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XYLOSANDRUS CRASSIUSCULUS (MOTSCHULSKY)
A BARK BEETLE NEW TO EUROPE
(COLEOPTERA SCOLYTIDAE) ⁽¹⁾

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Pennacchio F., Roversi P. F., Francardi V., Gatti E. – *Xylosandrus crassiusculus* (Motschulsky) a bark beetle new to Europe (Coleoptera Scolytidae).

Experiments on techniques to monitor the presence of exotic insects introduced to Italy led to the discovery in central Italy of a bark beetle new to Europe, *Xylosandrus crassiusculus* (Motschulsky). This Scolytidae, widely polyphagous on deciduous trees and well known for the damage it causes to various forest and orchard species, was captured in funnel traps baited with α -pinene+ethanol and with α -pinene+ethanol+*Ips sexdentatus* pheromone. The traps were set in a forested area in Central Italy, in the territory called «Le Cerbaie» near the Montefalcone Nature Reserve (Pisa), in mixed woods dominated by *Pinus pinaster* Aiton and *Quercus cerris* L.

Here we provide a description and original drawings of the female of the species to facilitate the identification of possible infestations. We also discuss the potential risks of acclimatization of this xylophagous beetle and the possibilities of its control.

KEY WORDS: Asian ambrosia beetle, insect pest introduction, Scolytidae.

INTRODUCTION

The intensification of commercial trade and the circulation of people and goods between distant geographical areas is resulting in an increase of accidental introductions to Italy of animals and plants harmful to agricultural crops and forest ecosystems (COVASSI, 1991; PELLIZZARI and DALLA MONTÀ, 1997; ZANDIGIACOMO *et al.*, 1998; TREMBLAY *et al.*, 2000;).

Experiments are under way to define monitoring strategies for the early detection of exotic phytophagous insects. Equipment and techniques are being tested for use in permanent networks to control high-risk points of entry of these organisms into Italy (harbours and airports).

The Experimental Institute for Agricultural Zoology, Florence (ISZA) is studying a trap prototype and the use of broad-action baits to standardize the methods of monitoring xylophagous species.

During experiments conducted in wooded habitats of Central Italy, we collected several specimens of a bark beetle new to the European fauna. Taxonomic investigations and the use of keys for the Bark and Ambrosia Beetles of North and Central America (WOOD, 1982) allowed us to attribute the specimens to an Indochinese species, *Xylosandrus crassiusculus* (Motschulsky). This scolytid, distributed in Asia (BROWNE, 1961; WOOD and BRIGHT, 1992) and recorded for Africa since 1962 (SCHEDL, 1962), was introduced to the United States many years ago (ANDERSON, 1974) where it now represents a problem in orchards and nurseries. The wide-ranging polyphagy of this bark beetle and the difficulty of controlling its infestations in new environments have prompted the publication of this paper. We report on the

collection site and the species' morphology and biology to facilitate the identification of new infestations and the rapid implementation of control measures.

COLLECTION SITE AND VOLATILES EMPLOYED

Specimens of the Asian Ambrosia beetle were captured in a forested area of Tuscany (central Italy), consisting mainly of mixed woods of *Pinus pinaster* Aiton and *Quercus cerris* L. with dense shrubby undergrowth, near the Montefalcone Nature Reserve (Pisa). The area is in the territory called «Le Cerbaie», characterized by rolling hills and valleys between 20 and 110 m a.s.l. It is about 35 km from the harbour of Livorno, in an area with a high concentration of sawmills.

In the period July-September 2003, 5 black funnel traps were set in this area: 2 baited with α -pinene+ethanol, 2 with the same blend plus the pheromone of *Ips sexdentatus* (Börner) and 1 lacking bait. During the trapping period, the *I. sexdentatus* pheromone was replaced every four weeks.

Xylosandrus crassiusculus (MOTSCHULSKY) 1866

Phloeotrogus crassiusculus MOTSCHULSKY, 1866: 403;
Xyleborus semiopacus EICHHOFF, 1878: 334;
Xyleborus semigranosus BLANDFORD, 1896: 211;
Dryocoetes bengalensis STEBBING, 1908: 12;
Xyleborus mascarenius HAGEDORN, 1908: 379;
Xyleborus ebriosus NIISIMA, 1909: 154;
Xyleborus okoumeensis SCHEDL, 1935: 271;
Xyleborus declivigranulatus SCHEDL, 1936: 30

Specimens examined – Eleven females captured at Bientina (Pisa), «Le Pianore», between 15 July and 27 August 2003 (Tab. 1)⁽²⁾.

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⁽²⁾ All the specimens are deposited in the coleopterological collection of the Experimental Institute for Agricultural Zoology, Florence.

Table 1 – Captures of *X. crassiusculus*

Date	No. of specimens	Bait
15.vii.2003	1 ♀	α -pinene+ethanol+ <i>Ips</i> pheromone
19.viii.2003	3 ♀♀	α -pinene+ethanol
19.viii.2003	1 ♀	α -pinene+ethanol+ <i>Ips</i> pheromone
19.viii.2003	4 ♀♀	α -pinene+ethanol+ <i>Ips</i> pheromone
27.viii.2003	2 ♀♀	α -pinene+ethanol+ <i>Ips</i> pheromone

Distribution – The original distribution range of *X. crassiusculus* is in tropical and subtropical Asia, from where it has been introduced to many areas of the world (ATKINSON *et al.*, 2000). This bark beetle has been recorded in equatorial Africa (Cameroon, Equatorial Guinea, Ghana, Ivory Coast, Kenya, Mauritania, Nigeria, Sierra Leone, Seychelles, Tanzania, Zaire, Madagascar, Mauritius), the Hawaiian Islands, Micronesia, New Caledonia, New Guinea and south-eastern U.S.A. (Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas) (BROWNE, 1961; SCHEDL, 1962; WOOD, 1982, 1992; KOVACH and GORSUCH 1985; CHAPIN and OLIVER 1986; DEYRUP and ATKINSON 1987).

Female morphology – Squat, cylindrical body, reddish-brown, with the distal half of the elytra tending to dark brown, length between 2.1 and 2.9 mm. Two or more races have been identified, of unknown significance, distinguished exclusively by size (WOOD, 1982). Length of the specimens captured in Italy 2.55-2.66 mm.

Frons slightly convex, distinctly striate, with scattered long bristles facing anteriorly and a fringe directed inferiorly in front of the mandibles. Like all xyleborines, the eyes are reniform and clearly sinuate at the anterior margin. The antennae present a clavate scape, funicle with 5 articles,

antennal club rounded and with apex obliquely truncated on the external surface.

Pronotum as long as wide, in dorsal view completely hiding the head. Anterior portion presents a uniformly rounded border and densely spiculate surface; disk smooth with fine, rather dense and distinct punctuation. Scutellum subtriangular and well developed.

Elytra equipped with golden bristles, thinner and shorter on the striae, much longer and set in regular lines on the interstriae, especially at the level of the declivity. Elytra of the specimens found in Italy 1.37-1.53 times as long as pronotum and 1.17-1.32 times their width. Punctuation of elytral disk consisting of distinct points, thinner at the interstriae. On the declivity, the points become indistinct, hidden by dense, minute granules uniformly arranged over the entire surface, giving a dull aspect. Disk and declivity uniformly convex, in lateral view forming a regular arch. Declivity around 1.5 times as long as disk, on the sides presenting an evident rim separating it from the lateral part of the elytra. Elytra form a distinct angle at the posterior margin, at the level of the suture (fig. I).

Anterior legs with coxae not contiguous and tibiae with external edge curved and finely toothed.

Biology, damage and management – Based on literature, the essential traits of the biology of *X. crassiusculus* are reported to evaluate the potential risks of damage deriving by its acclimatization.

Like all members of the tribe Xyleborini, *X. crassiusculus* is a xylomycetophagous lignicolous bark beetle, which in its pre-imaginal development lives in wood and feeds on the mycelium of ambrosian-type fungi. Females burrow maternal galleries in twigs, branches and trunks of small to medium diameter (2-30 cm). During the burrowing, typical cylindrical packets of frass appear on the outside (fig. II). The tunnels consist of burrow systems similar to those produced by *Xyleborus dispar* (Fabricius) (WOOD, 1982).

Females dig a little cavity where they lay eggs in small groups and the pre-imaginal stages develop together in the lumen of the maternal galleries. The females remain with the young until they reach maturity. The males, rare and

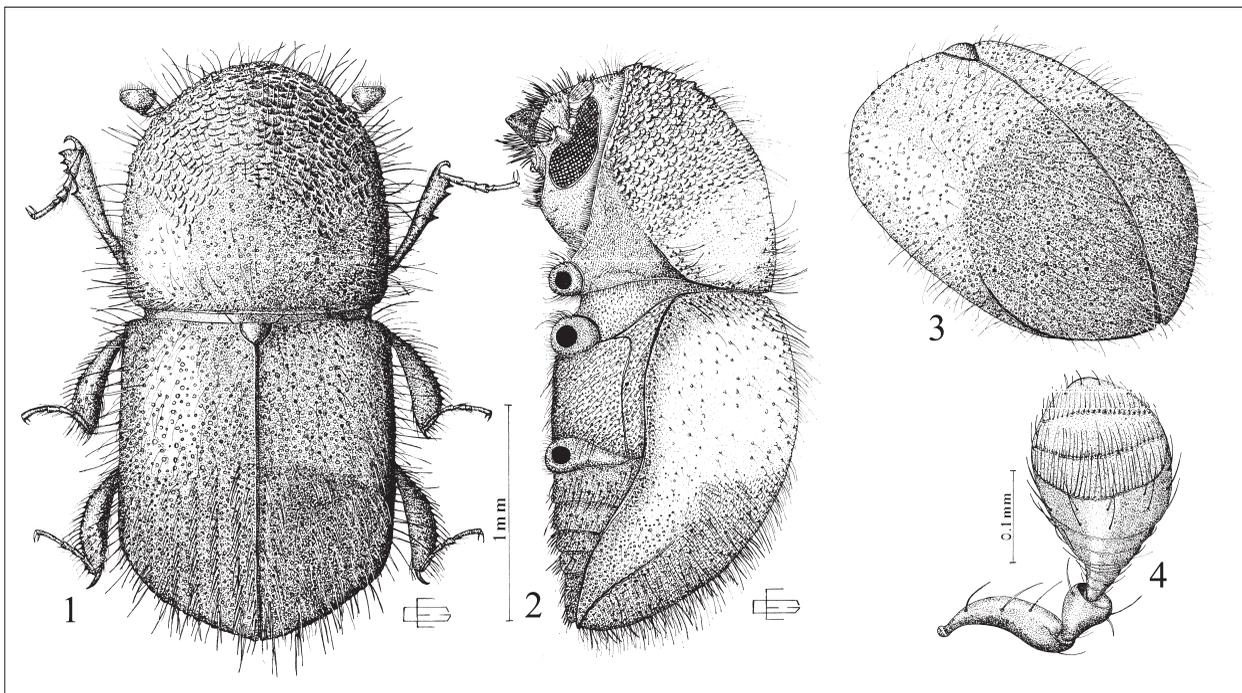


Fig. I – *Xylosandrus crassiusculus* (Motschulsky), female: 1, dorsal view; 2, lateral view; 3, elytral declivity; 4, anterior face of antenna.

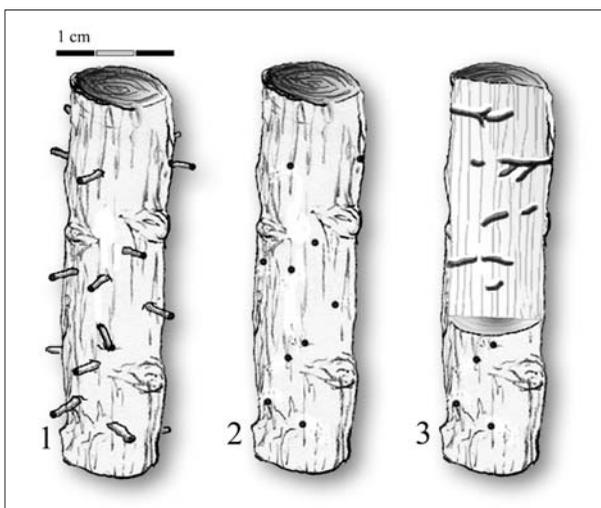


Fig. II – *Xylosandrus crassiusculus* (Motschulsky): 1, Branch with frass protruding from beetle entry holes; 2, The same without frass; 3, Longitudinal section of the branch showing gallery systems.

incapable of flight, fertilize the females before they emerge from the wood in which they develop and fly in search of a new host (ATKINSON *et al.*, 2000).

Xylosandrus crassiusculus is a widely polyphagous species, able to colonize at least one hundred species belonging to various genera of forest, agricultural and ornamental trees: *Alnus*, *Castanea*, *Ficus*, *Lagetroemia*, *Malus*, *Populus*, *Prunus*, *Quercus*, *Sorbus* and *Pinus* (WOOD, 1992).

The species can attack trees lacking signs of stress-related weakness, as well as freshly cut material (KOVACH and GORSUCH, 1985). However, high substratum humidity is necessary for the full reproductive cycle. Attacks on live trees usually occur at the base of the plant in young trees or at lesions or bark wounds on older trees (BROWNE, 1961; SCHEDL, 1962). Sporadic colonizations in the lower part of the trunk cause the formation of cankers at the attack sites and sometimes girdling and death of the tree. This type of damage was observed by BROWNE (1961) in Malaya and by SCHEDL (1962) in equatorial Africa. The same type of complications were observed on *Juglans nigra* L. after attacks by *X. germanus* (Blandford), a vector of phytopathogenic fungi of the genus *Fusarium* (WEBER and MCPHERSON, 1985). In any case, diffuse colonization by *X. crassiusculus* inevitably leads to the death of the tree (ATKINSON *et al.*, 2000).

Serious damage has been observed on nursery trees and in young orchards (WOOD, 1982; KOVACH and GORSUCH, 1985; HUDSON and MIZELL, 1999). Moreover, this xylophagous beetle's ability to extensively colonize chestnut trees (OLIVER and MANNION, 2001) could have detrimental effects on Italian chestnut silviculture.

Once the adults have burrowed inside the tree, it is virtually impossible to kill them with contact insecticides, which cannot reach the galleries bored deep in the wood. Likewise, subsequent attempts to kill the larvae with products applied to the external surface of affected trees are practically useless.

Therefore, the only alternative for the control of Asian ambrosia beetle infestations is the rapid felling of colonized trees and burning of the wood before the beginning of spring.

Moreover, stacks of lumber not quickly removed from the forest can be favourable sites for development of the beetle. Here again, the wood should be quickly destroyed if there are signs of the presence of *X. crassiusculus*. Alternatively, if one is dealing with valuable lumber already transported and stacked in yards, or with young plantations, it is possible to apply

pyrethroid treatments in the flight and early breeding period, identified by careful monitoring with ethanol-baited traps (OLIVER and MANNION, 2001), in order to kill the adults in the initial phase of penetration before the galleries are closed by frass packets.

RIASSUNTO

XYLOSANDRUS CRASSIUSCULUS (MOTSCHULSKY) SCOLITIDE NUOVO PER L'EUROPA (COLEOPTERA SCOLYTIDAE)

Prove sperimentali per la messa a punto di tecniche di monitoraggio per rilevare l'eventuale presenza di insetti esotici accidentalmente introdotti nel nostro Paese, hanno permesso di reperire nell'Italia centrale, uno scolitide nuovo per il territorio europeo, *Xylosandrus crassiusculus* (Motschulsky). Lo Scolitide, polifago a carico di latifoglie e noto per i danni arrecati a varie specie forestali e a fruttiferi, è stato catturato in trappole a caduta innescate con α pinene + etanolo e con α pinene + etanolo + feromone di *Ips sexdentatus*. Le trappole sono state collocate in un comprensorio forestale dell'Italia centrale, nel territorio denominato «Le Cerbaie», nei pressi della Riserva naturale di Montefalco (PI), in boschi misti a prevalenza di *Pinus pinaster* Aiton e *Quercus cerris* L.

Nel lavoro sono riportati la descrizione e disegni originali delle femmine della specie, per agevolare l'individuazione di eventuali focolai. Sono inoltre esaminati i rischi potenziali legati all'acclimatazione di questo xilofago e le possibilità di controllo.

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