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## Modern methods of protecting wool

The damage caused each year to personal effects and furnishings by lanivorous, or wool-eating, parasites — that is to say in particular the clothes moth (*Tineola biselliella*), the common carpet beetle (*Anthrenus scrophulariae*) and the black carpet beetle (*Attagenus pellio*) — is of such economic importance that great attention is paid to this problem today.

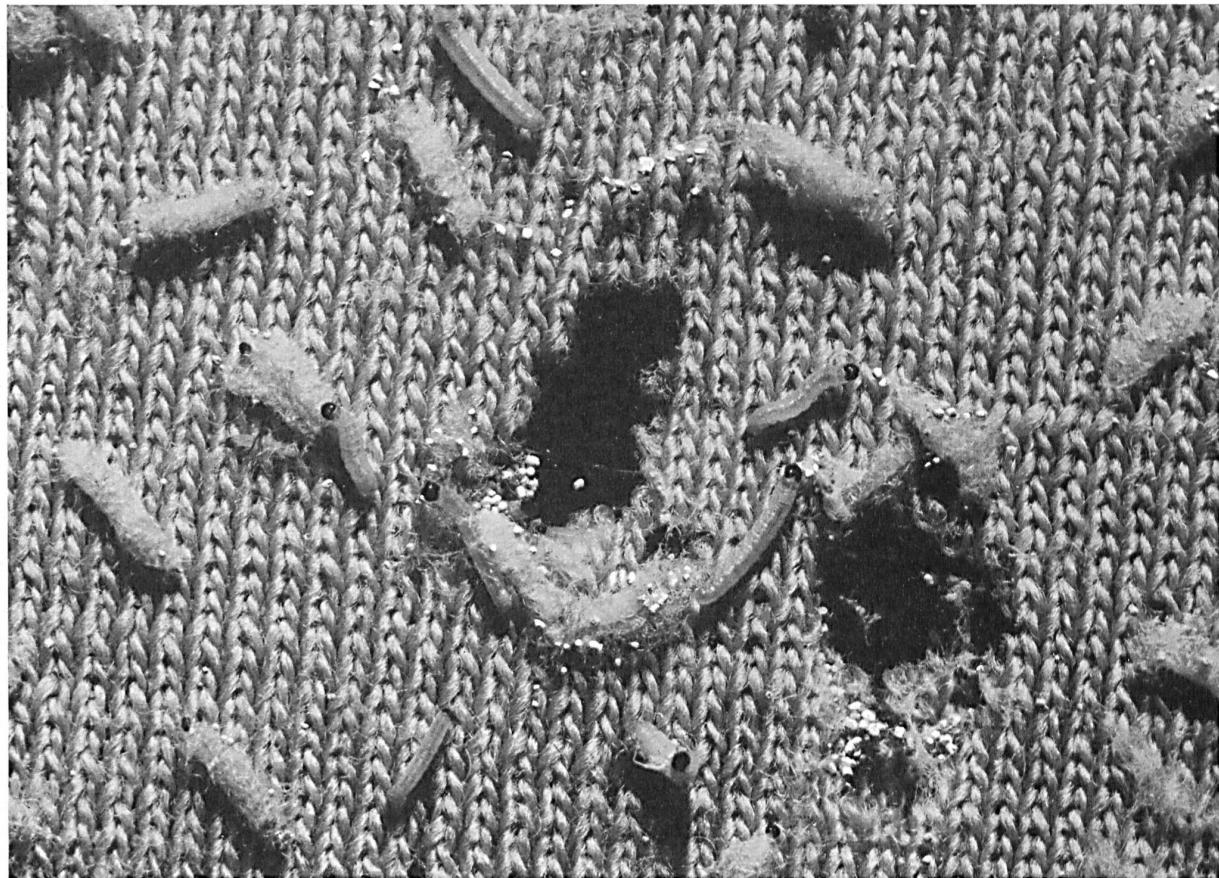
Taking the rate of reproduction of the clothes moth and its power of absorption as a basis, it is possible to calculate the amount of wool that would be consumed in one year by the descendants of a single family of this small moth, supposing that the theoretically possible three generations per year developed normally and completely. Under these conditions, the total consumption of wool would be about 1 cwt. From the economic point of view however the damage would be even greater, for one must also take into account the depreciation of valuable personal belongings caused by a single moth hole.

### The clothes moth (*Tineola biselliella*)

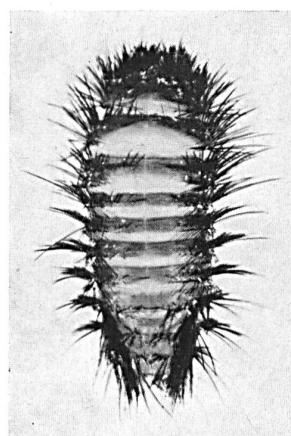
This tiny well-known moth, a pale golden yellow in colour, lays its eggs for preference in dark places. The larvae hatch a few days later. During the long period of its

life as a larva when the insect eats — which may last, depending on the surrounding temperature and the food available, from several weeks to anything up to several months — the larvae grow from a  $\frac{1}{2}$  millimetre to about 10 millimetres in length. Then they turn into chrysalises which hatch out as moths 2 to 4 weeks later and the cycle begins all over again.

The imago, or insect in its final and perfect form, absorbs no food, so it is not really the moth that causes so much havoc but its larva, which actually lives on the wool. When they have hatched out from the eggs, carefully concealed in the material, the larvae which do not like the light remain instinctively in the dark and make themselves a protective covering with a thread that they secrete and in which they incorporate wool fibres. They thrive particularly well during warm summer weather and in heated apartments. In eating, they make holes and tunnels in the nap of the material without however, in their work of destruction, going right through the material. That is why their treacherous activity is only noticed when the damaged parts are brushed or cleaned with a vacuum cleaner and the broken and sheared threads come away to reveal the damage.



Moth larvae (magnified)



Common carpet beetle, larva and imago (magnified)

## The beetles

The lanivorous beetles are, as we have already mentioned, the common carpet beetle (*Anthrenus scrophulariae*) and the black carpet beetle (*Attagenus pellio*). In their final form, these insects normally live in the open air and feed on the pollen of flowers and not on wool; it is once again the larvae therefore that eat the wool. The females of these insects only come indoors when they are about to lay their eggs. They seek out dark, dusty spots or settle directly on the wool to lay their eggs. The ugly, hairy larvae that hatch out (see illustrations) are even more voracious than the larvae of moths. The common carpet beetle and the black carpet beetle are much more widespread today than the clothes moth. They are moreover more resistant in all respects and consequently much more difficult to destroy.

## Protective measures

These few notes on the biology of lanivorous moths and beetles are sufficient to show that the results of our efforts to destroy these pests can never be completely successful so long as our fight remains purely offensive.

The products generally used nowadays to combat these lanivorous insects, i. e. naphtelene, camphor, benzol-paradichloride, etc. are supposed to keep the insects away with the gases they give off as they volatilize. This «gassing» method is however not very suitable in human habitations because of its unpleasant effects, which can even be dangerous to human beings. Moreover the effectiveness of these volatile products is not a hundred per cent sure and they are expensive and complicated to use, for they have to be renewed periodically. The same is true of the contact poisons, such as the DDT insecticides, which afford good protection but unfortunately only for a limited time and are easily washed off. This type of treatment must therefore be repeated from time to time.

Having recognized the economic importance of the fight against lanivorous pests and the weak points of the methods examined above, scientific research has sought to discover new means of solving the problem of wool protection. In the course of systematic research carried on over a period of years, the chemists and biologists of J. R. Geigy Ltd. at Basle (Switzerland) — the firm that has acquired a worldwide reputation for its success in the fight against parasites — has developed a new product which brings about a lasting chemical change in wool so that it no longer serves as a food for the larvae of insects, without however altering its other qualities in any way. This product is called MITIN.

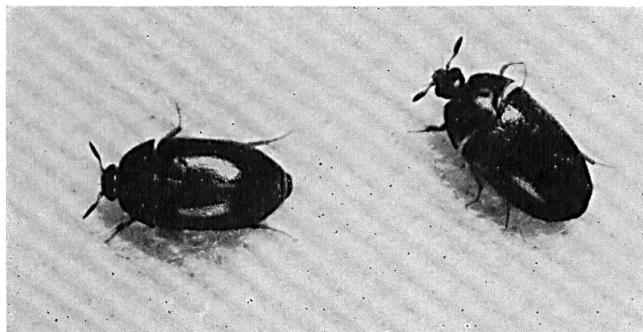
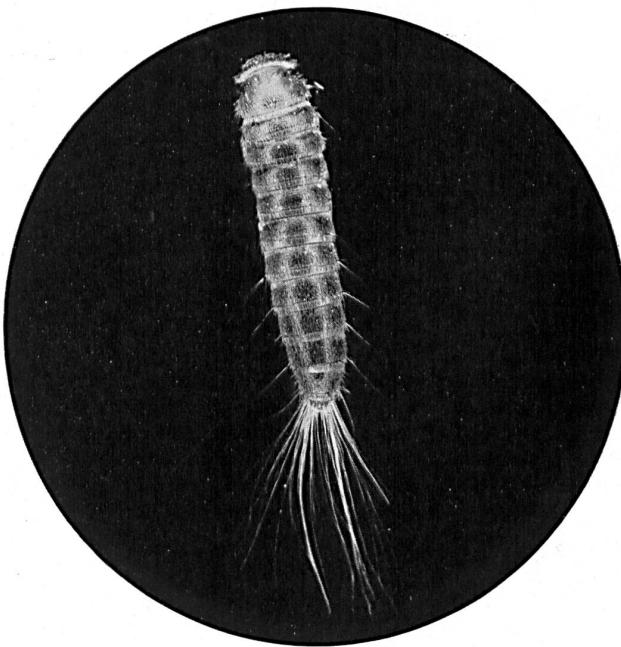
The larvae of clothes moths and the common carpet and black carpet beetles cannot live on wool that has been "mitinised"; they either have to leave it or die there. After being treated with Mitin, the wool possesses lasting protection against the destructive activities of clothes moths and other wool-eaters.

Mitin is a product strictly for industrial use, that is to say that only textile concerns possessing the necessary professional knowledge and technical installations can carry out the treatment properly.

It is impossible, even for experts, to tell the difference between ordinary wool and wool treated with Mitin. It is absolutely odourless and harmless to men and animals — with the exception of lanivorous insects. It remains soft and supple and the colours lose none of their qualities of fastness. The protection against parasites is preserved unaltered, even after repeated washing. Mitinised articles may be brushed, beaten or exposed to rain, snow and the rays of the sun without any ill effects and remain, even after several years, protected against damage by insects.

Wool treated with Mitin can therefore be provided with special labels of guarantee. These give consumers the assurance that the goods and articles thus labelled are protected once and for all against the undesirable effects of destructive insects.

Documents by  
J. R. Geigy Ltd., Basle.



Black carpet beetle, larva and imagoes (magnified)