

FREEZING FOR PEST CONTROL

Procedural Guidelines

Freezing according to the guidelines below has been shown to be effective in controlling all known museum pests. The procedure is safe for almost all materials, but should be used with caution for materials containing metal armatures and support wires, as moisture may condense on the metals and lead to corrosion.¹

The following procedures should be followed for eradication of pests in anthropological and natural history specimens:

1. The freezer used must be able to reach a temperature of -20°C or, preferably, -25°C or colder to ensure eradication of all life stages. (Most domestic chest and upright freezers reach -20 to -25°C . A commercial ice cream hardening freezer reaches -45°C .)
2. Specimens or artifacts to be frozen should be sealed in partially evacuated, heavy-duty polyethylene film. Plastic garbage bags can be used as long as they are sealed to prevent air circulation; an absolute airtight seal is not necessary. Where appropriate, specimens may be bagged and frozen in their drawers.
3. Materials to be frozen should be kept at room temperature (above 18°C) until ready to be placed in the freezer. As soon as the material is bagged for freezing, insects may respond to the environmental change and try to escape; therefore seal and freeze immediately. Mark all bags with the date of freezing.
4. Ideally, there should be adequate air circulation around the object in the freezer to allow it to cool to 0°C in four hours or less. The temperature should remain at -20 to -25°C or colder for a period of at least one week.² Thermocouples may be used to record the time/temperature parameters of the freezing procedure, i.e. the rate of cooling and thawing, and the time the specimen is held at the minimum temperature.
5. After freezing is completed, a slow rate of warming is thought to be desirable, particularly for artifacts that are fragile or that are composed of several different materials. This can be achieved by slowly increasing the temperature of the freezer, or by transferring specimens from the freezer to a refrigerator or cold storage area to thaw.

¹ Consult the Conservator about use of silica gel to mitigate this problem.

² A shorter freezing time may be adequate under some circumstances; if this is desired, consult the Pest Control Committee.

6. Polyethylene should not be unsealed until specimens have reached room temperature and no condensed water remains on the outside of the bags. Bags may then be removed, or specimens may be left bagged if desired.
7. All traces of insect activity should be removed from objects after, not before, treatment so that a new infestation would be noticed. Monitor the specimen(s) closely for renewed activity for the next few weeks. Some pest species may be resistant to the initial treatment so that a second period of freezing may occasionally be needed.
8. When an infestation has occurred inside a cabinet, the cabinet should be thoroughly vacuumed with a HEPA vacuum. Be aware that the vacuum cleaner bag may now be a source of infestation and may need to be discarded. Do not wipe the interior cabinet surface with a damp cloth, because moisture should be kept to a minimum.
9. A permanent record should be kept of specimens that have been frozen in order to control an infestation.
10. If reinfestation occurs after following these procedures, consult the Pest Control Committee.