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A PEST CONTROL STRATEGY FOR INSECT COLLECTIONS

by

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The aim of any pest control system for museums is to preserve the collections from attack by pests, and to use methods that are as safe as possible for staff working among them. There are presumably no pesticides that are entirely harmless to humans when used in large quantities, and ideally no pesticides should be used at all. In practice, pest control of collections should involve the use of as little pesticide as possible, the choice of the least toxic agent that can do the job, and an attempt to keep the effects of the pesticides chosen to a minimum. What I have to say below concerns collections of dried insects housed in storeboxes or in glass-topped drawers. The suggestions are ones that can be carried out without expensive equipment. They revolve around the prevention of infestation, and propose a way in which this can be combined with dealing with infestations if they occur.

The major pests of insect collections are the larvae of beetles belonging to the family Dermestidae, but mites can also cause trouble. There are others - notably fungi - but these will not be considered since they are relatively minor, at least in the United Kingdom.

PREVENTION

Physical. The first line of defence is cleanliness. Dust and debris provide an ideal milieu for dermestid larvae. (Proximity of collections to bird or mammal specimens, in which dermestids also feed, can be a problem.) However, even in the best kept collections trouble can arise, and perhaps the most effective barriers to pests are insect drawers with tightly fitting lids. If these can be housed in cabinets, or racks with doors, then so much the better. There is a need to check for cracks in the bases of insect drawers. Splits or widening of the joints provides access for pests. A well-constructed drawer of good quality materials will give the best protection to specimens. A further, and very important policy is to check the collection regularly for signs of pests. In the case of dermestid larvae, cast skins and dust

underneath specimens are the usual tell-tale signs. Regular inspection also acts as an estimate of the effectiveness of the control method. A number of drawers should be inspected each week if possible.

Chemical. The two pesticides used most frequently in insect collections are naphthalene and paradichlorobenzene. Of these only naphthalene was recommended for use in museum collections by Edwards et. al. (1980). Paradichlorobenzene (PDB) is being reviewed for registration for institutional use in America by the U.S. Environmental Protection Agency (EPA). Many curators no longer use PDB because they consider it a hazard to health. It is worth noting that naphthalene is a repellent; it does not kill dermestids. This means that it may discourage adult beetles from entering drawers to lay their eggs on specimens, but that once the eggs or larvae are there naphthalene may be of little use. Further information on naphthalene is given below.

Another chemical that is used in museums is Vapona (or dichlorvos or DDVP). The general availability of this substance, which is marketed as a polyvinylchloride strip impregnated with the pesticide, has caused much controversy. Its main use in insect collections is in drawers that are infested, but it can be used as a very effective preventative. The simplest and safest way of which I know has been developed by Dr. S. Endrödy-Younga of the Coleoptera section of the Transvaal Museum, Pretoria. A small block (about 1 cm²) is cut from a Vapona strip with a Stanley knife. (Use disposable gloves!) A pin is thrust through the block so that it can be pinned into a drawer. A collection can be systematically fumigated with a low concentration of Vapona by shifting a small number of blocks through it. A small block of Vapona is added to, say, each of a vertical row of drawers in a cabinet.

The blocks are left for a fortnight and then each piece is shifted to the next row. This is continued throughout the collection. For large collections one might put Vapona into more than one row (perhaps one at the beginning and one halfway through) or in one row to each room. The effective life of Vapona in a closed space with little air circulation is given as three to four months by Edwards et. al. (1980). Therefore new pieces should replace the old ones accordingly.

This method acts both as a preventative and as a cure. As a preventative it not only means that the drawers are fumigated systematically, but also that the collection is inspected regularly.

SOME COMMENTS ON NAPHTHALENE AND VAPONA

Naphthalene. Edwards et. al. (1980) list naphthalene as a pesticide 'recommended and registered for "museum use" ' (this is in the U.S.A.); but they note that its effectiveness is "questionable". Certainly we have found live dermestid larvae (Anthrenus) in drawers in the Hope Entomological Collections to which naphthalene had been added. Once eggs have been laid, naphthalene does not help; but the repellent effect on the adults is of value.

A problem with naphthalene is that it can recrystallize on specimens or on the lining of drawers.

The effects on health that have been noted are many and varied. Acute effects of naphthalene are experienced particularly by persons with a genetic predisposition to it. Chronic effects are given as dermatitis and skin allergies by Edwards et. al. (1980), and some of the acute effects listed by these authors are eye irritation, cataracts, haemolytic anaemia, jaundice, and acute kidney failure. The exact concentrations at which these effects were caused are not given. A further problem with naphthalene is that it is sold in various degrees of purity. Impurities in most commercially available naphthalene may be more hazardous than naphthalene itself. (Impurities are also left behind in drawers as a sooty deposit after naphthalene has sublimated.)

Vapona. Edwards et. al. list Vapona as a pesticide 'recommended and registered for use in "public buildings" and /or "institutions" '. They recommend its use in museums in 'storage or sealed display cases'. My experience of using Vapona is that it does kill dermestid larvae; and it is sold in a form that is particularly easy to use in insect drawers because the product can be cut, and blocks can be pinned into drawers.

One problem with Vapona is that it bleaches certain green moths after lengthy exposure. Another is that it exudes an oily substance that can collect on the glass lids of the drawers. For these reasons Vapona pieces should not be left for long in drawers. The desired effect seems to be achieved in a fortnight, and if the Vapona blocks are rotated the problems noted should not arise.

Vapona is implicated in adverse effects on the central nervous system. Acute effects range, on the mild side, from headaches, to unconsciousness and seizures in severe cases. Edwards et. al. (1980) give a list of chronic and acute effects. Effects depend on degree of exposure. Vapona has caused a great deal of controversy; therefore it should be used with caution. It should be handled only using disposable gloves, and the number of pieces should

be kept to a minimum.

OTHER PRECAUTIONS

In the Hope Entomological Collections there is a pesticide-free zone in the area where staff spend most of their time. Extractor fans are of great value in the ventilation of areas where pesticides are used.

SUMMARY

The scheme that follows summarizes one strategy in the protection of insect collections from dermestids:

PREVENTION

Physical: (i) keep collections, and areas in which they are housed, as well-dusted as possible.

(ii) store specimens in drawers with lids that have a good fit.

(iii) check collections regularly for signs of pests.

Chemical: (i) naphthalene is a repellent. It should be used with care.

(ii) Vapona (dichlorvos) kills insect pests; small quantities can be shifted through the collections. It should be used with great care.

PRECAUTIONS

Rubber, disposable gloves should be used when handling insecticides. Extractor fans assist ventilation.

REFERENCE

Edwards, S.R., Bell, B.M., and King, M.E. 1980. Pest control in museums: a status report (1980). The Association of Systematic Collections.

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