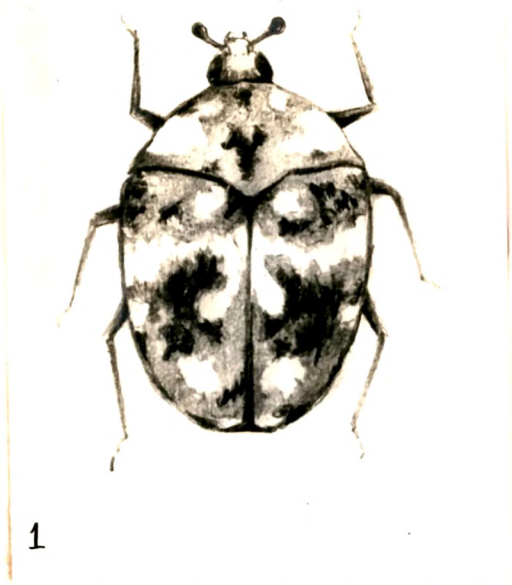
CHAPTER 1

SYSTEMATIC POSITION AND GENERAL MORPHOLOGY OF ANTHRENUS VORAX WATERHOUSE

Anthrenus vorax Waterhouse (Class - Insecta, Order - Coleoptera, Suborder - Polyphaga, Superfamily - Dermestoidea, Family - Dermestidae) is commonly called the Furniture-Carpet beetle. Dermestidae, the family to which it belongs, consists of small or moderately sized beetles in which the adults are usually invested with scales and the larvae with fine hairs. The distinctive morphological features of adults are the presence of five-jointed tarsi, short clubbed antennae retractable into recesses under the prothorax, retractile head and six cryptonephric malpighian tubules.

They are distributed throughout the world, inhabiting a wide range of ecological niches and feeding on a variety of materials such as wheat, rice, furs, feathers, hides and horns, as well as bacon, cheese etc. Some 52 species are reported to be associated with stored products in various parts of the world (Patel, 1958). The following are a few species of dermestid beetles common in India and which we have in our insect collection: Trogoderma granarium (Khapra beetle), Dermestes vulpinus (leather beetle), Anthrenus vorax (Furniture-Carpet beetle) and Attagenus piceus (Black carpet beetle).

Figs. 1 to 3 show the adult, larva and pupa of Anthrenus vorax. The adult measures about 3.5 mm in length and 2.5 mm in breadth and weighs about 5 mg. The male tends to be slightly smaller



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Figs. 1 - 3. Stages of development of Anthrenus vorax
1. Adult, 2. Fully grown larva, 3. Pupa

Fig. 4. Female reproductive system showing the spermathecal gland

in size, but this difference is not constant, and no dependable external sex differences are noticeable. The body is covered by glistening white, imbricate scales on the ventral surface and by coloured scales - black, yellowish brown and white, arranged in definite patches so as to form a mottled pattern on the elytra, thorax and head. The antenna is eleven segmented, the last three segments forming an apical club. The tarsus is five segmented and the apical segment bears two claws. The antennae and the legs are retractable into recesses on the ventral aspect of the body.

The adult though found to be non-feeding under laboratory conditions, possesses the usual coleopteran type of mouth parts and a well developed alimentary canal.

During the course of our studies on this insect, a hitherto unrecorded finding of the presence of a spermathecal gland was made. In a description of the reproductive system and the external genitalia of Anthrenus vorax given by Patel (1958) no mention has been made of the presence of a spermathecal gland and obviously it was considered to be absent in this insect.

The size and relationship of the gland with the spermatheca can be seen from Fig. 4. In the quiescent adult stage, before emergence of the beetle, this gland is a flattened tape-like structure connected to the spermatheca by a duct originating laterally, a short distance from the anterior end. The anterior or the posterior end or both, are often but not always, bifurcated. In the adult beetle after emergence the gland becomes more tubular and distended, the space within being filled with some secretion.

The duct which leads from the gland is swollen at the distal end showing a spiral passage inside and opens into the spermatheca.

Imms (1957) stated that in Coleoptera, an accessory gland of variable character is generally found in connection with the spermatheca. The present observation is in conformity with this statement. We have also noticed the presence of a spermathecal gland in Dermestes vulpinus which suggests that this is a common feature of the Family.

The full grown larva measures about 5 mm in length and 2 mm in breadth and weighs about 6 mg. The body has a thick coat of easily detachable hairs (Fig. 2) which has earned for it the popular name of "wooly bear". The tergites possess transverse rows of hairs of variable length, the lateral hairs being longest and projecting outwards at right angle to the body. Shorter hairs are found on the sterna. The 5th, 6th and the 7th abdominal segments bear laterally long bundles of hairs directed backwards and raised at an angle of 45° to the body. They are capable of being erected and have a characteristic structure with easily detachable arrow-headed apex. Short and thin arrow-headed hairs in fewer numbers are also found on many of the anterior tergites. A bundle of long vibratile hairs arise from the apex of the last abdominal segment.

The larva is coloured black, the inter-tergal membrane being whitish. The ventral surface is brownish white.

The number of larval moults is not constant. Patel (1958) observed that within very broad limits the number of moults varied between 5 and 14. Under conditions in which the insects were

reared in our laboratory with a diet consisting of dried muscle supplanted with yeast (Chapter 2), the number of moults varied within a narrower range between 5 and 8, with the general trend being for 6 or 7 moults.

When fully grown, the larva enters a quiescent phase known as prepupa. After 2 to 3 days a median dorsal split is formed extending from the epicranial suture to the 6th or 7th abdominal segment, thus exposing the pupa. The pupa remains within the split larval cuticle, has an yellowish colour and is clothed by fine, silky, yellowish brown pubescence. By the 7th day pupal stage, the wing-pads start migrating dorsally, and scales begin to appear. Next, the pupa to adult moult occurs, the pupal skin is thrust backwards and remains as a crumpled mass at the posterior end. This stage is known as the pre-emergent adult or quiescent adult stage and lasts for about 3 to 4 days after which the adults emerge. The sexes could be distinguished in the pupal stage by the following character. The female pupa bears a pair of papilla-like projections at the tip of the abdomen, which are longer and stouter than that of the male and diverge to form an angle.

The eggs are soft and small, measuring 0.6 to 0.9 mm in length and 0.25 to 0.4 mm in width (Patel, 1958). They bear a group of spine-like projections at one end. The egg laying habits are discussed in the next chapter.