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Publications.

This will require a subcommittee to agree to a new, possibly peer reviewed journal to be published once a year and a newsletter to be published three times a year. This will take some time to develop and might evolve from the improving Biology Curator. The respective editors for BCG & NSCG would be part of this committee with possible referees for peer review. A possible name for a publication could be 'Natural Sciences Collections' or 'The Natural Sciences Collector'.

A Name for the new, combined group.

The name 'Natural Sciences Collections Association' (NSCA, NaSCA or NatSCA) has been selected. Committee agreed that NSCA had the benefit of describing the group accurately, and was all encompassing including a full geological remit as well as the biological and conservation ones. [There is another group using the acronym NSCA (Natural Science Collections Alliance). However, they refer to themselves as the NSC Alliance, and as this is a relatively small American group, there should not be a conflict.]

- Until the merger has actually taken place, the general business of BCG and NSCG will continue as before.
- Decisions made by this committee must be communicated to the NSCG and BCG memberships. This should be in the form of selected bullet points published in 'The Biology Curator' and 'The [NSCG] Newsletter'. These could also be passed on to the Geology Curators Group via Steve Thompson. It was agreed that the process should be as open as possible, with all members being kept up to date with the progress of the merger committee.
- It was agreed that the meeting had gone extremely well and had been well chaired.

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Mammal Collections

Curation, Conservation and Uses

Grant Museum of Zoology, University College London, Gower Street
17th December, 2001

The following two papers complete the previous issues write ups of the mammals meeting.

The Conservation of Vertebrate Collections

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Vertebrate collections are used in a whole variety of ways within the museum environment including display, education and research. Put together our vertebrate collections are a valuable resource. The range of material that forms these collections is very diverse. This includes the traditional 'stuffed animal' or taxidermy mount; skeletal material; study skins; fluid preserved collections; freeze dried material; models and casts; and associated documentation. *(NB. Fluid preserved collections have additional conservation issues to those discussed in this brief article).*

When considering the conservation of these collections it is important to consider what is meant by the term 'conservation' . A suitable definition could be *'the employment of best practise to prevent or arrest the long term physical deterioration of natural science specimens, along with associated artefacts and documents to preserve their scientific and cultural worth'* (Carter and Walker, 1999). Essentially the aim of museum conservation is to halt the processes of deterioration, but to do this in such a way that the specimen is altered or changed as little as possible. Any treatments carried out need to be properly understood and practical to apply. One of the main 'ethics' of conservation practise is to ensure all treatments are 'fully reversible'. In practise this aim is not achievable, although some degree of compromise can normally be reached.

When considering the care of a collection as a whole there are a number of issues that need to be considered. The use of a form of 'risk assessment' can be useful in order to establish the main risks likely to affect a collection (Waller 1994; Waller 1999). This includes issues such as custodial neglect; insect pests; pollutants; light; humidity and temperature. A good storage environment is vital for the long-term stability of a collection. This includes both the 'macro' environment, which includes the building as a whole, and the 'micro' environment, which includes the storage furniture and units housing the collection. How the collection is to be used will also decide on the approach required for its care.

Museum conservation can be considered in two ways;

1. Preventative Conservation: This includes monitoring the collection area for potential problems, such as pest infestation and environmental changes. The aim is to deal with issues as they arise, not by the time they have damaged the collections. Preventative conservation also includes assessing the stability of materials used for storage and display to ensure their properties are suitable for the long term care of collections. Unsuitable materials can degrade and offgas acidic products causing harm to the collection.
2. Active or 'invasive' conservation: This is where the specimen is affected directly. This can include cleaning and repair, the treatment of pest problems and the movement of collections due to building work or storage furniture changes. It can also include research into specific problems. It is important to record all treatments that are carried out for the benefit of future users and carers of the collection material.

When active conservation is required on a specimen the first stage is to find out what is wrong with the specimen, and to discover the cause of the defect e.g. environmental fluctuation; problems with the original preservation method used; off-gassing products from the storage materials etc. This enables the conservator to decide on the type of action required and to chose appropriate methods and materials, whilst attempting to apply the ethics of conservation! It is worth noting at this point that it is important to take into account health and safety considerations. Many old taxidermy mounts and study skins contain arsenic, and some may contain mercury (often used to treat insect pests in the form of mercuric chloride). A recent edition of the Society for the Preservation of Natural History Collections (SPNHC) publication Collection Forum looks at some of these issues with respect to ethnographic cultural material (text online at www.spnhc.org). These are issues that have to be taken into account, especially when developing educational loan and 'hands on' collections. Also many of the chemicals used in conservation work are potentially dangerous and suitable safety measures should be observed.

There are still many unknowns when developing conservation treatments for natural history collections. However the work of other established museum conservation fields does give guidance into how we can treat our material. Useful work has been carried out by conservators working with art, archaeology, textiles and ethnographic collections and some useful textbooks are available (e.g. Cahan and Haines, 1991; Lee and Thicket, 1996; Timar-Balazsy 1998, Odegaard et al, 2000; Wolbers 2000; Unger et al, 2001). Techniques developed for the cleaning and repair of these materials have been adapted and developed for use with natural science collections.

Museum conservators are regularly called *'cleaners with chemistry degrees'*! However when you start to realise the complexity of the science behind 'cleaning' then this statement is not too far from the truth. The removal of the years of grime that inevitably seems to coat many of our collections is a constant demand, but how best to achieve this dirt removal? Many potential methods exist for the cleaning of specimens (e.g. see Horie, 1989). The most widely used method is to use some form of solvent cleaning. This can involve the use of organic solvents, or the use of water in some way.

A wide variety of organic solvents could be of potential use with the cleaning of vertebrate collection material. Commonly used solvents are acetone, ethyl acetate and trichloroethylene. Organic solvents can often be the most effective way to remove fats, oils, resins and waxes. However these solvents tend to have some serious health and safety concerns. These materials tend to be highly flammable and carry health risks. Thus they need to be used with care in well-ventilated areas. Another problem is that the action of organic solvents can be too effective e.g. the removal of structural oils from fur and feathers could led to embrittlement of the structural fibres.

Water tends to be the most commonly used cleaning agent. It is the most polar solvent, and when pure is very aggressive in its polar action. Water can dissolve many types of organic and inorganic polar soiling. However its use does require care as water can cause significant shrinkage, swelling and deformation to a specimen. The cleaning action of water can be further improved by the addition of surfactants to the solution. Two main classes of surfactant are available – non-ionic and ionic. Generally the non-ionic class are the most commonly used as these are more stable. Typical non-ionic surfactants are derived from ethylene oxide and this includes Synperionic N (due to be withdrawn from use due to biodegradation problems) and the Tritons. The use of surfactants greatly improves the cleaning action of water, allowing a wider range of soil to be dissolved. However this can cause problems with the redisposition of the removed soil. This can be countered by using soil carriers to prevent the redisposition of the solubilized dirt. PEG, PVP and SCMC are examples of soil carriers, and work by forming layers around the soil particles. The addition of chelating agents can also further improve cleaning action. Typical agents are EDTA or citric acid, which act by binding with metal ions such as Mg and Ca. A 'typical' recipe would be (after Horie *in* Horie and Murphy, 1988):

Non ionic detergent	0.2parts/100
Soil carrier	0.2parts/100
Chelating agent	0.1parts/100
Water	Balance

Others factors can also aid the control of the cleaning process such as pH. A slightly alkaline pH is considered to be best. This stabilises the surfactant, can aid in the neutralisation of acids and help break down fatty acids. For hard surfaces such as bone a 10% sodium bicarbonate solution can be very effective. However when using aqueous solutions it is important to avoid over wetting or prolonged contact of the surface to be cleaned with the water. Over-treatment can cause swelling and subsequent distortion. Many brief cleaning actions are better than one long one. On non-furry or non-feathered surfaces the use of poultices (e.g. sepiolite) or the use of solvent gels may be of benefit. Essentially the poultice or the gel carries the solvent allowing controlled cleaning in a specific area. (Wolbers 2000).

The repair of vertebrate collection material is often required. Any materials applied to a specimen must be carefully considered for their potential reversibility and long term stability. A huge variety of consolidants and adhesives are now available to the museum conservator (e.g. Horie 1987; Elder et al, 1997). A number of these materials have been in use long enough for their properties to be reasonably well understood. However this is a huge subject area that can only be briefly discussed in this short paper.

With natural science collection material relatively little research has been carried out on the effects of various adhesives and consolidants on the specimens being conserved. However the many different areas of museum conservation can provided a great deal of information on the use of many of these material. Of particular interest is the work of paleontological and ethnographic conservators. Examples of some potentially useful consolidants and /or adhesives;

- Acrylic polymers: These are methacrylate based polymers such as the Paraloids and Pliantex. They have reasonable solubility in a range of organic solvents. Acrylic polymers such as the Paraloid range are considered to have good long-term stability and reversibility. When mixed with inert materials such as glass microballoons then acrylic polymers can make very good inert and stable fillers.

- Acrylic emulsions: Short chained methacrylate based polymers that tend to be water soluble e.g. Primal WS24. Can be very good for consolidating friable materials with good penetration and stability. However this good penetration makes treatment with acrylic emulsions effectively irreversible, as it can be deeply absorbed. It could also alter biochemical properties of the material being conserved e.g. carbon dating.
- Polyvinyl acetate resins: This includes consolidants such as the Mowiliths and the Vinacs. These are potentially very useful within natural science conservation with good long term ageing properties. The physical properties of the polymers are easy to manipulate by varying the solvent system used.
- Epoxy resins: May be necessary to use for repair on strength grounds. However epoxies are generally avoided due to long term problems from offgasing products and shrinkage.

Insect pests can be a serious problem for our vertebrate collections, particular with skin and freeze dried material and there have been many publications dealing with pest control and associated management methods (e.g. Hillyer and Blyth, 1992; Linnie 1996; Rossol and Jessup, 1996; Rust and Daniel, 1996). It is important to keep a continuous programme of pest monitoring in place. The detection of infestation problems before they can establish themselves can prevent damage to the collections and save considerable time and money. When having to treat an infestation it is important to avoid as far as possible chemical treatments, although a useful permethrin based insecticide is Constrain. Alternatives such as freeze sterilisation and anoxic atmospheres are becoming increasingly utilised methods. Ultimately one of the best methods of pest control is good hygiene and good building design. Keep collection areas as clean as is practical, and avoid over-cluttering stores!

One of the most damaging factors to vertebrate collections is poor storage areas with poor environmental conditions. The effects of fluctuating levels of humidity and temperature can have a very damaging effect on collection material. Humidity levels are particular important as these can cause the greatest structural changes in collection material (e.g. Thomson, 1986; Cassar, 1995). The aim is to avoid fluctuating and excessive temperatures and relative humidity levels. Much can be achieved by using good storage units which can considerable reduce the effects of poor environmental conditions by buffering out the changes. Achieving stable environmental conditions in the building that houses the collection can be far more problematic and expensive to achieve. However many store areas can be significantly improved by improving windows and sealing up draft points. Generally it is probably better to avoid air conditioning units for environmental control. These are expensive, energy hungry and need regular maintenance. Alternative methods do exist, such as conservation heating, which controls relative humidity levels by heating. However it is best to establish the true environmental conditions of a store or building before embarking on control measures. This can be done through the use of thermo-hydrographs or computer dataloggers. By understanding the extent environmental conditions vary within a store or a building allows the extent of appropriate control mechanisms to be decided. The type of material being stored will also dictate the level of environmental control required in a collection area.

This brief article, and its references, provides a brief overview of some of the main conservation issues related to the care of vertebrate collection. Remember that a great deal can be achieved with limited technology and budgets. The single biggest controlling factor is probably the time we have available and the space available to store and use our collections.

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Useful Websites
Conservation online: www.palimpsest.standford.edu
American Institute for Conservation journal: www.aic.standford.edu/jaic/
SPNHC: www.spnhc.org

Documentation of Vertebrate Collections at the National Museums & Galleries of Wales Why document collections?

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There are many reasons to document museum collections but most can be grouped under two headings.

Access:
- Enables fast searches (important for data connected with large biological collections)
- Ability to link many different terms to aid searching
- Makes a wider variety of formats available e.g. web, interactive programmes etc.
- Which in turn enables easier sharing of information
- Easy duplication of data