

FOSSIL MAMMAL TYPE COLLECTION RE-HOUSING PROGRESS REPORT

The AMNH Fossil Mammal Type Collection was surveyed, photo-documented and re-housed in 2006/2007 as part of a National Science Foundation supported project (NSF DBI-545155). A type specimen is any specimen that has been designated as the name-bearer in the original published description of a taxon (Art. 73a, International Code of Zoological Nomenclature, 1999). In the Paleontology collections, the term “type specimen” is usually applied to holotypes (the single specimen or fragment on which a species is based) and genotypes (the single specimen or fragment on which a genus is based). Holotype specimens are marked with a single red diamond whereas genotypes are labeled with a double diamond. Type specimens are examined when a researcher needs to determine the morphological paradigm associated with a particular name. It is estimated that there are approximately 2,000 type specimens in Fossil Mammals, and with an average of 50 visiting researchers per year, the collection is examined quite frequently. Because of their frequent handling and use of comparison, it is critical that they are re-housed in proper storage enclosures.

Prior to re-housing, the fossils were stored using inferior materials (i.e. acidic boxes, acidic tissue, and cotton batting), were poorly supported, were over-crowded (i.e. trays were too small, too many specimens within a drawer, etc.) and were poorly organized. The following re-housing efforts have reduced most of these risks through a number of strategic steps.

Overview of Materials Used

Various archival, conservation grade materials were used throughout the re-housing project. They are included in list format below, with supplier information as well (specific websites and phone numbers can be found in accompanying information). The amount of material used below was sufficient to re-house ~190 specimens, ranging in sizes from a single tooth in a vial to a full skeleton in various pieces. The majority of the specimens re-housed were in the middle to larger size range.

<u>Material</u>	<u>Amount Used</u>	<u>Manufacturer Info</u>
Blue board	20 sheets	University Products
Ethafoam	150 ft. out of 300 ft. (50 %)	Reilly Foam
Tri-Rod (1 1/4")	25 out of 125 (20 %)	Granite State Log Homes
Tri-Rod (3/4")	189 out of 220 (86%)	Granite State Log Homes
Tyvek	2.75 meters	Material Concepts
Volara	37.5 ft. out of 600 ft. (6%)	Reilly Foam
Natural Nylon Rivets	300 male; 300 female	Volt Industrial Plastics
Low-Melt Adhesive Sticks	45 (~3 per day)	University Products
# Sheets of Red Paper	~55 sheets	Staples

Problem Solving Prototypes: Small, Medium/Large, and Oversized Specimens

Small specimens

When dealing with a small specimen (anything housed in a small glass vial or a small, shallow specimen) the metal-edged boxes seemed to work best. The small box can be lined with Ethafoam and separated with Tri-Rod bumpers to ensure a secure fit. This smaller box can then be nested inside a larger one to give adequate room for the associated labels. Whenever possible the labels were given enough room to be seen easily and lie flat. Very often labels were unfolded and allowed to lie flat for the first time after re-housing. The image below is an example of this.



Medium/Large specimens

More often than not, the medium-large sized specimens required a custom-made box. Most of the specimens dealt with during this phase of the project had large skulls, and the mandibles were often too tall for any of the manufactured boxes. After consulting with Paleontology staff, it was determined that particular care should be taken to ensure that the dentition was well-protected. Teeth provide some of the most diagnostic information to a researcher. Custom boxes that had the correct depth for each specimen were then constructed. These boxes were constructed as outlined in the accompanying re-housing guideline. A pair of

“before” and “after” images are included below to illustrate how the majority of the specimens were re-housed.

A common problem seen throughout the collection is shown in the “before” image. Many of the specimens were not housed in boxes that were either too large or too small. Often skulls and mandibles were piled on top of each other and/or flooding out of their box. By contrast, some specimens were placed in an entirely too large box which occupied precious storage space.



Oreodont specimen before rehousing



Same specimen after rehousing

Oversized Specimens

For specimens that were too heavy or large to re-house in a normal custom made box, enclosures were built into the drawer itself. The drawer was lined with a layer of Volara and then a layer of Ethafoam for added cushioning. A blue board bumper was then added to the back edge and two sides. This bumper provides protection from other drawers being pulled out and pushed back into the cabinet which could accidentally break the specimen below. The front is left off the bumper to allow for greater ease in handling and removing the specimen. An example of this is seen below.



Clam shell mounts

For specimens currently housed in the plaster cast clam shell mounts, a simple relining was done. Because the clam shell mount is quite useful in storing the specimen, aiding in handling and giving extra support; the decision was made to keep the mount with the specimen but add some extra cushioned support. The clam shell mount locks into place very closely around the specimen; if too much padding is added the close fit of specimen and mount will be lost. A single layer of Ethafoam was added to each side of the clam shell, providing enough cushioning while not losing the plaster mould quality the mount.

Statistical Information: Time Spent on Various Facets of the Project

Before re-housing could begin, a thorough inventory of the entire Fossil Mammal collection needed to be conducted. A total of 6 hours was spent by interns, supplementing 190 hours spent to date by volunteers, going through all floors (LL,1,2,3,7), to identify the physical location of each type specimen. This information was marked on spreadsheets placed on the outside of each cabinet in which a type was housed. This task, though tedious, was crucial to the speed of re-housing; many types were not in the location recorded in the collections database, while some type specimens have not been identified as such in the database. The inventory allowed specimens to be easily located with little question over their authenticity as types.

In total, 20 days were spent re-housing the LL of Building 3, with the oreodonts and suids forming the focus of the work. An average of 5.5 hours a day were spent on re-housing, equaling roughly 110 hours spent on re-housing in total. It is estimated that acquiring and returning specimens to the collection took about 8 hours in total, which included filling out loan tags and transportation to and from the 7th floor for re-housing. As of 8/23/06, about 190 specimens had been re-housed. 127 of these specimens were located in Building 3, together with around 63 specimens of rodents and other small specimens from the 5th floor of Building 3A.

Smaller specimens could usually be re-housed in the standard sized white trays. When a specimen could be fitted adequately within such a tray, the total time spent re-housing the specimen was ~7 minutes. These specimens were the easiest and fastest to re-house because of the time saved on custom box construction. The manufactured trays only needed to be lined with Ethafoam before re-housing could begin. About 40 plastic jewel boxes of various sizes were used (mainly the 1" square box to house small broken fragments). Of the manufactured trays, ~100 were used, with 25 used to re-house just one single specimen, and the other 75 used in a nesting fashion to re-house specimens with multiple small pieces.

When re-housing the oreodont collection, custom boxes were often built to allow the specimen to sit safely within the enclosure. The boxes, which were constructed from conservation grade blue board, took approximately 7 minutes per box to build. During this phase of the project, about 75 custom boxes were made, taking a total of ~8.5 hours to construct. When a custom box was used, the entire re-housing process took ~15-22 minutes per specimen (including box construction). The 75 custom boxes required 20 sheets of blue board (with many scraps left over from small-medium size box construction). Each sheet of blue board produced ~3.75 custom boxes.

There were also large or over-sized specimens that were too heavy to be housed in a box and so needed to be re-housed within the drawer they were stored in. In these cases the drawer was lined with a layer of Volara and then a layer of Ethafoam for added cushioning. Then a blue board bumper was placed around the back and side edges of the drawer to provide protection to specimens which were higher than the depth of their drawer. Approximately 10 full drawers were re-housed in this manner, using 10 blue board bumpers. Re-housing a full drawer would often take ~30 minutes for complete re-housing because of the complexity of its contents, and the challenge of fitting all of the components back into a single drawer.

Photo documentation was also completed on a majority of the specimens, which involved taking both a "before" and "after" image during the re-housing process. Each specimen took about 2 minutes to photograph, giving a total of around 4 hours spent on photo documentation. 66 specimens were photographed before re-housing and 52 specimens photographed after re-housing.

Red type labels are now included with the re-housed type specimens, to help speed recognition. The red labels include the specimen name, specimen number, holotype/genotype designation and publication information. 1.5 hours were spent formatting the design for the red label, and 4 hours spent locating publication information for the oreodont collection. A total of 10 hours were spent making the red labels, which includes entering all of the information, print-

ing, cutting, and creating Mylar envelopes for each.

Lastly, each specimen's condition was entered into an Access database written for the project. This database will help with monitoring the progress of the project, identifying which specimens have been re-housed, how many have been completed, etc., and will also allow queries to be run in the future so that collection information can be gleaned from the database. A total of 6 hours were spent evaluating and entering data, with roughly 32 reports per hour completed.

The total time taken to return specimens to the collection was approximately 4 hours, or 1.26 minutes per specimen, with minimal rearranging needed to fit each specimen back into its appropriate drawer. 36 specimens were forced to move from their locations in order to fit the re-housed type specimens back in place, about 18%. Of these 36 specimens, 9 types and 27 non-types were involved in the move.

Status of the Type Collection Rehoused to Date

The following information was compiled using the condition report database, in which all rehoused specimens were recorded and various information was entered for each. In total 190 specimens (expressed by specimen numbers) and 478 objects (skulls, mandibles, etc.) were re-housed as of 8/23/06. If the rough estimate of 2,000 type specimens is used, then during the summer of 2006, 10% of the type collection was re-housed.

Of the 478 objects, 80 were classified as needing some kind of repair (approximately 17%). This could include anything from a chipped tooth to a complete skull in several pieces. Repairs will be assigned by Jeanne Kelly and carried out at a later date.

Each object was assigned an overall condition level, ranging from 1-4. Condition level 4 was the highest level, meaning that the specimen was in good condition and generally stable. 284 objects out of 478 (approximately 59%) were labeled as condition level 4. About 26% (123/478) of objects fell into the condition level 3 category. Condition level 2 was reported for ~7% (31/478) of the completed objects. And lastly, condition level 1 was assigned to 3% (12/478) of the objects, which were dangerously unstable, brittle and crumbling to the touch.

The specimens' structural stability was also assessed separately during the condition reporting process. ~77% of objects (370/478) were found to be structurally stable, meaning that they could undergo general handling and not sustain excessive damage. ~19% of objects were found to be structurally unstable (91/478). These specimens either had many apparent, fresh breaks or fresh cracking was identified.

The condition report also recorded what methods of re-housing were used with each specimen. These were general descriptions including: Ethafoam block mount, Tyvek or Ethafoam lining, Custom box, Mylar label cover, and Support Wedges. ~69% of objects were re-housed in a custom box (331/478). ~59% of objects were re-housed with labels covered in Mylar. Not all of the specimens needed a Mylar label cover; the remaining 31% did not have his-

toric labels included with them. All of the new red type identification labels were given Mylar covers, but this was not included in the condition report. All of the information found with a specimen, whether it be a standard historic label or a small field note from the collector, was protected in Mylar and remained with the newly re-housed specimen.