

Survey of Gaseous Pollutant Concentration Distributions in Mineral Collections

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The concentrations of four types of gaseous pollutants were semiquantitatively determined in samplings of cabinets from three mineral collections. The pollutants measured included: acidic vapours (thought to be primarily carboxylic acid vapours), mercury vapour, sulfur dioxide, and silver-tarnishing gasses (thought to be primarily hydrogen sulfide). These pollutants were monitored using simple and inexpensive monitors and/or dosimeters. Some of the monitors and dosimeters were commercially available, whereas others were specially fabricated and calibrated. The three investigated collections provided examples of three material combinations: metal drawers in metal cabinets, wooden drawers in metal cabinets, and wooden drawers in wooden cabinets. Interpretation of pollutant concentrations as functions of position within the crystal-chemical classification system used to organize collection storage generally showed anticipated patterns. Several exceptions to these patterns, which have significant implications for collection care, were also noted.

Archaeological Artifact Attrition: Time's Arrow and Collection Depletion

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Archaeological collections from California containing human remains undergoing strict inventory and reconciliation protocols and representing 5 decades of accession were entered into a microcomputer-managed database and reconciled against the original excavation records. Artifact losses were tracked to determine the cause of collection attrition. Subsequently, various intuitively derived hypotheses regarding artifact loss were tested and found wanting. However, fresh hypotheses that more adequately explain artifact loss were next suggested and tested. The results are important to both archaeologists who have a professional stake in the intact preservation of entire collections and museum professionals concerned about the "critical paths" collections under their care, experience.

Different Degradation Effects on Miocene Whale Skeletal Remains from Gram, Denmark, Caused by the Clay Matrix

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Two pyritiferous whale bone skeletal remains obtained from Miocene clay (Gram Formation) were found to be in different states of preservation, although they had been deposited in more or less the same environment and stored under identical conditions. One of the skeletons was embedded primarily in light-coloured clay dominated by the mineral smectite with a high absorption capability and low pH. The other embedding medium consists of other clay minerals, mainly kaolinite and illite, having a neutral pH that can be explained by the presence of carbonates, which work as buffers. Pyritiferous fossil bones from smectite-rich clays appear to be more susceptible to deterioration after exposure than those preserved in clays dominated by other clay minerals.

The Warping and Cracking of Plexiglas Specimen Containers

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In the 1960s Plexiglas specimen containers were introduced in the anatomical collection of the Leiden Medical Faculty and in time replaced the cast rectangular glass jars. It was assumed that the Plexiglas jars would be less fragile and therefore better suited for use in medical teaching. Recently, we noticed that Plexiglas jars, after being filled and sealed, gradually warp to the inside and finally crack at the glued joints. We studied three experimental models to determine that the cause for the warping and cracking of Plexiglas jars are the result of the absorption of water by the Plexiglas and its slow diffusion through the acrylic.

Use of a Low-Oxygen Atmosphere for the Control of Insect Pests

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Eight species of stored-product insect pests at various stages of their development were exposed to a low-oxygen atmosphere of 1.5% for a period of 10 days. Apart from a 40% survival rate for the larval stage of *Anthrenus verbasci* (Coleoptera: Dermestidae), the modified atmosphere was observed to have a lethal effect on all insect states tested. When the exposure period was extended to periods of 20, 30, 40, 50, and 60 days, 100% mortality was recorded for all insects tested. Evidence from this investigation supports the view that atmospheres reduced in oxygen may represent a viable alternative to chemical control methods. The feasibility of

using this technique for the routine control and eradication of insect pests in museums is discussed.

Spirit Collections: Accelerated Aging Studies Concerning the Stability of Keratin in Ethanol and Formalin

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The keratins are a closely related family of chemically stable proteins composing mammalian hair, horn, hooves, and avian feathers. Sheep hair (wool) has been much studied chemically because of its economic value. To our knowledge, no studies have been conducted on the long-term stability of other keratins from a museum perspective. We present here differences in the stability of feathers and hair under simulated aging conditions. Feathers and hair were heated dry, in 70% ethanol, and in 70% ethanol plus 1% formalin at 180°C for periods of 1 and 2 days. Feather keratin was approximately 50% less stable in ethanol than was hair keratin, as evidenced by the amount of amino acids lost from the sample and appearing in the solution. Feathers and hair, heated for the same periods of time under dry conditions, exhibited the same pattern of stability. As a corollary, the amino acid patterns of fresh hair and feathers from our samples of different species were found to be distinct and indicative of their originating taxon.

The Interactions of Preservative Fluid, Specimen Container, and Sealant in a Fluid Collection

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The Leiden Anatomy Museum houses a collection of human body preparations made over a period of 400 yr. The anatomical and pathological collections from the 18th and 19th century include preparations by famous anatomists such as Albinus and Sandifort. Over the last 4 centuries there have been evolutionary changes in conservation methods. Some significant problems caused by the use of different combinations of preservative fluids, jars, and sealants are discussed with respect to how they related to the physical processes that take place in fluid-filled, sealed containers. One often-overlooked problem is negative pressure in Plexiglas jars, which causes warping and the occasional implosion of the container. This problem can be solved by the use of a bi-directional valve.