Developing New Methods for Recoloring
Faded Taxidermy Specimens at The American Museum of Natural History

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Abstract
In 2010-2012, the AMNH undertook a renovation of the natural habitat dioramas in its premier Hall of North American Mammals. Installed in the 1940s, many of these dioramas were exposed to unusually high light levels for 70 years, leaving much of the taxidermy emaciated and discolored to the point of scientific inaccuracy. Prompted by an energy-efficient lighting project, a renovation team comprising conservators, curators, exhibitions staff and a master taxidermist sought a means of restoring the naturalistic appearance of the faded mounts.

Treatment Goals
The project required a colorant whose application would not alter the hair morphology, hindering future re-treatment. The colorant must be applied in a binder, a medium of analyses was conducted.

Test swatches were produced by airbrushing a 1% solution of each stock dye color in ethanol onto unbleached worsted wool fabric. Another set of wool swatches was produced from 6 dye mixtures developed to recreate the natural appearance of the American bison. Further testing was produced using a medium application of the dye mixtures on pieces of bison fur.

Relative lightfastness of the Orasol® dyes
The swatches were aged in a Q-Sun light aging chamber according to ASTM D4303 (2). Evaluation of relative lightfastness was based on CIE L*ab*DE* 76 values calculated from measurements taken before and after exposure. The DE* values ranged from 2 to 21. Based on these results, a subset of Orasol dyes with optimal lightfastness was identified.

Dye Penetration
When airbrushed onto fur, Orasol dyes are easily removed by wiping the hair with solvent, suggesting their limited penetration into the fiber, and offering a good indicator of reversibility.

Conclusions
• Orasol dyes show promise for restoring the naturalistic appearance of deteriorated taxidermy specimens.
• The dyes offer good lightfastness, minimal effect on the texture and behavior of fur, low toxicity, and can be applied in situ.
• Careful selection of dyes and solvent can improve the lightfastness of the treatment.
• Minimal dye penetration facilitates reversibility of the treatment, but may complicate future cleaning through unwanted colorant removal.

Future Testing
• Consider alternative causes for the effect of the solvent choice on lightfastness, including solvent impurities that diminish dye stability, or the size of dye particles deposited.
• Investigate whether Orasol dyes accelerate or retard deterioration of the keratin substrate.
• Explore the use of laser scanning microscopy to visualize dye penetration into the substrate.

References
1. Manufacturer's data, “Ciba ORASOL dyes for printing inks” 2001-Oct-01
2. ASTM D4303: Standard Test Method for Lightfastness of Colorants Used in Artists’ Coloring Materials

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