

- 4 Antennal club with 3 to 8 segments, gradually differentiated from each other and rest of antennae, segments joined symmetrically along central axis (Figure 95)
 *Trogoderma* spp. (Figures 93–104)
- Antennal club with 3 large segments, much bigger than rest of segments of antennae, segments of club joined to one side (Figure 72) *Anthrenocerus* (Figure 71)

Simplified key to major genera of larvae of Dermestidae associated with stored products (based on Kingsolver 1987 and Peacock 1993)

Identification of cast skins is usually possible

- 1 Ninth segment of abdomen with two horn-like structures (urogomphi) (Figure 85) ...
 *Dermestes* spp. (Figure 84)
- Ninth segment of abdomen without two horn-like structures (Figure 103) 2
- 2 Dorsal surface of larvae with hastisetae (barbed arrow-headed setae – Figure 104). These are often partly rubbed off on worn specimens (Figures 70, 103, 104) 3
- Dorsal surface of larvae without hastisetae *Attagenus* spp. (Figure 76)
- 3 Tufts of hastisetae emerge directly from sclerotized (brown) areas of abdominal segments 4–7, hastisetae do not overlap over middle of abdomen. hastisetae present on final abdominal segment. .. *Trogoderma* spp. (Figure 103–104) and *Anthrenocerus* spp.
- Tufts of hastisetae emerge from non-sclerotized area below sclerotized (brown) areas of abdominal segments 4–7. Tufts of hastisetae overlap over middle of abdomen (Figure 70), hastisetae not present on final abdominal segment. *Anthrenus* spp.

References

Aitken (1975), Arbogast (1991), Banks (1994), Kingsolver (1987), Haines (1991), Haines and Rees (1989), Hinton (1945), Mound (1989), Peacock (1993), Roach (2000).

Variegated carpet beetles, Museum beetles
 (Genus: *Anthrenus*) (selected species)

| | |
|-----------------------------|--|
| <i>Anthrenus flavipes</i> | Furniture carpet beetle |
| ✓ <i>Anthrenus verbasci</i> | Small cabinet beetle, Varied carpet beetle, Variegated carpet beetle |

Summary

| | |
|----------------------|--|
| Feeding strategies | primary pest, secondary pest, scavenger |
| Commodities attacked | dried material of animal origin |
| Distribution | worldwide |
| Economic importance | high as domestic and museum pest |
| Eggs | laid amongst commodity |
| Larvae | eruciform, mobile, live amongst commodity |
| Adults | short lived, do not feed on commodity, can fly |

2-4 weeks

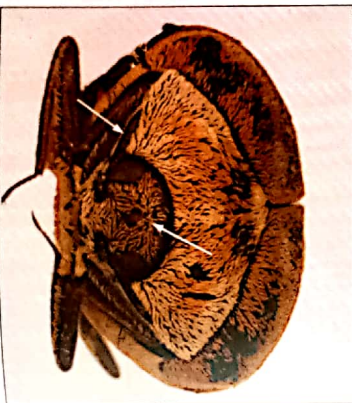
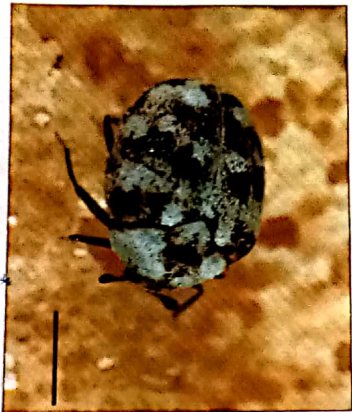
Introduction

The genus *Anthrenus* comprises more than 80 species worldwide. Members of this genus are mainly scavengers on dried material of animal origin. Many species are from time to time found associated with human activities as scavengers and pests of materials of animal origin. By far the most frequently encountered species is *A. verbasci*.

Identification

To identify *Anthrenus* species from other Dermestids see keys above or those of Kingsolver (1987), Haines (1991), Hinton (1945) or Peacock (1993). The two species listed here are often associated with the storage environment. However, many other species are known, some of which are found in domestic situations.

Adult *Anthrenus* are distinctive small oval 'seed-like' beetles 2–3 mm long (Figures 68–69). Legs and antennae can be tucked in when the insect is alarmed. The upper surface of the adult is covered with scales, which in all common pest species are multicoloured (mainly browns, black and white) giving the insect a characteristic mottled appearance. Larvae are oval in shape, creamy white to light brown in colour and are clothed in transverse bands of hairs (Figure 70). Tufts of hairs or hastisetae are present as patches on either sides of abdominal segments and overlap over the middle of abdomen.



Top left: Figure 68 *Anthrenus verbasci*, adult, showing body covered in highly patterned scales

Top right: Figure 69 *Anthrenus verbasci*, adult, head / antennae showing median ocellus, antenna cavity fully visible from front

Left: Figure 70 *Anthrenus verbasci*, larva, showing tufts of hairs including hastisetae at tip of abdomen

Life cycle

Females lay 30–100 eggs. On hatching, larvae feed and burrow into infested material, moulting many times as they develop. If conditions become unfavourable, larvae may enter diapause (a condition of suspended animation) and in temperate regions they usually overwinter in this state. Pupation takes place inside the skin of the last larval instar. Adults live for 2–4 weeks (*A. verbasci*) and typically emerge in late spring and early summer. They fly well and can often be found feeding on nectar and pollen from flowers. This food is not essential as populations can survive without it.

Physical limits and optimum rate of multiplication

| Species | Conditions within which breeding takes place | Shortest development period, with optimum conditions | Maximum monthly rate of increase |
|---------------------------|--|--|----------------------------------|
| <i>Anthrenus flavipes</i> | 20–35°C | > 25% | > 100 days at 30–35°C |

Multiplication is slow. Species that live under ambient conditions in temperate regions can take one or two years to complete development. Several generations a year may be possible under tropical conditions. Larvae can survive long periods of cold and dry conditions.

Economic importance

Anthrenus spp. are important pests of museums and homes, attacking dried artefacts of organic origin, including preserved insect specimens, skins, hides and woollen goods including clothes and carpets. Larvae of *A. verbasci* have occasionally been found feeding on a range of stored foodstuffs including savoury biscuits, dried baby food, cakes, peanuts, wheat and maize. In commercial grain storages, *Anthrenus* are usually scavengers of minor importance being associated with birds' nests or animal remains. In temperate regions, *A. verbasci* is a major household pest of woollen carpets and textiles.

Type of damage and symptoms

Damage consists of holes eaten by larvae in infested material and packing material. Large numbers of cast skins are left scattered through the infested and damaged material.

Ecology

In nature, *Anthrenus* species are scavengers of material mainly of animal origin. Household infestations typically start from birds' nests and dead birds or rodents in roof spaces or wall cavities. Emergence of adults in many species is synchronised to take advantage of optimal ambient conditions and easy availability of flowers for adult food. This sense of timing is very strong and persists even in cultures kept in constant conditions independent of outside stimuli.

Monitoring

Infestations are usually spotted by accumulations of cast larval skins. A synthetic sex pheromone is commercially available to attract adult male beetles. Adults are attracted to light and can be found feeding on pollen and nectar on flowers.