

## **A review of the *Anthrenus* Geoffroy, 1762 (Dermestidae) species on the British list**

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### **Abstract**

A component of the British list of Dermestidae (*Anthrenus* spp.) is checked for support from the scientific literature. No evidence is found for four of the species of *Anthrenus* on the British list existing as self-sustaining populations in Britain: three of these species are considered here plus one from a previous study. We argue that the number of species of *Anthrenus* on the British list should be reduced from 10 to six. The importance of regularly reviewing national lists to confirm rigorous scientific support for all species included is discussed.

### **Key words**

checklist, *coloratus*, *flavipes*, literature, *olgae*, *scrophulariae*, validation

## Introduction

A great deal of work is carried out describing new species both to science and to geographical areas. The results of this work are encapsulated in regional checklists, in particular national lists. A knowledge of the species that exist in a region is important. Most countries are signatories to the Global Convention on Biodiversity and are consequently responsible for maintaining and enhancing their own biodiversity. This is not possible without taxon specific lists. Adding species to lists, in other words extending species ranges, is pursued with great enthusiasm but rather less attention is devoted to reviewing species lists to ensure rigour and accuracy. The accuracy of a list and the degree of literature-based support for species included will vary among taxa. Some taxa are popular with many scientists engaged in their study whilst others less so. It is vital that species lists are periodically reviewed to ensure accuracy otherwise they could be prone to expansion and scientific rigour supporting the accuracy of a list is lost. Here we consider this issue with reference to The British checklist for the family Dermestidae.

Despite containing some easily recognisable species to the Coleopterist, the family Dermestidae remains poorly understood. Many species of Dermestidae are synanthropic; they are in one way or another associated with humans or their activities. The majority of species feed on keratinous material, such as dead skin, hair and feathers, or dead insects. They achieve pest status by infesting and damaging food stores (e.g. *Dermestes* Linnaeus 1758 spp. and *Trogoderma granarium* Everts 1898) or by eating into precious museum collections (e.g. *Anthrenus* Geoffroy 1762 spp., *Attagenus smirnovi* Zhantiev 1973 and *Trogoderma angustum* Solier 1849). In Britain they even breed in houses, emerging during the spring and attempt to escape into the countryside only to die in considerable numbers on windowsills (*Anthrenus fuscus* Olivier 1789 but mostly *A. verbasci* Linnaeus 1767). Even so, some entomologists have found the separation of some common species problematic as far back as Stephens around the end of the 18<sup>th</sup> beginning of the 19<sup>th</sup> century (Holloway et al 2018). This difficulty in separating some species appears to persist today (Holloway and Foster 2018).

Over 1600 species exist (Háva 2018) with 40 on the British list (Duff 2018). Very little is known about most of these species other than the few most notorious Dermestidae pest species. Remarkably little ecological work has been carried out and our knowledge of even the distribution of most species is nothing more than cursory. Some very common and widely distributed species are considered to ‘be everywhere’ and distribution maps reflect this assertion without always being based on supporting data. Insufficient effort is made to establish where they actually persist. *Anthrenus pimpinellae* Fabricius 1775 is a case in point. It has been considered almost cosmopolitan for a long time with a distribution including the whole of Europe (Háva 2015). Over the last ten years *A. pimpinellae* has been split into over 20 species in the Palaearctic (Kadej et al 2007, Kadej and Háva 2011; Holloway 2019) but, as far as the author is aware, there has been no reconsideration of where *A. pimpinellae* is found. The claim that the species occurs across the whole of Europe is not true; we do know that it has not been recorded with any certainty in the UK (Holloway et al 2018). *Anthrenus museorum* Linnaeus 1761, a well-known although relatively scarce species in the British countryside, is frequently cited as the species responsible for damaging museum specimens, especially insect collections (e.g. Háva 2011). Clearly the vernacular name, the museum beetle, is the likely root of this misapprehension. It has been known for decades that the species responsible for damaging museum material, at least in the UK, is *A. verbasci* (Holloway and Foster 2018, Holloway and Pinniger 2019) and yet the belief that *A. museorum* is the culprit persists. *Anthrenus verbasci* has been recorded as a household pest in Britain for over 100 years (Woodroffe and Southgate 1954; Peacock 1993). It is not unreasonable to have expected entomologists in the past to have spotted that *A. museorum* was not the species largely

responsible for destroying insect collections in museums. In short, the family Dermestidae perhaps hasn't received the attention that might be expected possibly as a result of the synanthropic activities of certain species.

Synanthropy can make it difficult to establish whether or not a species belongs on a national list. Some Dermestidae can be distributed beyond their natural range through international trade in food and woollen products as well as movement of museum specimens among collections. Peacock (1993) is the definitive work on Dermestidae in the UK and it is made very clear that some species have only been found on imported commodities in the UK. Despite this, the list generated by Peacock (1993) (updated from Pope 1977) appears to have been adopted as the checklist of Dermestidae appearing in the UK (Duff 2018). One of the species on the list, *A. pimpinellae*, has been investigated by Holloway et al (2018), partly as a result of the splitting of the *A. pimpinellae* complex (Kadej et al 2007; Kadej and Háva, 2011) but also because of curiosities surrounding the description of the original discovery (Beaumont 1895). Duff (2018) states that species on the British list should 'have been reliably recorded from the British Isles as possible residents'. Holloway et al (2018) found no conclusive evidence that *A. pimpinellae* conformed to this criterion and argued that the species should be removed from the British list. Recently Foster and Holloway (2015) have added one species from the *A. pimpinellae* complex to the British list, *A. angustefasciatus*, after three individuals were found together in open countryside (Figure 1). Here evidence is examined relating to other *Anthrenus* spp. that are currently on the British list and consider whether they too should remain on the British list according to the criterion laid down by Duff (2018).



Figure 1. *Anthrenus angustefasciatus*, NHM, London. Specimen new to Britain, 19 v 2014.

## Methods

The current checklist of British Dermestidae can be found in Duff (2018); ten species of *Anthrenus* are listed. Two approaches were taken to confirm the authenticity of each of these species on the

British list, except for *A. pimpineallae* which has already been considered by Holloway et al (2018). The scientific literature was extensively searched for reference to each species to confirm historical presence in Britain. In addition, the national collection of British Coleoptera (BNHM, London), the Oxford Museum of Natural History (OMHN) and the National Museum of Scotland (NMS) were consulted for specimens of each species on the list that were collected in Britain. If found the information associated with each specimen was inspected for evidence that might suggest that the specimen came from a self-sustaining population.

## Results

### *Anthrenus flavipes* LeConte 1854 (the Furniture Carpet Beetle)

*Anthrenus flavipes* is a well-known and destructive pest of keratinous and other protein-based products in many parts of the world (Veer et al 1991; Rajendran & Parveen 2005). Examples of *A. flavipes* (Figure 2) can be found in many collections in the UK including the BNHM, ONHM and NMS. In all cases, specimens of British origin appear to have been derived from reared individuals with no evidence that they came from self-sustaining populations either in doors or out-of-doors. Háva (2015) lists *A. flavipes* as cosmopolitan. However, Peacock (1993) states that it is probably a species of Asian origin that is now distributed widely across warmer parts of the world. Its distribution is limited by the susceptibility of the pupal stage to cold temperatures (Back and Cotton 1936) and therefore it has not been able to establish itself in temperate climates. It has not established in Britain (Peacock 1993) and given the winter temperatures experienced in Britain it is not likely to in the foreseeable future, at least out-of-doors. There are no records on NBN Atlas and there is no literature relating to *A. flavipes* breeding in Britain. There is no evidence that *A. flavipes* has been recorded in Britain as a self-sustaining population and should be removed from the British list.



Figure 2 *Anthrenus flavipes* ssp *flavipes* Oxford Natural History Museum.

### ***Anthrenus scrophulariae* Linnaeus 1758 (the Common or Buffalo Carpet Beetle)**

*Anthrenus scrophulariae* (Figure 3) probably originates from Europe but is now widely distributed around the world. Háva (2015) lists the species as being slightly less widespread than *A. flavipes* but still found throughout Europe, Asia, North America, North Africa and introduced into Chile and Australia. Peacock (1993) listed *A. scrophulariae* as a species associated with imports and stated ‘it has never been recorded with certainty in the wild...’ Many collections in the UK contain examples of *A. scrophulariae* derived either from culture or imported goods. *Anthrenus scrophulariae* has been split into several varieties (Kadej 2005). There is one record on NBN Atlas observed in 1975 (placed off the Norfolk coast in the North Sea) but the species is now red-listed as extinct (NBN Atlas 2019). However, since the species is recognised as a complex it is not known which variety this record refers to. The record could easily have been associated with an import and furthermore the individual found is not available for inspection. No literature could be found relating to *A. scrophulariae* breeding or establishing a self-sustaining population in Britain. For these reasons, *A. scrophulariae* should be removed from the British list.



Figure 3. *Anthrenus scrophulariae* ssp. *scrophulariae*, Oxford Natural History Museum

### ***Anthrenus coloratus* Reitter 1881**

*Anthrenus coloratus* (Figure 4) is widely distributed across south east and eastern Europe, parts of Asia, Africa and USA (Háva 2015). It was first recorded in Britain by Hinton (1945) and continues to occasionally appear on imported goods (Peacock 1993). In warmer parts of the world it is pest of taxidermy in natural history museums (Ansari & Basalingappa, 1986; Beal 1998; Rajendran & Hajira Parveen 2005) but, to date has not been recorded damaging museum specimens in the UK (Collections Trust 2019). Peacock (1993) argued that *A. coloratus* has never been established in Britain despite two individuals being found in the BNHM in 1983 and 1984 (Peacock 1993). There are no records of *A. coloratus* on the NBN Atlas. No literature could be found relating to *A. coloratus*

breeding in Britain. Overall there appears to be no evidence supporting the inclusion of this species on the British list. It is proposed here that *A. coloratus* is removed from the British list.



Figure 4. *Anthrenus coloratus*, Natural History Museum, London

#### ***Anthrenus olgae* Kalik 1946**

*Anthrenus olgae* is distributed principally throughout eastern and northern Europe with additional records claimed from the UK, Sweden, Finland, Germany and the Netherlands (Háva 2015). It is recorded as introduced in Britain by Peacock (1993). The claim for British status is based largely on Adams (1988) who recorded a light infestation from West London from 1984 to 1987, inclusive. There are no records of this species on the NBN Atlas but because of Adams (1988) *A. olgae* should remain on the British list.



Figure 5. *Anthrenus olgae*, Natural History Museum, London.

Included in the *Anthrenus* spp. remaining on the British list are *A. fuscus*, *A. museorum*, *A. sarnicus* and *A. verbasci*, all of which are well-established in Britain. There are many examples of all four species in museum collections. Of these species, *A. sarnicus*, the Guernsey Carpet Beetle, is introduced. It was first recorded in London in 1960 (Woodroffe, 1967) and since then has spread to many museums and historic houses across the country (Armes 1988). The remaining three species of *Anthrenus* have been resident in Britain for a very long time and at least *A. fuscus* and *A. museorum* are native. Alexander (2017) in his review of the status of beetles in Great Britain records *A. verbasci* as a naturalised introduction by virtue of a lack of evidence for it in Britain prior to 1500AD. However, some of the oldest collections of British insects contain *A. verbasci* so as far back as we can go, it has been known from Britain. Given this *A. verbasci* should be considered a species of Least Concern rather than a naturalised introduction.

## Discussion

In this review the evidence supporting the appearance of species of *Anthrenus* on the British list has been considered. Following the criterion provided by Duff (2018) for status as a British species, the research suggests that only the following *Anthrenus* species should appear on the British list:

- *Anthrenus (Anthrenodes) sarnicus* (Figure 6A)
- *Anthrenus (Anthrenus) angustefasciatus* (Figure 1)
- *Anthrenus (Florilinus) museorum* (Figure 6B)
- *Anthrenus (Florilinus) olgae* (Figure 5)
- *Anthrenus (Helocerus) fuscus* (Figure 7A)
- *Anthrenus (Nathrenus) verbasci* (figure 7B)

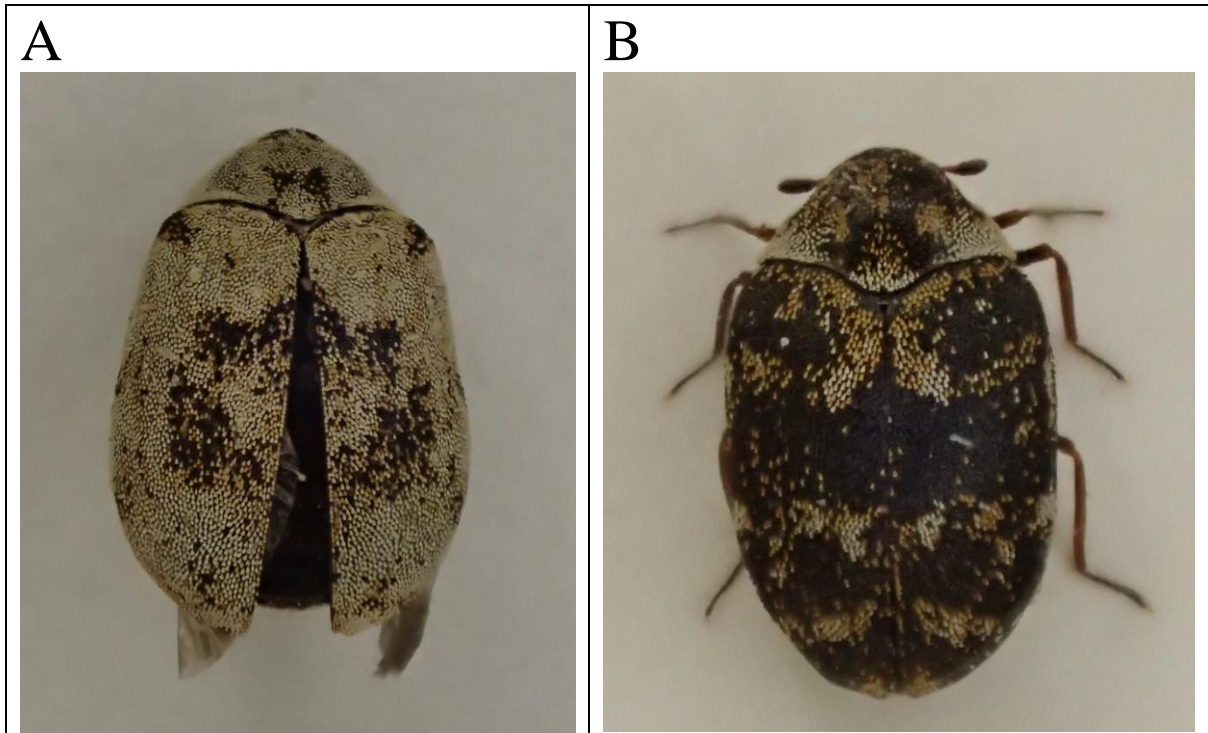


Figure 6. A: *Anthrenus sarnicus* and B: *Anthrenus museorum*

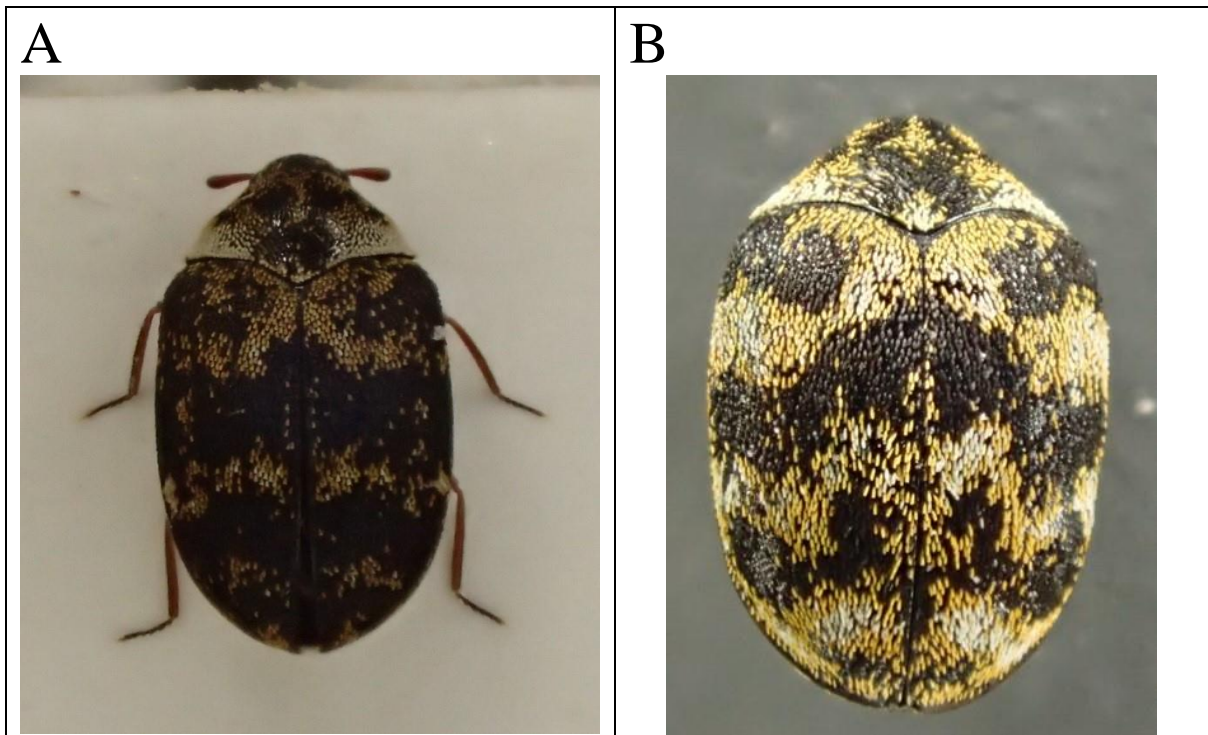


Figure 7. A: *Anthrenus fuscus* and B: *Anthrenus verbasci*



With *A. pimpinellae* removed from the list as proposed by Holloway et al (2018) and *A. angustefasciatus* added (Foster and Holloway 2015), the removal of the species discussed here will reduce the checklist of British Dermestidae to 37 species. One further species of *Anthrenus* appears in Háva (2015) as introduced into Britain: *A. oceanicus*. The author is not aware of any published evidence to support this claim.

In this study it has been demonstrated that several of the *Anthrenus* species claimed to occur in Britain lack any kind of evidence to support this assertion. A checklist of Dermestidae is perhaps more likely than some other beetle families to lack a certain amount of rigour due the synanthropic nature of many of the species. Even so the study clearly shows how over time species can creep onto a list and that, without periodic review of the content, the list could begin to lose value. In a more extensive study, Holloway et al (2019) examined the checklist of Dermestidae claimed for mainland Spain and the Balearic Islands. In a similar vein to the current study, Holloway et al (2019) failed to find support for 25% of the species appearing on the Spanish list.

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