

CONTROL OF INSECTS IN PAINTINGS

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ABSTRACT - Research was carried out at the Unidentified Conservation Laboratories, Emsterdam, to compare various methods to control insects in old Dutch paintings. The experiments showed that for flower still-lives, freezing resulted in complete mortality with the smallest danger to the material and with the safest use to personnel. In case of fruit still-lives, controlled atmospheres gave the best results.

INTRODUCTION

Pest control in museums is almost getting boring; everybody is carrying out research and there is a vast amount of literature written on the subject (Gilberg 1992). Despite all efforts, insects are still eating away complete collections and the universal answer to infestations has yet to be found. There is one group of artifacts that has never received any attention, although insects are causing great damage and really should be dealt with. The artefacts concerned are Dutch paintings of the 17th and 18th century, in particular the still-lives with flowers and fruits. These are excellent food sources for various insect species.

At first glance there seems to be nothing wrong with the elaborate flower arrangements and tasty fruit displays. However, a closer look reveals that many flowers begin to wilt and much of the fruit has passed expiry date. One of the reasons for their deterioration is attack by various insects. If these paintings are not disinfested soon, the flowers and fruit will be irreparably damaged and our future impression of the skill of the Dutch Masters will change accordingly. This paper describes research carried out at the Unidentified Conservation Laboratories, Emsterdam (UCL) on the extermination of the insect pests. Various methods commonly used in insect control were adjusted to this specific problem and compared on the basis of efficacy, effect on the artifact and safety for personnel.

METHODS AND MATERIALS

A series of Dutch still-life paintings from the 17th and 18th centuries were illegally obtained from several museum collections which, it was thought, would not miss one or two canvases. After all, it was for a good cause.

The paintings were treated using the following methods:

- A. Spraying with a commercial pyrethrum insecticide: 200ml 0.025% Deltamethrin in organic solvent.
- B. Fumigation with phosphine in a gas chamber.
- C. Freezing: 48 hours at -20°C, sealed in a polyethylene bag.
- D. Heat: exposure to 70°C for 24 hours.
- E. Irradiation with a dose of 1 kGy gamma-radiation.
- F. Exposure to controlled atmospheres: 60% carbon dioxide at 30°C for 4 weeks, 99.95% nitrogen at 30°C for 4 weeks.
- G. Mechanical treatment with a swatter.
- H. "Trappemdead" mixed pheromone traps.

RESULTS AND DISCUSSION

Most of the species encountered belonged to the orders *Lepidoptera* (butterflies and moths), *Coleoptera* (beetles), *Diptera* (flies) and *Psocoptera* (lice). Also found were *Araneæ* (spiders).

Efficacy

Table 1. lists the efficacy of the various methods. With exception of treatment with carbon dioxide, swatter and trapping, most of the methods proved to be effective. In the case of carbon dioxide the flowers disturbed the treatment by converting the carbon dioxide into oxygen. With the swatter it just was not possible to hit all the insects. Trapping relies on the sexual curiosity of the male insects and there happened to be many females in the paintings (Eminist 1964).

Effect on material

In contrast to the efficacy of the various methods, the effects on the material proved to be a problem for most of the methods. The effects ranged from slight discolourations to total destruction of the flowers. These results are summarised in Table 1.

- A. Some of the flowers were found to be highly sensitive to the insecticide spray. They wilted and lost their attractiveness. The fruit had a rather unpleasant taste after treatment (Figure 1).
- B. Fumigation with phosphine proved to be quite detrimental to the flowers and where metal objects were present in the picture such as watches, knives and

bowls, corrosion was noticed on several occasions. Despite the fact that phosphine killed all developmental stages of the insects, it has to be strongly advised against.

- C. Freezing resulted in a very slight discolouration of the flowers. Most fruits had no problem with the treatment, the only exception being strawberries, which went soggy, although they do not occur that often in these paintings. Experience showed that the vase can crack if the water is not removed before treatment (Figure 2).
- D. During application of high temperature the flowers transpired too much water and were not able to recover the loss. The fruit still-lives turned into compote.
- E. The disadvantage of gamma-radiation is the large amount of energy hitting the flowers and fruit. Ageing tests showed that the vase-life of treated flowers was much shorter than the untreated flowers, and that fruit lost its flavour.
- F. Carbon dioxide had no effect on the flowers but it was impossible to create a high enough concentration to kill the insects as the flowers converted the gas into oxygen. Nitrogen caused a rapid death of the flowers. Fruit did not suffer any negative effects.
- G. Application of the swatter requires a highly skilled hand. In these tests use of the apparatus caused disarrangement of the flowers, dimples and scratches on the fruit and also one of the vases was broken by accident.
- H. The pheromone traps did not cause any damage to the material but placing the traps in the picture proved aesthetically unsatisfying.

method	effect on insects	effect on material
A. spray	95% mortality	fl wilt, fr taste
B. fumigation	100% mortality	fl dead, fr taste
C. freezing	100% mortality	negligible
D. heat	100% mortality	fl dead, fr compote
E. irradiation	100% mortality	short vase/bowl-life
F. 60% CO ₂ 100% N ₂	30% mortality 95% mortality	fl and fr OK fl dead, fr OK
G. swatter	60% hit	disfigurations
H. trappemdead	25% caught	disturbs aesthetics

Table 1. Summary of efficacy and effects on flowers (fl) and fruit (fr) for various insect control methods.

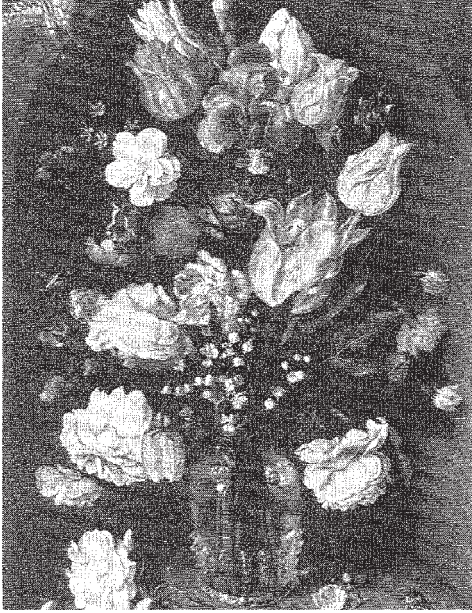


Figure 1a. Jacob de Gheyn: Glass with Flowers, 1612. Before treatment.



Figure 1b. Jacob de Gheyn: Glass with "Flowers", 1612. After treatment with insecticide spray (method A).

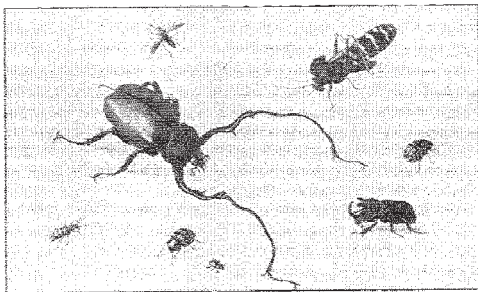


Figure 2a. Herman Henstenburgh: Blad met uitheemse insekten. Before treatment.

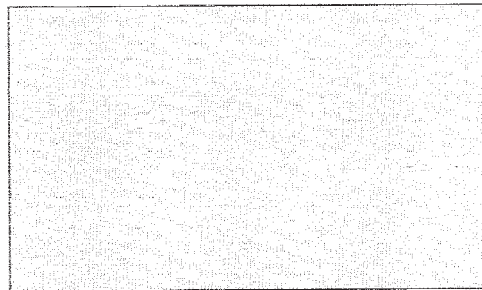


Figure 2b. Herman Henstenburgh: Blad met uitheemse insekten. After treatment.

Safety Considerations

Even though conservators should put their own health in second place and sacrifice everything to save our cultural heritage (Tétro, personal communication), we might as well try to use the safest method. In this respect all non-chemical methods are preferred to the use of insecticides. Of the non-chemical methods, only the use of the swatter can lead to self-inflicted injuries (Rees 1987).

CONCLUSION

It proved to be quite difficult to control the various insects found in Dutch still-life paintings because the flowers and fruit were sensitive to most of the methods. The only method suitable for disinfestation treatment of Dutch 17th and 18th century flower still-life paintings was freezing. It resulted in complete mortality and only a slight discolouration of the flowers with no risk for the conservator. In the case of the fruit still-lives, controlled atmospheres gave the best results and least risks.

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Anna Brokowski started her carrier in conservation by accident. Born in Siberia she was trained as a bricklayer. She fled to the West in 1984. After the rejection of her proposal to restore the Berlin Wall in 1990, she dissappeared into the drug scene of Emsterdam. Currently she is on a de-tox work experience program at UCL as a bicycle conservator.