

First European interception of the brown fir longhorn beetle, *Callidiellum villosulum* (Fairmaire, 1900) (Coleoptera, Cerambycidae)

Christian COCQUEMPOT¹ & David MIFSUD²

ABSTRACT. A specimen of the brown fir longhorn beetle, *Callidiellum villosulum villosulum* found in Malta represents the first record of this invasive species for Europe. Historical details on world invasion of this species are provided as well as a short description, origin and biology. A brief pest risk analysis of this species is also presented.

KEY WORDS. Malta, Europe, invasive species.

INTRODUCTION

Some invasive longhorn beetles (Coleoptera, Cerambycidae) have been present in Europe for a relatively long time. However, in the last two to three decades the number of these invasive insects in Europe has risen exponentially due to increased international trade of goods which created new and rapid transport pathway opportunities. To this effect, in these last twenty years, 19 species of alien longhorn beetles have been introduced and established in Europe, and some 20 other species have been intercepted or recorded but so far not naturalized. It is worth mentioning that since the middle of the 18th century, more than 250 longhorn beetle species have been intercepted within Europe (COCQUEMPOT, 2007; COCQUEMPOT & LINDELÖW, 2010).

The Maltese Islands, situated in the centre of the Mediterranean basin, are no exception to alien longhorn beetles. Species such as *Rosalia alpina* (Linnaeus, 1758), *Cordylomera spinicornis* (Fabricius, 1775), *Ropalopus clavipes* (Fabricius, 1775), *Callidium violaceum* (Linnaeus, 1758), *Morimus asper* (Sulzer, 1775) and *M. funereus* (Mulsant, 1863) have been intercepted in Malta but their naturalization has never been confirmed. Some other species are most likely introduced and seem to be well established in the Maltese Islands but introduction dates are lacking and they may have been established since a relatively long time. These include species such as *Cerambyx nodulosus* Germar, 1817 and possibly *C. carinatus* Küster, 1846, *Nathrius brevipennis* (Mulsant, 1839), *Gracilia minuta* (Fabricius, 1781) and possibly also *Hylotrupes bajulus* (Linnaeus, 1758) (MIFSUD, 2002; COCQUEMPOT & LINDELÖW, 2010). For some other alien established longhorn beetles more data is available; thus *Phoracantha semipunctata* (Fabricius, 1775) was introduced in the mid 1990's (MIFSUD & BOOTH, 1997) whereas *P. recurva* Newman, 1840 was locally found for the first time in the early years of 2000 (MIFSUD, 2002). The introduction and establishment of these two *Phoracantha* spp. in Malta was expected, since the species were being found all over Europe and the Mediterranean basin. On the contrary, the introduction and establishment of *Phrynetta leprosa* (Fabricius, 1775) in the late 1990's was unexpected (MIFSUD & DANDRIA, 2002) and since that time it was the major cause of death of hundreds of trees of *Morus nigra* L., 1753 (Moraceae).

¹ UMR 1062 CBGP, International Campus of Baillarguet, CS 30016, 34988 Montferrier-sur-Lez cedex, France. E-mail: cocquemp@supagro.inra.fr

² Department of Biology, Junior College, University of Malta, Msida MSD 1252, Malta. E-mail: david.a.mifsud@um.edu.mt

The interception of these alien species in Europe is still an ongoing phenomenon and the present paper includes information on one such interception in Malta. The single live specimen found was identified as *Callidiellum villosulum* (Fairmaire, 1900), a species which has been expanding its native range since 2008, especially in the United States. In this context, it is worth mentioning that another invasive species of *Callidiellum* Linsley, 1940, *C. rufipenne* (Motschulsky, 1861), commonly known as the Japanese cedar longhorn beetle has already been detected in Europe and its rapid expansion seems imminent (VAN MEER & COCQUEMPOT, 2013).

Callidiellum villosulum (Fairmaire, 1900)

Material examined. MALTA: Burmarrad, 1.iv.2013, 1 ex., found on saleable wooden commodities. Some of the wooden items were not debarked and arrived, via Italy, from China, their country of origin.

A World invasive species

Callidiellum villosulum villosulum was first intercepted in the United States in 1999 (CIESLA, 1999) and since then additional interceptions were made, but its establishment is not yet confirmed (McCARTHY, 2011). It has also been intercepted in Japan via Christmas tree imitations originating from China (IWATA *et al.*, 2006) and more recently, in Canada, following the host trees (SINOSKI, 2012). *Callidiellum villosulum* has also been detected in Launceston (Tasmania) in Australia, imported with wood packaging (ANONYMOUS, 2012). All these examples prove that *C. villosulum* is a new potential invader which must be seriously watched to forecast possible introduction and establishments in new territories.

Identification and description

The adult male of *C. villosulum* (Fig. 1) was immediately recognized, but identification was confirmed with reference to GRESSITT (1951) and CHOU (2008). Adults of this species vary from 7 to 11 mm in length. Their elytrae are entirely testaceous to slightly bronze. The entire body is covered with long pale hairs. The punctures of the pronotal disc are uniform and there are two oval lateral elevations surrounded by a smooth ring. The head, prothorax and femora are reddish, the antennae and tibiae black. *Callidiellum villosulum arisanum* Kano, 1930 differs from the typical form by its entirely black appendages. Adults of *C. villosulum* differ from the closely related *C. rufipenne* (Fig. 2) by the dark blue elytra in males, and bright red elytra in females. The larva, described by NAKAMURA & KOJIMA (1981) and COOK (2011), is typical of the Tribe Callidiini. The mature larva is about 16 mm long and the body is creamy white. The pronotum has short hairs on the anterior half and faint longitudinal striae on the posterior part.

Biology

The known host plants of *C. villosulum* are mainly Taxodiaceae such as *Cunninghamia lanceolata* (Lambert) Hooker, 1827 and *Cryptomeria japonica* (L.f.) D. Don, 1841 (*C. fortunei* Hooibr. ex Otto & Dietrich, 1853 is a synonym of *C. japonica*) (FU-JI, 1991; HUA *et al.*, 1993, 2009; ANONYMOUS, 2005). NAKAMURA & KOJIMA (1981) quoted also *Taiwania cryptomerioides* Hayata, 1906 (Taxodiaceae), *Chamaecyparis formosensis* Matsumura, 1901 (Cupressaceae) and *Pinus taiwanensis* Hayata, 1911 (Pinaceae). The latter host plant indicates that the brown fir longhorn beetle can develop on Pinaceae but it is likely that the Taxodiaceae, which are often included in Cupressaceae, are the main hosts. This information may suggest that *C. villosulum* has the potential to adapt to different host plants as is the case for *C. rufipenne* (VAN MEER & COCQUEMPOT, 2013).



Figure 1: *Callidiellum villosulum* (male specimen from Malta); **Figure 2:** *Callidiellum rufipenne* (male specimen from France).

Callidiellum villosulum undergoes one generation per year in Zhejiang Province, China and also in Taiwan but NAKAMURA & KOJIMA (1981) commented that this may not always be the case. Larvae feed under bark until they mature and then towards September/October bore a short gallery straight into the sapwood where they pupate and hibernate. Depending on climatic conditions, adults generally emerge between March and May, with an emergence peak from late March to early April. Oviposition occurs some days after first emergences and eggs are laid in the cracks of tree bark. Young larvae begin to bore flattened galleries into the cambium two weeks later (NAKAMURA & KOJIMA, 1981; COOK, 2011). Only one parasitoid is known to develop in *C. villosulum* larvae, *Ontsira palliatus* (Cameron, 1881) (Hymenoptera, Braconidae) (LIANQUIN *et al.*, 1987) but it is not specific to this longhorn beetle and more parasitoids are likely to be discovered.

Origin

The typical form of the brown fir longhorn beetle is native to South-Oriental China (HUA, 2002), and recorded also from Taiwan (HUA, 2002). The subspecies *arisanum* is native to Taiwan (KANO, 1930), but has also been recorded in continental China (Jiangxi) (HUA, 2002).

Introduction risks

The interception of *C. villosulum* in Malta means that the species is travelling through Europe with wood logs, wood products and wood packaging material. From such items, an introduction becomes possible and a potential establishment involving phytosanitary risk for both ornamental or forest Taxodiaceae may take place in Europe. Such a risk is seriously taken into consideration in the United States and Canada where endemic and endangered populations of *Sequoia sempervirens*

(D. Don) Endlicher, 1847, *Sequoiadendron giganteum* (Lindl.) J. Buchholz, 1939 and *Taxodium distichum* (L.) Richard, 1810 (Taxodiaceae) could be threatened in case of establishment of *C. villosulum*. In Europe, the risks and potential damages are the same as those cited for *C. rufipenne* (VAN MEER & COCQUEMPOT, 2013) with special concern to the non indigenous Taxodiaceae, and the indigenous Cupressaceae.

CONCLUSION

The present record of *Callidiellum villosulum* which is the first for Europe, remind us that invasive cerambycids are still circulating throughout the World and threatening to infest our ornamental, forest plantations, and natural landscapes. Previous interceptions of this species in the United States, Canada and Japan, indicate that the main pathways of *C. villosulum* are wood logs for industrial use or manufactured products, wood packaging material and especially via Christmas tree imitations, coming from China. The biology of the brown fir longhorn beetle indicates that such introductions and establishments in Europe are likely to take place with phytosanitary risks for cultivated Taxodiaceae and biodiversity associated with indigenous Cupressaceae.

ACKNOWLEDGMENTS

We would like to thank the Plant Health Department of the Ministry for Sustainable Development, the Environment and Climate Change in Malta for making available to us the specimen of *Callidiellum villosulum* and H.-P. Aberlenc for taking the photographs of figures 1 and 2.

REFERENCES

- ANONYMOUS (2005) Pest datasheet for *Callidiellum villosulum* (Fairmaire) (Coleoptera: Cerambycidae). *Fes. Fed. US/Forest Health*, 2005: 3 pp.
- ANONYMOUS (2012) Significant pest and disease identifications - Entomology. *OSP Bulletin*, March 2012: 2.
- CHOU, W. I. (2008) *The Atlas of Taiwanese Cerambycidae* (Second Edition). Owl Publishing House, Taipei. 408 pp.
- CIESLA, W. M. (1999) *Callidiellum villosulum*. Pest Report EXFOR Database online sheet. [<http://www.spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=1&langdisplay=english>. Accessed 20.x.2013].
- COCQUEMPOT, C. (2007) Alien longhorned beetles (Coleoptera Cerambycidae): Original interceptions and introductions in Europe, mainly in France, and notes about recently imported species. *Redia*, **89**: 35-50.
- COCQUEMPOT, C. & LINDELÖW, Å. (2010). Longhorn beetles (Coleoptera, Cerambycidae). Chapter 8.1 (pp. 193-218: doi: 10.3897/biorisk.4.56). In: ROQUES, A. *et al.* [eds.] Alien terrestrial arthropods of Europe. *BioRisk*, **4** (1): 552 pp.
- COOK, J. (2011) *Callidiellum villosulum*. Brown Fir Longhorned Beetle. Institute for the Study of Invasive Species. [www.tsusinvasives.org/database/brown-fir-longhorned-beetle.html. Accessed 14.x.2013].
- FU-JI, P. (1991) Notes on the genus *Callidiellum* Linsley from China (Coleoptera: Cerambycidae, Cerambycinae). *Acta entomologica sinica*, **34** (3): 341-343.
- GRESSITT, J. L. (1951) Longicorn Beetles of China. *Longicornia*, **2**: 1-667.
- HUA, L.-Z. (2002) *List of Chinese Insects*. Vol. II. Zhongshan (Sun Yat-sen) University Press, Guangzhou. 612 pp.
- HUA, L.-Z., NARA, H. & YU, C. (1993) *Longicorn-Beetles of Hainan & Guangdong*. Muh-Sheng Museum of Entomology Publisher, Nantou Hsien, Taiwan: 319 pp.

- HUA, L.-Z., NARA, H., SAMUELSON, G. A. & LINGAFELTER, S. W. (2009) *Iconography of Chinese Longicorn Beetles* (1406 Species) in Color. Sun Yat-sen University Press, Guangzhou. 474 pp.
- IWATA, R., KAWAKAMI, Y. & NIISATO, T. (2006) Occurrence of *Callidiellum villosulum villosulum* (Fairmaire) (Coleoptera: Cerambycidae) from an imitation Christmas tree manufactured in China. *House and Household Insect Pests*, **28** (1): 85-89.
- KANO, T. F. (1930) New and unrecorded Longicorn-beetles from the Japan-Empire. *Insecta Matsumurana*, **5** (1-2): 41-48.
- LIANQIN, Z., SHIHAN, S. & JUNXIANG, F. (1987) Studies on controlling *Semanotus sinoauster* (Gressitt) (Coleoptera: Cerambycidae) by release of *Ontsira palliatus* (Cameron) (Hymenoptera: Braconidae). *Scientia silvae sinicae*, **23** (3): 306-313.
- McCARTHY, R. (2011) Longhorned beetle's trip ends in Baltimore. *NPDN News*, **6** (3): 1-2.
- MIFSUD, D. (2002) Longhorn beetles (Coleoptera, Cerambycidae) of the Maltese Islands (Central Mediterranean). *The Central Mediterranean Naturalist*, **3** (4): 161-169.
- MIFSUD, D. & BOOTH, R. (1997) Further contributions to the knowledge of the Longhorn Beetles (Coleoptera: Cerambycidae) of the Maltese Islands. *The Central Mediterranean Naturalist*, **2** (2): 35-36.
- MIFSUD, D. & DANDRIA, D. (2002) Introduction and establishment of *Phryneta leprosa* (Fabricius) (Coleoptera, Cerambycidae) in Malta. *The Central Mediterranean Naturalist*, **3** (4): 207-210.
- NAKAMURA, S. & KOJIMA, K. (1981) Immatures stages of Taiwanese Cerambycid Beetles (Coleoptera, Cerambycidae), with notes on their habit. *Kontyû*, **49** (1): 155-165.
- SINOSKI, K. (2012) Invasive beetle hitches a lift in B.C. liquor store decorations imported from China. *Global News*, December 5, 2012: 1 pg.
- VAN MEER, C. & COCQUEMPOT, C. (2013) Découverte d'un foyer de *Callidiellum rufipenne* (Motschulsky, 1861) dans les Pyrénées-Atlantiques (France) et correction nomenclaturale.

Received: May 30, 2013
Accepted: August 10, 2013