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A review of *Dermestes* Linnaeus (Coleoptera: Dermestidae) species on the British list

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ABSTRACT

The evidence for inclusion of ten species of *Dermestes* currently on the British list is examined. Insufficient evidence is found for the inclusion of four of these species on the list; only six of the species were considered to have self-sustaining populations in the UK either in or out of doors. A further *Dermestes* species has been claimed to exist in the UK, but no evidence to support this claim could be found.

Keywords: checklist, *maculatus*, *murinus*, *undulatus*, *haemorrhoidalis*, *lardarius*, *peruvianus*, United Kingdom

INTRODUCTION

The Dermestidae Latreille, 1804, contains over 1800 species (Háva 2023), but the amount of work carried out into the taxonomy, ecological aspects, and biology of the family is quite small. The bulk of these species occur south of the UK in warmer climates; the UK only supports a few dozen species. The 'stand-out' work on the Dermestidae of the UK is Peacock (1993) wherein a total of 38 species are listed. Peacock (1993) is clear that some of the species listed occur only associated with imports, but even so, these 38 species all appear on the UK beetle list (Duff 2018). Part of the issue is that some species of Dermestidae are synanthropic. Couple this with the difficulty some workers have differentiating among species of Dermestidae (Holloway, Barclay & Foster 2018), a situation that appears to have persisted for over 200 years (Holloway, Barclay & Foster 2018), establishing what should be included in the British list becomes cloudy. Duff (2018) is clear that species which 'have never formed established populations' should not be included in the list.

Holloway (2020) examined the *Anthrenus* Geoffroy, 1762, species on the British list to consider which should be included following Duff's (2018) criterion for inclusion. Maintaining a self-sustaining population does not exclude species that exist principally or wholly in buildings, for example *Anthrenus sarnicus* Mroczkowski, 1968, or *Attagenus smirnovi* Zhantiev, 1973, both of which are well-known as pests in museums in the UK (Hanson *et al*. 2012; Pinniger & Lauder 2018; Holloway & Pinniger 2020). Holloway (2020) considered 10 *Anthrenus* species, nine from Peacock (1993) plus *A. angustefasciatus* Ganglbauer, 1904 (Foster & Holloway 2015); of these 10 species, only six qualified for retention on the British list.

Holloway (2020) argued that synanthropy can make it difficult to establish what should appear on a national list, especially when a species is carried around the

world through trade in food and other commodities. The current study examines the *Dermestes* Linnaeus, 1758, species appearing on the British list (Duff 2018) to consider whether inclusion is justified.

METHODS

The current checklist of British Dermestidae can be found in Duff (2018). For each species, the scientific literature and websites were searched for reference to each species to confirm historical or current presence in Britain.

Authoritative publications are available for the identification of British *Dermestes* (Peacock 1993; Duff 2020). The current research is intended to consider strictly whether each species should appear on the British list (rather than to aid their identification), but images of each species are included for clarity.

RESULTS

Peacock (1993) and Duff (2018) list 10 *Dermestes* species as British:

Subgenus *Dermestinus* Zhantiev, 1967

- *D. carnivorus* Fabricius, 1775
- *D. frischii* Kugelann, 1792
- *D. maculatus* De Geer, 1774
- *D. murinus* Linnaeus, 1758
- *D. undulatus* Brahm, 1790

Subgenus *Dermestes* Linnaeus, 1758

- *D. ater* De Geer, 1774
- *D. haemorrhoidalis* Küster, 1852
- *D. lardarius* Linnaeus, 1758
- *D. leechi* Kalik, 1952
- *D. peruvianus* Laporte de Castelnau, 1840

As Háva (2007) reported that *D. bicolor* Fabricius, 1781, also appears in the UK, in addition to the 10 species listed in Duff (2018), the claim that *D. bicolor* is British is also considered.

Subgenus *Dermestinus*

Dermestes carnivorus Fabricius, 1775

According to Hinton (1945), *D. carnivorus* (Figs 1A & B) is found in North and South America, Europe, and India, although possibly indigenous to America (Fauvel 1889). Mroczkowski (1968) and Háva (2023) go further identifying *D. carnivorus* as cosmopolitan. *Dermestes carnivorus* is distributed widely in foodstuff and other commodities, such as hides (Andres 1925), tobacco (MacGillavry & Corporaal 1922), and raw cacao (Richards & Herford 1930). However, Peacock (1993) states that *Dermestes* species need animal matter or material containing animal protein to complete development, so it is possible that individuals in tobacco were only there to pupate, and in cacao feeding on carcasses and exuviate of moths (*Ephestia* sp.). Howe & Freeman (1955) mention *D. carnivorus* as regular imports into Britain from West Africa, especially on shipments of bones and hide. Alexander (2017) records *D. carnivorus* as 'an infrequent and casual import'. Eleven records are associated with NBN Atlas (2023) but 10 of those relate to preserved specimens held by the Natural History Museum, London (NHML) with no location or date data provided. The only other record is from Coventry in 1932 (but with no more precise collection data provided). Overall, any evidence that *D. carnivorus* occurs in the UK as a self-sustaining population is very weak and the species should probably be removed from the British list.

Dermestes frischii Kugelann, 1792

Dermestes frischii (Figs 2A & B) is widely distributed across warmer parts of the world with both Peacock (1993) and Háva (2023) recording it as almost cosmopolitan. Howe & Freeman (1955) found it regularly associated with animal product imports from West Africa. Peacock (1993, and references therein) also record *D. frischii* associated with imports. Consistent with these observations, Alexander (2017) states *D. frischii* to be a 'fairly regular import but not established in Britain'. Forty-one records appear on NBN Atlas (2023), but 38 of these refer to preserved specimens mostly in NHML with limited associated data. The three further records are from an import of dried puffer fish (Coventry) in 2002, Bangor in 1983, and north Kent in 2011, but in both latter cases, data on the circumstances of the finds are not reported. Peacock (1993) does list outdoor records but also states that these records are 'sometimes presumed' to be from outdoors. Records for *D. frischii* in Britain are sketchy, consistent with Alexander's (2017) assessment that it is an import and not established. It does not fulfil the requirements outlined by Duff (2018) and should be removed from the British list.

Dermestes maculatus De Geer, 1774

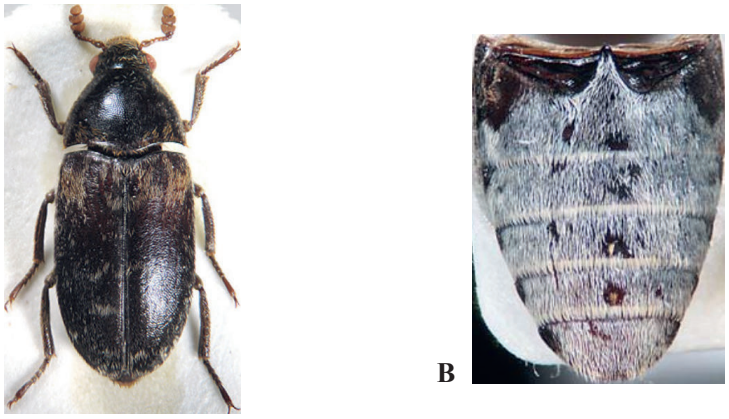
Dermestes maculatus (Figs 3A & B) is probably the commonest species of *Dermestes* found in imported goods globally. Peacock (1993) lists a range of examples where the species has been found indoors in the UK. Hinton (1945), Peacock (1993), and Háva (2023) describe it as cosmopolitan, but it is likely to have its origins in Europe (Fauvel 1889). It is certainly found out of doors on occasions (Peacock 1993) and despite its intolerance to cold it is likely to have become established, at least indoors (Peacock 1993; Alexander 2017). There are 151 records on NBN Atlas (2023). In view of the published evidence, *D. maculatus* should remain on the British list.

Dermestes murinus Linnaeus, 1758

Dermestes murinus (Figs 4A & B) is a species known to many Coleopterists in the UK. It is a native, non-synanthropic species of least concern (Alexander 2017) widely distributed across the UK. 179 records appear on NBN Atlas suggesting that whilst common it is thinly distributed with perhaps a greater concentration in East Anglia. It feeds in the wild on dead mammals and birds, with its numbers peaking in May and June. *Dermestes murinus* is an established species native to the UK and belongs on the British list.

Dermestes undulatus Brahm, 1790

Dermestes undulatus (Figs 5A & B) is not considered a pest species in the UK, although it is sometimes found on stored products overseas (Peacock 1993). It could be declining in the UK; it is now rare and considered vulnerable (Alexander 2017). Thirty-one records appear on NBN Atlas (2023), but only five of those records occur after the year 2000. The NBN atlas records indicate that it is largely a shoreline species probably feeding on dead fish, shellfish, and other animals washed up dead on the shoreline. Nearly all records are from out of doors, *D. undulatus* clearly belongs on the British list.



Photos: Andreas Herrmann

Fig. 1. — *Dermestes carnivorus* Fabricius, 1775: A, habitus; B, sternites.

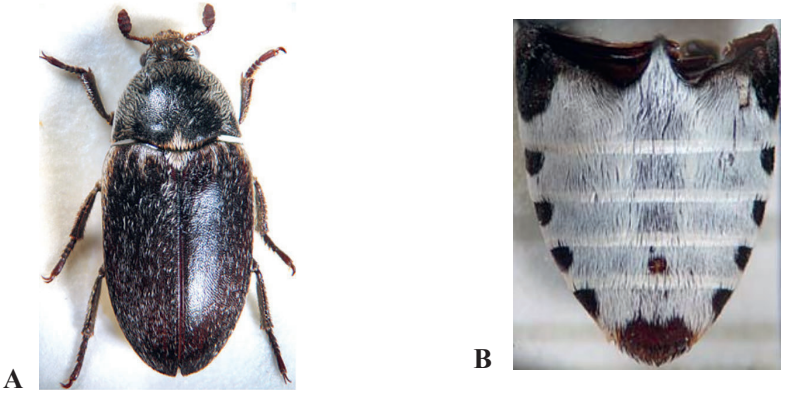


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Fig. 2. — *Dermestes frischii* Kugelann, 1792: A, habitus; B, sternites.

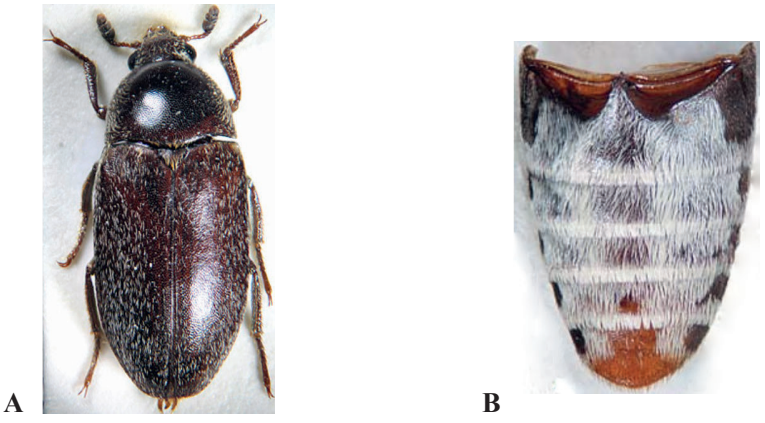

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Fig. 3. — *Dermestes maculatus* De Geer, 1774: A, habitus; B, sternites.

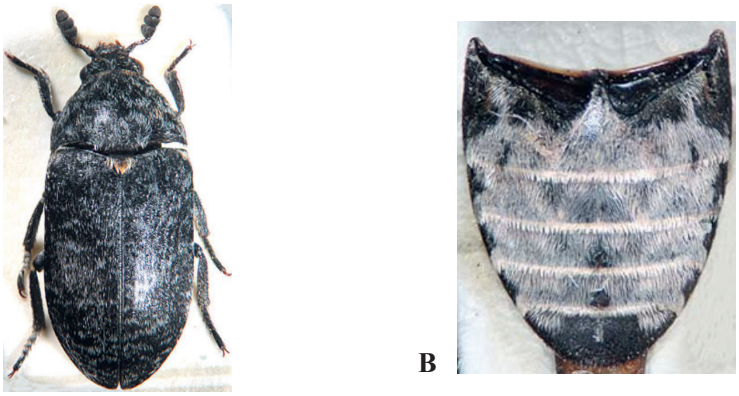

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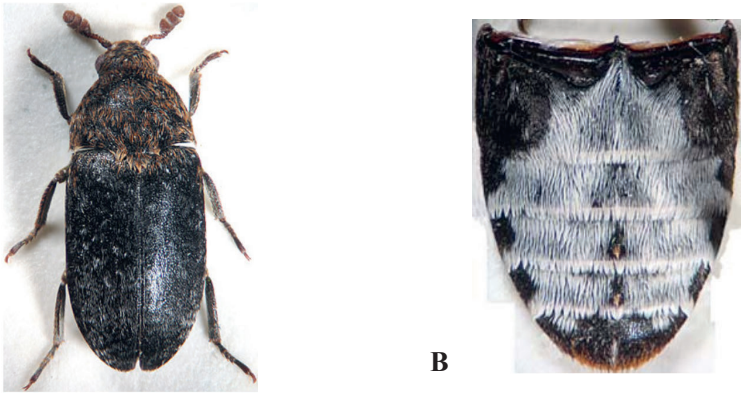
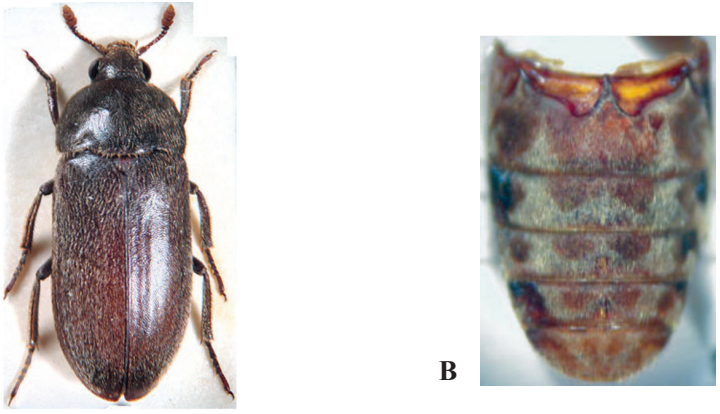
Fig. 4. — *Dermestes murinus* Linnaeus, 1758: A, habitus; B, sternites.



Photos: Andreas Herrmann

Fig. 5. — *Dermestes undulatus* Brahm, 1790: A, habitus; B, sternites.



Photos: Andreas Herrmann

Fig. 6. — *Dermestes ater* De Geer, 1774: A, habitus; B, sternites.

Subgenus *Dermestes*

Dermestes ater De Geer, 1774

Another *Dermestes* species considered to be cosmopolitan (Mroczkowski 1968, Peacock 1993, Háva 2023) although possibility originating from America (Fauvel 1889). *Dermestes ater* (Figs 6A & B) only comes into the UK on imported goods, but associated with a wider range of material including some vegetable-based commodities as well as animal-based ones (Hinton, 1945, Howe & Freeman 1955, Peacock 1993). Of the 29 records on NBN Atlas (2023), only one does not refer to a preserved, culture-derived specimen and that was collected in Scotland from food for pet spiders. The author has a culture of *D. ater* at the University of Reading derived from food for pet reptiles (GJH, unpub. data). Alexander (2017) reports records of *A. ater* in the UK as only the result of importation. There is no evidence to suggest that *D. ater* is established in the UK, either indoors or out of doors, and should not appear on the British list.

Dermestes haemorrhoidalis Küster, 1852

Dermestes haemorrhoidalis (Figs 7A & B) is essentially a European species (Peacock 1993) that has been distributed worldwide on commodities (Háva 2023). It has likely been in the UK since the beginning of the 20th century, but has probably been extensively confused with *D. peruvianus* (Peacock 1976). *Dermestes haemorrhoidalis* is distributed mainly across the southern counties of England, but is most frequent in London where it is often the commonest *Dermestes* spp. encountered (Peacock 1993). There are a few records from out of doors, but not enough to suggest that the species persists beyond buildings. Nevertheless, it is likely to have developed a self-sustaining population (Alexander 2017) and as such should remain on the British list.

Dermestes lardarius Linnaeus, 1758

Dermestes lardarius (Figs 8A & B) is probably the most frequently encountered *Dermestes* sp. in the UK, at least in England and Wales (NBN Atlas 2023). *Dermestes lardarius* is widely distributed and considered cosmopolitan by Hinton (1945), Mroczkowski (1968), Peacock (1993), and Háva (2023), although most likely originating in Europe (Fauvel 1889). It has been spread widely as a pest of imported commodities, but it is now only considered a minor household pest in the UK (Peacock 1993). It is a common species of least concern (Alexander 2017), frequently encountered out of doors and belongs on the British list.

Dermestes leechi Kalik, 1952

That fact that *D. leechi* (Figs 9A & B) is on the British list indicates the latitude given to species entry onto the list. *Dermestes leechi* has a natural distribution probably stretching from north-western Africa, east into Asia. *Dermestes leechi* is found out of doors in Russia in animal burrows and bird nests (Zhantiev 1976; Adams 1980), and there is a fascinating report of *D. leechi* from a 3000-year-old Egyptian mummy (Strong 1981). *D. leechi* is infrequently found in imported commodities and has only been recorded in the UK (Scotland) once in 1978 (Adams 1980). Unquestionably, *D. leechi* should not be on the British list.

Dermestes peruvianus Laporte de Castelnau, 1840

Dermestes peruvianus (Figs 10A & B) is believed to naturally occur in South America according to records of imports (Aitken 1975). However, as it was confused with *D. haemorrhoidalis* for much of the 20th century there is uncertainty about its natural distribution. Since it is a pest of various commodities, it has been transported widely and has now become established in the UK (Peacock 1993). In addition to imports, it is now frequently found in museum café areas, such as NHML (M. Barclay, pers. comm.). *Dermestes peruvianus* has also been found breeding out of doors in pigeon nests in London (Peacock 1993). *Dermestes peruvianus* has become a common pest species of the genus in the UK and fulfils the requirements for inclusion on the British list of Dermestidae.

Dermestes bicolor Fabricius, 1781

Dermestes bicolor (Figs 11A & B) is considered in this contribution because Háva (2007, 2023) claimed that it occurs in the UK. Hinton (1945) discusses the appearance and distribution (middle and southern Europe, Caucasus) presumably because he felt it had the potential to appear in the UK. Hinton (1945) provides evidence of *D. bicolor* activity in Germany, but not from the UK. Neither Peacock (1993), Alexander (2017), nor Duff (2018) mention *D. bicolor* as a British species. Finally, it does not appear in Duff (2020), which illustrates identification features of *Dermestes* spp. occurring or likely to occur in the UK. It is not clear where the notion that *D. bicolor* is a British species comes from, but what is clear is that it should not be added to the British list before evidence of an established population comes to light.

DISCUSSION

In this study, the evidence for the appearance of 11 species of *Dermestes* on (or potentially included on) the British list is considered. Throughout, Duff's (2018) criterion of an established, self-sustaining population is followed rather than simple appearance in Britain. The research suggests that only the following six *Dermestes* species should appear on the British list of Dermestidae:

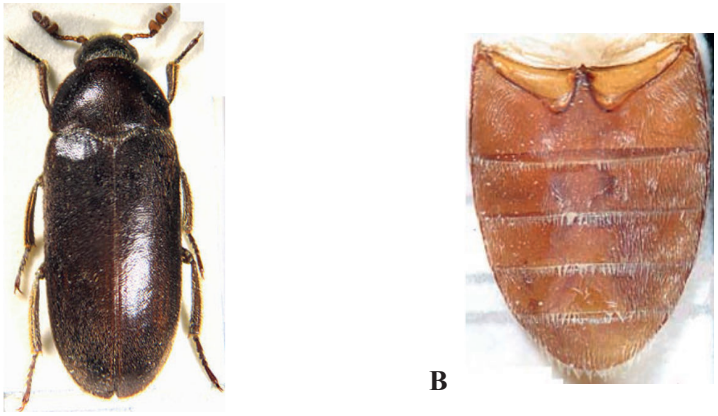
Subgenus *Dermestinus*

- *D. maculatus* De Geer, 1774
- *D. murinus* Linnaeus, 1758
- *D. undulatus* Brahm, 1790

Subgenus *Dermestes*

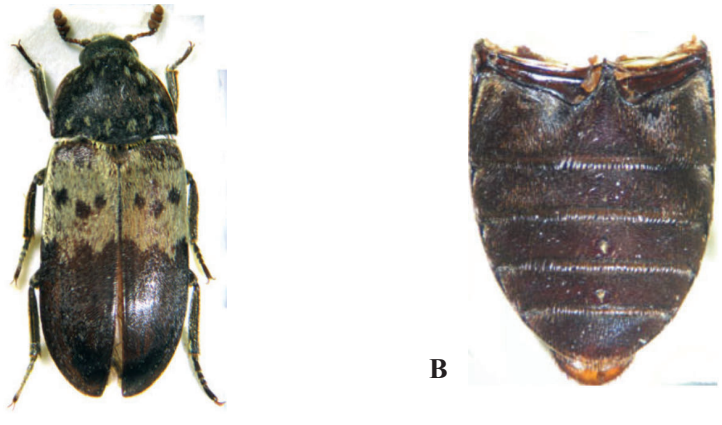
- *D. haemorrhoidalis* Küster, 1852
- *D. lardarius* Linnaeus, 1758
- *D. peruvianus* Laporte de Castelnau, 1840

Dermestes carnivorus, *D. frischii*, *D. ater*, and *D. leechi* should be removed. In addition, there is no evidence to suggest that *D. bicolor* should be added to the British list. Holloway (2020) carried out a similar examination of *Anthrenus* species on the British list and concluded that four species should be removed from the list, thus reducing the British list to 37 species (including *Anthrenus angustefasciatus* (Foster & Holloway 2015), *Attagenus trifasciatus* (Fabricius, 1787) (Duff 2018) and *Trogoderma angustum* (Solier, 1849) (Shaw 1999)). When the research carried out here is included, a further four species should be removed from the British list, reducing it still further to 33 species. Holloway (2020) argued that the synanthropic and pest status of several species of Dermestidae on the British list can make it



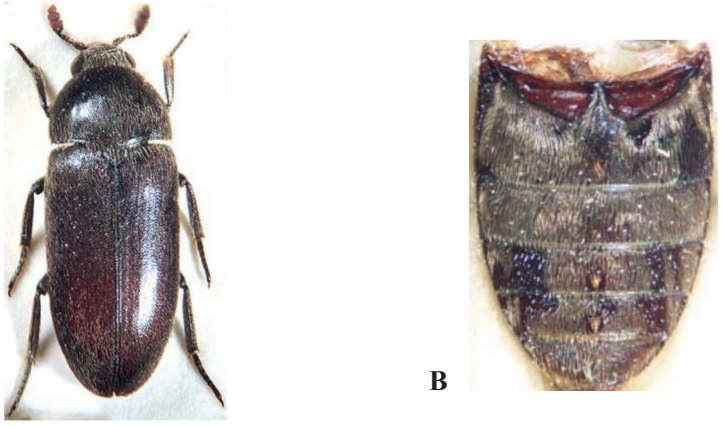
Photos: Andreas Herrmann

Fig. 7. — *Dermestes haemorrhoidalis* Küster, 1852: A, habitus; B, sternites.



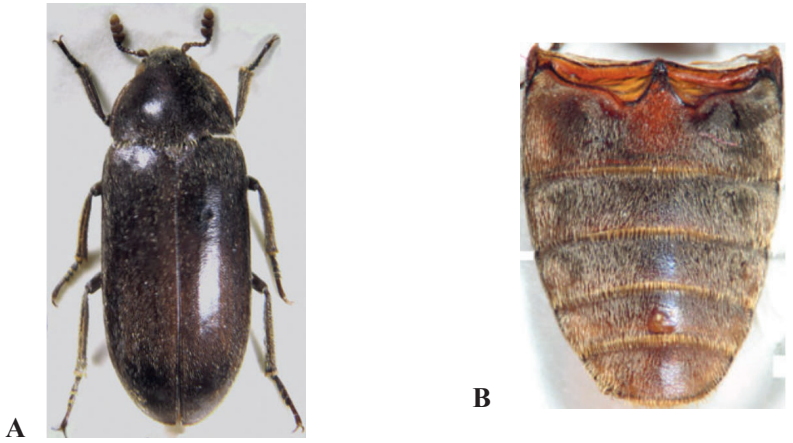
Photos: Andreas Herrmann

Fig. 8. — *Dermestes lardarius* Linnaeus, 1758: A, habitus; B, sternites.



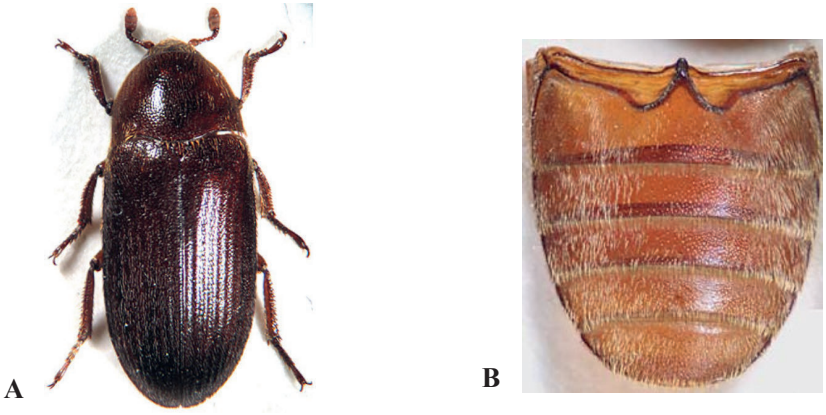
Photos: Andreas Herrmann

Fig. 9. — *Dermestes leechi* Kalik, 1952: A, habitus; B, sternites.



Photos: Andreas Herrmann

Fig. 10. — *Dermestes peruvianus* Laporte de Castelnau, 1840: A, habitus; B, sternites.



Photos: Andreas Herrmann

Fig. 11. — *Dermestes bicolor* Fabricius, 1781: A, habitus; B, sternites.

difficult to decide whether a species should appear on the list. Nevertheless, it does appear that as Duff's (2018) established-population criterion is rarely followed a British checklist will generally expand to include adventitious species. If country lists are to have any value, species entry onto the list should be considered with greater rigour, an approach that should not be limited to just the British list of Dermestidae. Holloway, Cañada Luna & Kadej (2019) examined a list of Dermestidae recorded for Spain, and failed to find any evidence for 25% of the species included on the list. Ruta *et al*. (2004) considered the species of Dermestidae appearing on the Polish list. From an original 54 species, Ruta *et al*. (2004) suggested removing 11 because of suspected misidentifications, and after removing introduced species proposed that the Polish list should consist of 29 indigenous species, with a further eight introduced species occurring at multiple locations, and six more introduced species from a single location.

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