

The Bark Beetles (Coleoptera: Scolytidae) of the Maltese Islands (Central Mediterranean)

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ABSTRACT. The bark beetle fauna of the Maltese Islands is reviewed, based on literature records and examination of collected material. A total of twenty-one species have been recorded of which seventeen species represent new records from the Maltese archipelago. These include *Hylurgus micklitzii*, *Kissophagus hederarum*, *Phloeosinus thujarum*, *Liparthrum mori*, *Scolytus amygdali*, *Scolytus rugulosus*, *Scolytus sulcifrons*, *Pityogenes calcaratus*, *Orthotomicus erosus*, *Thamnurgus characiae*, *Coccotrypes dactyliperda*, *Crypturgus cylindricollis*, *Crypturgus numidicus*, *Xyleborinus saxesenii*, *Hypocryphalus scabricollis* comb. nov., *Hypothenemus eruditus* and *Hypothenemus leprieuri*. The earlier citation of *Scolytus scolytus* is incorrect and should refer to *S. sulcifrons* whereas the citation of *Cryphalus piceae* is definitely incorrect due to the absence of its host-plants in Malta. Additionally, two species, *Xyleborus ferrugineus* and *X. volvulus* were collected alive on logs originating from Tropical Africa and intended for the timber industry. So far, there were no local records of establishment of these two species in Malta.

KEY WORDS. Bark beetles, Malta, Scolytidae, new records.

INTRODUCTION

The Scolytidae, commonly referred to as bark beetles comprise some 6,000 described species world-wide (BRIGHT & SKIDMORE, 2002; KNÍŽEK & BEAVER, 2004). Most species breed in woody plants where they feed most commonly on the phloem, however few species are known from other plant parts, such as seeds, cones, fruit and the central pith of fallen leaves. Most species prefer dying or dead host material but some species are known to cause primary attacks on healthy host plants, often leading to mortality of the attacked host plant.

The bark beetle fauna of the Maltese Islands was never studied in any detail and few species are to be found in previous literature dealing with Maltese entomology. Following, we provide an account of previously recorded species of Scolytidae from the Maltese Islands. Probably, the earliest records are those of CAMERON & CARUANA GATTO (1907) in which four species are reported. This material was available for study during the present work and additional information on this historical material is to be found in MIFSUD & AUDISIO (2008). BORG (1922) in his book entitled “*Cultivation and Diseases of fruit trees in the Maltese Islands*” does mention some species of bark beetles but, as with most other insect pests and diseases mentioned therein, in most cases no specific detail is provided as to whether or not the mentioned organism occurs in Malta. LUIGIONI

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(1929), in his work on the Italian Coleoptera, merely repeated the records of CAMERON & CARUANA GATTO (1907). ANDRES (1916) published a list of Lepidoptera, Hemiptera and Coleoptera which he 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 single record of bark beetle, "*Cryphalus piceus* [sic!] Rtz.", but *Cryphalus piceae* (Ratzeburg, 1837) is a species which is mainly associated with *Abies* and *Picea* trees. Since this material was not available for study and due to the absence of the mentioned host-trees in Malta, this species is excluded from the present work. SALIBA (1963) produced a general work on insect pests of crop plants in the Maltese Islands. In this work he listed three species of bark beetles, and the only details provided for these records included local abundance and host plants. CILIA (1974) published a revision of the bark beetles of Malta. He included all previous records and added *Scolytus mediterraneus*. Both the works of SALIBA (1963) and CILIA (1974) lack species descriptions and some identification need validation.

The present work was undertaken in order to have a more realistic picture of the bark beetle fauna of the Maltese Islands. The work forms part of a larger project which the first author is coordinating so as to update the faunistic knowledge of the coleopteran fauna of the Maltese Islands.

MATERIAL AND METHODS

Material of bark beetles was collected from the Maltese Islands between 1989 and 2007, by general sweeping, from under bark of trees and woody plants, from branches, by light traps and by rearing infected woody parts of plants for the possible emergence of the beetles. For macrophotography of the specimens, a system consisting of an Olympus SZH 10 binocular microscope combined with a DP72 Olympus Digital microscope camera was used. Photos were finally processed by using the Deep Focus Model.

We follow the nomenclature used by WOOD & BRIGHT (1992) with some modifications proposed by PFEFFER (1995). More recently, the higher classification of bark beetles was modified to include the group as a subfamily of Curculionoidea (e.g. LAWRENCE & NEWTON, 1995). For each species distributional and host plant data (after WOOD & BRIGHT, 1992; BRIGHT & SKIDMORE, 1997; PFEFFER, 1995; COLONNELLI, 2003) are included.

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

BMNH Natural History Museum, London, UK;
CBT private collection Beaver, Thailand;
CKP private collection Knížek, Prague;
CMM private collection Mifsud, Malta.

CHECKLIST OF MALTESE BARK BEETLES

FAMILY SCOLYTIDAE Latreille, 1807**Subfamily Hylesininae Erichson, 1836****Tribe Tomicini C.G. Thomson, 1859***Hylurgus micklitzii* Wachtl, 1881**Tribe Hylesinini Erichson, 1836***Kissophagus hederæ* Schmitt, 1843*Hylesinus varius* (Fabricius, 1775)**Tribe Phloeotribini Chapuis, 1869***Phloeotribus scarabaeoides* (Bernard, 1788)**Tribe Phloeosinini Nüsslin, 1912***Phloeosinus thujæ* (Perris, 1855)**Tribe Hypoborini Nüsslin, 1911***Lipathrum mori* (Aubé, 1862)*Hypoborus ficus* Erichson, 1836**Subfamily Scolytinae Latreille, 1807****Tribe Scolytini Latreille, 1807***Scolytus sulcifrons* Rey, 1883*Scolytus mali* (Bechstein, 1805)*Scolytus amygdali* Guérin-Meneville, 1847*Scolytus rugulosus* (Müller, 1818)**Tribe Ipini Bedel, 1888***Pityogenes calcaratus* (Eichhoff, 1878)*Orthotomicus erosus* (Wollaston, 1857)**Tribe Dryocoetini Lindemann, 1876***Thamnurgus characiæ* Rosenhauer, 1878*Coccotrypes dactyliperda* (Fabricius, 1801)**Tribe Crypturgini LeConte, 1876***Crypturgus cylindricollis* Eggers, 1940*Crypturgus numidicus* Ferrari, 1867**Tribe Xyleborini LeConte, 1876***Xyleborus ferrugineus* (Fabricius, 1801)**Xyleborus volvulus* (Fabricius, 1775)**Xyleborinus saxesenii* (Ratzeburg, 1837)**Tribe Cryphalini Lindemann, 1876***Hypocryphalus scabricollis* (Eichhoff, 1878) comb. nov.*Hypothenemus eruditus* Westwood, 1836*Hypothenemus leprieurii* (Perris, 1866)

*Introduced species whose establishment was not confirmed

KEY TO GENERA OF MALTESE BARK BEETLES

1. Lateral outer margin of anterior tibiae unarmed by tooth-like processes except for single curved process at outer apical angle; elytra slightly or not declivous behind, the abdomen ascending abruptly behind to meet them *Scolytus* Geoffroy, 1762
- Lateral outer margin of anterior tibiae armed by several tooth-like processes; elytra declivous behind, descending to meet the horizontal abdomen 2
2. Basal margins of elytra procurved and armed by a series of marginal crenulations; pronotum weekly if at all declivous anteriorly; head usually visible from dorsal view 3
- Basal margins of elytra forming a straight, transverse line across body, unarmed, sometimes with weekly elevated continuous line; pronotum weekly to strongly declivous anteriorly, usually armed by many asperate crenulations; head usually partly or entirely concealed from dorsal view 9
3. Smaller species, 0.9 - 1.3 mm long 4
- Larger species, 1.5 - 4.3 mm long 5
4. Setae on elytral interstriae hair-like, long and erect; antennal funicle 5-segmented *Hypoborus* Erichson, 1836
- Setae on elytral interstriae scale-like, short and semi-erect; antennal funicle 4-segmented *Liparthrum* Wollaston, 1864
5. Antennal club symmetrical, cone-shaped, not flattened, when asymmetrical, than very slightly flattened and pointed apically 6
- Antennal club asymmetrical, flattened, not pointed apically or strongly modified 8
6. Anterolateral areas of pronotum without asperities; prothorax without elevated costate ridge from coxa to anterior margin *Hylurgus* Latreille, 1810
- Anterolateral areas of pronotum asperate; prothorax with elevated costate ridge from coxa to anterior margin 7
7. Antennal funicle 7-segmented; pronotal and elytral surface nearly fully covered with wide scale-like setae of different colours *Hylesinus* Fabricius, 1801
- Antennal funicle 6-segmented; pronotal surface covered with hair-like setae; surface of elytra nicely visible through thick semi-erected hair-like setae... *Kissophagus* Chapuis, 1869
8. Antennal club segments immovable; elytral interstriae 1 and 2 depressed on the elytral declivity, interstriae 3 armed by series of tubercles *Phloeosinus* Chapuis, 1869
- Antennal club segments constricted at sutures and movable, profoundly extended outwards into a sublamellate process; elytral declivity regularly rounded. *Phloeotribus* Latreille, 1796
9. Elytral declivity flattened, truncated, depressed or other way modified, bearing some kind of tubercles, tooth-like or spine-like processes 10
- Elytral declivity not extremely modified, regularly rounded or flattened to shallowly depressed, without any processes 13

10. Meso- and meta-thoracic tibiae slender, abruptly narrowed apically, with a few widely spaced coarse teeth; males and females similar in size and general shape11
- Meso- and meta-thoracic tibiae broadly dilated to just beyond their middle length, than gradually narrowed to apex, with a series of small closely set teeth, all about the same size and shape; males rare, smaller than females, dwarfed, often different in shape12
11. Smaller species, 2.0 - 2.8 mm long; elytral declivity rounded, bearing several pairs of strong spines (in males) or pointed tubercles (in females), along sutura slightly sulcate.....*Pityogenes* Bedel, 1888
- Larger species, 2.7 - 3.5 mm long; elytral declivity very steep, truncated, shallowly concave, lateral margins elevated and armed by tooth-like processes.....*Orthotomicus* Ferrari, 1867
12. Scutellum nicely visible, moderately large, its surface flush with adjacent surface of elytra ..
.....*Xyleborus* Eichhoff, 1864
- Scutellum hardly visible, cone-shaped, displaced cephalad from anterior margin of elytra ..
.....*Xyleborinus* Reitter, 1913
13. Larger species, 2.0 - 2.8 mm long; development in *Euphorbia* or palm seeds14
- Smaller species, 0.7 - 1.95 mm long; phloeophagous, living in regular woody plants15
14. Cylindrical; pronotum remarkably longer than its width, slightly declivous; elytral declivity flattened to shallowly concave; both sexes of equal size; development in *Euphorbia*
.....*Thamnurgus* Eichhoff, 1864
- Suboval, stout; pronotum rounded, strongly declivous, elytral declivity regularly rounded; males dwarfed; development in palm seeds*Coccotrypes* Eichhoff, 1878
15. Antennal funicle 2 - segmented, club with one obscure suture indicated at tip; pronotum weekly declivous, without asperities; development in coniferous trees (*Pinus*, *Picea*)
.....*Crypturgus* Erichson, 1836
- Antennal funicle with more than 2 segments, club clearly marked by sutures; pronotum strongly declivous, its declivity with numerous asperities, anterior margin asperate; development in broadleaf hosts (e.g. *Ficus*)16
16. Suboval, stout, 1.54 - 1.95 mm long; antennal club sutures aseptate, remarkably procurved; tarsal segment 3 rather broad, bilobed.....*Hypocryphalus* Hopkins, 1915
- Cylindrical, 0.7 - 1.55 mm long; antennal club sutures septate, stright or weekly procurved; tarsal segment 3 narrow, laterally compressed, not bilobed.*Hypothenemus* Westwood, 1836

ANNOTATED FAUNISTIC LIST

FAMILY SCOLYTIDAE

Subfamily Hylesininae

Tribe Tomicini

Hylurgus micklitz Wachtl, 1881

(Fig. 1, 2)

Diagnosis: The only species of the genus in Malta. Body length 3.5 - 4.3 mm, longitudinal, parallel, dark brown; head visible from dorsal aspect, frons densely punctato-granulate, convex, slightly transversely flattened above epistoma where a short longitudinal keel is present, antennal club conical; pronotum longer than wide, narrowing and constricted anteriorly, nearly straight (not declivous) from lateral aspect, rather deeply punctate with median longitudinal impunctate area, shining, laterally with very long hair-like setae; basal margins of elytra procurved, raised and armed by a series of crenulations, elytra parallel, laterally with very long hair-like setae as on the pronotum, declivity rounded and without any remarkable morphological extremities, but densely pubescent.

Material examined: MALTA: Buskett, 24.vi.2003, 1 ex., attracted to light in mixed woodland *Pinus/Cupressus*, leg. D. Mifsud (CMM); Mellieha, Kortin, 9.vii.2004, 1 ex., attracted to UV light trap, leg. H. Borg Barthet (CMM).

Distribution: Croatia, France, Germany, Greece, Hungary, Italy (including Sardinia and Sicily), Spain, South Russia in Europe; Israel, Turkey in Asia; Algeria, Egypt, Libya, Morocco, Tunisia in North Africa.

Host plants: Mainly *Pinus halepensis* but also other *Pinus* spp.

Comments: *H. micklitz* represent a new record for the Maltese Islands.

Tribe Hylesinini

Kissophagus hederæ (Schmitt, 1843)

(Fig. 3, 4)

Diagnosis: Body length 2.0 - 2.4 mm, longitudinal, slender, brown; head visible from dorsal aspect; frons densely punctato-granulate, convex, antennal club longitudinally conical; pronotum longer than wide, constricted anteriorly, nearly straight (not declivous) from lateral aspect, rather deeply and densely punctate, matt, all pronotal setae directed towards the centre of the pronotal disk; basal margins of elytra procurved, raised and armed by a series of conspicuous tubercles, elytral striae punctate and deeply impressed, interstriae wider than striae, covered with short scale-like setae in two rows and with one row of two or three times longer setae in middle, declivity regularly rounded and without any remarkable morphological extremities.

Material examined: MALTA: Buskett, 15.vii.1997, 1 ex., leg. D. Mifsud (CKP), Buskett, 24.vi.2003, 1 ex, attracted to light in mixed woodland, leg. D. Mifsud (CKP), 14.ii.2000, 4 exs., dead specimens in dead branches of *Hedera helix*, leg. D. Mifsud (CKP, CMM).

Distribution: Austria, Belgium, Croatia, France, Germany, Great Britain, Greece, Hungary, Italy (including Sardinia and Sicily), Malta, Poland, South Russia, Spain, Switzerland, Ukraine in Europe, Algeria in North Africa and Turkey in Asia.

Host plants: *Hedera helix* and *H. colchica*.

Comments: *K. hederæ* represents a new record for the Maltese Islands. Within the above cited material, one specimen was tentatively determined as *K. novaki* Reitter, 1894, which has all morphological characters as in previous species except for: body length 2.0 - 2.2 mm, pronotum as long as wide, only setae on the anterior half of pronotum directed towards the centre of the pronotal disk, these on the posterior half oriented transversally, elytra somewhat more shining. Pending additional material for study and due to uncertainty of this determination, we do not list this species in the Maltese faunal list of bark beetles.

Hylesinus varius (Fabricius, 1775)

(Fig. 5, 6)

Diagnosis: The only species of the genus in Malta. Body length 2.5 - 3.5 mm, oval, pronotum and elytral surface nearly fully covered with scale-like wide setae of different colours, marbled; head visible from dorsal aspect, frons convex, slightly flattened in males, shining, punctate, covered with short rather dense setae, antennal club remarkably big, longitudinally conical, asymmetrical, pointed apically; pronotum wider than long, sides gradually narrowed anteriorly, slightly declivous from lateral aspect, densely punctato-granulose, shining, covered with marbled scale-like vestiture; basal margins of elytra procurved, armed by a series of conspicuous tubercles, elytral striae deeply punctate and impressed, interstriae wider than striae, granulate and covered with tightly placed short scale-like setae of different colours, marbled, declivity long and slightly rounded.

Material examined: MALTA: 1 ex., G.C. Champion coll., B.M. 1927-409 [D. E. Bright det. as *Hylesinus varius*] (BMNH).

Distribution: Widely distributed in central and southern Europe with records from Austria, Belgium, Bulgaria, Belarus, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy (including Sardinia), Latvia, Lichtenstein, Lithuania, Luxemburg, Macedonia, Malta, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, Yugoslavia in Europe; Algeria, Morocco, Tunisia in North Africa; China, Iran, Turkey in Asia.

Host plants: Mainly *Fraxinus* spp., but occasionally also in *Olea* sp., *Juglans* spp., *Quercus* spp., *Robinia pseudoacacia*, *Acer* spp., *Ailanthus* spp., *Carpinus betulus*, *Corylus avellana*, *Fagus sylvatica*, *Pyrus malus* and *Syringa vulgaris*.

Comments: CAMERON & CARUANA GATTO (1907) recorded this species from Girgenti under the name of '*Hylesinus fraxini* Panzer'. This material was collected in Malta by Commander James

John Walker in 1874-76. The above cited specimen is the same one which was available to Cameron and Caruana Gatto in 1907. CILIA (1975) recorded this species from Girgenti and also from Buskett.

Tribe Phloeotribini

Phloeotribus scarabaeoides (Bernard, 1788)

(Fig. 7, 8)

Diagnosis: The only species of the genus in Malta. Body length 1.8 - 2.5 mm, shortly oval, dark brown to black, elytra brownish in basal two-thirds, head visible from dorsal aspect; frons convex, semi-shining, punctate, with rather sparse long hair-like setae, antennal club very big, particular segments constricted at sutures and movable, profoundly extended into a sublamellate process; pronotum wider than long, sides gradually narrowed anteriorly, constricted anteriorly, slightly declivous from lateral aspect, densely punctato-granulose, semi-shining, with hair-like long setae; basal margins of elytra procurved, armed by a series of conspicuous tubercles, elytral striae finely punctate and not impressed, interstriae wider than striae, covered with two or more rows of short scale-like setae and with one row of long, semi-erected hair-like setae in the middle, declivity regularly rounded. The species is very distinct by the extreme shape of the antennal club.

Material examined: MALTA: Wied il-Ghasel, 26.ix.1992, 2 exs., in dead twigs of *Olea europaea*, leg. D. Mifsud (CKP, CMM); Fiddien, 19.iii.1996, 1 ex., leg. D. Mifsud (CMM); Zejtun, 22.x.1997, 1 ex., leg. D. Mifsud (CKP).

Distribution: Bulgaria, Croatia, France (including Corsica), Greece, Hungary, Italy (including Sardinia and Sicily), Malta, Portugal, Spain, Switzerland, Ukraine in Europe; Algeria, Canary Islands, Egypt, Libya, Morocco and Tunisia in North Africa; Cyprus, Iraq, Israel, Jordan, Lebanon, Syria and Turkey in Asia.

Host plants: Development takes place mainly in branches of *Olea europaea*, but also in *Pistacia lentiscus*, *Fraxinus* spp., *Phyllyrea* spp., *Rhamnus alaternus* and *Syringa vulgaris*.

Comments: This species was recorded by CAMERON & CARUANA GATTO (1907) from "Marsa Scirocco" (an old version for the village name of Marsaxlokk). CILIA (1975) recorded the species from Wied Has-Sabtan. SALIBA (1963) reported this species as occasional on olives.

Tribe Phloeosinini

Phloeosinus thujae (Perris, 1855)

(Fig. 9, 10)

Diagnosis: The only species of the genus in Malta. Body length 1.5 - 2.2 mm, shortly oval, dark brown; head visible from dorsal aspect, frons impressed in males with longitudinal keel, convex in females, punctato-granulose, with rather short hair-like setae, antennal club rather big, asymmetrical, rounded apically; pronotum wider than long, sides parallel in basal half, then

strongly constricted anteriorly, very slightly declivous from lateral aspect, punctate, shining, with rather sparse hair-like setae; basal margins of elytra procurved, armed by a series of tubercles, elytral striae very narrow, finely punctate and deeply impressed, interstriae much wider than striae, finely punctate and with series of small granules in the middle, elytral declivity rounded, impressed on 1. and 2. interstriae, 3., 5. and 7. interstriae on the declivity with series of conspicuous tubercles, these on 3. interstriae are the biggest, tubercles less developed in females, whole elytra covered with fine hair-like setae getting scale-like character posteriorly (on the declivity). The species is very distinct by the shape of elytral declivity, mainly in males.

Material examined: MALTA: Buskett, 6-12.v.2003, 14 exs., reared from dead branches and trunks of *Cupressus sempervirens*, leg. D. Mifsud (CMM).

Distribution: Albania, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Croatia, Czech Republic, France (including Corsica), Germany, Great Britain, Greece, Hungary, Italy (including Sardinia and Sicily), Macedonia, Malta, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Spain, Switzerland, Ukraine, Yugoslavia in Europe; Algeria, Canary Islands, Egypt, Libya, Morocco, Tunisia in North Africa; Turkey in Asia.

Host plants: *Biota orientalis*, *Callitris* sp., *Chamaecyparis* spp., *Cupressus* spp., *Juniperus* spp., *Platycladus orientalis*, *Sequoia* spp., *Thujae* spp., *Thujopsis dolobrata*, *Tsuga heterophylla* and *Wellingtonia* spp.

Comments: *P. thujae* represents a new record for the Maltese Islands.

Tribe Hypoborini

Liparthrum mori (Aubé, 1862)

(Fig. 11, 12)

Diagnosis: The only species of the genus in Malta. Body length 0.9 -1.2 mm, one of the smallest species in Malta, shortly oval, dark brown if fully coloured; head nearly fully concealed under pronotum, frons flattened, punctate, antennal funicle 4-segmented; pronotum wider than long, rapidly narrowed anteriorly, very slightly declivous from lateral aspect, finely punctate, semi-shining, with very sparse irregularly placed tubercles in two middle lines on anterior half, pubescence of sparse scale- and hair-like setae; basal margins of elytra procurved, rather strongly elevated, deeply and sparsely punctured in the rows, finely punctate on interstriae, setae on elytral interstriae scale-like, short and semi-erect, these getting more abundant posteriorly near elytral apex.

Material examined: MALTA: Marsa, Ghammieri, 24.xii.1996, 1 ex., from mulberry twigs, leg. C. Farrugia (CKP), 19.i.1997, 1 ex., from mulberry twigs, leg. C. Farrugia (CMM), 24.ii.1997, 1 ex., from *Morus* sp. twigs, leg. C. Farrugia (CKP); Wied tal-Isqof, 16.vii.2002, 6 exs., attracted to UV light trap, leg. D. Mifsud (CMM); Girdgenti, 5.vi.2003, 7 exs., reared from dead branches of *Morus* sp., leg. D. Mifsud (CMM).

Distribution: Croatia, France, Greece, Hungary, Italy (including Sardinia), Malta, Ukraine in Europe; Algeria, Morocco and Tunisia in North Africa.

Host plants: *Genista* spp., *Morus alba*, *Ficus carica* and *Viscum laxum laxum* on *Pinus maritima*.

Comments: *L. mori* represents a new record for the Maltese Islands.

***Hypoborus ficus* Erichson, 1836**

(Fig. 13, 14)

Diagnosis: The only species of the genus in Malta. Body length 1.0 - 1.3 mm, morphological characters similar as for previous species, but more stout, antennal funicle 5-segmented, pubescence of more hair-like setae only and with distinct hair-like very long erected sparse setae on the elytra.

Material examined: MALTA: 33 exs., G.C. Champion coll., B.M. 1927-409 (BMNH); Valletta, 16.ix.1989, 1 ex., in *Ficus* sp., leg. D. Mifsud (CMM); Żejtun, 13.viii.1990, 2 exs., leg. D. Mifsud (CMM), 16.ix.1993, 1 ex., leg. D. Mifsud (CMM), 22.x.1997, 1 ex., leg. D. Mifsud (CMM), 1.ix.2001, 1 ex., leg. D. Mifsud (CMM); Buskett, 15.ix.1995, 1 ex., in *Ficus carica*, leg. D. Mifsud (CMM), 7.xi.1995, 1 ex., in *Ficus carica*, leg. C. Farrugia (CMM); Selmun, 30.iii.1996, 1 ex., leg. D. Mifsud (CMM); Girgenti, 8.x.1996, 1 ex., leg. D. Mifsud (CMM); Wied Has-Sabtan, 31.xii.1996, 1 ex., leg. D. Mifsud (CMM); Dingli, 14.ii.2000, 29 exs., in *Ficus carica*, leg. D. Mifsud (CKP, CMM); St. Thomas Bay, Tal-Munxar, 13.iv.2003, 1 ex., leg. D. Mifsud (CMM). **GOZO:** Ghasri, 28.xi.1994, 6 exs., under bark of *Ficus carica*, leg. C. Farrugia (CMM), 22.vi.1995, 4 exs., in *Ficus carica*, leg. C. Farrugia (CMM).

Distribution: Austria, Azerbaijan, Azores, Bosni Herzegovina, Bulgaria, Croatia, France (including Corsica), Greece, Hungary, Italy (including Sardinia and Sicily), Macedonia, Malta, Portugal, Russia, Slovenia, Spain, Switzerland, Ukraine, Yugoslavia in Europe; Algeria, Canary Islands, Egypt, Madeira Islands, Morocco, Tunisia in North Africa; Cyprus, Iran, Iraq, Israel, Jordan, Turkey in Asia.

Host plants: Mainly associated with *Ficus carica* but the following hosts are also recorded, *Ailanthus altissima*, *Styrax officinalis* and *Vitis vinifera*.

Comments: This species was recorded by CAMERON & CARUANA GATTO (1907) from "Marsa Scirocco" (an old version for the village name of Marsaxlokk) and CILIA (1974) recoded it from Manoel Island. This species is very common and widespread throughout the Maltese Islands.

Subfamily Scolytinae

Tribe Scolytini

Key to the Maltese species of *Scolytus*

1. Body length 3.4 - 6.0 mm, very large species; frons with not very dense long hair-like setae except hairless stripe in the middle; abdomen slightly concave, with long sparse setae in males and glabrous in females, posterior margin of the 3. and 4. sternite with small tubercle in the middle, which are sometimes missing in males, anal margin of the 5. sternite bears a flat brush of setae in males, distinctly divided into 4 larger and 2 narrow bunches of dense hairs*sulcifrons*
- Body length 1.4 - 4.5 mm, medium and small species; frons with very sparse hair-like setae or nearly glabrous; abdomen obliquely ascendant, with rather short setae, posterior margin of the 3. and 4. sternite without tubercles, anal margin of the 5. sternite without brush of setae**2**
2. Body length 3.0 - 4.5, medium size species; frons broadly convex in females and flattened in males, rugose, nearly glabrous except long hair-like setae laterally above epistoma; pronotum very finely punctured also laterally; elytral interstriae flat and very wide, posterior margin of elytra unarmed or with very fine tubercles*mali*
- Body length 1.4 - 4.2 mm, smaller species; pronotum deeply punctured laterally, where punctures round or elongate, nearly forming furrows; elytral interstriae narrow and densely punctured, posterior margin of elytra armed by remarkably tubercles**3**
3. Body length 2.0 - 3.0, elytra reddish; frons impressed in males and with conspicuous carina in its middle, weakly flattened in females, sometimes also with carina; pronotum deeply punctured laterally, punctures more regular; elytra shining, elytral interstriae flat, finely and sparsely punctured, striae not impressed and not densely punctured; posterior margin of elytra armed with conspicuous tubercles*amygdali*
- Body length 1.4 - 4.2 mm, dark, nearly black; frons convex in both sexes, slightly flattened in males; pronotum very deeply punctured laterally, punctures there and on the base of pronotum elongate, nearly forming furrows; elytra matt, elytral interstriae very narrow and densely punctured similarly as in deep striae, posterior margin of elytra armed by small tubercles*rugulosus*

Scolytus sulcifrons Rey, 1883

(Fig. 15, 16)

Diagnosis: Body length 3.4 - 6.0 mm, very large species, black, with the elytra rusty-red-brown; frons slightly flattened in males, convex in females, finely longitudinally rugose and with not very dense long hair-like setae except hairless stripe in the middle; pronotum wider than long, finely punctate on disk, stronger punctuation anteriorly and laterally, light neck-like constriction anteriorly; elytral apex truncate at the suture, scutelar fovea deep but not reaching elytral half, elytral striae depressed, shallowly punctate, interstriae broad, less strongly punctate; abdomen slightly concave, with long sparse setae in males and glabrous in females, posterior margin of the

3. and 4. sternite with small tubercle in the middle, which are sometimes missing in males, anal margin of the 5. sternite bears a flat brush of setae in males, distinctly divided into 4 larger and 2 narrow bunches of dense hairs, females without this brush, 5. sternite with transverse shallow impression posteriorly.

Material examined: MALTA: 1 ex., G.C. Champion coll., B.M. 1927-409, [*S. destructor* Ol. (hand written label)] (BMNH).

Distribution: Bulgaria, Croatia, France, Greece, Hungary, Italy, Kazakhstan, Macedonia, Malta, Poland, Russia Ukraine in Europe.

Host plants: *Ulmus* spp. and *Quercus* sp.

Comments: CAMERON & CARUANA GATTO (1907) recorded *Scolytus scolytus* (Fabricius, 1775) from the Maltese Islands. This material was collected by Commander James John Walker in 1874-76. The above cited specimen is the same one which was available to Cameron and Caruana Gatto in 1907. Thus the record of *S. scolytus* by CAMERON & CARUANA GATTO (1907) should refer to the above cited species. CILIA (1975) recorded *S. scolytus* from Buskett (on *Fraxinus*) and Chadwick Lakes (on *Populus*). This material was not available during the present study but we are of the opinion that such records may either refer to *S. sulcifrons* or to some other species of *Scolytus*.

***Scolytus mali* (Bechstein, 1805)**

(Fig. 17, 18)

Diagnosis: Body length 3.0 - 4.5, medium size species, shining, black, elytra rusty-brown; frons broadly convex in females and slightly flattened in males, slightly impressed above clypeus, rugose, nearly glabrous except long hair-like setae laterally above epistoma; pronotum wider than long, very finely punctured on disk and also laterally; elytra slightly broadly emarginate apically at the suture, scutelar fovea conspicuous, extending beyond the elytral half, elytral striae depressed, densely punctuate, elytral interstriae flat and very wide, less strongly punctuate, posterior margin of elytra unarmed or with very fine tubercles; abdomen slightly, concavely ascendant in both sexes, covered with sparse erect hair-like setae, these are longer laterally in males, 4. sternite somehow thickened in the middle in the form of a small tubercle-like process in males.

Material examined: None.

Distribution: Austria, Belarus, Belgium, Bosnia Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy (including Sicily), Latvia, Lithuania, Luxemburg, Malta, Macedonia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, Yugoslavia in Europe; Algeria, Egypt, Morocco in North Africa; China, Iran, Russia, Turkey in Asia. The species was also introduced in North America.

Host plants: *Armeniaca vulgaris*, *Carpinus betulus*, *Malus* spp., *Prunus* spp., *Pyrus* spp., *Castanea* spp., *Cerasus* spp., *Corylus* sp., *Cotoneaster* sp., *Crataegus* spp., *Cydonia* spp.,

Laurocerasus officinalis, *Malus* spp., *Padellus mahaleb*, *Padus avium*, *Persica vulgaris*, *Populus* spp., *Pyracantha coccinea*, *Sorbus* spp. and *Ulmus* spp.

Comments: This species was recorded by both SALIBA (1963) and CILIA (1975). The latter recorded the species from Wied il-Faham and stated that it is a rather common species on *Prunus* and *Crataegus monogyna*. SALIBA (1963) states that it is common on apple, pear and plum.

Scolytus amygdali Guérin Méneville, 1847

(Fig. 19, 20)

Diagnosis: Body length 2.0 - 3.0, small species, elytra reddish; frons impressed in males and with conspicuous carina in its middle, weakly flattened in females, sometimes also with carina; pronotum nearly as wide as long, neck-like constricted anteriorly, deeply punctured laterally, punctures small, elongate and more regular, sometimes forming short furrows on lateral sides of pronotum; scutellar area nearly reaching elytral half, elytra shining, elytral interstriae flat, finely and sparsely punctured, striae not impressed and not densely punctured; posterior margin of elytra armed with conspicuous tubercles; abdominal sternites convexly ascendant, without any processes and tubercles, dull, not very strongly pubescent.

Material examined: MALTA: Żejtun, 30.ix.1989, 1 ex., leg. D. Mifsud (CKP), 8.ix.1990, 1 ex., leg. D. Mifsud (CKP); Siġġiewi, 25.vii.1993, 2 exs., under bark of cultivated plume tree, leg. D. Mifsud (CMM); Balzan, 28.ix.1996, 3 exs., in dead branch of peach tree, leg. D. Mifsud (CKP, CMM); Dingli, 14.ii.2000, 5 exs., under bark of dead (?) *Prunus* sp. (cultivated), leg. D. Mifsud (CKP, CMM); Rabat, 14.ix.2001, 8 exs., in branches of *Prunus armeniaca*, leg. D. Mifsud (CMM).

Distribution: This species is widely distributed in Europe, being recorded from Austria, Bulgaria, Croatia, France (including Corsica), Georgia, Greece, Italy (including Sardinia and Sicily), Macedonia, Malta, Russia, Spain, Ukraine in Europe; Canary Islands, Egypt, Morocco, Tunisia in North Africa; Cyprus, India, Israel, Jordan, Pakistan, Syria, Turkey in Asia.

Host plants: *Amelanchier* spp., *Armeniaca vulgaris*, *Amygdalus communis*, *Mespilus germanica*, *Persica vulgaris* and *Prunus* spp.

Comments: *S. amygdali* represents a new record for the Maltese Islands. It is however possible that some of the earlier records of *S. rugulosus* should be attributed to this species (see note under *S. rugulosus*).

Scolytus rugulosus (Müller, 1818)

(Fig. 21, 22)

Diagnosis: Body length 1.4 - 4.2 mm, smaller species, but very variable in its length and other features, nearly black; frons convex in both sexes, slightly flattened in males; pronotum wider than long or as wide as long, with deep longitudinal punctuation, being stronger anteriorly and laterally, where punctures form elongate furrows; elytra matt, elytral interstriae very narrow and densely punctured similarly as in deep striae, posterior margin of elytra armed by small tubercles; abdominal sternites obliquely ascendant, without any processes and tubercles, covered with not very dense short recumbent setae and sparse and longer erected hair-like setae.

Material examined: MALTA: Rabat, 14.ix.2001, 1 ex., leg. D. Mifsud, on *Prunus armeniaca* (CKP); Fiddien, 19.v.2003, leg D. Mifsud (CMM).

Distribution: Albania, Austria, Azerbaijan, Azores, Belarus, Belgium, Bosnia Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France (including Corsica), Germany, Great Britain, Greece, Hungary, Italy (including Sardinia and Sicily), Ireland, Latvia, Lithuania, Luxemburg, Malta, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, Yugoslavia in Europe; Algeria, Egypt, Morocco, Tunisia in North Africa; China, Cyprus, India, Iran, Iraq, Israel, Kazakhstan, Lebanon, Mongolia, Pakistan, Russia, Saudi Arabia, Syria, Turkey in Asia; Oriental region; introduced into North and South America.

Host plants: *Malus* spp., *Prunus* spp., *Pyrus* spp., *Amelanchier* spp., *Crataegus* spp., *Sorbus* spp., *Cotoneaster* spp., *Cydonia oblonga*, *Mespilus* sp.

Comments: SALIBA (1963) reported the occurrence of *S. rugulosus* as occasional on plum, while CILIA (1974) reported its abundance as occasional and rather scarce (from Wied Incita and Wied is-Sewda on *Prunus* sp.). This material was not available for this study but from the short descriptions and drawings furnished by CILIA (1974) we are of the opinion that at least part of these records of *S. rugulosus* should refer to *S. amygdali*. Furthermore, CILIA (1974) recorded also *Scolytus mediterraneus* Eggers, 1922 from Dingli (on *Prunus* sp.). This taxon is however a synonym of *S. rugulosus*.

Tribe Ipini

Pityogenes calcaratus (Eichhoff, 1878)

(Fig. 23, 24, 25, 26)

Diagnosis: The only species of the genus in Malta. Body length 2.0 - 2.8 mm, long, parallel, dark brown, elytra reddish-brown, shining; head concealed from dorsal aspect, sometimes partly visible, frons flat and punctato-garnulate in male, with two deep lateral impressions and very fine punctuation in females, antennal club round, flattened, with two sinuate sutures on anterior side; pronotum cylindrical on basal half, rounded anteriorly, declivous from lateral aspect, declivity covered with asperities; elytra cylindrical, basal margins of elytra transversely straight, rounded, not ornamented, elytra very finely punctate on striae and interstriae, striae not impressed, elytral declivity round, slightly sulcate along sutura, laterally of this depression bearing three pairs of pointed spines, of which the second pair is the most developed and strong, curved and pointed posteriorly (in males) or with just small bluntly pointed tubercles (in females).

Material examined: MALTA: Żejtun, 25.x.1989, 1 ex., leg. D. Mifsud (CKP); Rabat, Dwejra, 21.vi.2002, 1 ex., attracted to UV light trap, leg. P. Sammut; Wied tal-Isqof, 2.viii.2002, 2 exs., leg. D. Mifsud; Buskett, 24.vi.2003, 55 exs., attracted to UV light trap in mixed woodland *Pinus/Cupressus*, leg. D. Mifsud (CKP, CMM).

Distribution: Croatia, France (including Corsica), Greece, Hungary, Italy (including Sardinia), Malta, Portugal, Russia, Spain, Ukraine in Europe; Algeria, Morocco, Tunisia in North Africa; Israel, Syria, Turkey in Asia.

Host plants: Mainly *Pinus* spp. but also on *Pseudotsuga menziesii*.

Comments: *P. calcaratus* represents a new record for the Maltese Islands.

***Orthotomicus erosus* (Wollaston, 1857)**

(Fig. 27, 28, 29, 30)

Diagnosis: The only species of the genus in Malta. Body length 2.7 - 3.5 mm, long, parallel, dark brown if fully coloured, often reddish, shining; head nearly fully concealed from dorsal aspect, frons finely punctato-granulate, with several conspicuous tubercles in the middle, antennal club round, flattened, with two procurved sutures on anterior side; pronotum cylindrical on basal half, rounded anteriorly, slightly constricted in the middle, declivous from lateral aspect, declivity covered with fine asperities; elytra cylindrical, basal margins of elytra transversely straight, rounded, not ornamented, elytra deeply punctate on striae and very finely and sparsely on interstriae, striae impressed, elytral declivity abrupt, truncate, shallowly concave, with lateral margins strongly elevated and armed by tooth-like processes (in males) or less developed and with smaller tubercles (in females), declivital disk deeply punctate; vestiture of very sparse, long, hair-like setae, getting more abundant near elytral declivity.

Material examined: MALTA: Floriana, 22.xi.1999, 10 exs., under bark of *Pinus halepensis*, leg. C. Farrugia (CKP, CMM); Rabat, Saqqajja, 28.iii.2003, 77 exs., under bark of *Pinus halepensis*, leg. D. Mifsud (CKP, CMM); Buskett, 24.vi.2003, 10 exs., attracted to UV light trap in mixed woodland *Pinus/Cupressus*, leg. D. Mifsud (CKP, CMM).

Distribution: Austria, Azores, Bulgaria, Croatia, Finland, France (including Corsica), Great Britain, Greece, Italy (including Sardinia and Sicily), Macedonia, Malta, Poland, Portugal, Russia, Slovenia, Spain, Switzerland, Ukraine, Yugoslavia in Europe; Algeria, Egypt, Libya, Madeira, Morocco, Tunisia in North Africa; Afghanistan, China, Iran, Israel, Jordan, Korea, Syria, Turkey Uzbekistan in Asia; introduced into South Africa and North America.

Host plants: *Pinus* spp., rarely in *Abies pinsapo*, *Cedrus libani* and *Picea orientalis*.

Comments: *O. erosus* represent a new record for the Maltese Islands.

Tribe Dryocoetini

***Thamnurgus characiae* Rosenhauer, 1878**

(Fig. 31, 32)

Diagnosis: The only species of the genus in Malta. Body length 2.0 - 2.8 mm, long, parallel, dark brown, shining, both sex of equal size; head nearly fully concealed from dorsal aspect, frons shining, smooth, very sparsely punctate, antennal club round, flattened, with straight or recurved sutures on anterior side; pronotum longer than wide, suboval, lateral margins rounded very slightly declivous from lateral aspect nearly on its whole length, steeply near anterior apex, whole surface sparsely, but deeply punctate, punctures are longitudinal and curved; basal margins of elytra transversely straight, rounded, not ornamented, elytra deeply and rather sparsely punctate on striae and interstriae, striae not impressed, elytral declivity steep, flattened, slightly concave

(more distinctly so in males), lateral margins of the depression not ornamented by any tubercles or spines, declivital disc nicely punctate in the striae, shining.

Material examined: MALTA: St. Thomas Bay, Tal-Munxar, 20.iv.1996, 1 ex., leg. D. Mifsud (CMM); Mtahleb, 20.iv.1998, 1 ex., near *Cystus* shrubs, leg. D. Mifsud (CMM); Xaghri tà Laroka (Buskett area), 14.ii.2000, 10 exs., in dead branches of *Euphorbia characias*, leg. D. Mifsud (CZP, CMM). GOZO: Dwejra, 19.iv.1990, 1 ex., leg. D. Mifsud (CMM); Ramla, 3.xi.1996, 1 ex., leg. C. Farrugia (CMM).

Distribution: France, Greece, Italy (including Sardinia and Sicily), Malta, Spain in Europe; Algeria, Tunisia in North Africa.

Host plants: *Euphorbia characias*.

Comments: *T. characiae* represents a new record for the Maltese Islands. This species is locally very rare, due to the scarcity of its host plant, the large spurge, *Euphorbia characias*. In the Red Data Book for the Maltese Islands, LANFRANCO (1989) states that *E. characias* is now a very rare plant, confined to places with loose stones in the vicinity of Buskett and Mtarfa and a few places in Gozo.

Coccotrypes dactyliperda (Fabricius, 1801)

(Fig. 33, 34)

Diagnosis: The only species of the genus in Malta. Body length 2.0 – 2.5 mm, sub-oval, stout, dark or reddish brown, shining, males dwarfed; head concealed from dorsal aspect, frons shining, finely granulate, longitudinally rugose, antennal club round, flattened, with straight or recurved sutures on anterior side; pronotum rounded, strongly declivous, on the whole surface finely asperate except longitudinal smooth area on the disc; basal margins of elytra transversely straight, not ornamented, elytra sparsely punctate on striae and interstriae, striae not impressed, elytral declivity long, nearly from the middle of elytra, broadly and regularly rounded, vestiture rather sparse and of semi-erected hair-like long setae.

Material examined: MALTA: Marsa, Ghammieri, 10.x.2001, 1 ex., leg. D. Mifsud (CMM); Zejtun, 26.ix.2001, 1 ex., leg. D. Mifsud (CMM).

Distribution: France (including Corsica), Greece, Hungary, Italy (including Sardinia and Sicily), Malta, Portugal, Spain, Switzerland in Europe; Canary Islands, Egypt, Libya, Madeira, Morocco in North Africa; India, Israel, Japan, Jordan in Asia; and worldwide (other countries in Africa, Asia, Australia, New Zealand, South and North America).

Host plants: Many different plants, mainly seeds of *Phoenix* spp.

Comments: *C. dactyliperda* represents a new record for the Maltese Islands.

Tribe Crypturgini

Key to the Maltese species of *Crypturgus*

1. Body length 1.0 - 1.2 mm, slender, shining; pronotum rather strongly punctate, surface smooth in between the punctuation; elytral striae deeply regularly punctured with distinct interspaces between the punctures, interstriae smooth, very finely and sparsely punctured, declivital setae rather sparse in both sex.....*cylindricollis*
- Body length 1.45 - 1.55 mm, stout, semi-shining; pronotum rather strongly punctate, surface shagreened in between the punctuation, nearly matt; elytral striae deeply and very densely punctured without distinct interspaces between the punctures, interstriae punctato-granulate, not smooth, declivital setae dense, very dense (brushy) in females.....*numidicus*

Crypturgus cylindricollis Eggers, 1940

(Fig. 35, 36)

Diagnosis: Body length 1.0 - 1.2 mm, slender, cylindrical, dark brown to black, elytra slightly lighter than pronotum, shining; head partly visible from dorsal aspect, frons semi-shining, densely finely punctate, slightly convex to flattened; pronotum sub-parallel with rounded anterior and posterior angles, very weakly declivous, densely and rather deeply punctate, between punctures finely shagreened, without any asperities; basal margins of elytra transversely straight, not armed, elytra parallel, deeply punctate on striae and very finely and sparsely on interstriae, striae impressed, elytral declivity rounded, without any extremities, sparsely covered with long hair-like setae.

Material examined: MALTA: Mistra Valley, 30.viii.1999, 1 ex., leg. C. Farrugia (CMM).

Distribution: Bosnia Herzegovina, Bulgaria, Croatia, Greece in Europe; Turkey in Asia.

Host plants: *Pinus* spp. and *Picea orientalis*.

Comments: *C. cylindricollis* represents a new record for the Maltese Islands. This species is often synonymized with *C. pusillus* (Gyllenhal), but PFEFFER (1994) treats this taxon as a separate species.

Crypturgus numidicus Ferrari, 1867

(Fig. 37, 38)

Diagnosis: Body length 1.45 - 1.55 mm, stout, semi-shining to matt, dark brown, semi-shining; head partly visible from dorsal aspect, frons matt, very densely and finely punctate, slightly convex; pronotum rounded, sub-oval, weakly declivous, but more than previous species, densely finely punctate on disc, punctato-granulose anteriorly, between punctures finely shagreened, matt, without any asperities; basal margins of elytra transversely straight, not armed, elytra parallel, very deeply and densely punctate on striae without distinct interspaces between the punctures, punctato-granulose on interstriae, striae impressed, elytral declivity rounded, without any

extremities, sparsely covered with long hair-like setae in males and with dense brush-like setae in females.

Material examined: MALTA: Rabat, Saqqajja, 28.iii.2003, 72 exs., in bark of dead trunk of *Pinus halepensis*, leg. D. Mifsud (CMM), Buskett, 24.vi.2003, leg. D. Mifsud

Distribution: Bosnia Herzegovina, Bulgaria, Croatia, France (including Corsica), Greece, Hungary, Italy (including Sardinia and Sicily), Russia, Spain in Europe; Algeria, Tunisia in North Africa; Turkey in Asia.

Host plants: *Abies pinsapo*, *A. numidica*, *Cedrus libanotica*, *Pinus halepensis*, *P. pinaster*, *P. pithyusa*, *P. leucodermis*.

Comments: *C. numidicus* represents a new record for the Maltese Islands.

Tribe Xyleborini

Key to the species of *Xyleborus* (females)

1. Body length 2.0 - 3.3 mm, elytral declivity flattened, 2. interstriae impressed, without tubercles, 1. interstriae with small pointed tubercles at the base and very sparse towards apex, 3. interstriae armed by about three widely spaced pointed tubercles, the one near middle conspicuously larger than others**ferrugineus**
- Body length 2.1 - 2.8 mm, elytral declivity distinctly convex, 2. interstriae not impressed, without tubercles, 1. and 3. interstriae armed by series of tubercles all of equal size and shape**volvulus**

Xyleborus ferrugineus (Fabricius, 1801)

(Fig. 39)

Diagnosis: Body length 2.0 - 3.3 mm, cylindrical, slender, reddish brown, shining; head concealed from dorsal aspect, frons semi-shining, finely reticulate, punctures sparse and small; pronotum longer than wide, sides parallel on basic two thirds, rounded frontally, declivity asperate, disk sparsely and shallowly punctate; scutellum nicely visible, moderately large, its surface flush with adjacent surface of elytra; basal margins of elytra transversely straight, not ornamented, sides of elytra parallel, rounded behind, rather coarsely punctate on striae, striae not impressed, interstriae finely punctate, elytral declivity steep, flattened, interstriae 1 and 2 flat (2 rather impressed), unarmed except for one or two pointed granules at base of 1. interstriae 3 feebly elevated, armed by one coarse tubercle at the middle of declivity, one to three smaller pointed granules often present on basal half, few small granules present in lateral areas, vestiture of moderately long hair-like setae.

Material examined: MALTA: Żebbug, 3.v.1994, 1 ex., under bark of imported logs from Central Africa (?) Cameroon (for timber industry), leg. D. Mifsud (CMM).

Distribution: Partly in Palaearctic Region; throughout the Afrotropical, Australian, Nearctic and Neotropical Region.

Host plants: Numerous unrelated host-plants.

Comments: This species was found alive under bark of large logs imported from Central Africa and intended for the timber industry. To-date there is no evidence that this species acclimatized in the Maltese Islands.

Xyleborus volvulus (Fabricius, 1775)

(Fig. 40)

Diagnosis: Body length 2.1 - 2.8 mm, cylindrical, slender, reddish brown, shining; similar to the previous species, but elytral declivity distinctly convex, 2. interstriae not impressed, without tubercles, 1. and 3. interstriae armed by series of tubercles all of equal size and shape.

Material examined: MALTA: Żebbug, 3.v.1994, 1 ex., under bark of imported logs from central Africa (?) Cameroon (for timber industry), leg. D. Mifsud (CMM).

Distribution: Japan, Russia, Taiwan in Asia; throughout the Afrotropical, Australian, Nearctic, Neotropical and Oriental Region.

Comments: This species was found alive under bark of large logs imported from Central Africa and intended for the timber industry. To-date there is no evidence that this species acclimatized in the Maltese Islands. A number of records of this species from SE Asia to the SW Pacific and many records from Africa may actually refer to *X. perforans* (Wollaston, 1857) (WOOD & BRIGHT, 1992).

Xyleborinus saxesenii (Ratzeburg, 1837)

(Fig. 41, 42)

Diagnosis: The only species of the genus in Malta. Body length 1.6 - 1.8 mm, cylindrical, slender, brown to black, semi-shining to matt; head concealed from dorsal aspect, frons convex, reticulate, punctures sparse and shallow; pronotum longer than wide, sides parallel on basic two thirds, rounded frontally, declivity asperate, anterior margin armed by small serrations, disk matt, reticulate, sparsely and shallowly punctate; scutellum hardly visible, cone-shaped, displaced cephalad from anterior margin of elytra; basal margins of elytra transversely straight, not ornamented, sides of elytra parallel, elytral declivity shallowly bisulcate, interstriae 1 and 3 feebly elevated, each armed by a row of pointed tubercles, interstriae 2 impressed, unarmed except one or two minute granules at the base, small tubercles on lateral areas of the declivity, vestiture of short hair-like setae.

Material examined: MALTA: Msida (University grounds), 12.xi.1993, 1 ex., leg. D. Mifsud (CMM); Żejtun, 12.ii.2003, 1 ex., leg. D. Mifsud (CMM).

Distribution: Albania, Austria, Azerbaijan, Azores, Belarus, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, France (including Corsica), Germany, Great Britain, Greece, Hungary, Italy (including Sardinia and Sicily), Latvia, Lithuania, Luxemburg, Macedonia, Moldavia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, Yugoslavia in Europe; Algeria, Canary Islands, Egypt, Libya, Morocco, Madeira, Tunisia in North Africa; China, India, Iran, Israel, Japan, Kazakhstan, Kyrgyzstan, Mongolia, North Korea, Russia, South Korea, Syria, Tajikistan, Turkmenistan, Turkey in Asia; worldwide in Afrotropical, Australian, Nearctic, Neotropical and Oriental Region.

Host plants: Numerous unrelated hosts.

Comments: *X. saxesenii* represents a new record for the Maltese Islands.

Tribe Cryphalini

Hypocryphalus scabricollis (Eichhoff, 1878) comb. nov.

(Fig. 43, 44)

Diagnosis: The only species of the genus in Malta. Body length 1.54 - 1.95 mm, suboval, very stout, sub-oval, yellowish-brown, pronotum bicoloured, lighter posteriorly, matt; frons convex, flattened above epistoma, strongly shagreened, finely sparsely punctate; pronotum nearly as wide as long, anterior margin armed by conspicuous teeth, summit well developed in basal third, declivity long, somehow flattened, asperate, surface covered with rather dense microscopic scale-like setae and erected sparse hair-like setae; elytra rounded, rather short, broadly rounded behind, striae not impressed, sparsely punctured, interstriae almost smooth, very densely and very finely punctate, much wider than striae, matt, elytral declivity convex, steep, 1. and 2. interstriae somehow flattened to the elytral apex (apical margin of elytra nearly transversely straight), vestiture as on pronotum.

Material examined: MALTA: Migra Ferħa, 22.vii.1996, 1 ex., leg. C. Farrugia (CKP); Żejtun, 24.x.1991, 1 ex., leg. D. Mifsud (CKP), Żejtun, 22.x.1997, 1 ex., leg. D. Mifsud (CKP), Żejtun, 24.xi.2001, 1 ex., leg. D. Mifsud (CMM); Fawwara, 4.ix.2001, 10 exs., leg. Dandria, on *Ficus* sp. (CKP, CMM); St. Thomas Bay, Tal-Munxar, 13.iv.2003, 2 exs., leg. D. Mifsud (CMM); Floriana, 10.ix.2002, 11 ex., on *Ficus atrocarpae*, leg. A. Catania; Buskett, 15.v.2003, 1 ex., leg. D. Mifsud (CMM).

Distribution: This species was described from Hindostan (Barma).

Host plants: *Ficus retusa*, *Ficus* sp.

Comments: The specimens collected in Malta were compared to all *Cryphalus* species in Schedl's collection in Wien and Knížek's collection in Prague. The species was found morphologically related to the Indian species, *Cryphalus scabricollis* Eichhoff, 1878. A detailed study of material attributed to *C. scabricollis* (including its synonyms) revealed that the Maltese material is identical with specimens of *Cryphalus dilutus* Eichhoff, 1878, a species which was put under synonymy of *C. scabricollis* by Wood (1989). The Maltese specimens as well as specimens of *C. dilutus* deposited in Wien (Holotype examined) differ from *C. scabricollis* (Allotype examined)

morphologically by the remarkably prolonged pronotum anteriorly. However due to insufficient material for comparison (high external sexual dimorphism in shape of pronotum and frons exist in *Hypocryphalus*) and impossibility to study wide intra-specific variation of both named species, we follow Wood (1989). Future work could lead to the resurrection of *C. dilutus* from its synonymy. Due to the generic characteristics, mainly remarkably procurved antennal club sutures, the species is here transferred to the genus *Hypocryphalus* Hopkins, 1915. *H. scabricollis* is definitely an introduced species in the Mediterranean Region. The genus currently accomodates around 50 described species distributed mainly in the Afrotropical, Oriental and Australasian regions. This is the first record of the genus in Europe.

Key to the Maltese species of *Hypothenemus* (females)

1. Body length 1.0 - 1.3 mm; antennal club rounded, suturae weakly procurved; pronotal declivity rounded from lateral view, asperities on pronotal declivity numerous and arranged in rather regular concentric rows; pronotal and elytral erected setae about twice longer than wide, scale-like *eruditus*
- Body length 1.35 - 1.55 mm; antennal club remarkably longer than wide, suturae straight, club segments constricted near sutura; pronotal declivity flattened from lateral view, asperities stronger and more pointed, absent on the flattened part; pronotal and elytral erected setae at least five times longer than wide, more hair-like *leprieurii*

Hypothenemus eruditus Westwod, 1836

(Fig. 45, 46)

Diagnosis: Body length 1.0 - 1.3 mm in females (0.7 - 0.8 in males), cylindrical, dark brown to almost black, vestiture pale; frons convex, slight transverse impression immediately above epistoma, rugose-reticulate, finely punctate, small median groove or tubercles at upper level of eyes; pronotum wider than long, anterior margin armed by four to eight teeth, summit well developed, declivity asperate, asperities arranged in rather regular concentric rows; elytra parallel, narrowly rounded behind, striae not impressed, punctured, interstriae almost smooth, as wide as striae, finely punctate, elytral declivity convex with interstriae finely granulate; vestiture of mixture of hair- and scale-like setae, pronotal and elytral erected setae about twice longer than wide, scale-like.

Material examined: MALTA: Żejtun, 22.x.1997, 1 ex., leg. D. Mifsud (CMM), 12.x.2001, 1 ex., leg. D. Mifsud (CMM); Bahrja, 16.vii.1997, 1 ex., leg. D. Mifsud (CBT); St. Thomas Bay, Tal-Munxar, 14.i.2003, 1 ex., in dead branch of *Capparis* sp., leg. D. Mifsud] (CMM).

Distribution: Azerbaijan, Azores, Croatia, France (including Corsica), Italy (including Sicily, Malta, Spain, Russia, Turkey, Ukraine in Europe; Algeria, Canary Islands, Egypt, Morocco, Madeira in North Africa; China, India, Iran, Israel, Japan, South Korea in Asia; practically cosmopolitan species Afrotropical, Australian, Nearctic, Neotropical and Oriental Region.

Host plants: Numerous unrelated host-plants.

Comments: *H. eruditus* represents a new record for the Maltese Islands.

***Hypothenemus leprieurii* (Perris, 1866)**

(Fig. 47, 48)

Diagnosis: Somehow similar to previous species, but larger, body length 1.35 – 1.55 mm in females, antennal club remarkably longer than wide, suturae straight, club segments constricted near sutura; pronotal declivity flattened from lateral view, asperities stronger and more pointed, absent on the flattened part; pronotal and elytral erected setae at least five times longer than wide, more hair-like.

Material examined: MALTA: Bahrija, 2.v.1990, 2 ex., leg. D. Mifsud (CKP), 16.vii.1997, 2 exs., leg. D. Mifsud (CBT, CKP); Girgenti, 8.x.1996, 1 ex., leg. D. Mifsud (CBT); Fomm ir-Rih, 28.iv.1997, 1 ex., leg. D. Mifsud (CKP); St. Thomas Bay, Tal-Munxar, 13.iv.2003, 1 ex., leg. D. Mifsud (CMM). GOZO: Ramla, 18.iv.1990, 1 ex., leg. D. Mifsud (CMM); Ghasri, 28.vi.1995, 1 ex., leg. C. Farrugia (CMM); Dwejra, 19.vii.1996, 1 ex., leg. C. Farrugia (CBT).

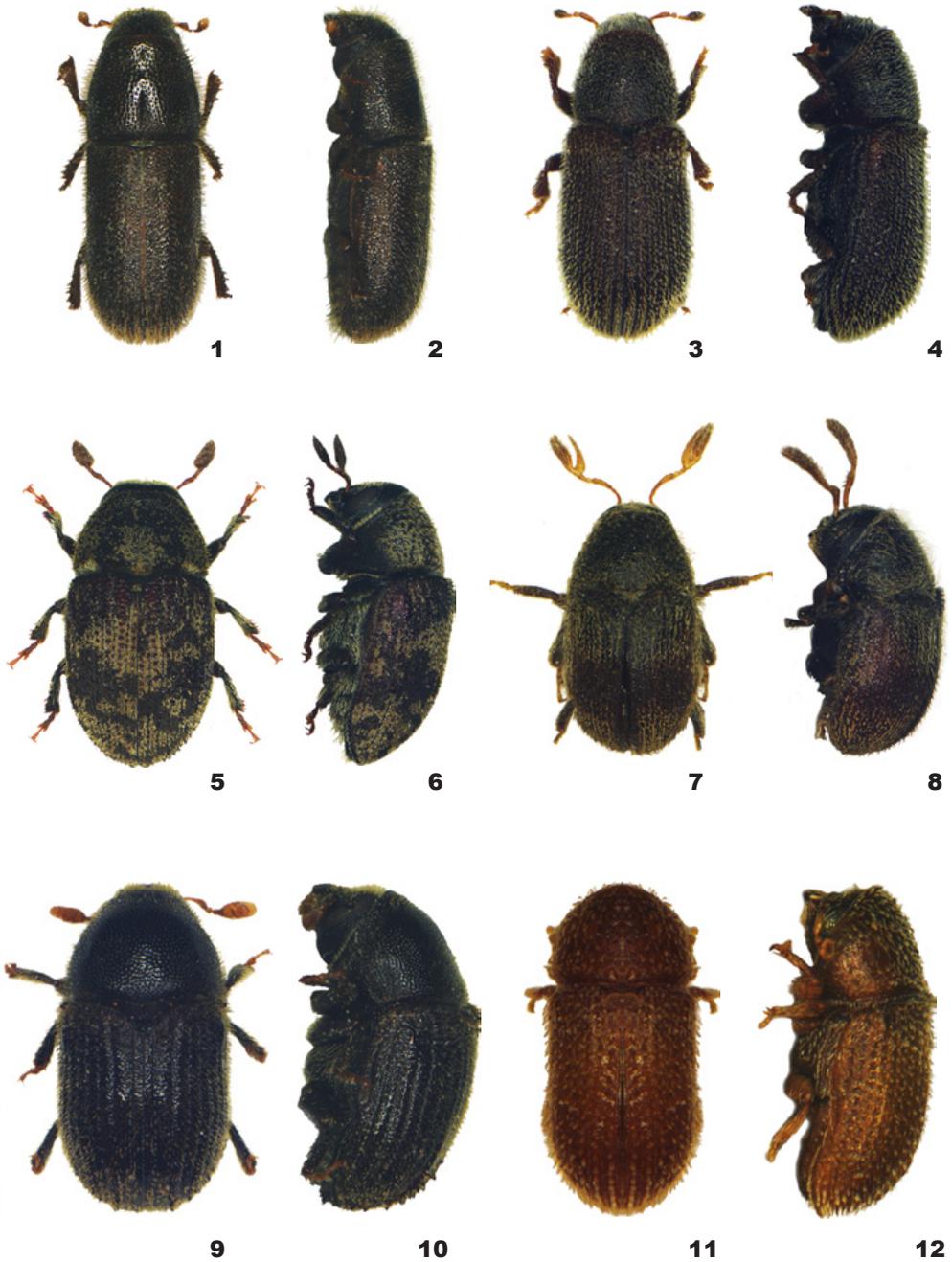
Distribution: Italy (Sardinia) and Malta in Europe; Algeria in North Africa; Cyprus, Israel, Syria, Turkey in Asia.

Host plants: *Ficus carica*.

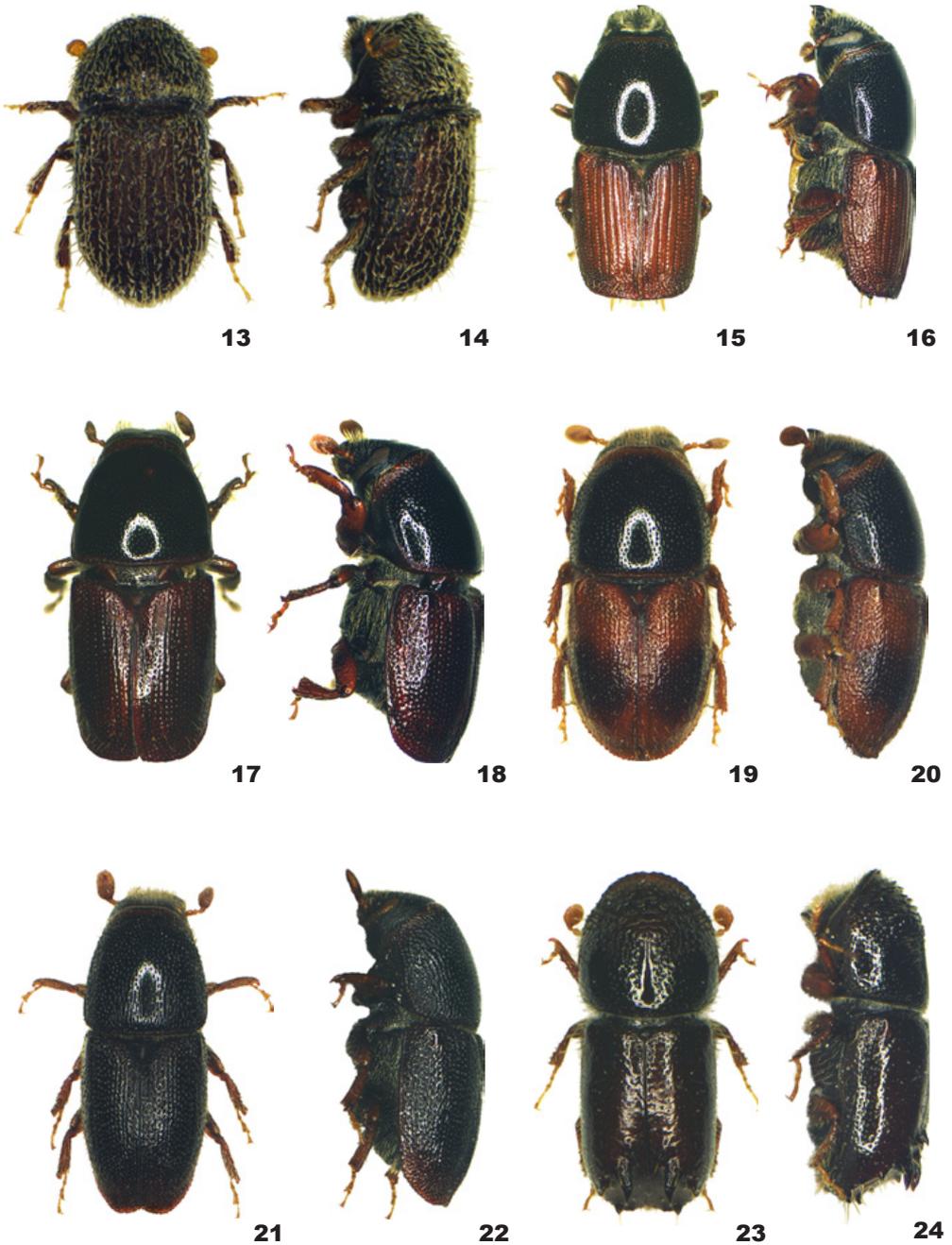
Comments: *H. leprieurii* represents a new record for the Maltese Islands.

CONCLUSIONS

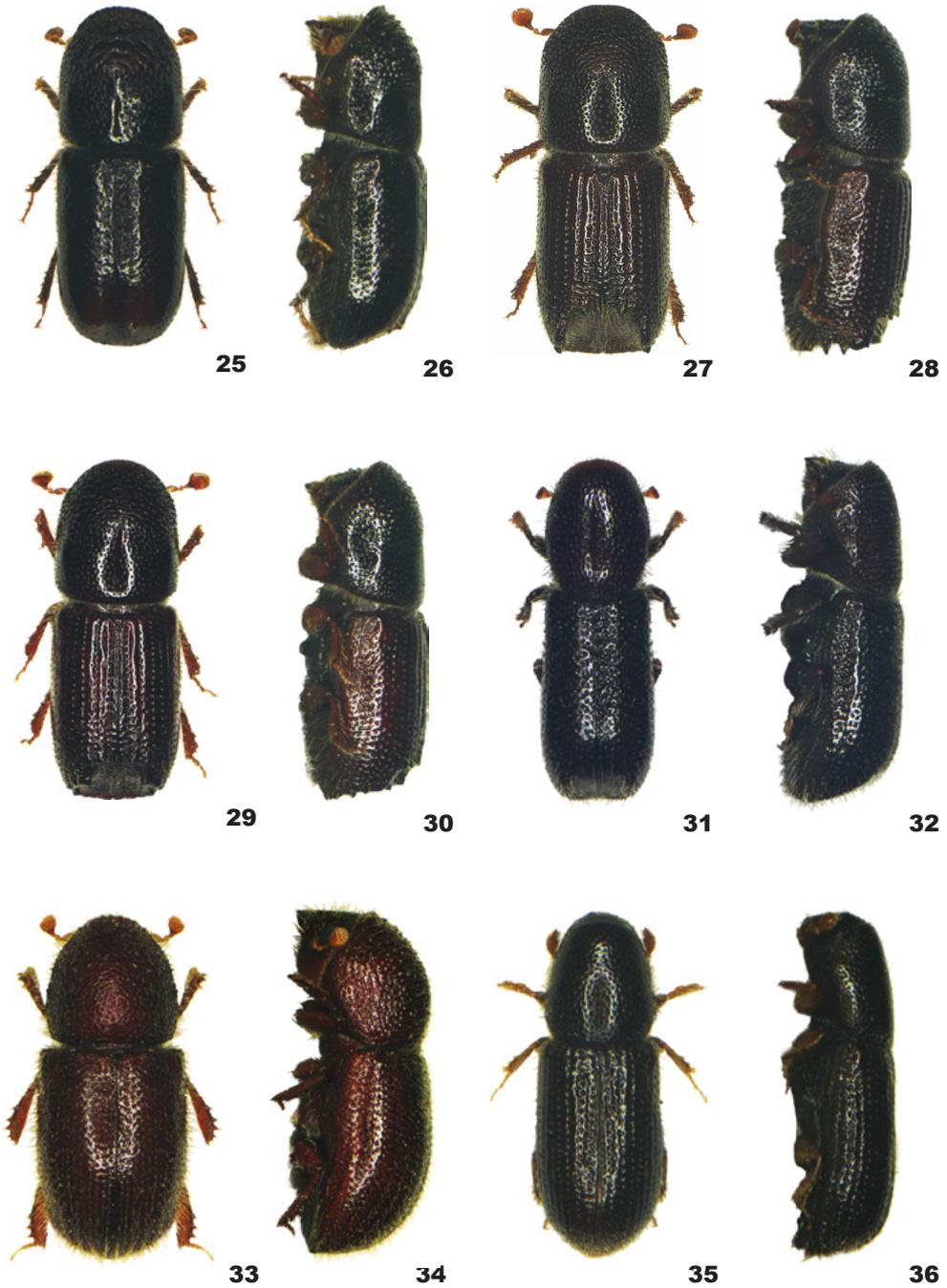
Even though the Maltese Islands represent one of the most densely populated countries in the world (with some 1,100 inhabitants per km²) with few natural habitats, and even though tree species are rather wanting, the present work lists a total of twenty-three species of bark beetles. Of these, two species, namely *Xyleborus ferrugineus* and *X. volvulus* represent introduced taxa which so far were not found to be established in Malta. Both species are mainly found in tropical and sub-tropical regions and are often introduced into new territories with wood intended for the timber industry. Most of the remaining twenty-one species, represent indigenous species with the notable exception being *Hypocryphalus scabricollis*, an Asian species which was most likely introduced with *Ficus retusa*, a species which is widely planted in Malta along road sides and gardens. There are unconfirmed records of this bark beetle on *Ficus carica* and this should be further evaluated. Bark beetles with a confined Mediterranean distribution are represented by the following seven species: *Hylurgus micklitzi*, *Phloeotribus scarabaeoides*, *Liparthrum mori*, *Hypoborus ficus*, *Scolytus amygdali*, *Pityogenes calcaratus* and *Hypothenemus leprieurii*. Species having Mediterranean distributions with penetrations in Europe are represented by *Kissophagus hederæ*, *Phloeosinus thujæ*, *Orthotomicus erosus* (records of this species from Asia should possibly refer to *O. angulatus* (Eichhoff, 1875)), *Thamnurgus characiae* and *Crypturgus numidicus*. South-European species are represented by two taxa, namely *Scolytus sulcifrons* and *Crypturgus cylindricollis*. Species with much larger geographical distributions are represented by the remaining taxa. Thus *Hylesinus varius* and *Scolytus mali* can be considered an Euro-Asian species; *Scolytus rugulosus* is also considered as a Euro-Asian species but it is also present in the



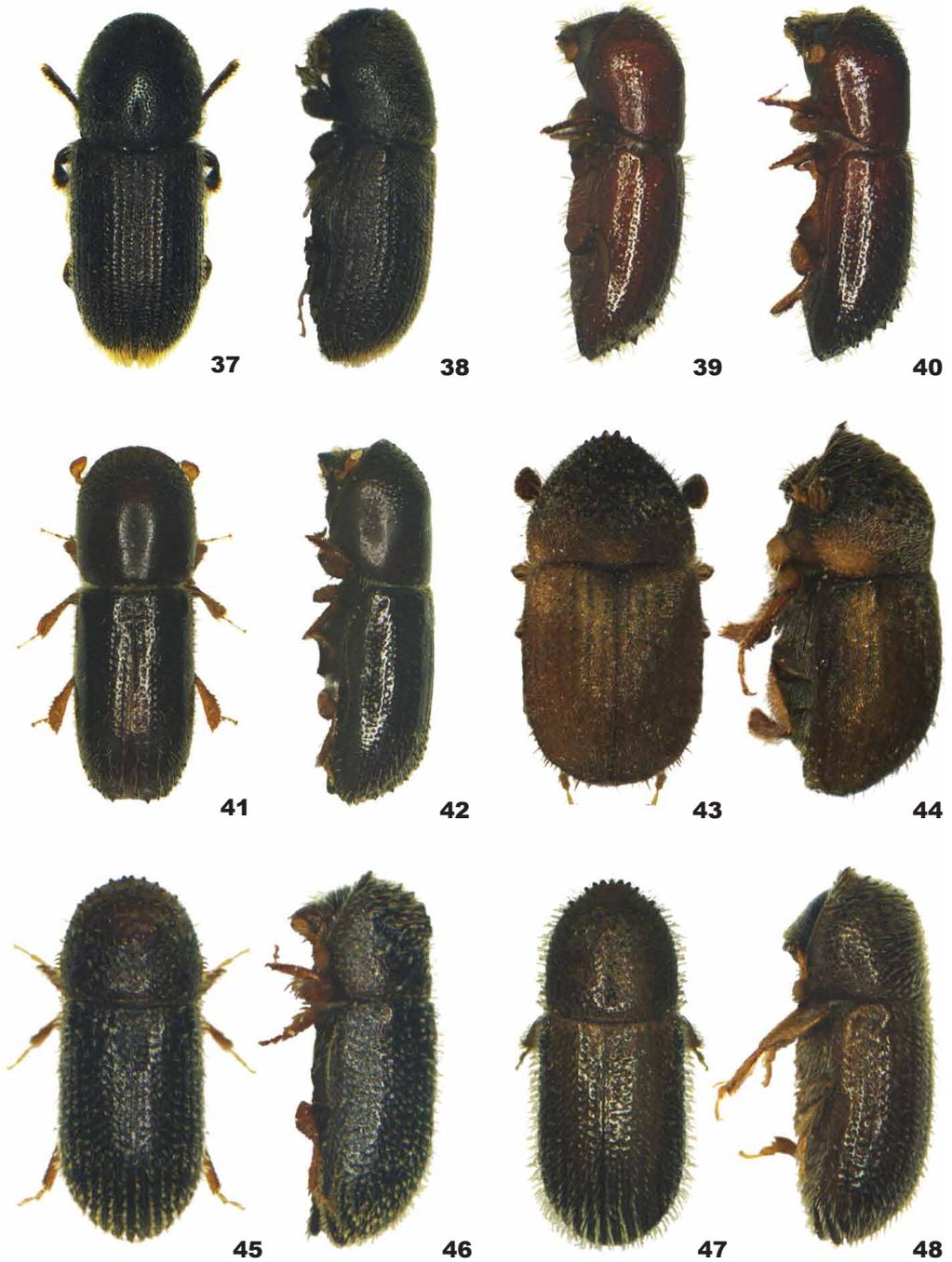
Figures 1-12: Bark beetles, dorsal and lateral views. 1-2: *Hylurgus micklitzii*; 3-4: *Kissophagus hederiae*; 5-6: *Hylesinus varius*; 7-8: *Phloetribus scarabaeoides*; 9-10: *Phloeosinus thujae*; 11-12: *Lipathrum mori*.



Figures 13-24: Bark beetles, dorsal and lateral views. 13-14: *Hypoborus ficus*; 15-16: *Scolytus sulcifrons*; 17-18: *Scolytus mali*; 19-20: *Scolytus amygdali*; 21-22: *Scolytus rugulosus*; 23-24: *Pityogenes calcaratus*, male.



Figures 25-36: Bark beetles, dorsal and lateral views. 25-26: *Pityogenes calcaratus*, female; 27-30: *Orthotomicus erosus*; 27-28: male; 29-30: female; 31-32: *Thamnurgus characiae*; 33-34: *Coccotrypes dactyliperda*; 35-36: *Crypturgus cylindricollis*.



Figures 37-48: Bark beetles, dorsal and lateral views. 37-38: *Crypturgus numidicus*; 39: *Xyleborus ferrugineus*; 40: *Xyleborus volvulus*; 41-42: *Xyleborinus saxesenii*; 43-44: *Hypocryphalus scabricollis*; 45-46: *Hypothenemus eruditus*; 47-48: *Hypothenemus leprieurii*.

whole Palaearctic Region. Three species, *Coccotrypes dactyliperda*, *Xyleborinus saxesenii* and *Hypothenemus eruditus* may be finally considered as cosmopolitan species.

Not much can be said on the status of most species in the Maltese Islands as further collections need to be carried out. However, some general remarks on some species can be considered. For example *Phloeotribus scarabaeoides* represents taxon which is common wherever olives are cultivated. *Hypoborus ficus* is another extremely common species found practically wherever *Ficus carica* is present. *Scolytus amygdali* seem to be the species which is mostly associated with cultivated stone-fruit and thus able to provoke considerable damage in such crop plants. *Pinus halepensis* is the only native pine tree in Malta, which is widely planted in private and public gardens and along roadsides. Species associated with this host are often found in large numbers when a dying or a freshly dead tree is found. *Thamnurgus characiae* is a common bark beetle in continental Europe but in Malta this species represents a very rare taxon, due to the rarity of its host plant, *Euphorbia characias* which is now confined to few locations in Malta and Gozo. Protection of these sites would be an effective way to preserve also *Thamnurgus characiae*.

ACKNOWLEDGEMENTS

We thank Roger Beaver (Thailand) and Heinrich Schönmann (Austria) for confirming certain problematic issues on scolytid taxonomy. We also thank Henry Borg-Barthet, Paul Sammut and Charles Farrugia for donating species of bark beetles from their collections. We also thank Enzo Colonnelli (Rome, Italy) for the critical review of the present work and for useful suggestions. This work was partly supported by the Ministry of Agriculture of the Czech Republic, Project No. MZe 002070203 Stabilization of forest functions in antropically disturbed and changing environmental conditions.

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ISSN : 2070-4526

Date of Publication : 30th September 2009

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Received: March 20, 2009

Accepted: August 25, 2009