3rd Annual Fossil Preparation & Collections Symposium 2010

FPCS

The Field Museum

April 29 - May 1

Chicago, IL

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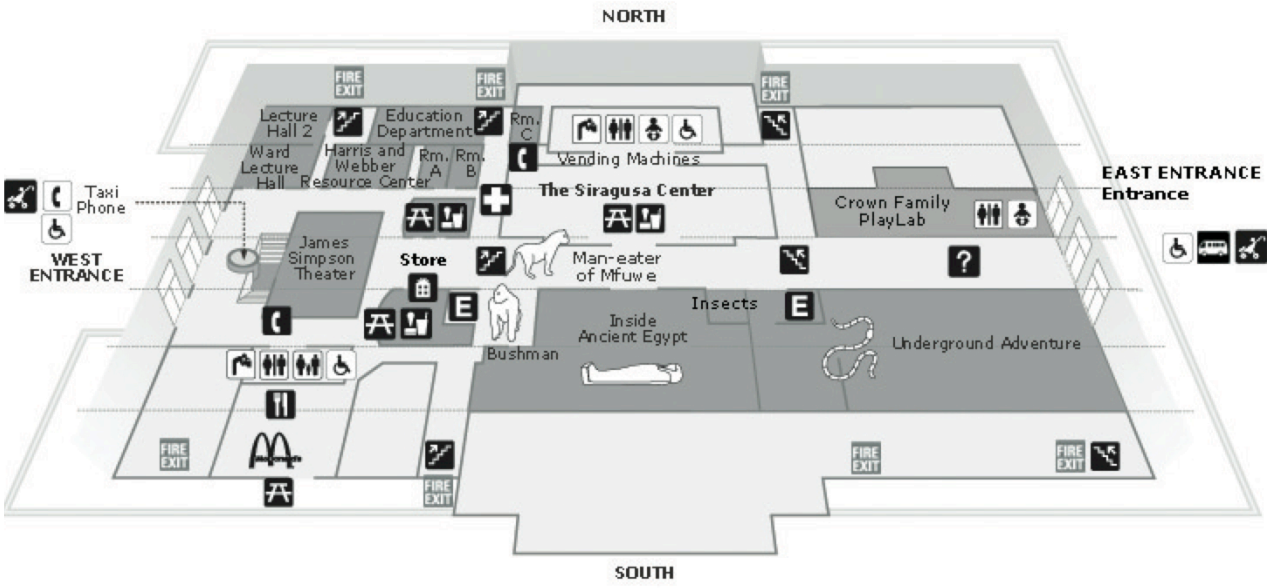
Ground Level



West Entrance (north lobby)

Registration, Refreshments
Organize for Tours
Gather for Workshops
Access to Northwest Terrace Lunch Information

Lecture Hall 2

Roundtable: Collecting Large Vertebrate Specimens
Roundtable: Professional Development
Foul weather lunch
Poster Session, vendors

Classroom A (Rm. A)

Roundtable: Volunteer Programs

Ward Lecture Hall

Platform Presentations
Roundtable: Laboratory Renovation and Design

Classroom B (Rm. B)

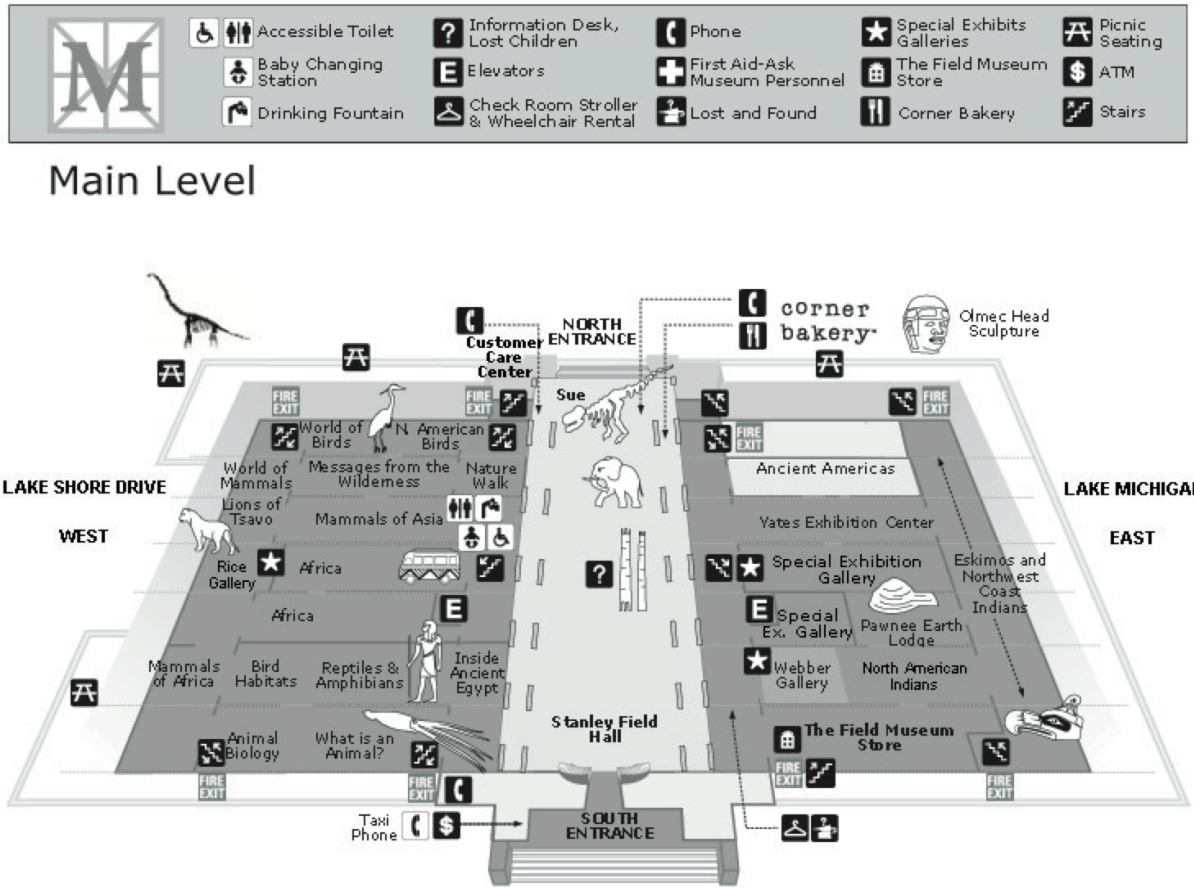
Roundtable: Air Abrasion Facilities & Techniques
Roundtable: Molding, Casting, and Flesh Reconstruction

Biosync Conference Room (not on map)[1]

Roundtable: Laboratory Safety, OSHA Standards, MSDS and Hazardous Waste

[1] The entrance to the Biosync Conference Room is located between the Crown Family Play Lab. And the East Entrance

Maps and Location Guide



Rice Gallery: Center West

Opening Reception: 5-9pm Thursday, April 29th

Webber Gallery

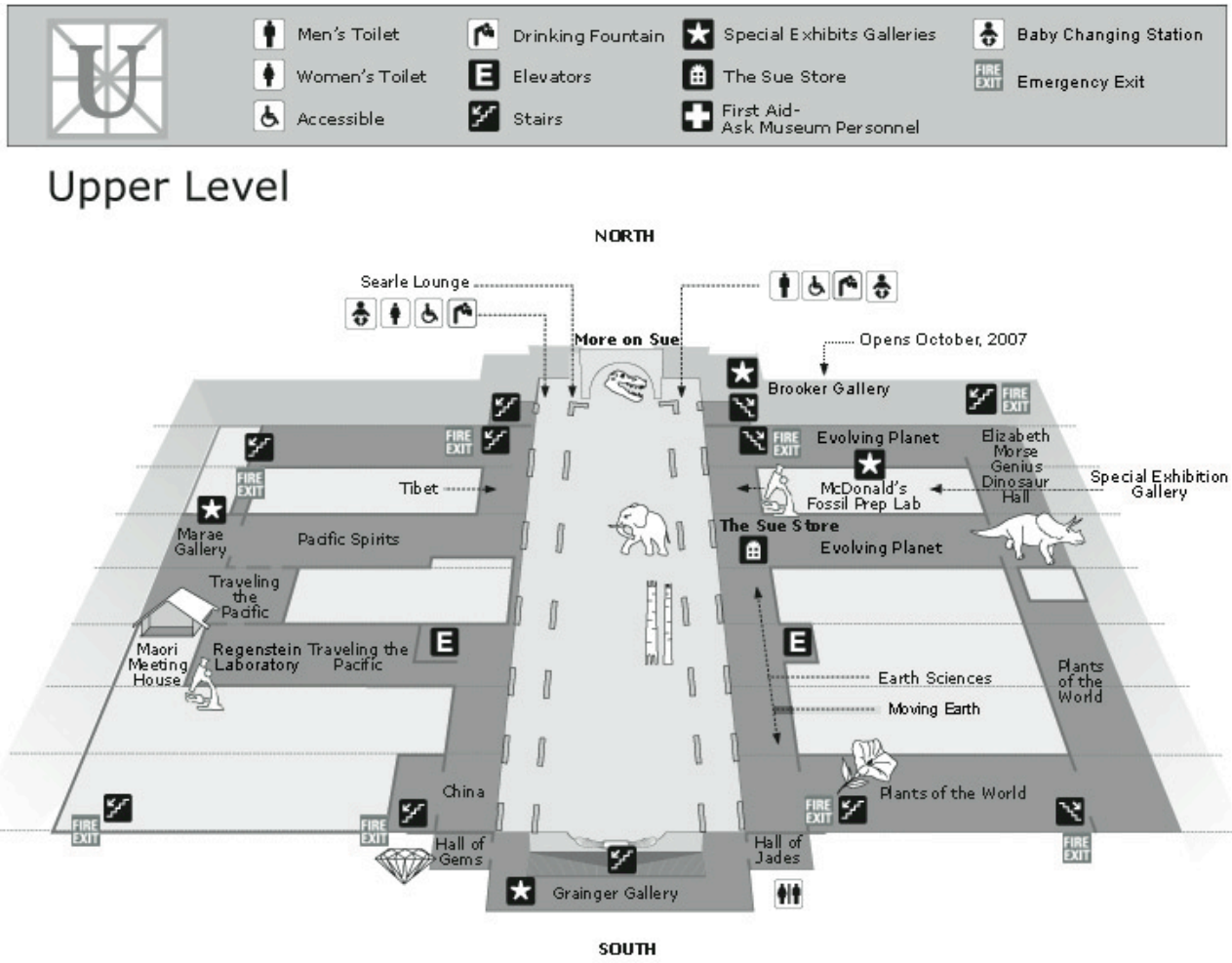
Special Exhibit - Mammoths and Mastodons: Titans of the Ice Age
(ticket required for entry)

North Entrance

Exit towards city
Access to Northwest Terrace Lunch area (Brachiosaur)

South Entrance

Taxi Service: curbside



Evolving Planet

Fossil and Dinosaur Exhibit

McDonald's Fossil Prep Lab

Public Preparation Laboratory
Near Access to Fossil Mammal Collections (Roundtable: Collections Management at The Field Museum)

Regenstein Laboratory

Anthropology Public Viewing Lab.

Schedule of Events – Thursday, April 29th

9:00 AM | **Registration at West Entrance**
Refreshments and light edibles available
Meet and greet, organize for tours

9:15 | **Collections and Laboratory Tours: participants placed upon arrival**
- Collection Resource Center
- Fossil Mammal Collections, McDonald's Fossil Preparation Laboratory,
- Fossil Fish Collection, Herpetology Collection, Preparation Laboratories

12:00 PM | **Lunch served on Northwest Terrace (weather permitting)**
In the case of inclement weather, lunch will be served in Lecture Hall 2

1:30 | **Roundtable Discussions**

Air Abrasion Facilities & Techniques – J.P. Cavigelli
Classroom B

Laboratory Safety, OSHA standards, and MSDS – Jolynn Willink
BioSync Conference Room

Laboratory Renovation and Design[2] – Matthew Brown
Ward Lecture Hall

Collecting Large Vertebrate Specimens – Mike Getty and Eric Lund
Lecture Hall 2

3:00 | **Break:** refreshments available at west entrance

3:30 | **Roundtable Discussions**

Molding, Casting, and Flesh Reconstruction – Erin Fitzgerald, Tyler Keillor
Classroom B (Rm. B)

Collections Management, Rehousing, and Organization - William Simpson
Fossil Mammal Collection

Volunteer Programs – Dennis Kinzig, Karen Nordquist, Irene Broede
Classroom A (Rm. A)

Professional Development – Greg Brown, Marilyn Fox, Matthew Brown
Lecture Hall 2

5-9:00 PM | **Opening Reception**
Rice Gallery, Main Floor (Center West), The Field Museum
Pizza, Beer and Beverages served

[2] This roundtable discussion is complemented by the platform presentation "Renovation and Modernization of the University of Texas at Austin Fossil Preparation Laboratory" by Matthew Brown, 11:45am Friday.

Schedule of Events – Friday Morning, April 30th

9:00 AM	**Registration at West Entrance** Refreshments and light edibles available
	Platform Presentations: Ward Lecture Hall
9:15	**Opening Remarks: Peter Makovicky, Chair, Geology Department**
9:30	**Simpson, William:** Building a 3D Virtual Model of a Mounted *Tyrannosaurus*
9:45	**Egberts, Sebastian:** Use of Computed Tomography (CT) Data in Physical Preparation of Fossil Vertebrates
10:15	**Carrió, Vicen:** Protocols of Packaging and Moving Specimens: organization strategies for institutions
10:30	**Van Beek, Constance:** Preparation of Micro-features of Eocene Green River Formation Specimens: materials and methods
10:45	**Break:** refreshments available at west entrance
11:00	**Wylie, Caitlin D.:** Preparation and Society: fossil preparation techniques in the 19th century and today
11:15	**Williams, Scott A.:** The Permian Challenge: preparing small fossil tetrapods from Richard's Spur, Oklahoma
11:30	**Fry, Roger F., and Derek J. Main:** Mapping and Excavating a Mid-Cretaceous Crocodile (Archosauria: Goniopholidae) at a Large Urban Dig Utilizing and All Volunteer Crew: the Arlington Archosaur Site, North Central Texas
11:45	**Brown, Matthew:** Renovation and Modernization of the University of Texas at Austin Fossil Preparation Laboratory[3]
12:00 PM	**Lunch served on Northwest Terrace (weather permitting)** In the case of inclement weather, lunch will be served in Lecture Hall 2

[3] This presentation is complemented by the roudtable discussion "Laboratory Renovations and Design" at 1:30 PM on Thursday.

Schedule of Events – Friday Afternoon, April 30th

1:00 PM	**McDonald, H. Gregory:** A Brave New World: The Paleontological Resources Protection Act of 2009: collection management partnerships between federal agencies and non-federal repositories, a view from the National Park Service
1:30	**Boonchai, Nareerat, Steve Manchester, and Terry Lott:** Methods for the Preparation and Anatomical Analysis of Eocene Leaf Cuticles from Puryear Claypit, Western Tennessee
1:45	**Smith, Matthew E.:** Preparation Methods for Fossil Invertebrates from Florida and the Caribbean Islands
2:15	**Break:** refreshments available at west entrance
2:30	**Cavin, Jennifer L.:** Cast Cutter Vs. Hand Saw: an experiment in opening field jackets
2:45	**Evander, Robert L.:** Preventative Maintenance for Air Scribes
3:00	**Nelson, Thomas L., Jennifer M. Grasso, and Philip A. Gensler:** Addressing a Critical Need Within the Collections at Hagerman Fossil Beds National Monument: refined and improved techniques and materials for the production of multi-size clam shell specimen cradles
3:30	**Beiner, Gali Gali and Rivka Rabinovich:** An Elephant Task: conservation methods of middle Pleistocene Proboscidian remains from Revadim, Israel
3:45	**Mackenzi-Morrison, Ian:** Molding and Casting Using a Desiccant Chamber, Vaccuum Pump and Pressure Feed Tank
4:00	**Poster Session: Lecture Hall 2** **Boonchai, Nareerat, et.al.:** Excavating Dinosaurs in Nakhon Ratchasima, Northeastern Thailand: how to deal with hard rock and fragmented bones **Fitzgerald, Vicki:** Reproductive Health and Safety for Employees Working in Vertebrate Paleontology Laboratories **Potapova, Olga, et.al.:** Preservation Techniques and Documentation Procedures for Collections at the Mammoth Site of Hot Springs Inc., South Dakota **Val, Sandra, et.al.:** Preparation of Dinosaur Eggshells: new insights on traditional techniques **Viegas, Pedro Andrade and Remmert Schouten:** The Bristol Dinosaur Project: the new Paleo. Lab. with an invitation to provide feedback and ideas
5:00 PM	**Meeting adjourned for the day**

Schedule of Events – Saturday, May 1st

9:00 AM	**Workshops – arrive at West Entrance for escort to 3rd Floor** Refreshments and light edibles available on the 3rd Floor Archival Materials and Techniques for Fossil Preparation Amy Davidson, Rm 3107 Fossil Preparation Lab. Techniques for Acid Preparation Jim Holstein, Rm 3112 Fossil Preparation Lab. Creating Temporary Support Structures for Preparation Debbie Wagner, Rm. 3226 Histology Techniques at The Field Museum Akiko Shinya, Rm. 3013 Rock Sawing & Sample Prep. Lab.
12:00 PM	**Lunch served on Northwest Terrace (weather permitting)** In the case of inclement weather, lunch will be served in Lecture Hall 2
1:00	**Workshops** Archival Materials and Techniques for Fossil Preparation Amy Davidson, Rm 3107 Fossil Preparation Lab. Techniques for Acid Preparation Jim Holstein, Rm 3112 Fossil Preparation Lab. Creating Temporary Support Structures for Preparation Debbie Wagner, Rm. 3226 Histology Techniques at The Field Museum Akiko Shinya, Rm. 3013 Rock Sawing & Sample Prep. Lab.
4:00	**Workshops adjourn**
6:00 PM	**Symposium Dinner Reception, offsite (see map and directions on pink flier in Registration packet)**

© The Field Museum, CSGEO3248 - Elmer Riggs, the first curator of Fossil Mammals (wearing cap) and field laboratory assistant Harold W. Menke preparing Grand Junction Colorado fossils including the Brachiosaurus altithorax femur still in plaster jacket at left. Paleontology Laboratory, Field Museum. Geology specimen P25107

The series of roundtables are designed to allow for more detailed and extended discussions among peers regarding a specific topic. Roundtables will begin with an introduction/short presentation by the organizer(s) followed by open discussion among participants. Each participant has the opportunity to engage in discussion by asking questions, sharing ideas, solutions and case studies. Topics for discussion were selected to cover a range of preparation and collections issues in the hopes that everyone will find something interesting and useful. Please sign up for Roundtables of your choice in each time slot at the registration table.

Roundtables: 1:30 PM

Air Abrasion Facilities & Techniques

Organizers: J.P. Cavigelli, Field/Preparation Coordinator, Tate Geological Museum, Casper College, Casper WY
Location: Classroom B, ground floor

Fossil preparation with the use of air abrasion provides a unique method to removing soft matrix from relatively harder bone. This method is very useful for specific forms of preservation, however, it also adds additional logistical issues with safety, setup and space. Because air abrasion releases micropowders into the air, proper ventilation and breathing accommodations must be considered. Additionally, the technique of air abrasion has many nuances that can be mastered through experience and patience. A variety of powders are used, depending on the qualities of each individual specimen and careful maintenance is essential to maintaining proper operation of machines. The organizer has valuable detailed experience with air abrasion preparation and will provide a basis, based on experiences, for open discussion with participants. This will be an excellent opportunity to ask questions and share experiences about this technique, and discuss its virtues and shortfalls.

Laboratory Safety, OSHA standards, and MSDS

Organizer: Jolynn Willink, Safety and Benefits Manager, The Field Museum
Location: BioSync Conference Room

Fossil Preparation involves exposure to various chemicals and airborn particulates that can affect the health of workers. The Occupational Safety and Health Administration (OSHA) has detailed guidelines setup for individuals working in these environments. Material Safety and Data Sheets (MSDS) are a key component to understanding health and safety standards that should be used in dealing with chemicals in the laboratory setting as well as in the field. With all these compounds and regulations in place it can be difficult to maintain standards as set by federal agencies. A short presentation will summarize OSHA standards, MSDS and provide tips to proper Lab maintenance including proper disposal of hazardous materials. Informational handouts will be available regarding MSDS, particulates, safety in the laboratory, and proper chemical disposal for individuals who seek a better understanding of safety protocols and standards for fossil preparation.

Laboratory Renovation and Design[4]

Organizer: Matthew Brown, Chief Preparator, Vertebrate Paleontology Laboratory, University of Texas, Austin
Location: Ward Lecture Hall

Some aspects of fossil preparation have changed only slightly or not at all over the last century, while some have been altered quite dramatically. The introduction of new materials, techniques, and equipment can impact laboratory workflow negatively or positively depending on how well the lab space is planned. Some laboratories have work that is limited to specific localities or types of preservation, others prepare material of all sizes from every continent. There are an almost infinite number of variables to consider when making generic recommendations for laboratory design, but some constants can be applied to most facilities. At the least, design priority should be given to the safety of the workers and the specimens. Many preparators innovate independently and lack the outlet to communicate ideas to colleagues. Participants are encouraged to share ideas and examples of successful strategies for designing laboratory space as well as join in on the discussion to learn how to better outfit their own laboratories.

Collecting Large Vertebrate Specimens: common problems and potential solutions

Organizers: Mike Getty, Collections Manager of Paleontology, and Eric Lund, Paleontology Laboratory Supervisor, Utah Museum of Natural History
Location: Lecture Hall 2

This roundtable will focus on common issues in collecting large vertebrate specimens based on the organizers' experiences. They will open with an overview of several issues that include:

collecting specimens in particularly hard matrix,
tips on jacketing large blocks,
separating large articulated specimens into manageable blocks,
transporting specimens from remote areas,
effectively mapping quarries in the field.

An open discussion on these and other topics related to large vertebrate excavation will follow so as to draw on individual experiences that will help provide ideas for solving potential problems encountered in field excavation.

[4] This roundtable discussion is complemented by the platform presentation "Renovation and Modernization of the University of Texas at Austin Fossil Preparation Laboratory" by Matthew Brown, 11:45am Friday.

Roundtables: 3:30 PM

Molding, Casting, and Flesh Reconstruction

Organizers: Erin Fitzgerald, Fossil Preparator/Paleoartist; Tyler Keillor, Fossil Preparator/Paleoartist, University of Chicago
Location: Classroom B, ground floor

Expanding upon the molding and casting techniques that were described at previous Fossil Preparation and Collections Symposia, this roundtable discussion will highlight some advanced techniques and challenging projects. A seventeen-piece silicone mold from a fully prepared psittacosaur cranium will be on hand to illustrate complicated molding partitions. A variety of casting materials are commonly used, but since they have different properties, these variables will impact how the mold should be made. The intended use of the resulting cast (ie, archival cast, education cast, display copy, etc.) will also play an important role in deciding which casting material to use. Finally, the creation of a flesh reconstruction will be discussed. A rigid and flexible model of "DuckCroc" will be shown as examples. Participants are encouraged to share their own experiences as well as discuss molding and casting materials, and techniques.

Collections Management at Field Museum

Organizer: William Simpson, Collections Manager, Fossil Vertebrates, Field Museum of Natural History
Location: Fossil Mammal Range, 2nd Floor, Center East Lightwell

Though most institutions share the broad goals of collections management, the details of how these goals are approached vary across different collections. The organizer will explain how Field Museum's fossil vertebrate collections are managed and what challenges this collection faces. Topics will include fieldwork, accessioning, cataloguing, storage, padding/cradling, databasing, labeling, lending, and exhibition. This will then help to provide a framework for a broader discussion of procedures, problems and challenges faced by the attendees and their collections.

Volunteer Programs

Organizers: Dennis Kinzig, Karen Nordquist, and Irene Broede; Volunteers, The Field Museum
Location: Classroom A, ground floor

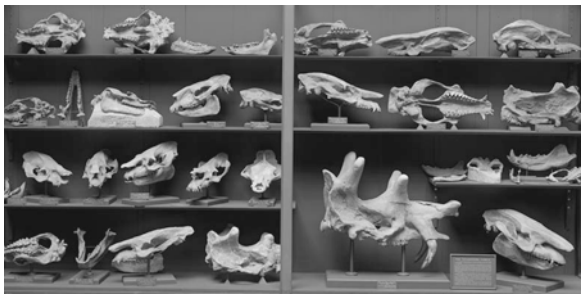
Volunteerism in Vertebrate Paleontology at The Field Museum has existed for many decades. Some volunteers are brought in, trained, and leave within a few months while others stay on for years and remain devoted to their work. The Geology Department is fortunate to have a small core group of devoted volunteers who have been with the museum for decades. In addition, our ongoing program continues to bring in enthusiastic new volunteers who are integrated into existing programs through our preparation screening test and interviewing. This roundtable is hosted by the long-term volunteers who have helped keep our volunteer program ongoing with special emphasis on microsorting. They will discuss the organization of the program, likes and dislikes of how it is run and share their insight regarding motivation and longevity. An open discussion on volunteerism is relevant to all institutions that rely on volunteers for their valuable skills and devotion.

Professional Development

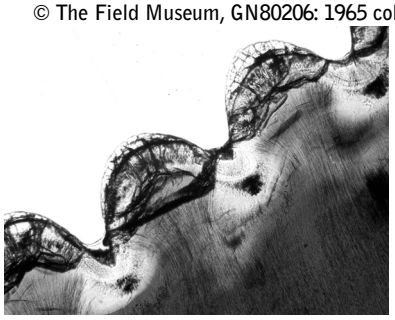
Organizers: Greg Brown, Chief Preparator Vertebrate Paleontology, University of Nebraska State Museum, Lincoln NE; Marilyn Fox, Preparator, Division of Vertebrate Paleontology, Peabody Museum of Natural History, Yale University; and Matthew Brown, Chief Preparator, Vertebrate Paleontology Laboratory, University of Texas, Austin
Location: Lecture Hall 2, ground floor

As we work toward greater professionalism within the field of fossil preparation, there has been an increasing amount of discussion about professional development. What does this mean and how can it best be achieved? Many who are new to fossil preparation as well as those with more experience seek ways to connect with others in the field, receive professional training, learn about adhesives and compounds, and generally improve their knowledge of the field. This roundtable is designed for individuals who would like to gain insight into this process and share with others their experiences of entering and excelling in the field of fossil preparation and collections management.

© The Field Museum, GN80206: 1965 collection installation



© The Field Museum, CSGE036718: Titanothere skulls



Tooth serrations thin section

Support cradle for preparation

Archival housings for delicate specimens

All participants have been placed in a workshop in the morning and afternoon depending on their registration form and availability. A complete list of participants and workshop assignment is available at the Registration table. Each workshop will last approximately 3 hours. Refreshments will be available on the 3rd floor throughout the day. Lunch will be served on the Northwest Terrace (weather permitting). At the completion of the second workshop, registrants can explore the museum until closing at 5:00 PM.

Creating Temporary Support Structures for Preparation

Instructor: Debbie Wagner, Fossil Preparator, The Field Museum
Location: 3rd Floor, Room 3226

Description: This workshop introduces ways in which temporary supports are used to assist preparation. From adding needed strength to using cradles for handling, we will look at and discuss several ideas. Procedures covered are applying and removing waxy substances as well as non-invasive techniques such as small plaster jackets, self-hardening synthetic clay and rubber plugs. Examples will be provided and participants will receive an object in which to practice.

Outline and Content:
Waxy Substances: Applying a layer of wax can add well needed support. We will discuss the use of Polyethylene Glycol (PEG) and Cyclododecane. This technique allows thin bone to be prepared safely. Due to health and safety concerns related to ventilation, we will work only with PEG.

Plaster Cradles: At times when the object being prepared is too delicate to be held, a simple cradle can be created in a matter of minutes. Materials needed are plaster bandages and a thin layer of foam or Tyvek. We will look at the best way to hold the specimen and practice making a cradle. This technique can also be used as a storage option.

Self-Hardening Clay/Rubber: Blocks of self-hardening clay or rubber can be used to fill prepared areas when the other side also needs work. Once again, a layer of foam or Tyvek is used to protect the bone. While soft, the clay or rubber is molded into desired shape and left to harden. These blocks can also indicate where extra caution should be practiced.

Archival Materials and Techniques for Fossil Preparation: Paraloid B-72, Labeling and Housings

Instructor: Amy Davidson, Senior Principal Preparator, American Museum of Natural History, New York NY
Location: 3rd Floor, Fossil Preparation Laboratory, Room 3107

Description: This workshop will cover three ways that fossil preparators can use high quality materials and techniques to prolong the life of specimens and associated data. The workshop will make use of demonstrations and step-by-step, hands-on exercises. In addition, reference papers will be distributed in advance and discussed during the workshop.

Outline and Content:
Part I: Paraloid B-72: What is Paraloid B-72 and why is it considered archival. An easy way to mix B-72 using the Koob method and how to decide between acetone and ethanol. Thick B-72 in acetone for joins: how to make Koob tubes. Easy ways to clean jars and keep lids from sticking. How to use or counteract B-72 solvent retention time as well as softening and re-dissolving B-72. Bulking up B-72 for gap filling. How to encourage penetration and reduce thick, shiny coatings. Techniques for very large and very small joins. Making very fast joins on some porous materials. Participants will make B-72 joins and fills on their mini-flowerpot specimen using materials in the kit.

Part II: Archival Labeling: In this section we will walk through Davidson et.al., 2006 "*Assembling an Archival Marking Kit for Paleontological Specimens*" available on-line at: www.vertpaleo.org/education/documents/Davidson_et_al_2006.pdf
A demonstration of techniques with participants labeling their repaired specimen using a B-72 sandwich method. Printed labels and pencil labels will be discussed. Participants will also label gelatin-capsules, plastic boxes, and plastic bags.

Part III. Archival Housings: There are many ways to make archival housings- I will briefly discuss built-up techniques using hot-glue, the references provided and show examples of the materials used for those techniques. We will focus on cavity mounts made of cut-out ethafoam. These use no adhesives and allow liners, labels, photos and notes to be inserted into the ethafoam. Participants will create their own cavity mount using materials provided in the kit and will also learn how to include a small labeled plastic box in the mount and attach reference photos in Mylar sleeves and folded labels of archival Bristol board.

Acid Preparation Methodology

Instructor: Jim Holstein, Fossil Preparator, The Field Museum
Location: 3rd Floor, Fossil Preparation Laboratory, Room 3112

Description: Some specimens respond well to preparation methods designed to chemically dissolve the surrounding matrix while leaving the bone undamaged and in position. Specific characteristics that make this method favorable include: the specific type of matrix encasing the specimen, quality of preservation, and structural characteristics of the bone. Using proper materials, having an appropriate lab set-up as well as adhering to safety protocols are important. When care is taken and the specimen is treated properly, results will be optimal. This workshop will be structured with a lecture, hands-on embedding of a specimen, mixing of an acid solution, and discussion.

Outline and Content:
Acids: This workshop will focus on the basics of acid preparation and will include what an acid is, how acids work, and when acid preparation is appropriate. A basic overview of mixing acid baths and calculating concentrations will be covered with a demonstration of making an acid bath. Buffering agents will also be discussed.

Transfer preparation: Transfer preparation involves embedding the exposed surface of a specimen into resin for permanent storage prior to removal of matrix surrounding the unexposed portions of the specimen. We will discuss transfer preparation specifically and use the transfer of Santana Formation fishes into a polyester resin/acrylic medium as an example. Acid preparation of non-transferred specimens will be discussed as well.

Safety: When working with acids safety is an important issue. Proper ventilation, as well as avoiding skin contact is essential. Safety protocols in the handling and storage of acids will be addressed with a basic overview of an MSDS (Materials Safety and Data Sheet).

Histology Techniques at The Field Museum

Instructor: Akiko Shinya, Chief Preparator, The Field Museum
Location: 3rd Floor, Rock Sampling Room 3013

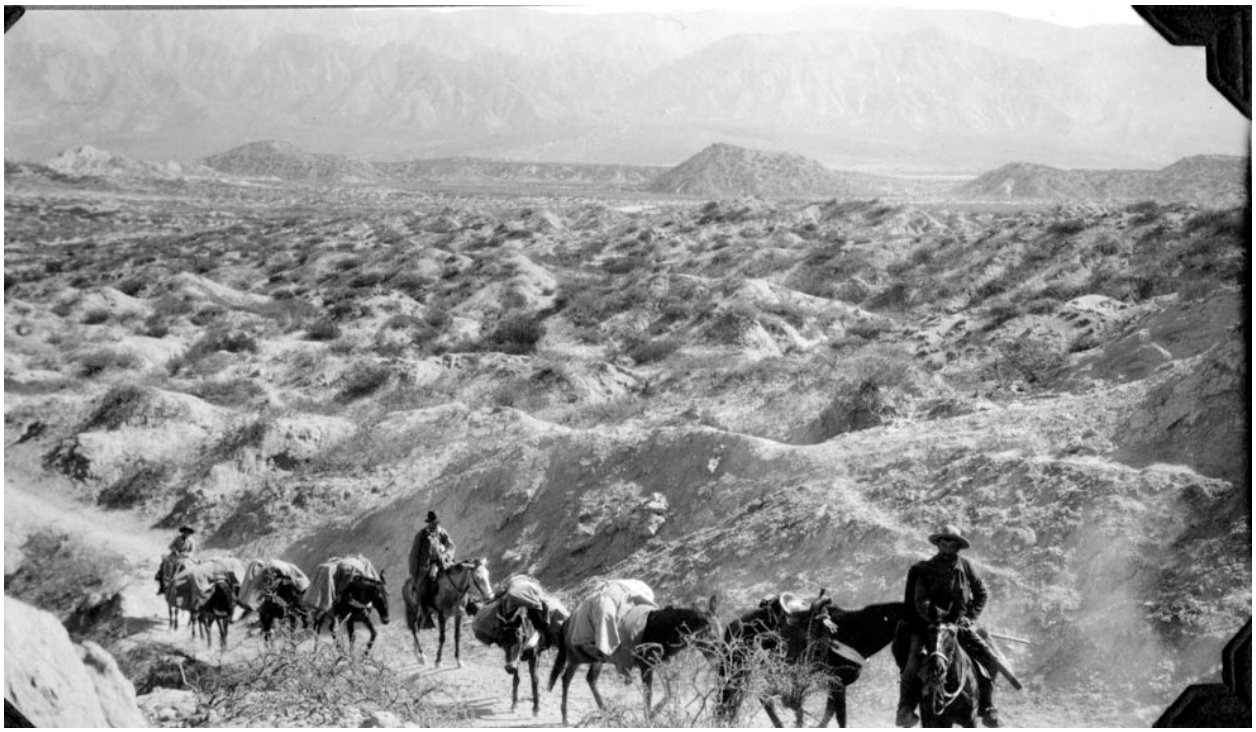
Description: Histology is a vital part of Vertebrate Paleontology in obtaining cell level anatomical information of specimens. It is our observation that such destructive sampling is becoming more commonly used in research projects. Over the past several years, Lisa Herzog has taken a lead in learning, practicing, and developing excellent methods in making thin sections at the Field Museum and her technique has become standard in our lab. Using examples of her thin sections including whole or partial teeth, maxilla, dentary, rib, fibula, etc., this workshop will introduce you to the technique and materials on making thin sections through a lecture, demonstration, hands-on practices, and discussion. Although everyone is welcome to attend, this workshop is primarily aimed for beginners who are intending to acquire equipment or have access to equipment but have limited experience.

Outline and Content:
Introductory lecture: From preparation of specimens prior to cutting to embedding to polishing and viewing under a light microscope, the lecture will be an overview of our method. We will also cover specific materials and equipment required for the process. This includes embedding materials, size and types of slides, polishing materials as well as saws and blades.

Demonstration and hands-on practices: Prior to hands-on practices, demonstration will be given to follow up the introductory lecture. We will provide embedded specimen samples for hands-on practice, so that each participant will have an opportunity to cut, polish, and mount specimens.

Discussion: Post practice discussion on methods, prevention and solutions for potential problems. We will review participants' specimens and discuss issues relating to technique that may arise during the workshop.

© The Field Museum, CSGE069518
Elmer Riggs, left and Robert C. Thorne with the cordilleron pelvis, in situ



© The Field Museum, CSGE069245
Expedition members on horses arriving at destination: South America Argentina, Field Paleontological Expedition Geology Fossil Collecting Elmer S. Riggs, Robert C. Thorne, Rudolf Stahlecker, Felipe Mendez Expedition

AN ELEPHANT TASK: CONSERVATION METHODS OF MIDDLE PLEISTOCENE PROBOSCIDEANREMAINS FROM REVADIM, ISRAEL: **Platform Presentation 3:30 PM**

Beiner, Gali Gali[1] and Rivka Rabinovich[123]. *National Natural History Collections[1], Institute of Earth Sciences[2], Institute of Archaeology[3], The Hebrew University of Jerusalem, Israel*

Elephant (proboscidean) finds in the Southern Levant region tend to be meager, due to poor bone preservation, limited excavation areas and post-depositional tectonics. Additionally, most assemblages are dominated by teeth. Finds from Israel demonstrate the presence of several species, giving rise to various paleo-ecological theories on species dispersion and interactions with hominins. This is partly due to the fact that southern Levantine finds are dated no later than the Lower Palaeolothic *sensu lato* (ca. 1.5 ma – 300,000), whilst proboscideans in Eurasia continue into much later periods. In Israel, the Middle Pleistocene site of Revadim stands out with a relatively large excavation area of 250 m^2, a clearly defined stratigraphic sequence and an excavation approach emphasizing landscape-based research that studies the distribution of human activities across landscape facies during constrained time intervals. Thus, the conservation of elephant remains from Revadim is of considerable importance to ongoing paleontological research in Israel.

Three elephant scapulae, received in three different states of preservation, demonstrate the difficulties faced by a conservator on a low budget. Considerations took into account the state of preservation and the need to prepare the objects for research, rather than for display. Since the elephant finds were part of a taphonomical research, preserving surface modifications was of supreme importance. Fill materials had to be light because of the need for researchers to handle large objects post-conservation. Following study of other cases of gap-filling, both in modern and sub-fossil bone, and considering the restrictions and particular requirements of the material at hand, a system was devised consisting of Japanese tissue impregnated with Paraloid (Acryloid) B72 in acetone then built in layers over a "scaffolding" of rods and coated with microcrystalline wax. The resultant fill was lightweight, reversible, relatively cheap, and unobtrusive to the researching scientists.

EXCAVATING DINOSAURS IN NAKHON RATCHASIMA,NORTHEASTERN THAILAND: DEALING WITH HARD ROCK AND FRAGMENTED BONES: **Poster Presentation**

Boonchai, Nareerat[1,2,3], Pratueng Jintasakul[3], Yoichi Azuma[4], Masateru Shibata[4], Yupa Thasod[1], Yoshikasu Noda[4], Rattanaphorn Hanta[1], Jaroon Duangkrayom[1], Atsushi Yabe[4], and Toru Sekiya[2]. *Florida Museum of Natural History, University of Florida[1]; Jilin University, China[2]; Northeastern Research Institute of Petrified Wood and Mineral Resources, Nakhon Ratchasima Rajabhat University, Thailand[3]; Fukui Prefectural Dinosaur Museum, Japan[4]*

An abundance of dinosaur skeletons, pterosaur teeth, and other vertebrate fossils such as fishes, turtles, and crocodiles, have been discovered from the Lower Cretaceous Khok Kruat Formation in Nakhon Ratchasima Province, northeastern Thailand. Although a fossil from this formation in Nakhon Ratchasima was first discovered in 1981 and recognized as dinosaurian later in 1997, research excavations were impeded by the challenges of excavating fragmentary bones from hard rock. Local villagers, however, found fossils when they collected these hard red rocks for their gardens using power tools. For this reason, many of the fossils suffered terrible damage that greatly reduced their research value. In 2007 The *Northeastern Research Institute* of Petrified Wood and Mineral Resources (Thailand) and Fukui Prefectural Dinosaur Museum (Japan) began a collaborative paleontological research project of the Khok Kruat Formation, called the Thailand-Japan Dinosaur Project (TJDP). During 2007-2009, TJDP unearthed thousands of vertebrate fossils from this formation scattered in very hard reddish calcareous conglomerates and sandstones. Many of them were disarticulated and fragmented. Despite the Japanese team having experience excavating in such consolidated rocks in Japan, the situation in Thailand was much different, causing us to implement new and different strategies to work at this site. One of the most striking differences is the state of the bone bed. The Nakhon Ratchasima bone bed site has large cracks, enlarged by erosion and chemical weathering that divides the rock bed into isolated rock hummocks or "islands" in the shape of large boulders. The excavation proceeded by numbering and mapping the exposed fossils of each island in order, and then breaking each island into smaller pieces to note exactly where individual fossils came from. Using this method, we could recognize approximately where each fossil was found at the site. These methods have led to the successful recovery of many specimens including new dinosaur material from the Khok Kruat Formation.

METHODS FOR PREPARATION AND ANATOMICAL ANALYSIS OF EOCENE LEAF CUTICLES FROM PURYEAR CLAYPIT, WESTERN TENNESSEE: **Platform Presentation 1:30 PM**

Boonchai, Nareerat[123], Steve Manchester[1], and Terry Lott[1]. *Florida Museum of Natural History, University of Florida[1]; Jilin University, China[2]; Museum of Petrified Wood and Mineral Resources, Thailand[3]*

Fossil leaves from the middle Eocene Claiborne Group of Puryear Clay Pit, Tennessee, one of the classic Eocene Localities in America, were collected in the early part of the last century with further collecting starting in the 1960s. Thousands of plant fossils from this locality are in the paleobotany collection of the Florida Museum of Natural History. Most of them are very well preserved leaves. The cuticle and venation pattern is particularly well-preserved in leaves of the family *Lauraceae*. To preserve a record of these specimens in their original state, each specimen is photographed prior to any preparation. Preparation begins by removing pieces of cuticle from the leaves. They are first soaked in Hydrofluoric Acid for about 2 hours to dissolve any attached clay, rinsed with water, then soaked in "Jeffrey's solution" for a few

hours until they become clear, then again rinsed with water. Pieces of cuticle that are not clear are soaked in bleach until they became clear (approximately 15 minutes). The clear cuticle is transferred to a series of Ethanol baths (50%, 95%, and 100 %, respectively). Cleaned cuticle is stained with 1% safranin-o in Ethanol for 1-2 hours until it becomes red. Any over-staining is rinsed with 100 % Ethanol. Modified insect pins are used to separate any part of the upper and lower epidermis that remain stuck together. The cuticle is then mounted on a slide using Canada Balsam and sealed with fingernail polish. The completed slide is photographed under a light microscope. Cuticle slides obtained through this method show the cellular arrangements in exquisite detail and are difficult to distinguish from preparations of extant leaf cuticle. This work supplements earlier studies demonstrating the abundance of *Lauraceae* in the Claiborne flora.

RENOVATION AND MODERNIZATION OF THE UNIVERSITY OF TEXAS AT AUSTIN FOSSIL PREPARATION LABORATORY[5]: **Platform Presentation 11:45 AM**

Brown, Matthew. *University of Texas at Austin, Vertebrate Paleontology Laboratory, Austin TX*

In 2009 a project was undertaken to modernize the fossil preparation facilities in the Vertebrate Paleontology Laboratory at the University of Texas at Austin. The University hosts an active research program and one of the country's largest Vertebrate Paleontology graduate programs. The purposes of the preparation lab include conservation and preparation of fossils for research and display, as well as instructing future paleontologists in paleontology methods. Three current and two emeritus faculty members contribute preparation projects and students in need of training. In addition, the facilities are also used by visitors and faculty from other departments and institutions.

Laboratory renovation was aimed at creating a large and safe workspace, highly adaptable to a wide range of projects. Designing rolling, height adjustable worktables, adding more cabinetry, and increasing the reach of compressed air and dust extraction systems optimized space. Chemical selection and use was re-evaluated for adherence to conservation principles and worker safety. Microscope workstations were upgraded to Wild Heerbrugg systems, and several workstations (including a microscope setup with a teaching arm) were geared toward integration into preparation training programs. A photoport was added to one workstation, where a Sony HD camcorder feeds into a 40'' wall mounted flat-screen monitor. The monitor is also connected to a dedicated CPU so that accessory media, such as PDF, photographic, MSDS, or CT dataset libraries can be accessed for reference at any time. The types of tools and techniques available were increased so that students could become familiar with the wide range of materials available in the field.

[5] This presentation is complemented by the roudtable discussion "Laboratory Renovations and Design" at 1:30 PM on Thursday.

PACKAGING AND MOVING SPECIMENS: ORGANIZATION STRATEGIES FOR INSTITUTIONS: **Platform Presentation 10:15 AM**

Carrió, Vicen. *Natural Sciences Department, National Museums Collection Centre, National Museums Scotland*

Moving specimens from one location to another requires knowledge of both the specimen and appropriate packing materials. Both specimens and staff could be at risk and it is imperative to avoid damage to both. After many years of bringing temporary exhibitions from the UK to USA, the National Museums Collections Centre has developed a routine process to more easily deal with all the necessary steps, including checking loan datasheets, preparing condition reports and crates for customs to check, as well as allowing for quick unpacking and setup.

The selection of appropriate packing materials and detailed knowledge of the material to be packed are the main priorities of any approach. Materials used to pack a large mammal vertebra will be different to those used to pack a very delicate fossil scorpion. The type of move also determines appropriate techniques and materials. Moving collections within an institution can be relatively easy, as the primary task is to determine the best route to the new destination. However, packing and moving gets more complicated when specimens need to be moved to other institutions in the same country and even more so when specimens are sent to other countries. Some essential conservation/archival packing materials used include: Acid free tissue, Correx/Twinplast, Polyethylene/Polythene trays and bags, Plastazote, Steel pins, Acid free board/boxes. Non-archival materials such as bubble wrap and plastic is used only when not in direct contact with an object.

COMPARING A CAST CUTTER WITH A HAND SAW: AN EXPERIMENT IN OPENING FIELD JACKETS: **Platform Presentation 2:30 PM**

Cavin, Jennifer L. *John Day Fossil Beds National Monument*

Fossil specimens are commonly jacketed in the field and later opened in a lab. It is widely accepted that opening a field jacket may cause damage to the encased fossils. An experiment was undertaken to test the amount of damage done to fossil specimens when opening a jacket. Two methods, a cast cutter and a hand saw, were tested with two types of "matrix," one hard and one soft/loosely consolidated. Four replica jackets were made using plaster soaked burlap. The hard matrix was replicated using plaster combined with sand from a channel deposit within the Turtle Cove Member of the John Day Formation from the Foree area of John Day Fossil Beds National Monument. The unconsolidated, or soft, matrix was medium, sub-rounded sand from the same Formation without the addition of plaster. Instead of

risking real fossils, a broken ceramic plate was used to imitate fossil reaction. The plate fragments were embedded into the matrix leaving a measurable fracture in between. The cracks between the plate fragments were measured, and the jackets were then sealed with more plaster soaked burlap. Finally, each jacket was opened using either a cast cutter or a hand saw. When opened, the cracks between the plate fragments were measured again. In both cases, cast cutter and hand saw, the plate fragments in the unconsolidated matrix jackets moved well out of their original position making it impossible to measure the cracks. The results from measuring the cracks in the hard matrix jackets show that, while both methods caused movement, the degree of movement in the jacket opened by the cast cutter was considerably higher. Although the crack in the "fossil" specimen embedded in the hard matrix jacket opened by hand was not extensively widened, other damage did occur to the "fossil" due to the less precise cut of the hand saw versus the cast cutter.

USE OF COMPUTED TOMOGRAPHY DATA IN PHYSICAL PREPARATION OF FOSSIL VERTEBRATES: **Platform Presentation 9:45 AM**

Egberts, Sebastian. *Ohio University College of Osteopathic Medicine*

Computed Tomography (CT) has been extensively used to investigate the morphology of fossil vertebrates without physically altering the specimens. While this noninvasive method is often applied in order to visualize internal structure of a specimen, it is seldom used as an approach to document and plan physical preparation. Making predictions about the physical preparation of an unprepared specimen using digital images can yield significant advantages. For example, identifying the distribution of bone in an unopened plaster-jacket can significantly speed up the initial removal of bulk matrix. There are a variety of different scanners of which preparators can take advantage. These include medical CT scanners capable of scanning the largest samples with the lowest overall resolution to microfocus scanners that are limited to 3cm specimens but with tremendous resolution. Lack of resolution or contrast in the CT dataset can camouflage bony elements. This lack of contrast can be improved by using contrast thresholding in program such as VG Studio Max 2.0 and Avizo to increase the relative intensity of hard parts. With a great variation in preservation, composition of fossils, and of stone matrices, digital imaging and physical preparation often yield different results. It is, for example, often impossible to differentiate in a digital dataset between bone and matrix if the bone is encrusted by a thin layer of matrix, but the latter can often be easily removed by physical preparation. If, on the other hand, a bony element is entirely enclosed by other elements that can not be removed without damage to the specimen, digital preparation of that particular element might be the only option. I present actual examples of specimens that were CT scanned and prepared. I offer what to do when datasets are ideal and problematic and demonstrate how to predict the best method of preparation for a particular fossil.

PREVENTATIVE MAINTENANCE FOR AIR SCRIBES: **Platform Presentation 2:45 PM**

Evander, Robert L. *American Museum of Natural History*

A program of daily maintenance for commonly-used mechanical tools was accompanied by a daily maintenance log to document its effectiveness. For air scribes, the daily maintenance consisted of disassembling the tool, immersing the metal components in an alcohol bath, wiping the components dry using paper towels and pipe cleaners, checking all the components, sharpening the stylus, oiling the stylus lightly, reassembling the tool, and giving the tool a short test run to adjust to the cleaning. This process requires approximately fifteen minutes each morning for one or two tools. On days of heavy use, it may be necessary to sharpen the stylus during the day. Each time the stylus is sharpened, it is oiled lightly.

Over the last three years, tool performance has been consistently reliable, demonstrating that this modest program can preserve these tools in prime working order. Air scribes work well with very little lubrication, if the lubrication is focused at the wear points. This program provides essentially no lubrication to the piston of those air scribes that have a piston as their primary mover, yet no hesitations have developed in the rhythm of the tool.

The daily log has proven useful in determining both component and whole tool lifetimes. The most commonly replaced part in air scribes is the stylus. Replacement becomes necessary when repeated sharpenings shorten the length of the stylus so that it no longer projects beyond the bushing. O-rings require replacement when they begin to develop cracks. O-rings fail more quickly when the bushings are screwed onto the barrel too tightly. O-rings tend to fail during use. If the tool worked fine in the morning and is hesitant in the afternoon, stop and inspect the O-ring. It is time to change the whole tool when chatter marks develop on the circle of contact between the bushing and the spring. The most obvious clue that this phase of tool life has arrived is the failure of the stylus to spin during its normal back-and-forth cycle. Microscopic inspection for chatter marks on the inside of the bushing can then be used for confirmation.

REPRODUCTIVE HEALTH AND SAFETY FOR EMPLOYEES WORKING IN VERTEBRATE PALEONTOLOGY LABORATORIES: **Poster Presentation**

Fitzgerald, Vicki. *Yale Peabody Museum of Natural History, New Haven, CT*

Men and women working in preparation laboratories today are more aware than ever before of the potential hazards of working with chemicals. Many of them are of reproductive age and vulnerable to some of the components within commonly used products. These employees must routinely use chemicals in preparation, molding, and casting that may not be

encountered in other professions, including solvents, adhesives, polyester and epoxy resins and their catalysts. It is possible that these chemicals, which are so routinely used in the laboratory, are or may be hazardous to reproductive health. Some of these chemicals pose developmental risks to human embryos even before a woman is aware of the pregnancy. Acetone, for example, can contain small amounts of benzene, which is classified as a carcinogen, mutagen, and a reproductive toxin. It is very difficult to assess the amount of a chemical that affects reproductive health in humans. This poster will outline some commonly used laboratory chemicals and their associated risks so exposure can be minimized and or prevented. A general guideline of preventative lab practices is included.

MAPPING AND EXCAVATING A MID-CRETACEOUS CROCODILE (ARCHOSAURIA: GONIOPHOLIDAE) AT A LARGE URBAN DIG UTILIZING AN ALL VOLUNTEER CREW: THE ARLINGTON ARCHOSAUR SITE, NORTH CENTRAL TEXAS: **Platform Presentation 11:30 AM**

Fry, Roger F.[1] and Derek J. Main[2]. *Scotese Museum, University of Texas – Arlington TX[1], Geosciences Dept., University of Texas – Dallas, Richardson, TX[2]*

The Arlington Archosaur Site (AAS) located in Arlington, Tarrant County, TX is a productive fossil site that has produced abundant remains of a variety of Cretaceous vertebrates. The vertebrate fossils represented range from dinosauria, crocodilian, and chelonian to elasmobranch and dipnoan, with crocodilian and chelonian being most common. The site, stratigraphically located within the Mid–Cretaceous Woodbine Formation (Cenomanian; 95 Mya), represents the paleo-environment of a coastal delta plain consisting of fine grained sediments (mudstone), rich with organic material, which overlies a peat bed. During the midst of the 2009 field season, a large (~7 m) Cretaceous crocodile (*goniopholidae*) was discovered and excavated from the basal peat bed in a hectic one week period. Due to the urban location of the site and its accessibility to the general public, an emergency excavation, now known as "Crocorama", was organized utilizing the online social networking site, Facebook. Using a volunteer field team assembled through contacts within the AAS Facebook Group, we were able to conduct an excavation that ran for 7 days, up to 24 hours a day. The site was mapped using Cartesian coordinates in a 5m x 2.5m grid system. Each fossil was located and drawn in on the grid prior to removal from the field then wrapped and stored for transport with coordinates recorded on the package as well as on the site map content page. As the site expanded, additional grids were developed by extending the coordinate system. The grid coordinates were marked with a GPS and later digitized. Within the one week excavation more than 60 vertebrate elements of a large Cretaceous crocodile were recovered from the site as well as several elements of an unidentified chelonian. The crocodilian elements recovered included; osteoderms, vertebrae, humerus, radius, phalanges, dentary, premaxilla, maxilla, quadrate, and teeth. Currently the only known crocodile from the Woodbine

Formation is *Woodbinesuchus* which is relatively smaller; therefore, the AAS "Crocorama" fossils may represent a new species.

MOLDING AND CASTING USING A DESICCANT CHAMBER, VACCUUM PUMP AND PRESSURE FEED TANK: **Platform Presentation 3:45 PM**

Mackenzie-Morrison, Ian. *Royal Ontario Museum, Toronto, ON, Canada*

The molding and casting of vertebrate fossils is a common and routine procedure used to produce casts for research and display. Due to the nature of molding and casting materials and the techniques employed in the mixing and pouring process, it is almost impossible to produce casts without some artifact of the process present in the reproduction. Air bubbles that are present within the pre-cured molding material cause spherical bumps to be present on the surface of the finished cast, while bubbles present in the casting process result in cavities, or vacant spaces at the surface of the cast causing loss of valuable data. Using a desiccant chamber with a vacuum pump to degas the molding and casting compound prior to pouring greatly reduces the total number of bubbles present in the liquid mixture. The use of a pressure feed tank after pouring significantly decreases the size of any remaining bubbles, making an almost bubble free reproduction. The use of these devices greatly improves the likelihood of producing casts that are devoid of artifacts produced during the molding and casting process, saving both time spent on recasting and money wasted on producing unusable casts.

A BRAVE NEW WORLD: THE PALEONTOLOGICAL RESOURCES PROTECTION ACT OF 2009 AND COLLECTION MANAGEMENT PARTNERSHIPS BETWEEN FEDERAL AGENCIES AND NON-FEDERAL REPOSITORIES, A VIEW FROM THE NATIONAL PARK SERVICE (NPS): **Platform Presentation 1:00 PM**

McDonald, H. Gregory. *National Park Service, Fort Collins, CO*

The Paleontological Resources Protection Act (PRPA) was signed into federal law on March 30, 2009. Currently federal agencies are working collaboratively to develop the regulations by which the law will be implemented by each agency. While the organic act creating each agency means there will be some variation between how each land-management agency implements the PRPA, the goal is to make the regulations as uniform as possible among the different agencies. Regulations being developed include guidelines for issuing research/collecting permits and how Federal fossils in collections will be managed by non-federal repositories. This talk will address parts of the law on how fossils originating from federal lands will be managed by non-federal repositories with an emphasis on NPS collections management policy. The PRPA requires that every permit shall include requirements that (1) the paleontological resource collected from Federal lands under the

permit will remain the property of the United States; (2) the paleontological resource and copies of associated records will be preserved for the public in an approved repository, to be made available for scientific research and public education; and (3) specific locality data will not be released by the permittee or repository without the written permission of the Secretary. In section 6, Curation of Resources it states that any paleontological resource, and any data and records associated with the resource, collected under a permit, shall be deposited in an approved repository and that the Secretary may enter into agreements with non-Federal repositories regarding the curation of these resources, data, and records.

Among all the federal land-management agencies the NPS has the most active museum management with collections often managed on-site at a park. Not all parks manage collections and in many cases parks may collaborate with partner repositories to care for portions of their collections. For example, a park responsible for a civil war battlefield may care for collection items pertaining to the civil war but house their natural history collections with a natural history museum. Currently the NPS has over 200 parks with fossil resources but has trained paleontologists at only 8 parks. Consequently many parks will house their fossils with a partner repository. Accountability for these specimens and their data is paramount and current NPS regulations require the specimens be cataloged in the Interior Collection Management System (ICMS). This database not only serves as the catalog but also allows parks to perform the required annual inventory by generating a set of random catalog numbers of specimens that must be visually confirmed as being in the collection, either the park's or partner repository.

ADRESSING A CRITICAL NEED WITHIN THE COLLECTIONS AT HAGERMAN FOSSIL BEDS NATIONAL MONUMENT: REFINED AND IMPROVED TECHNIQUES AND MATERIALS FOR THE PRODUCTION OF MULTI-SIZE, CLAM SHELL SPECIMEN CRADLES: **Platform Presentation 3:00 PM**

Nelson, Thomas L., Jennifer M. Grasso, and Philip A. Gensler. *Hagerman Fossil Beds NM, Hagerman, ID*

Hagerman Fossil Beds National Monument (HAFO) in southern Idaho contains the world's richest known Pliocene-aged fossil deposits yet discovered. Since the monument was established in 1988 the museum collections have grown to well over 50,000 paleontological specimens. Many of the larger specimens were excavated from the Hagerman Horse Quarry from 1997-1998 and represent several hundred skeletal elements belonging to the extinct horse, *Equus simplicidens*. Though the preparation backlog of this material is far from being complete, a large number of cranial and post cranial elements are prepared and stored in museum cabinets.

A critical need in regards to the storage of collections was identified by the Chief Preparator and the Park Paleontologist at HAFO. Though the specimens are stored on standard ¼ inch thick ethafoam drawer liners, most require additional support for long term preservation and protection. A considerable number of specimens, primarily cranial and vertebral material, are exhibiting deterioration and breakage due to stress from inadequate support. A very large scale project was designed and put into action to address this critical need. The goal of this project was to not only provide adequate support and protection for the specimen, but also to allow the specimen to be viewed from all sides to facilitate research and exhibition, without removing the specimen from its cradle.

This project started with a unique, clam-shell cradle design developed at Dinosaur National Monument. The design was modified and refined to accommodate the needs of the HAFO specimens. By utilizing different materials and procedures, combined with some technique changes, we improved the design, reduced materials, and reduced processes while in turn increasing production rates. The end result is a refined ultra strong, lightweight design that protects fossil specimens, allows for easy access, is suitable for transportation and is an aesthetically acceptable option for exhibition. A supplemental hand-out consisting of a complete list of materials, vendors and pricing for this project will be available.

PRESERVATION TECHNIQUES AND DOCUMENTATION PROCEDURES OF THE COLLECTIONS AT THE MAMMOTH SITE OF HOT SPRINGS, INC., SOUTH DAKOTA: **Poster Presentation**

Potapova, Olga, Larry Agenbroad, Don Esker, and Justin Wilkins. *Mammoth Site of Hot Springs Inc., Hot Springs, SD*

The Mammoth Site of Hot Springs, Inc. is a unique Pleistocene (26,000 BP) trap that contains the remains of over 58 mammoths that lived in the South Dakota area. In total over 5,000 specimens belonging to 84 species of plants and animals were recovered, preserved and stored in the Museum. Among those are remains of 44 species of vertebrates, most of which belong to the Columbian Mammoth (*Mammuthus columbi*). Since the site's discovery in 1974, various conservation and documentation procedures have been implemented, followed and then changed. In conjunction with grants received from the Institute of Museum and Library Services (IMLS) and The Society of Vertebrate Paleontology (SVP) (2003, 2006, and 2008) the staff and Collections Committee of The Mammoth Site were able to consolidate the databases, enhance record keeping of specimens, standardize preservation documentation procedures, and effectively use individuals working with collections, on the bone bed *in-situ,* and in the lab. Bonebed procedures have changed recently that incorporate additional measures to prevent damage to the bonebed. In 2005-2006 new Condition Report forms were developed and used for extensive records of every individual bone, both *in-situ* bones and those removed from the bonebed. Detailed record keeping in the bonebed has been achieved through the use of these specifically developed forms, and the incorporation of a Trimble

5600 robotic total station, state of the art overhead digital photography, and ArcGIS® software. Experiments in 3D cartography are ongoing. Additionally, money awarded by the IMLS in 2009 has been put to use in installing a humidity control system intended to reduce damage to the hygroscopic specimens in the bonebed.

BUILDING A 3D VIRTUAL MODEL OF A MOUNTED *TYRANNOSAURUS*: **Platform Presentation 9:30 AM**

Simpson, William F. and Peter J. Makovicky. *The Field Museum, Chicago, IL*

As part of the 10-year anniversary of the unveiling of Field Museum's *T. rex*, "SUE", the museum is producing a 3-dimensional digital model of this specimen. The job is somewhat complicated because the real bone is mounted and on display, so surface scan data is being obtained in a variety of ways. The Chicago Police Department's Crime Lab scanned the mounted bones with a green-light laser using multiple scans from various vantage points around the exhibit hall. Next, the authors took many cast bones of the museum's unmounted research cast of SUE to Loyola Hospital outside Chicago to be CT-scanned. This proved to be an efficient means of obtaining surface scan data. Most of the cast bones that would fit in this medical unit were scanned. We took several larger bone casts including the left ilium and the skull to a larger CT-scanner at Ford Motor Company outside Ann Arbor, Michigan. Finally, we had several additional large cast bones including the pubic boot and articulated right ilium & sacrum surface scanned using a white light scanner.

Linda Deck & Ralph Chapman of D&C collaborated in this project as did Art Anderson of Virtual Surfaces and Joe Lichko of Cubic Visions.

These data will be used for a variety of academic, educational, and marketing objectives. Pete Makovicky will use the data to initiate a study producing an estimate of live weight for this species. A degraded version of the scan data will be used on the museum website in various educational modules. Scaled down copies of the skull and jaws based on rapid prototypes produced from the scan data will be promoted at the museum stores.

PREPARATION METHODS FOR FOSSIL INVERTEBRATES FROM FLORIDA AND THE CARIBBEAN ISLANDS: **Platform Presentation 1:45 PM**

Smith, Matthew E. *Petrified Forest National Park, Holbrook, AZ*

Working as an invertebrate preparator for a year in northern Florida presented many challenges to a transient vertebrate fossil preparator. Applying techniques learned in vertebrate paleontology settings such as labs and professional meetings allowed unique

invertebrate fossils from the state of Florida and some of the Caribbean islands to be freed of matrix and safely added to the Florida Museum of Natural History Invertebrate Paleontology Collection. The remains of most multi-cellular fossil invertebrates are composed largely of calcium carbonate, both before and after fossilization, and are therefore unsuitable candidates for acid preparation. Exceedingly delicate fossils in hard calcareous matrices have to be mechanically prepared. Additionally, depending on the type of calcium carbonate present certain parts of the organism may be well preserved while other parts may be very poorly preserved. The use of Cyclododecane was critical for the preparation of certain specimens. Also, keeping the specimens wet during micro-preparation to increase the color contrast between the specimen and the matrix was critical in some cases. Porcupine quills were useful tools during mechanical preparation as well. Unusual field conditions and geologic settings require difficult collection techniques that may be foreign to many vertebrate paleontologists. Some of these fossils will require the development of novel preparation techniques with further input from professional preparators and conservators.

PREPARATION OF DINOSAUR EGGSHELLS: NEW INSIGHTS TO TRADITIONAL TECHNIQUES:

Poster Presentation

Val, Sandra, Carolina Cancelo, Bernat Vila, and Albert G. Sellés. *Institut Català de Paleontologia. Universitat Autònoma de Barcelona*

Traditionally, techniques used in the preparation of fossil eggshells were based on the similarity of the matrix to the eggshells. These techniques often resulted in aggressive preparation methods and frequently produced significant dissolution or abrasion damage to the eggshells. The damage often did not allow for optimal parataxonomic study since eggshell features were potentially destroyed. Based on our experience, we propose a new method for cleaning fossil eggshells, specifically those with a calcium carbonate composition.

Preparation techniques were conducted on dinosaur eggshell fragments collected from several Late Cretaceous deposits (Tremp Fm.) in the South-Pyrenean basins (Catalonia, NE Iberian Peninsula). Sampled localities occur in continental facies that include mudstones, marls, oncolite limestones and fine to medium, well-cemented sandstones. In most cases, eggshells are imbedded in a highly carbonated matrix that strongly hinders the removal of secondary deposits. Our preliminary study consists of an analysis made using an electron microscope to study the effects of various chemical treatments on eggshells. The new technique represents a reasonable alternative to traditional treatment with organic acids. Preliminary results include a description of the characteristics of eggshells before and after treatment and specific problems with matrices. It has been observed that this type of alternative treatment rarely produces abrasion on the eggshells, nor does it alter the eggshell surface, allowing us to study the structure of the eggshells in greater detail. In the cases where very hard matrices hindered extraction of the eggshells, we accomplished extraction from the matrix, preserving

the important aspects for study. Finally, we propose standard guidelines in order to put this technique into practice.

PREPARATION OF MICRO-FEATURES IN EOCENE GREEN RIVER FORMATION SPECIMENS: MATERIALS AND METHODS: **Platform Presentation 10:30 AM**

Van Beek, Constance. *The Field Museum, Chicago IL*

The locality known as Fossil Lake (52 mya) of the Eocene Green River Formation of Wyoming and Utah has yielded a wealth of exquisitely fossilized flora and fauna. A fine-grained limestone matrix has preserved morphological features with impressive detail: from insect wings and fish embryos, to delicate veining on leaves. Micro-features as thin as 1-2mm that have been beautifully preserved, such as bird feathers, body and skin impressions, leaf material, delicate rows of scales and fin rays, jaws filled with teeth and denticles that need special attention for proper preparation. In addition, the comparatively more robust bones of birds, fishes and other animals are often thin and hollow. These detailed specimens present a unique challenge: how to effectively remove matrix without damaging their micro-features. Air-abrasion is too forceful and leaves behind powder residue that cannot be removed completely. Acid preparation is a possibility, but the specimen must be permanently embedded in resin, and this method may still prove too damaging. Appreciable success was achieved in preparing and preserving these delicate fossils and their micro-features by refining hand tools and mechanical preparation techniques. Specialized pin vise tips were developed through alternative sharpening methods that proved effective in removing matrix without damage to the specimen. Blunted air scribes removed matrix effectively if oriented correctly to the specimen surface, and with 'choked down' air flow. Finally, some consolidation was also used to keep delicate surfaces and bones intact. Implementation of these methods is an important part of uncovering the delicate features of specimens such as the ones found in this particular formation.

THE BRISTOL DINOSAUR PROJECT: THE NEW PALAEO LAB WITH AN INVITATION TO PROVIDE FEEDBACK AND IDEAS: **Poster Presentation**

Viegas, Pedro Andrade and Remmert Schouten. *Department of Earth Sciences, Bristol University, Bristol UK*

The Bristol Dinosaur is one of the first dinosaurs ever to be discovered and is still one of the oldest known dinosaurs in the world (approx. 200 ma). Since the 1830´s countless tons of fossil bearing rock have been recovered from Bristol quarries and surroundings. Some material is prepared and stored in collections and some was unfortunately lost (destroyed) during a bombing raid in World War II. Additionally, a large amount of material remains to be

prepared. In 2009 The University of Bristol secured three years funding from the Heritage Lottery Fund to support the "Hands on our Ancient Heritage" project. This project will support laboratory renovations as well as the preparation of remaining material, while making it available for research. It is also intended as a vehicle to encourage children and the general public to consider related aspects of heritage such as learning new information about social and scientific history and the conservation of natural heritage. To both these aims an Education Officer and a Fossil Preparator have been appointed.

Currently, the main concern is the new Preparation Laboratory to be designed and custom made to fit the needs of the extensive paleontological assets present at Bristol University. Outdated features, old piping and mechanical preparation equipment will be replaced by current standards in laboratory equipment and safety features. Ranging from macro to micro, mechanical and acid techniques will be used to complete preparation of the Bristol Dinosaur, *Thecodontosaurus antiquus*, contained in approximately 4 tons of rock. Both students and assessed enthusiastic volunteers will be involved in the project to be supervised by the Prep. Lab. Manager and Fossil Preparator. The lab has a limited amount of space, which needs to be designed to suit various needs such as mechanical preparation as well as acid preparation and the instruction thereof. The students and volunteers will be encouraged to learn fossil preparation and conservation techniques and receive fossil preparation guidance and so be involved in new discoveries.

This communication is to invite feedback and ideas for the project and new laboratory design, which will have to suit many different requirements and aims. What are the best materials and equipment and how to stay on budget while providing an ergonomic, efficient, and safe facility are the questions that presently confront Bristol's Paleo. Lab. team.

This communication is a contribution to the Bristol Dinosaur Project "Hands on our Ancient Heritage", funded by the Heritage Lottery Fund.

THE PERMIAN CHALLENGE: PREPARING SMALL FOSSIL TETRAPODS FROM RICHARD'S SPUR, OKLAHOMA: **Platform Presentation 11:15 AM**

Williams, Scott A. *Burpee Museum of Natural History, Rockford IL*

The Burpee Museum of Natural History (BMRP) has been conducting a fossil vertebrate collecting program from the famous Permian fissure fill deposits from the Dolese Quarry, near Richard's Spur, Oklahoma since 2006. The fossil producing layer is represented by a series of fossilized karst deposits with fissure fills in Ordovician carbonate bedrock. Tetrapod specimens collected from the fissure fill material range from completely disarticulated to partially articulated skeletons. The presence of partially articulated skeletons suggests that there has been little transport for at least some specimens. The fauna includes varanopid

synapsids, para-reptiles, trematopid and dissorophid amphibians with the captorhinid *Captorhinus aguti* predominating. Specimens recovered from these deposits require careful preparation to fully utilize the potential of the specimen in future research. Several factors may contribute to the difficulty of preparation including: surrounding matrix type, specimen size, state of fossil preservation and bone density. The BMRP employs numerous tools and techniques to tackle a range of preparation challenges including: use of pneumatic tools, underwater screen washing, light air abrasion, and the use of low-grade acetic acid (5%) for specimens encased within calcium carbonate. Many of the specimens within the calcium carbonate are very delicate and often partially articulated. The vibration from pneumatic tools can displace loosely cemented skeletal remains. Additionally, some of the material is so densely fossiliferous that over-prepping can cause specimen loss. Acid preparation techniques must be used in small, localized areas to ensure that parts of the specimen susceptible to acid dissolution are not adversely affected. Clay walls and temporary barriers are utilized to prevent acid from over-prepping surrounding material and loosing *in situ* placement. In many cases no one technique can fully prepare a specimen, instead the careful application of several techniques is required. Dozens of specimens prepared using these techniques are being utilized in ongoing tetrapod research.

PREPARATION AND SOCIETY: FOSSIL PREPARATION TECHNIQUES IN THE 19TH CENTURY AND TODAY: **Platform Presentation 11:00 AM**

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Within the community of fossil preparators, standard accepted fossil preparation practices are unofficial but understood. However, each individual has unique skills, experiences, and knowledge about the basics and more complex aspects of fossil preparation. Individual goals and values change the way fossils are approached, creating infinite possible combinations of techniques. Because individual goals and beliefs determine the ways in which fossils are prepared, they are evident in the finished fossil specimens themselves. A case study of a specimen first prepared in the 19th century and recently re-prepared illustrates the physical effects on a fossil of the preparators' goals and interests. A modern-day preparator removed the remnants of old preparation techniques that are now considered to be poor practice, such as the use of cement and bricks to support a fragmented fossil skull. Thus a 19th-century specimen was transformed into a 21st-century specimen that reflects the currently accepted preparation techniques, such as reversible adhesives and chemically stable external supports. The tools and techniques that 19th century preparators used to remove matrix, adhere fragments, and build external supports reveal the materials and knowledge that were conventional to that particular historical and social context. I will suggest some explanations for why these preparators chose the techniques they did, and raise questions of why we choose the techniques we use today.