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Title: Removing Pooled Fat and Mothproofing Freeze-dried Mammals by Perfusion

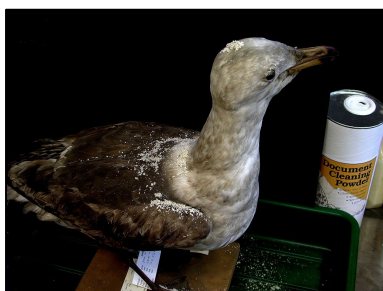
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Back of same gull showing one side cleaned



Successful completion of the work leading to a much cleaner bird

**Conclusion**

I don't know of a similar method developed for the cleaning of this type of material. Although it may take a skilled conservator one day to clean an entire gull, the technique's efficacy is now proven. The powder appears to neutralise any acidic defects caused by dust in feathers and removes any contaminant coloration and even grease spots. This technique is considerably more convenient and less messy than the washing technique and the end result looks infinitely better.

**Removing pooled fat and mothproofing freeze-dried mammals by perfusion**

**Abstract**

This article follows up to a short piece that I wrote about 'lyophiloresistance' over 10 years ago in *Conservation News*, **51**: 38-39 (1993). It deals with the ongoing problem of removing *tris*-structured molecular compounds (e.g. dense fluids, such as glycols, and lipids) from freeze-dried biological specimens - particularly mammals.

A job that many taxidermists avoid, if possible, is the mounting of peoples' pets that have passed away! The difficulty of capturing the exact mood pose for the deceased animal combined with the removal of a larger amount of subcutaneous fat than usual can provide a daunting task!

A pet owner can even be so attached to their animal that even the thought of removing any body part is unthinkable – what to do? I was approached some months ago by just such a couple – could I freeze-dry their beloved cat without removing ANY body parts. I explained that the eyes would not look good and would normally be replaced with glass. No, that was out of the question but I could process the body with the eyes closed. I will always ensure that the finished result is final and if it doesn't quite capture the mood then that is the owner's risk. This was agreed and I set up the cat in the required pose with his eyes closed. Keeping the eyes closed is quite a problem, the eyelids tend to sag and leave the eyes one quarter open. Even when fully frozen, the lids just keep on creeping slightly open! Eventually they just had to be pinned shut.

**Molecular size-related problems**

Freeze-drying will remove water (as ice) and other cellular fluids in the form of sublimed vapour. Larger or heavier molecules, particularly those with a *tris* structure such as glycerol, glycols and of course triglyceride lipids, tend to get left behind: the process hasn't a low enough temperature to freeze them and once the mono-aliphatic molecules have been sublimed away, these remain behind and give rise to waxiness and other associated problems.

The cat freeze-dried well over a 10-month period, accompanied by a 'passing traffic' of smaller mammals, fungi and birds. The process of freeze-drying will, however, only remove a small amount of fat mainly in the form of monostearides. The heavier triglycerides remain in the body and gravity will form them into a pool on the lower side where they start to creep through making the ventral fur greasy. If left untreated this fat pool will continue to creep through and permeate much of the animal's skin; this leads to oxidation, fat

burn and fur drop!

The same problems are also apparent in smaller mammals: the tails of mice and other rodents constitute a fat store against lean times. When freeze-dried, the tail either becomes saturated with pooled fat or, after time, the skin shrinks down onto the caudal skeleton and giving the tail an undesirable knobbly appearance. Taxidermists often obviate this by substituting a piece of non-corroding wire or inert but flexible plastic (poly-propylene) into the tail skin, having removed the caudal skeleton. By pricking the tail, once frozen, this problem can be considerably reduced for freeze-dried specimens. The monostearides are assumed to sublime away along with the water (ice) vapour and the remaining triglycerides are usually too small in content to cause any lasting problems.

Another problem, however, is the tastiness to pests that a freeze-dried mammal presents. Insect pests seem to sense a freeze-dried feast like a vole or mouse and will often infest these before touching any mounted specimens. Below I have outlined a technique that will deal with both problems at the same time.

**Technique**

Removal of pooled triglycerides in a freeze-dried cat or other mammal is essential for the reasons mentioned above. Once processed, the cat's ventral fur started to become greasy. Placing the specimen onto some paper towel soaked some of the fat pool away but it wasn't until I injected the cat with a solvent containing mothproofers that the process really started to move forward.

I still use Eulan W (also known as Edolan), which along with most of the conservators'/curators' arsenal of pest-preventive chemicals has been severely regulated or restricted by COSHH over recent years. Providing that it is injected into the body and just permeates the skin and not the fur AND the specimen is suitably hazard-labelled, then that still seems to be acceptable. Eulan is much too oily and hazardous to inject undiluted and must be diluted to at least 10% in iso-propyl alcohol (the most suitable solvent I have found so far). As the alcohol evaporates, the Eulan is left internally as an unpalatable barrier against any invading pests.

The isopropanol, as a carrier solvent, proved most effective at dissolving out the triglyceride pool even faster and yellow stains appeared on the paper towels (Fig. 1).

The syringe that I use is ideal for injecting the solvent since the needles have capped clearing wires that can be withdrawn once the needle has penetrated the body cavity and preventing the tip from becoming clogged with body tissue. 50ml of isopropanol twice a week at front and back of the ventral body removes about 10% of the fat pool. Once the yellow stains no longer appear I will finally revert to using the Eulan as an insect-proofing barrier and leave the cat on the towels until the staining ceases. The ventral fur will then be dry-cleaned with isopropanol to remove any greasiness and that, hopefully, will be the end of any fat and pest-related problems.

**Conclusion**

Although this technique is still ongoing, it is working well combining fat removal with mothproofing. Any further developments, including problems, will be reported in later issues.



freeze-dried cat showing the lipid-soaked paper towels and the greasiness of the ventral fur