

Notes on the carpet beetle *Attagenus lobatus* in Italy

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Abstract

Morphological, distributional and eco-ethological data on the carpet beetle *Attagenus lobatus* Rosenhauer (Coleoptera Dermestidae) are reported, based on original observations. *A. lobatus* is a household and stored product species with a primarily Palearctic distribution, secondarily Holarctic due to passive dispersion by man. This species is not very common in temperate climates and is here recorded for the first time in northern Italy.

Key words: dermestids, household pests, morphology, eco-ethology, geographical distribution, northern Italy.

Introduction

The genus *Attagenus* Latreille - one of the largest and most important genera of Dermestidae - includes over 230 valid species described in the world (Háva, 2003; 2015). At least 20 species of *Attagenus* are economically more or less relevant worldwide, as they are household and stored product pests (Hinton, 1945; Gorham, 1991; Hagstrum and Subramanyam, 2009). Obviously the harmful synanthropic species have been and continue to be spread passively and accidentally by man through travel, transport and trade, gradually expanding their areals and tending to a cosmopolitan distribution, for some species already achieved (Hinton, 1945; Howe, 1991; Nicoli Aldini, 2003a; Háva, 2011a; 2015).

As regards Italy, 21 *Attagenus* species have been recorded so far (Audisio *et al.*, 1995; Háva and Nardi, 2007; Nardi and Háva, 2013), a dozen of which may be of economic interest. Among the latter we can quote with certainty: *A. bifasciatus* (Olivier), *A. brunneus* Faldermann, *A. cyphonooides* Reitter (= *A. alferii* Pic), *A. fasciatus* (Thunberg), *A. lobatus* Rosenhauer, *A. pellio* (L.), *A. schaefferi schaefferi* (Herbst) and *A. unicolor unicolor* (Brahm). However some of these species (e.g. *A. cyphonooides* and *A. fasciatus*) - being of exotic, tropical or sub-tropical origin - have been reported for Italy so far only on the basis of single, more or less recent records, while there are still no reliable data on their permanent settlement in Italy (Trematerra, 1987; Nicoli Aldini, 2003b; Nardi and Háva, 2013). As in regions with a temperate climate these primarily exotic species live exclusively in domestic and industrial environments (houses, warehouses, factories) which are not always easily accessible to specialized entomological research, it is more likely that they escape monitoring and faunal investigations compared with congeneric autochthonous species living also or above all in natural or semi-natural environments (species whose development is primarily related to insect and bird nests, mammal dens, animal dry materials, dried vegetables, etc.).

Of the species mentioned above, *A. brunneus*, *A. pellio* and *A. unicolor unicolor* have been found and reported with relative frequency in Italy, but the others all seem to be much more sporadic and occasional (Nardi

and Háva, 2013). These also include *A. lobatus*, the object of the following notes. It should also be stressed that even for the three common species above, most of the data available for Italy consist in simple distributional reports, while biological, ecological and ethological observations are much less frequent.

Materials and methods

The original data presented here are based on material mostly collected by the author and only to a small extent provided by other collectors. The author's investigations took place in an apartment in the urban area of Bologna (the building is located about half a kilometer east of the historic centre of the town, in the 'Santo Stefano' district); in the apartment *A. lobatus* has been present permanently for decades, although with a very low population density, so findings are rather sporadic.

The measurements of adults *in toto* (length) were carried out on specimens prepared on labels and dry preserved; the antennae and the male genitalia were examined and measured, by means of an ocular micrometer, on microscopic preparations obtained with previous clarification in a KOH solution and observed in glycerol (antennae) or in Faure's fluid mounted on a slide (male genitalia). The micrograph of the detail of the pronotal lobe (figure 6) was taken by means of a SEM on a metallized dry specimen; the SEM used was a Quanta FEG 250 ESEM FEI in the Laboratorio di Microscopia Elettronica, Facoltà di Scienze Agrarie, Alimentari e Ambientali, Università Cattolica del Sacro Cuore, Piacenza.

Results and discussion

The following notes are provided on *A. lobatus*: a) collecting data of the specimens examined by the author; b) salient morphological characteristics of the adult for the purpose of specific discrimination from other closely related species; c) a summary of current knowledge of its general and Italian distribution; d) some original biological and eco-ethological observations concerning the adults; e) a summary of possible damage it may cause.

Examined specimens of *A. lobatus*

Lombardy - Milan, urban environment, in an apartment: 24.VII.1997 (1 ♀, F. Gallizia *leg.*) (Nicoli Aldini collection).

Emilia Romagna - Bologna, urban environment, in an apartment: 3.VII.1974 (1 ♂); 15.VII.1974 (1 ♀); 5.VIII.1975 (1 ♂, 1 ♀); 28.VII.1976 (1 ♀); 19.VI.1978 (1 ♂); 29.VI.1982 (1 ♂); VII.1994 (1 ♀); 28.VI.2009 (1 ♀); 19-20.VI.2010 (1 ♀); 9.V.2010 (1 ♂); 29.V.2010 (1 ♀); spring-summer 2010 (1 ♂, 1 ♀); 26-27.VI.2010 (1 ♀); 17.VII.2010 (1 ♂); 17.VII.2011 (1 ♀); VII.2011 (1 ♀); 24.VI.2012 (1 ♂); 25.IV.2014 (1 ♂); 7.IX.2014 (1 ♂); 14.VI.2015 (1 ♂, collected dead); 19.VII.2015 (1 ♂, 1 ♀, both collected dead); 26.VIII.2015 (1 ♂, collected dead); 29.VII.2017 (1 ♂); 22.VI.2019 (2 ♀♀, one of which collected dead); 7.VII.2019 (1 ♀); 21.VII.2019 (1 ♀) (R. Nicoli Aldini *leg.* all the specimens from Bologna, preserved in the Nicoli Aldini collection).

Sardinia - Cagliari: 21.VI.1971 (1 ♀, inside house, C. Meloni *leg.*); 24.VII.1973 (1 ♀, C. Meloni *leg.*) (Meloni collection preserved in the Museo Civico di Storia Naturale "Giacomo Doria", Genoa). Cagliari: M.te Urpinu, 29.VII.1971 (1 ♀, inside house, C. Meloni *leg.*, Nicoli Aldini collection).

Morphology and identification

A. lobatus is 2.8-6.0 mm long (among the specimens examined by the author: males 3-4.2 mm, females 3.5-4.8 mm). Body slightly more slender in the male and more squat in the female, uniformly ochre-light-brown in colour, with the head a little darker; antennae and legs of the same ochre colour (figures 1-2). Body provided dorsally and ventrally with very fine, short and dense, downy clear pubescence. Male with the distal antennomere of the club no longer or only slightly longer than the proximal two antennomeres of the club (figure 3); female with antennal club shorter (figure 4). Posterior margin of the pronotum in front of the mesothoracic scutellum with a median protruding lobe-shaped prominence - present in both sexes - posteriorly truncated and generally provided on the border with hairs, facing backwards, slightly longer on the two sides and shorter at the centre (figures 5-6). Male legs slightly more slender than those of the female. Male genitalia as in figure 7.



Figure 1. *A. lobatus* ♂ from Bologna, habitus.



Figure 2. *A. lobatus* ♀ from Bologna, habitus.



Figure 3. *A. lobatus* from Bologna, ♂ right antenna.



Figure 4. *A. lobatus* from Bologna, ♀ right antenna.



Figure 5. *A. lobatus*, ♀ from Bologna, detail showing the pronotal lobe.

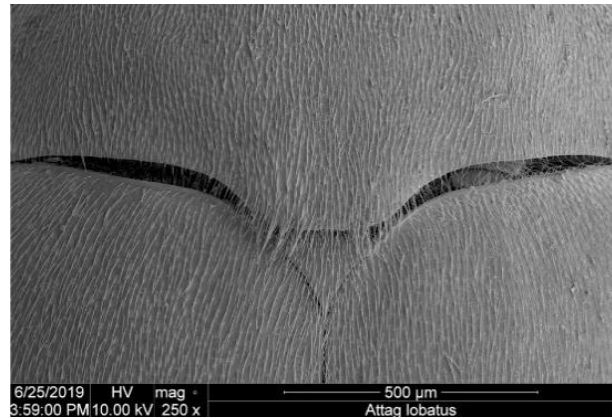


Figure 6. *A. lobatus*, ♀ from Bologna, SEM micrograph of the pronotal lobe and chaetotaxy.



Figure 7. *A. lobatus* from Bologna, ♂ genitalia (dorsal view).

The set of these characteristics allows specific discrimination from closely related species (Porta, 1929; Hinton, 1945; Ver *et al.*, 1991; Manzanares, 2013).

General and Italian distribution

A. lobatus is a primarily Palaearctic (Centralasian-Mediterranean) species, secondarily Holarctic due to passive introduction into North America, where it is established permanently in some towns of the USA (Beal, 1970).

This species has been reported for the following countries: Europe- Bulgaria, Czech Republic, France, Greece, Italy, Romania, Spain, Ukraine; Africa- Algeria, Egypt, Morocco, Sudan, Tunisia; North America- USA; Asia- Afghanistan, China, India, Iran, Iraq, Kazakhstan, Kuwait, Kyrgyzstan, Mongolia, Pakistan,

Russia, Saudi Arabia, Syria, Tajikistan, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan (Hinton, 1945; Mroczkowsky, 1968; Beal, 1970; Veer *et al.*, 1991; Al-Houty, 1997; Hagstrum and Subramanyam, 2009; Háva, 2007; 2009; 2011b; Háva *et al.*, 2013; Kadej and Háva, 2014).

For Italy it has been reported so far in Tuscany, Lazio, Campania, Apulia, Calabria, Sicily and Sardinia (Luigioni, 1929; Porta, 1929; Audisio *et al.*, 1995; Háva and Nardi, 2007; Nardi and Háva, 2013). For Sardinia the data reported here confirm the recent record by Háva and Nardi (2011); the above data for Lombardy and Emilia-Romagna represent the first reports for northern Italy, where the species has however been established in the anthropic environment for decades at least.

Bio-, eco- and ethological notes

In the above mentioned apartment in Bologna (Emilia-Romagna, Italy), *A. lobatus* has been observed more or less continuously, although always with a very low population density, as of the seventies of the last century, very likely indicating a stable settlement of the species. The apartment is located on the fifth floor in a building built in the 1960s. Adults of this species have been observed from May to September, in living rooms (where carpets are also found), in bedrooms (with parquet floors, wooden skirting boards, bedside carpets), and in bathrooms.

The adults of *A. lobatus* show a marked tendency to fly. In the summer months when the temperature of the domestic environment is high, during the day specimens (males especially, but not only) of this species make short flights, flying for example approximately at human height towards a natural light source (window) or, in the evening, to an artificial source (chandeliers, bedside lamps). The flight is very fast, with a mostly curvilinear or rather spiralling course and recalls, in speed and also in the rapid changes of direction, the flight of a small fly rather than that of a beetle. The species therefore presents an evident positive phototaxy, especially in the male and at least in certain phases of the adult life. Sometimes the adult also settles on walls, at head height or even higher, making itself clearly visible on light coloured walls.

In the same conditions a lower tendency to fly is revealed by the congeneric *A. brunneus*, which has been present syntopically for decades in the same apartment as juvenile stages and as adults, but rather more frequent than *A. lobatus*. *A. brunneus* does not fly so fast and in flight is more easily recognizable as a beetle. In addition, in the same apartment the syntopic presence of larvae and adults of another carpet beetle, the widespread *Anthrenus (Florilinus) verbasci* (L.), has also been observed with a certain continuity over the years, although always in a low number of individuals. In the same environmental conditions, at room temperature both *A. brunneus* and *A. verbasci* adults appear in spring on average earlier and disappear, in late spring or summer, earlier than *A. lobatus*, which seems to be therefore a more thermophilic species.

Early stages of *A. lobatus* are only incompletely known. The mature larva is described by Beal (1970) and Veer *et al.* (1991). Eggs were never obtained from females of *A. lobatus* found in the apartment in Bologna and kept alive in glass tubes with dry food substrate. Only *A. brunneus* adults were obtained by rearing some *Attagenus* larvae collected over the years in the same environment. The biological cycle of *A. lobatus* seems to be univoltine (Veer *et al.*, 1991; Wilches *et al.*, 2016) or even slower, according to the environmental conditions.

Damage

A. lobatus is reported associated with feathers, fur, hide, museum specimens, woollen clothes, red pepper, wheat; it has been collected in facilities where grains are stored or processed (Veer *et al.*, 1991; Hagstrum and Subramanyam, 2009). According to Hagstrum *et al.* (2013), it is recorded with the same frequency both on animal products and grains.

In an apartment, it is likely that the larval development of this species is based on wool carpets, woollen clothes, small dead insects, shoe leather, hair and other organic debris forming the 'house dust' on the floors. Due to the very low population densities observed in the apartment in Bologna, the damage by *A. lobatus* must be locally very limited and can be considered insignificant.

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