful genitalia illustrations for distinguishing *L. juniperi*.

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