Association for
Materials&Methods
in Paleontology

The 2017 annual meeting logo was designed and illustrated by Mariah Slovacek, based on original concept art by Matthew Brown and John Maisano. It features the giant Texas pterosaur *Quetzalcoatlus northopi*, from the Cretaceous Javelina Formation of Big Bend National Park.

Host Institution
Kenneth Bader
Deborah Wagner
J. Chris Sagebiel
E. Chase Shelburn
Chris Bell
Ernest Lundelius
Ann Molineux
Matthew Brown

Annual Planning Committee
Conni J. O'Connor – Chair
Jessica Barnett
Vicen Carrió
Jennifer Cavin
Marilyn Fox
Lisa Herzog

Follow us on:

Association for Materials and Methods in Paleontology

@AMMPaleo
This event is #AMMP10

https://www.youtube.com/channel/UCC9-2xLHQWdcfRxWLkpx8eg

or, search for Association for Materials and Methods in Paleontology

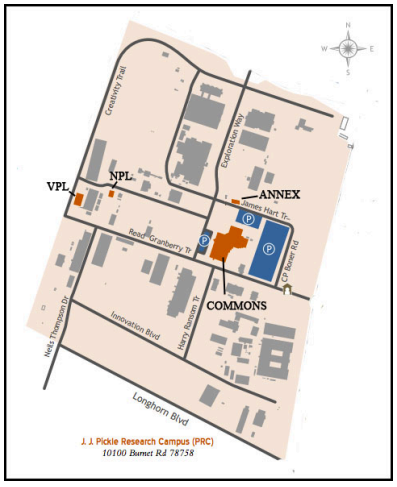
*revised August 2017
Cite as: Doe, J. 2017. A novel technique for sentence creation. Abstracts of the 10th Annual Meeting of the Association for Materials and Methods in Paleontology (rev. ed.), Austin, Texas. pp. X-XX.

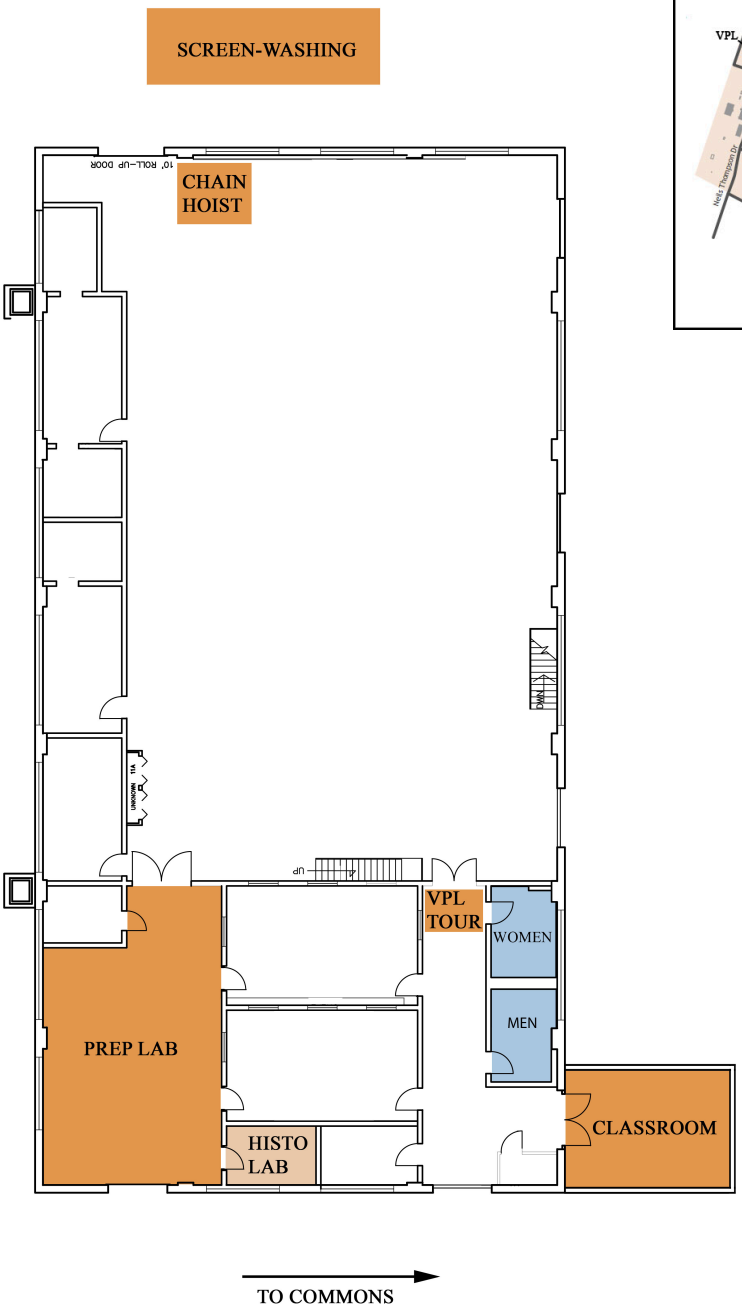
Table of Contents

The Commons – Room Map

Commons Learning Center
THE UNIVERSITY OF TEXAS AT AUSTIN

Vertebrate Paleontology Laboratory





Schedule of Events

Tuesday – April 18		
Pre-Conference Field Trip	Conservation Labs at the Harry Ransom Center University of Texas ***Transportation leaves promptly at 12:30PM from front entrance of hotel***	12:30PM – 5:00PM
Registration/Silent Auction Drop-off	Hotel – Lobby	6:00PM – 8:00PM
Wednesday – April 19		
Transportation departs to various locations	Hotel – Outside Front Entrance	7:30AM – 8:30AM
Registration/Silent Auction Drop-off	The Commons – Stadium	8:00AM – 8:45AM
Histology Basics	VPL – Preparation Lab	1:30PM – 6:00PM
CT Fundamentals	University of Texas High-Resolution X-Ray CT Facility	8:00AM – 5:00PM
Ethics Symposium	The Commons – Stadium	8:45AM – 5:00PM
Opening Reception	Austin Beerworks ***Transportation back to the hotel leaves promptly at 9:00PM***	5:30PM – 9:00PM
Thursday – April 20		
Registration/Silent Auction Drop-off	Host Hotel – Outside Nelson	8:00AM – 9:00AM
Welcome/Announcements	Host Hotel – Nelson	8:45AM – 9:00AM
Platform Presentations	Host Hotel – Nelson	9:00AM – 10:30AM
Break		10:30AM – 10:45AM
Platform Presentations	Host Hotel – Nelson	10:45AM – 12:00PM
Lunch	On your own	12:00PM – 1:30PM
Platform Presentations	Host Hotel – Nelson	1:30PM – 3:00PM
Break		3:00PM – 3:30PM
Platform Presentations	Host Hotel – Nelson	3:30PM – 5:00PM
Poster Presentations	Host Hotel – Nelson	5:00PM – 6:00PM
Dinner	On your own	6:00PM – 8:00PM
Trivia/Game Night	Host Hotel – Nelson	8:00PM – 10:00PM
Friday – April 21		
Transportation departs to The Commons	Hotel – Outside Front Entrance	7:30AM – 8:30AM
Workshops Session 1	The Commons – Various (See pg. 16)	8:30AM – 11:30AM
Lunch	On your own	11:30PM – 1:00PM
Student/Volunteer Round Table	The Commons – Café	11:30PM – 1:00PM
Workshops – Session 2	The Commons – Various (See pg. 16)	1:00PM – 4:00PM
Committee Meetings	The Commons – Various (See pg. 16)	4:00PM – 5:00PM
Transportation departs to Hotel	The Commons – Outside Front Entrance	5:00PM – 6:00PM
Closing Banquet/Silent Auction	Hotel – Nelson	6:00PM – 10:00PM
Saturday – April 22		
Post-Conference Field Trip – Lunch Provided	***Transportation leaves promptly at 8:45AM from front entrance of hotel!***	8:45AM – 5:00PM

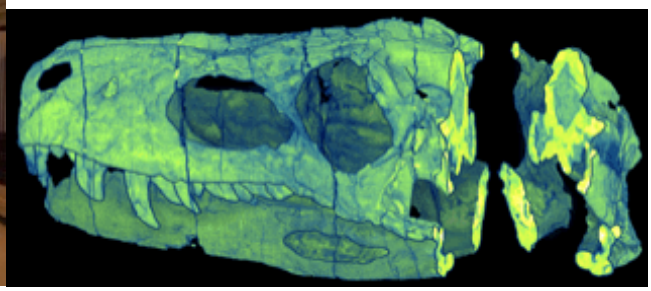
Schedule of Events –Tuesday, April 18
Pre-Conference Field Trip (12:30PM – 5:00PM)

The Conservation Labs at the Harry Ransom Center at The University of Texas at Austin

An internationally renowned humanities research library and museum, it holds extensive collections in literature, photography, film, art, and the performing arts. The Conservation Department of the Harry Ransom Center is charged with the care of the Center's collections.

“Treatment of the Center's diverse holdings requires an in-depth understanding of many types of material, a broad range of technical skills, and occasionally the development of unique procedures and structures. Although each conservator and technician is skilled in a particular specialty such as book, paper or photograph conservation, box making, or exhibit preparation, all are equally engaged with preservation, exhibition and access for the full range of objects in the collections.”

*****Transportation leaves from the front of the hotel promptly at 12:30PM!*****

Computed Tomography (CT) Workshop

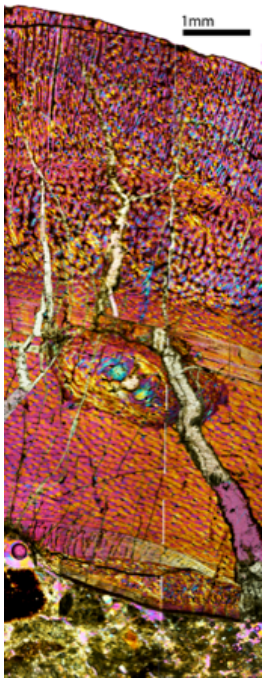
Leaders: Jessica Maisano and Matthew Colbert

The University of Texas High-Resolution X-Ray CT Facility (UTCT; www.ctlab.geo.utexas.edu) will host a one-day workshop on the fundamentals of acquiring and working with CT data of biological and paleontological samples.

Content will include an overview of what CT data represent, how these data are acquired, and guidelines for specimen selection/preparation. The workshop will include hands-on training in basic image processing of CT data, including: basic data handling; reslicing; creating 3D animated renderings (both volumetric and isosurface); and segmenting components of the data (e.g., endocasts, individual bones). Software employed will include Avizo® and ImageJ. Time permitting, participants may have the opportunity to work with their own CT data.

This workshop will serve as an introduction to understanding the process of CT acquisition. Participants will tour the UTCT facility, and get hands on experience with handling and interpreting data.

*****Transportation leaves from the front of the hotel promptly at 7:30AM!*****



Histology Workshop

Leaders: Sarah Werning and Lisa Herzog

The end product of histological sampling can yield remarkable results that cannot be obtained through x-ray or CT analysis alone. Procedures leading to the end result can be complex, fraught with problems, and dangerous to perform.
The histology workshop will go over the basics of histological sampling methodologies with hands on demonstrations. Participants will go through the process from beginning to end product.

Topics will include:

- Documentation
- Specimen Sampling
- Embedding
- Slide fixing
- Grinding
- Polishing
- Safety

12. Ethics of the Use of Specimens

The preparator is able to mitigate the risk of damage from research and education as much as possible without compromising the scientific value of a fossil specimen. The preparator is able to evaluate whether the specimen would be subject to undue or unnecessary risk by sampling, handling, loan, or display. A qualified preparator understands exhibition as a form of specialized specimen storage, and can evaluate exhibitions and their accompanying furniture, lighting, and other materials to ensure their compatibility with sound conservation practices.

- Defining the Professional Preparator: Essential Competencies, 2012

Often without explicitly stating it, the decisions and methodologies we practice are based on ethical reasoning. This is a critical element to operating in any field. When it comes to paleontological data, ethical decision-making and reasoning should be at the core of our thinking. However, it may not be entirely clear what this means or how to place it in context.

Here, we address this topic with targeted talks on various aspects of ethics in paleontology. Additionally, discussion time will allow for feedback, comments, and questions regarding each topic. The day will close with attendees participating in the development of the AMMP Code of Ethics; a fundamental document that helps define us as an Association.

With the understanding that paleontological localities, collected specimens, and associated records represent an irreplaceable resource; members of AMMP will work actively for the preservation and long-term access to paleontological specimens, collections, and records. All actions of the member should be informed by respect for the specimens in their care and members will strive to make informed decisions based on the best of current knowledge to select materials and methods that do not adversely affect the specimen or its possibilities for future research. An AMMP member will act with transparency, honesty and respect in all professional relationships.

- Current AMMP Ethics Statement

Schedule of Events – Wednesday, April 19 – Stadium Room
Ethics Symposium

7:30-8:30	Shuttles run from host hotel to The Commons
8:00-8:45	Registration open
8:45	**Lisa Herzog – AMMP President** Welcome, Opening Remarks
9:00	**Chris Bell – Keynote Speaker** Consequences of Altering Fossil Specimens for Research or Exhibition: Ethical Implications for Data and Public Education
9:45	**Sarah Werning** Consumptive or Just Destructive: Ethics, Policies, and Best Practices When Considering Fossil Sampling Requests
10:05	**Matthew E. Smith** Ethical Considerations for Reconstruction and Restoration
10:25	**Chris Sagebiel** Ethical Collecting: Implementing Practice Based on Policy
10:45	**BREAK**
11:00	**Chris Bell, Sarah Werning, Matthew E. Smith, and Chris Sagebiel** Speaker Discussion Panel
12:00-1:30	**LUNCH**
1:30-1:50	**Matthew A. Brown and Joshua Lively** Whose is it? A Case Study in Specimen Acquisition
1:50-2:10	**Evan Kent** Copyright and the Museum World
2:10-2:30	**BREAK**
2:30-5:00	**AMMP Ethics Statement Round Table Discussion**

Schedule of Events – Thursday Morning, April 21 – Nelson Room
Platform Presentations

8:45	**Welcome/Announcements**
9:00	**Christopher Capobianco** ASSESSING THE OVER-SIZED COLLECTIONS AT THE MUSEUM OF COMPARATIVE ZOOLOGY (MCZ), HARVARD UNIVERSITY: WHY A COLD WAR MISSILE BUNKER IS NOT AN IDEAL PLACE FOR MUSEUM COLLECTIONS
9:15	**René Hernandez-Rivera and Ricardo Servin-Pichardo** RESTORATION OF THE SECOND CAST OF "ISAURIA" (*LATIRHINUS UITSTLANI*), THE FIRST MEXICAN DINOSAUR EXHIBITED IN A MUSEUM
9:30	**Kenneth Bader** THE CHALLENGES OF PREPARING AND CONSERVING THE TEXAS GOMPHOTHERE, *GNATHABELODON BUCKNERI*
9:45	**Nicole Ridgwell, Howasta Tahiry, and Daniel Chure** LONG TERM CONSERVATION CHALLENGES IN THE CARNEGIE QUARRY AT DINOSAUR NATIONAL MONUMENT
10:00	**Gregory Brown** FOOTPRINTS AND SWIRLS: PRESERVATION OF EPHEMERAL TRACE FOSSILS AT THE ASHFALL FOSSIL BEDS USING CYCLODODECANE AS AN INTERMEDIATE IN DOUBLE TRANSFER PREPARATION
10:30	**BREAK**
10:45	**Mariana Di Giacomo** CONSERVATION SCIENCE MEETS FOSSIL PREPARATION: FTIR AS A TOOL TO IDENTIFY MATERIALS IN PALEONTOLOGICAL COLLECTIONS
11:00	**Kelsie Abrams** TINY SHINY THINGS: A CASE STUDY ON THE USE OF ULTRAVIOLET LIGHT FOR MICROPREPARATION OF CENOZOIC MAMMALS
11:15	**Olivia Lundelius** SORTING MICROFOSSIL CONCENTRATE UNDER ULTRAVIOLET AND DAYLIGHT CONDITIONS USING A SUPPORT VECTOR MACHINE
11:30	**Jaime Hirtz and Edward C. Shelburne** ADVANCED TECHNIQUES FOR THREE-DIMENSIONAL SCANNING USING NEXTENGINE AND SCANSTUDIO
11:45	**Edward C. Shelburne and Jaime Hirtz** SCAN TIME: INCORPORATING NEXTENGINE 3D LASER SCANNING INTO YOUR LABORATORY WORKFLOW
12:00-1:30	**LUNCH (on your own)**

Schedule of Events – Thursday Afternoon, April 21 – Nelson
Platform Presentations

1:30	**Rubén Contreras and Vicen Carrió** How Water Can Help in Palaeontological Preparation: The Case of the Tw:eed Project
1:45	**Marilyn Fox** Treatment of Fossil Specimens Before and After Destructive Sampling
2:00	**Hillary McLean and Michael Getty** Very Delicate Maneuvers: Constructing an Archival Cradle for an Enormous Irish Elk Skull
2:15	**Adam Behlke** Technique for Phantom Shims in a Poured Mold
2:30	**Michelle Pinsdorf and Abby Telfer** Break It Down – Training Volunteers to Repair Damaged Fossils Through a Group Workshop
2:45	**Jessica Barnett and Darrah Jorgensen** Prioritizing Digitization Workflow Through Task Division
3:00	**BREAK**
3:30	**Vanessa Rhue** Shipshape Loans: The Art of Selecting Materials for Housing Fossils Sent on Institutional Loan
3:45	**Matthew E. Smith, Adam Marsh, and William Parker** Revisiting Field sites, Preparation, and Increasing the Utility of Fossil Specimens
4:00	**AMMP General Meeting**

Schedule of Events – Thursday Evening, April 20 – Nelson Room
Poster Session

5:00 PM

Ana Balcarcel
ARCHIVAL FILLS: APPLICATION AND TINTING OPTIONS

Jennifer Cavin
MAKING ECONOMICAL CASTS FROM ONE PART MOLDS OF GOMPHOTHERE TEETH

Cyrus Green
YOU WANT TO DO WHAT TO THE BONE? ENSURING PROPER COLLECTIONS STORAGE AND MAXIMIZING DATA PRESERVATION FOR BONES USED IN HISTOLOGICAL STUDIES

José L. Gudiño Maussán, Felisa J. Aguilar, and René Hernández-Rivera
DIGITAL PHOTOGRAMMETRY MODELLING APPLIED TO DINOSAUR TRACKS FROM CERRO DEL PUEBLO FORMATION (LATE CAMPANIAN), COAHUILA, MEXICO: AN APPROACH TO TEST ITS EFFECTIVENESS AS MEANS OF RESEARCH AND PRESERVATION

Rachel Narducci, Eleanor Gardner, and Lisa Lundgren
COMMUNICATING FOSSIL COLLECTION AND PREPARATION TECHNIQUES TO A WIDER AUDIENCE: A CASE STUDY UTILIZING WEBINARS

Jacob Van Veldhuizen, Patricia Weaver, Lindsay Zanno, and Lisa Herzog
DEVELOPING A WORKFLOW FOR TRANSFERRING AND REHOUSING SPECIMENS DURING A CABINETRY UPGRADE: A CASE STUDY FROM THE NORTH CAROLINA MUSEUM OF NATURAL SCIENCES

Mariah Slovacek and Neil Landman
UNWRAPPING THE PAST ONE WHORL AT A TIME – A CASE STUDY OF THE DESTRUCTIVE ANALYSIS OF *ALLONAUTILUS SCROBICULATUS*

Vicki Yarborough
DEAD OR ALIVE? NAVIGATING THE PROCEDURAL MAZE AND PREPARATION COMPLEXITIES TO MOLD THE TEETH OF A LIVING *DAUBENTONIA MADAGASCARIENSIS* (AYE-AYE)

Schedule of Events – Friday Afternoon, April 21
Workshops and Tours

8:30 – 11:30 **Session 1**	**Collections Tours** Organizer: J. Chris Sagebiel Location: VPL – Vertebrate Paleontology Collections
	Lifting Heavy Specimens: A Look at Using Chain Hoist Assemblies Organizer: Tylor Birthisel Location: VPL – Classroom
	Microscopy in the Lab Organizer: Mike Eklund Location: VPL – Preparation Lab
	Microvertebrate Collection, Screen-washing, and Sorting Organizer: Christopher Capobianco Location: VPL – Screen-washing Area
	Paleo Imaging and 3D Scanning: Preserving Collections through Digitization Organizers: Chase Shelburne and Jaime Hirtz Location: NPL – Lab
	Prep Lab Design Organizer: Vicen Carrió and Alan Zdinak Location: The Commons – Tower Room
11:30 – 1:00	**LUNCH /** **Volunteer and Student Round Table** Organizer: Vanessa Rhue Location: The Commons – Café
1:00 – 4:00 **Session 2**	**Collections Problematica** Organizer: Chris Sagebiel Location: The Commons – Mustang Room
	Collections Tours Organizer: Ann Molineux Location: NPL
	Gap Fillers Organizer: Marilyn Fox Location: VPL – Preparation Lab
	Georeferencing Organizer: Christina Lutz Location: The Commons – Tower Room
	Improving Preparation Documentation with Tablet Technology Organizers: Mike Eklund and Conni O'Connor Location: VPL – Classroom
	Modern Osteological Preparation Organizer: Kenneth Bader Location: Annex
	4:00 – 5:00 **AMMP Committee Meetings (Various Rooms)**

6:00 **Silent Auction Viewing and Bidding Open**

7:00 **Silent Auction Officially Ends – Pens Down**
Winning Bids to Cashier for Payment

7:30 **Dining Begins**

8:30 **Closing Remarks**

Award Presentations

The **William W. Amaral Legacy Award** is a lifetime achievement award in recognition of significant and lasting contribution to the field of paleontology through advancement of the objectives of AMMP.

Throughout his career, Bill demonstrated a commitment to the principles of our profession. Bill was a teacher, an advocate, an innovator, and a skilled practitioner. Working within the Society of Vertebrate Paleontology, he raised standards and expectations about what a fossil preparator is and does, helping to build a community by championing the very idea of profession. He participated in fieldwork for more than 40 years, and worked to improve or develop techniques for collecting and preparing fossils even into retirement.

Named in honor of the late William W. Amaral, recipients of this award embody the traits that Bill personified, and that he spent his career working to instill in others – patience, vigilance, collegiality, and above all, a drive to advance techniques in paleontology.

The **Association for Materials and Methods in Paleontology Service Award** recognizes individuals who have made a substantial contribution to the association above and beyond the duties of typical members. Nomination is made by the Board of Directors.

Proceeds from this year's silent auction will again assist in funding the **Russ McCarty Student Travel Award**. Named in honor of the late Russell McCarty of the Florida Museum of Natural History, this award will provide one year of membership, waived registration fees, and a stipend to help support travel to present at the annual meeting of the Association for Materials and Methods in Paleontology. To be eligible, nominees enrolled in a graduate or undergraduate program, and must have submitted an abstract for the meeting. Nominations can come from the general membership, and student nominees need not be current members of the association.

Silent Auction Total – Future Plans

Entertainment – René Hernandez, Harmonica

Schedule of Events – Saturday, April 22
Post-Conference Field Trips

7:30 AM Transportation will arrive outside the hotel.

8:00 AM **All field trips depart from Host Hotel at 8:45AM SHARP!**
Your field trip assignment is indicated on the reverse of your name badge.
Lunch will be provided on all field trips

FIELD TRIPS

1. **Waco Mammoth National Monument/Inner Space Caves**
   Field Trip Organizers: Ernest Lundelius and Kenneth Bader

2. **Dinosaur Valley State Park**
   Field Trip Organizers: Conni O'Connor and Marilyn Fox

6:00 PM **Approximate scheduled return to hotel. Actual time may vary slightly.**

Workshop Descriptions

Friday, April 21 – The Commons
Workshop Descriptions

COLLECTIONS PROBLEMATICA
Organizer: Chris Sagebiel
Location: The Commons – Mustang Room
Session: 2

This discussion workshop will address collection issues including old loans, found-in-the-collections mysteries, limited scientific value specimens, complex donations, possible legal issues (NAGPRA, endangered species), etc. Come with questions and ideas.

GAP FILLERS
Organizer: Marilyn Fox
Location: Vertebrate Paleontology Lab – Preparation Lab
Session: 2

After lying in the ground for millions of years, subject to weathering, there will inevitably be gaps between broken pieces of fossil bone. This workshop will discuss some methods of loss compensation at different scales. An epoxy putty that may be necessary for structural support of a large bone may not be appropriate for infilling on a delicate Jurassic mammal jaw. We will discuss bulking agents, such as marble dust, cellulose powder, microspheres and ground matrix, as well as adhesives that can be used. We will also discuss products such as epoxy putty, plaster, and water putties and where they may or may not be appropriate. Just as not every break needs to be re-joined, so every gap does not need to be filled. Some alternate methods, like bone bandages and supports will also be covered.

GEOREFERENCING
Organizer: Christina Lutz
Location: The Commons – Tower Room
Session: 2

Very often, old paleontological sites do not have good locality data. Since they pre-date modern GPS systems, they may have only a rough locality description, such as “4 miles from the crossing.” Georeferencing is the process of assigning latitude and longitude coordinates to sites without such data previously provided. We will discuss Georeferencing best practices which provide us with the guidance for how to use this data and when we should not rely on it.

In this workshop we will utilize the GeoLocate web application to give sites latitude and longitude data as well as a radius of uncertainty. We will demonstrate how to utilize TRS (township, range, section) data as well as narrative data and how to import our results into a database. We will discuss the use of automated systems for this process. Websites that assist in searching tricky sites will be given. To complete the picture, we will create a KML map of these sites using Google Earth.

Participants will be sent links to the relevant (free) websites and should bring their own laptop.

IMPROVING PREPARATION DOCUMENTATION WITH TABLET TECHNOLOGY
Organizers: Mike Eklund and Conni O'Connor
Location: Vertebrate Paleontology Lab – Classroom
Session: 2

One critical area of fossil preparation that is often short on detail is the documentation of specimen changes and the manmade actions that impact the fossil. Using an electronic tablet like an iPad can make a very simple task of imaging changes in a specimen as well as annotating/highlighting complex details of the preparator's actions. The workshop will cover improved imaging strategy as well as the use of layering image techniques to generate a simple yet vastly more complete record of specimen preparation.

LIFTING HEAVY SPECIMENS: A LOOK AT USING CHAIN HOIST ASSEMBLIES
Organizers: Tylor Birthisel
Location: Vertebrate Paleontology Lab – Classroom
Session: 1

This class will review methods and techniques for the safe operation of chain hoists and similar equipment to lift heavy specimens. We will review basic equipment needed and safety techniques. Questions and alternative methods are welcome for open discussion.

MICROSCOPY IN THE LAB
Organizer: Mike Eklund
Location: Vertebrate Paleontology Lab – Preparation Lab
Session: 1

The science of paleontology requires the recognition of and in turn preservation of all manner of specimen detail. The microscope is the critical tool used to help diagnose and execute appropriate specimen preparation actions. This workshop will address commonly misunderstood issues like proper magnification and lighting as well as ergonomics around irregular specimens. The workshop will also give guidance on how to introduce and teach proper use of the microscope to newcomers in the fossil preparation lab environment.

MICROVERTEBRATE COLLECTION, SCREENWASHING, AND SORTING
Organizer: Christopher Capobianco
Location: Vertebrate Paleontology Lab – Screen-washing Area
Session: 1

The process of screen-washing fossil-rich sediment to concentrate microvertebrate remains for identification has been an essential part of paleontology for over 100 years. During this time, screen-washing has remained relatively unchanged, however, recent innovations in material and methods has greatly increased the efficiency and productivity of the process. This workshop will present and discuss these new materials and methods used in screen-washing, and provide hands-on learning to guide participants step by step through screen-washing. Factors hindering screen-washing productivity will be mentioned, and different workflows will be presented to help maximize efficiency given the space and resources available. Finally, organizational methods of sorting microvertebrate material for study and accessioning into collections will be practiced to complete the screen-washing procedure. All necessary equipment will be provided.

MODERN OSTEOLOGICAL PREPARATION
Organizer: Kenneth Bader
Location: Annex
Session: 2

Modern skeletal collections are a valuable asset for identification of vertebrate fossils. Participants will observe specimen dissection and skeletonization techniques using maceration and dermestid beetles. This workshop will also include discussions on the legality and ethics of specimen collecting, safety issues in the lab, and a visit to the skeletal collection.

PALEO IMAGING AND 3D SCANNING: PRESERVING COLLECTIONS THROUGH DIGITIZATION
Organizers: Chase Shelburne and Jaime Hurtz
Location: Non-Vertebrate Paleontology Lab
Session: 1

Specimen imaging is a key component of collection digitization. There are many methods of imaging, including stacked photography and 3D scanning, as well as related procedures for increasing image quality. 3D scanning with a NextEngine laser scanner has become a key component of specimen digitization at the Non-vertebrate Paleontology Laboratory. Specimen smoking, high-quality stacked photography using Helicon Focus, and use of MeshLab for 3D model image overlays round out our imaging procedures. Topics covered in this workshop include 3D scanning using a NextEngine laser scanner and the associated program ScanStudio; 3D model image overlay using MeshLab; high-quality, stacked photography using Helicon Focus and Helicon Remote; and specimen smoking procedures using ammonium chloride. We will discuss best practices and relevance to specimen digitization for each of these procedures.

PREP LAB DESIGN
Organizer: Vicen Carrió and Alan Zdinak
Location: The Commons – Tower Room
Session: 1

The opportunity to design a fossil preparation laboratory can be both exciting and daunting. There are seeming innumerable decisions to make, yet the ultimate choices are governed by three factors: space, budget and needs.

Through lectures and thought experiments we'll navigate the process of designing and building a fossil prep lab, from layout to picking out furniture. We'll explore floorplans, workstations, dust collection, ergonomics, health and safety, storage, microprep and macroprep, and much more. We'll look at options to fit different budget allocations, from shoestring to blank check/cheque. We'll discuss must-have features and the pitfalls to avoid. Differences between North American and European requirements will be addressed. The information presented comes not only from the personal experience of the workshop leaders but crowdsourced collective wisdom of the professional prep community.

Attendees will come away with information and resources but most importantly the mindset to successfully plan a functional prep lab.

VOLUNTEER AND STUDENT ROUND TABLE
Organizer: Vanessa Rhue
Location: The Commons – Café
Session: Lunch

Are you new to AMMP? Would you like to meet other volunteers and students in the prep & collections care community? Are you a volunteer supervisor and curious about how other institutions run their programs? If any of these topics resonate with you, you're invited to join us for a meet and greet lunch at the Commons Café. Grab a bite to eat and look for the designated AMMP Student & Volunteer Round Table sign. We'll be gathering to make new friends and talk about our current projects.

Abstracts, Alphabetical by Primary Author

TINY SHINY THINGS: A CASE STUDY ON THE USE OF ULTRAVIOLET LIGHT FOR MICROPREPARATION OF CENOZOIC MAMMALS

Kelsie Abrams
South Dakota School of Mines and Technology, Rapid City, South Dakota, United States of America
kelsie.abrams@sdsmt.edu

Preparing small, delicate mammals can prove quite the challenge to preparators that are unfamiliar with tiny, fossilized organisms. When faced with the task of preparing SDSM 100000, a small mammal from the White River Group of South Dakota, a new preparation strategy had to be formed. Due to recent successful preparations of White River specimens with ultraviolet (UV) light at other institutions, it was decided that SDSM 100000 would be prepared underneath UV light. A workstation was fitted with a custom built box that provided a dark space for the preparation to be conducted beneath a 395 nanometer ultraviolet bulb with seven LED lights. The UV bulb was used in conjunction with a Leica A60S microscope operating between five and 15x magnification. Amber filter glasses and nitrile gloves were worn to protect the preparator from harmful UV radiation. The UV light created a strong color contrast between fossil tissue and matrix, greatly decreasing the chances of microscopic remains being lost during matrix removal. Matrix removal was accomplished with a combination of carbide steel needles, a microjack #1, and Paraloid B-72 at 10/90 w/v in acetone. In addition to being a consolidant to the small, fragile bones, the 10% Paraloid B-72 proved to be crucial in removing matrix. Droplets of consolidant were delivered to the matrix with pipette tips and allowed to soak for up to a minute. The adhesive properties of the setting Paraloid B-72 held the saturated bentonite together, while the acetone considerably softened the bentonite. The loose but consolidated layers of bentonite sloughed off the bone tissue easily with minimal encouragement from the needles. Breaks in the bones were successfully repaired with Paraloid B-72 at 50/50 w/v in acetone. Without the use of the UV light, matrix removal around the compact clusters of vertebrae and digits would likely have been dangerous and destructive to the specimen. The successful preparation of this specimen, along with the recovery of micro remains in other White River jackets, has led to UV light preparation being a standard procedure in the Foster Preparation Lab.

THE CHALLENGES OF PREPARING AND CONSERVING THE TEXAS GOMPHOTHERE, *GNATHABELODON BUCKNERI*

Kenneth Bader
University of Texas at Austin, Jackson School of Geosciences, Austin, Texas, United States of America
k.bader@jsg.utexas.edu

In 1939, the Works Progress Administration (WPA) excavated a large accumulation of gomphothere bones from Clarendonian-Age deposits in Bee County, Texas. The majority of the clay matrix was removed from the bones in the field, resulting in burlap and plaster jackets that tightly conform to the bone surface. Approximately one quarter of the collected specimens were prepared by WPA staff. Unfortunately, the bone is poorly mineralized and the WPA preparators often resorted to covering bone surfaces with plaster in an attempt to reconstruct missing bone. Renewed research interest in these gomphotheres has led to the opening of the remaining jackets with the goal of describing unaltered bone surfaces.

Our first task is to conserve bones that were prepared by the WPA. Bone surfaces were originally consolidated in the field and lab with a variety of products. These unknown adhesives softened during hot summers in the University of Texas Vertebrate Paleontology Lab and gradually accumulated a thick layer of dust. A team of undergraduates and volunteers are cleaning off the layers of coating and dust by dissolving the old adhesives with acetone and alcohol and scraping off the residue.

Over the past 78 years, the outer layer of plaster on the unopened field jackets has deteriorated, exposing burlap. Jackets containing elongate bones, such as ribs and tusks, are flexible. Before preparation, the old jackets are covered with a sheet of plastic and a new, removable half-jacket is added to create an inflexible support structure for the specimen. The plastic sheeting acts as a separator between the old and new jackets. The old jacket is opened, the specimen is consolidated using Paraloid B-72 and Butvar B-98, and the matrix is mechanically removed. This matrix is screen-washed for microvertebrate fossils. A second half-jacket is constructed over the prepared surface and the specimen is flipped to provide access to the other surface. The first half-jacket is discarded and the remaining old plaster jacket is removed from the bone surface. Once the conservation and preparation processes are completed, the specimens are stored in felt-lined, fiberglass and Hydrocal cradles.

ARCHIVAL FILLS: APPLICATION AND TINTING OPTIONS

Ana Balcarcel
American Museum of Natural History, New York, New York, United States of America
anab@amnh.org

There are many materials that have been historically used to fill gaps or to aesthetically restore fossil specimens. Some of these structural or aesthetic fills are still made with permanent materials such as epoxies of various formulae and brands. These are often two-part reaction materials that are irreversible when set, and are available in a variety of colors to help camouflage their presence. These commercial products are easy to apply and have the comfort of tradition behind them, but they are sub-optimal in terms of reversibility. An alternative option is the use of cellulose fills: a mix of archival cellulose fibers (available in a variety of grades) and Paraloid B-72 in acetone as an adhesive. At AMNH we have been using Whatman brand CF11 cellulose fiber, which if used as described above, is a fill easily reversible with acetone. The CF11 grade is particularly advantageous because of its larger fibers and allows for faster reversal. Naturally a white color, this mix can be tinted before or after application with dry earth pigments that are easy to use and safe to handle, if the user so wishes. Remarkable color matches have been achieved with these dry pigments on our Amazonian fossils. Dilution or strengthening of color can be used to simply reduce contrast between fill and fossil, or to match them indistinguishably, as for exhibit pieces. Clear images and descriptions of the steps will be included. The ability to reverse these fills is the main advantage of this method versus others. Tinting is provided as an option, not necessarily endorsed, as its pros and cons are both outlined.

PRIORITIZING DIGITIZATION WORKFLOW THROUGH TASK DIVISION

Jessica Barnett* **and Darrah Jorgensen**
Fort Hays State University, Hays, Kansas, United States of America
*jrbarnett2@mail.fhsu.edu

Any digitization project requires an efficient workflow that can be completed by scientists of varying education levels. Pre-existing digitization workflows can be easily modifiable, but tasks are often generic or too advanced for novices. Institutions that attempt to take on the digitization process may be left to struggle with unfamiliar tasks from start to finish. In 2016, the Sternberg Museum of Natural History was the recipient of two National Science Foundation (NSF) grants for the digitization of paleontological specimens. One grant focused on digitizing specimens from the Western Interior Seaway. The second focused on digitizing, imaging, curating, and archiving the remaining paleontological specimens in the collection for easier access to researchers, educators, students, and the general public. Project goals included adding to an online textbook and website of paleontology, 3-D scans and printable models of specimens for classroom use, workshops to engage science teachers, and items to augment public programs and exhibits at participating institutions.

To simplify the digitization process, we separated workflow protocols from iDigBio into three task levels: novice, experienced, and advanced. Novice tasks such as data entry, note transcription, preparing a specimen to be photographed, and specimen photography once trained, could be completed by anyone (undergraduates and volunteers); experienced tasks could be completed by experienced researchers (graduate students and higher) such as quality checking entered data, identifying exemplary specimens to photograph, photo editing, updating nomenclature, 3-D scanning, and educating visitors on the project; and advanced tasks could only be completed by collections manager and principle investigator, such as pre-digitization curation, maintaining information backups on internal and external servers, entering metadata with specimen photos, and updating the NSF committee of progress. By separating tasks and workspaces, we were able to sustain interest in each aspect of digitization, increase efficiency, minimize duplication of effort, and maintain a list of tasks for each member of the research team to complete.

TECHNIQUE FOR PHANTOM SHIMS IN A POURED MOLD

Adam Behlke
National Museum of Natural History, Smithsonian Institution, Washington, District of Columbia, United States of America
adbehlke@gmail.com

In mold making, a shim is a thin material applied perpendicular to the specimen that splits a section of a mold. The slit in the finished mold adds flexibility around delicate areas that will not withstand the stress of demolding. A previous technique described the use of phantom shims where the shim material is removed part way through the process and a separator is applied to prevent bonding of the molding material. This is used to great effect on layered molds as the material is applied in layers and can be excluded from the backside of the shim until the shim is removed.

To add a phantom shim in a poured mold, the location of the shim is first determined. The shim is constructed with clay, smoothed, and sealed to the specimen to prevent seepage of molding material around the shim. A retaining wall is built around the area where the molding material is poured and strip of cheesecloth is draped over the shim to reinforce the edge of the shim. The molding material is applied and the cheesecloth embedded. Now, the clay retaining wall and shim are removed from the specimen, the surfaces of the specimen cleaned, and the face of the shim is coated with a separator. The clay retaining wall is built around the specimen as a typical block mold and the molding material is poured in to the top of the shim. After the rest of the cheesecloth is embedded in the molding material, the pouring continues until the specimen is covered. A mother mold is needed to cap the specimen and prevent the shim from opening during the casting process.

A layered mold is used on delicate fossils as the layered mold is inherently more flexible, and the process to add a phantom shim is well-known in the context of a layered mold. Poured molds were traditionally inappropriate for these delicate fossils as they were not flexible enough to reduce the stresses of demolding. On specimens where a projection would not withstand demolding yet the rest of the specimen is a suitably robust, it was still necessary to create a layered mold. With the process described above, we can have the convenience of a poured mold with the flexibility of the phantom shims to protect any delicate projections.

CONSEQUENCES OF ALTERING SPECIMENS FOR RESEARCH OR EXHIBITION: ETHICAL IMPLICATIONS FOR DATA AND PUBLIC EDUCATION

Christopher J. Bell*, Michael J. Eklund, and Matthew A. Brown
Jackson School of Geosciences, University of Texas at Austin, Austin, Texas, United States of America
*cjbell@jsg.utexas.edu

Scientific investigations of fossils necessarily involves trade-offs between preservation of intact specimens and their depositional context, and the human interventions that allow us to collect, prepare, study, conserve, and/or exhibit those specimens. Human interventions begin immediately following discovery of a specimen in the field, and encompass a broad range of actions and decisions that impact the specimen and its utility for future scientific investigation and public education. The latter is an important consideration because cultural norms that govern standard practices in paleontology change through time, as do technological capabilities that allow us to interact with specimens in new and unanticipated ways. The decisions that scientists make about how to interact with specimens have consequences in many directions. In this presentation, we emphasize ethical implications for two categorical areas, data integrity and public education.

Manipulations of specimens and their surrounding matrix in the field, in the lab and for subsequent research purposes all involve decisions that will impact the future use of a specimen. Deliberate actions such as mechanical preparation, retention or disposal of surrounding matrix, and application of hardeners or consolidants all impact the ways in which future generations of scientists can interact with a specimen. Consideration of these issues should necessarily involve an evaluation of both the short-term desires of researchers, and the longer-term need to protect specimens and their contextual data for future, unanticipated uses. An essential component of this is the creation and retention of a record of what is done to a specimen during the various stages of collection, preparation, and curation. A necessary corollary is that the record remains closely tied to the specimen (in physical and/or database storage) so all subsequent investigators are immediately aware of past interventions, and can evaluate consequences for their own work. Researchers also bear a responsibility for data integrity. This manifests itself primarily in the area of data reporting. Failure to report what is known about a specimen may result from ignorance or indifference, dismissal of data as irrelevant for the current research question, perception of impact on interpretive context, or ulterior motives in other directions. The worst-case scenarios here would involve action or suppression of information with deliberate intent and knowledge – a form of data fraud. A more common manifestation is action from ignorance. Both scenarios have similar consequences for subsequent scientific use(s) of a specimen.

Exhibition of fossils is an important venue for public education in paleontology. Many institutions maintain policies of exhibiting 'complete' specimens that involve composite materials that include actual fossil material (or casts made directly from original material), as well as constructed material to 'fill out' a specimen. This often is done without any interpretive guides to explain how we fill out specimens (from other specimens of the same taxon, from homologous elements of closely related taxa, from general principles of comparative anatomy, digital technologies paired with 3-D printing, etc.). This is a missed opportunity in public education; we are sacrificing the opportunity for expanded education to achieve a simplistic and increasingly misunderstood representation of a 'reality' (attractive and 'complete' specimens) that we do not often achieve with actual discoveries in the field. This requires careful consideration within our community about the goals of such exhibitions. Deception is deception, even when it is benign. Current practices result in a vacuum in public education, and we have ceded the interpretive context to the viewing public. That public, in many cases, thinks differently about our discipline than we do, and in the absence of clear context provided by us will interpret what we do to suit their own needs or goals. Communities that are antithetical to science or to particular scientific theories are now seizing the opportunity to exploit paleontology as a new avenue of attack to establish their agendas for public school education.

Curators and collection managers are not the owners of specimens; we all are custodians of specimens, responsible for studying then to further our collective knowledge of the past, but also protecting and conserving them for future use and for public education. Our community needs to engage in active discussions of the best ways of enhancing data integrity and education. It may help to have preparators and collections professionals develop a unified voice on these topics that can then be carried laterally and vertically to other professionals in paleontology.

FOOTPRINTS AND SWIRLS: PRESERVATION OF EPHEMERAL TRACE FOSSILS AT THE ASHFALL FOSSIL BEDS USING CYCLODODECANE AS AN INTERMEDIATE IN DOUBLE TRANSFER PREPARATION

Gregory Brown
University of Nebraska State Museum (retired), Lincoln, Nebraska, United States of America
gwbrownx@inebraska.com

Ashfall Fossil Beds near Royal, Nebraska, is known for its perfectly preserved three-dimensional skeletons of Miocene (Clarendonian) vertebrates in paludal/lacustrine deposits of volcanic ash. Recently, interns excavating the site discovered several canid footprints and as yet unidentified sedimentary surface structures. The occurrence of these trace fossils is limited to a 1 to 2 mm thick layer of dense clay-like sediment within a thick bed of soft volcanic ash. Once uncovered, desiccation and differential shrink/swell between these dissimilar layers caused lessening of relief, delamination, fragmentation and curl of the print layer. Although the goal at Ashfall is to preserve all specimens in situ, attempts to stabilize the tracks in place with Paraloid B-72 and Tegovakon V TEOS consolidants were not successful. Attempts to mold two deteriorating footprints were successful, but the original prints did not survive. As an alternative, a variation of the traditional transfer preparation technique was devised to stabilize and permanently preserve the footprints and other trace features and the thin sediment layer in which they occur. When the print layer was exposed, cyclododecane (CDD) was melted and poured over the track and surrounding surface without a separator. Good adhesion of the CDD to the surface is critical and was assured by applying gentle heat to the surface before application. Reinforcement (gauze or fiberglass scrim) and additional layers of CDD were applied by brush. This layer of CDD provided a temporary rigid facing that protected the prints and imprint layer. The area was then gently undercut, lifted and inverted and any loose ash beneath the print layer was removed by brush. A high-quality epoxy resin (TAP Marine Grade) was then applied to the exposed underside of the print layer and allowed to set. Finally, the slab was again inverted to rest on its new, permanent epoxy substrate and the CDD allowed to sublimate. Once sublimation was complete, the original print, sediment layer and all sedimentary features were stable and could be transported to the museum collections or safely replaced in situ for display.

WHOSE IS IT? A CASE STUDY IN SPECIMEN ACQUISITION

Matthew Brown* **and Joshua Lively**
University of Texas at Austin, Jackson School of Geosciences, Austin, Texas, United States of America
*matthewbrown@utexas.edu

The Texas Vertebrate Paleontology Collections celebrate a heritage of more than 125 years of fossil collecting across the state, and are the principle repository for vertebrate fossils from Texas. The collections have been built through a mix of state government and University of Texas (UT) collecting, as a repository for scholarship for other museums and land agencies, and private donations by members of the public. Often, the interests of all of these parties intersect; ideally, permitting agreements or deeds of gift are executed between researchers, collectors, and land owners prior to excavation. In some cases, the proper route is less transparent and requires further investigation during the due diligence process of accessioning. Once such case entered the collections in 2015, when a private collector approached UT with a specimen that they wished to transfer to the collections. This specimen was determined to be an important new species of mosasaur, and was accepted for donation. Collected from a navigable waterway in Texas, title to the specimen was assumed to be held by the collector. Navigable waterways in Texas are public rights of way, and generations of Texans have prospected them for fossils for decades. During the standard course of due diligence during the accessioning process, collections staff discussed this scenario with lawyers from two agencies who oversee permitting for other UT activities- Texas Parks and Wildlife and the General Land Office (GLO). Both lawyers provided personal opinions that navigable waterway laws do not provide authorization for public collection of natural resources like fossils. Furthermore, consultation with a surveyor at GLO determined that the property from which the mosasaur was collected was deeded in accordance with the Small Bill Act of 1929, which grants ownership of the stream bed and its resources to the property owner, rather than the State of Texas. Thus, the appropriate step was for UT to contact the land owner and offer to return the specimen immediately. UT staff explained the scenario by which the rightful ownership of the specimen was misunderstood, and also offered to house the specimens if the owners would prefer to donate the bones. The preference of the owners was to donate the material in exchange for two casts, and the specimen is now legally housed at the Texas Vertebrate Paleontology Collections where it is being described as part of a PhD dissertation project
.

ASSESSING THE OVER-SIZED COLLECTION AT THE MUSEUM OF COMPARATIVE ZOOLOGY (MCZ), HARVARD UNIVERSITY: WHY A COLD WAR MISSILE BUNKER IS NOT AN IDEAL PLACE FOR MUSEUM COLLECTIONS

Christopher Capobianco
Museum of Comparative Zoology, Cambridge, Massachusetts, United States of America
Christopher_Capobianco@fas.harvard.edu

As museum collections continue to grow, space becomes more and more of a limiting resource. To mitigate this issue, many museums have taken to purchasing off-site storage space to hold certain components of their collections. However, custom-built buildings are expensive and museums re-purpose preexisting structures to house growing collections. The MCZ purchased three Cold-War era missile bunkers and repurposed the facility into the Concord Field Station (CFS). The over-sized material from the vertebrate paleontology collection was moved in the early 1990s to help free up space in the crowded MCZ. Despite the additional space, the bunker was less than adequate for proper collection storage and care.

With recent discussions of moving the collections back to the MCZ, an assessment was required to understand what material was there and the amount of space it would require. Three trips were made to the facility over a period of a few weeks to complete the inventory. Every specimen was photographed and assigned a temporary number and a spreadsheet was created do document each specimen's field number, dimensions, and conservation concerns. This spreadsheet could then be cross-referenced to the old collection map used to document the location of specimens prior to their CFS move. In total, 421 specimens were located at the CFS.

From a conservation standpoint, the poor housekeeping and environmental conditions led to several issues. High and variable humidity led to substantial amounts of black mold to form on many of the jackets. Many of the jackets lack proper labeling and accession numbers making them difficult to identify/cross-reference. Structurally, many of the jackets were in poor shape due to lack of proper support and degradation of the jackets themselves. Although tempting in a world where museum collection space is limited, not all locations are suitable for paleontological collections. The additional space may be beneficial in the short term; however, the problems that can arise are more detrimental to the specimens in the long run. Greater foresight must be used to mitigate space and conservation issues when planning future collection space.

MAKING ECONOMICAL CASTS FROM ONE PART MOLDS OF GOMPHOTHERE TEETH

Jennifer Cavin
John Day Fossil Beds National Monument, Kimberly, Oregon, United States of America
jennifer_cavin@nps.gov

At John Day Fossil Beds National Monument, we needed to make high quality resin casts from one part molds of two large elephant teeth that could be used for either research or public outreach. If the molds had been two part, hollow casts could have been made that do not use large amounts of expensive resin. However, the molds were one part, and therefore needed to be poured solid. In the first set of casts, both molds were filled completely with Smooth-Cast 300 two part polyurethane resin. Each solid resin cast cost approximately $60 in materials. In order to cut costs, an inexpensive filler material that would not react poorly to the exothermic reaction of the setting resin was needed; USG 20-minute Casting Plaster was used. The first step was to create a cavity into which the plaster could be poured. 48 mL of the Smooth-Cast 300 was poured into each mold, and the molds rotated by hand until all surfaces had a good thickness of the resin and picked up the details of the mold. Next, a batch of casting plaster was made, tinted grey with acrylic paint to more closely match the color of the resin, and poured into the resin coated molds. After the plaster cured, the last step was to seal the casts with a closing layer of resin; another 48 mL of Smooth-Cast 300 was poured on top of the cured plaster. The finished products looked just like the solid resin casts, however, they did weigh noticeably more. This procedure used 81% less resin than the solid resin casts and saved the lab about $50 per cast in material costs. The end result was a high quality, low cost, durable cast that could be used for both research and public outreach.

HOW WATER CAN HELP IN PALAEONTOLOGICAL PREPARATION: THE CASE OF THE TW:EED PROJECT

Rubén Contreras[*] and Vicen Carrió
National Museum of Scotland, Edinburgh, Scotland, United Kingdom
[*]r.russell@nms.ac.uk

There are different ways to prepare fossils depending on the physical-chemical characteristics of the matrix and how the fossils have been preserved.

During the Tw:eed (Tetrapod world: early evolution and diversification) project excavations from the earliest Carboniferous (350 million years ago), tetrapod, fish, plant and arthropod fossils were found, uncovered and prepared. The matrix from these outcrops is mainly clays-silts-sands in different proportions. Knowing its composition helps us to organise our work both in the field and in the lab efficiently.

Clays are fine-grained sediments composed of phyllosilicate minerals, with variable amounts of water trapped in their mineral structure. Phyllosilicates are hydrated aluminium silicates with either water or hydroxyl groups attached that form parallel sheets of silicate tetrahedral crystals of Si2O5. Clays have a plastic behaviour due to the water content and become brittle and non-plastic when drying. With a higher proportion of sand in the matrix, stability is higher from changes in humidity.

When water is absorbed by clay (between the clay layers) the separation of layers (swelling) starts. The swelling grows when there is more water between clay layers enabling complete separation of one layer from another.

The relationship between matrix and water could help us to understand how they work together in palaeontological preparation. The water is applied by pipette or smear brush on the matrix surface allowing relative control in water penetration.

Water as a solvent should be considered too, as it can remove layers of matrix without any further fossil damage (vibrations, cracks). Nevertheless, excess water could crumble or destroy both the matrix and the fragile fossils. Better results are produced with more initial information.

Knowledge in mineralogy and petrology of the clays are important too. It is essential to know how the matrix is going to react when water is used (or any other solvent) in palaeontological preparation and in which proportion, to avoid any damage to the specimen.

CONSERVATION SCIENCE MEETS FOSSIL PREPARATION: FTIR AS A TOOL TO IDENTIFY MATERIALS IN PALEONTOLOGICAL COLLECTIONS

Mariana Di Giacomo
University of Delaware, Newark, Delaware, United States of America
marudigi@udel.edu

For several years the fields of preparation and conservation have been working closely together to ensure the preservation of paleontological specimens. Archival materials have been introduced into paleontological collections and conservators have been learning the unique features of fossil preparation. Conservation science, unfortunately, has had a less important role as an aid for preparators. One of the many techniques that can be useful in several stages of fossil preparation is Fourier transform infrared spectroscopy (FTIR). It can distinguish organic materials by detecting atomic bonds based on their vibration modes. One example of this is the adhesives and consolidants employed by previous preparators that were not documented and may need to be removed. A sample of less than 1 mm2 from the material can help determine its composition and therefore aid in the decisions to be made on the best technique to remove it. FTIR can also be employed when trying to determine whether to use a new product, either as a consolidant/adhesive or as an exhibit material, when the manufacturer does not reveal its composition. It is a fast technique that can make preparation decisions easier and work more efficient when dealing with large collections and having to establish priorities. It can also be useful to determine if a specimen can be sampled for chemical analyses. Spectra of commonly used materials in paleontological collections can be very different between one another and changes can be detected between fresh and aged samples, showing how these materials change over time.

TREATMENT OF FOSSIL SPECIMENS BEFORE AND AFTER DESTRUCTIVE SAMPLING

Marilyn Fox
Yale Peabody Museum of Natural History, New Haven, Connecticut, United States of America
marilyn.fox@yale.edu

Fossils are rare and irreplaceable resources; best practices in destructive sampling for histology or other studies call for sampling a specimen while causing the least amount of damage. Accepted practices of treatment of specimens before sampling include consolidation, molding and casting. However, researchers who perform destructive sampling may be less than familiar with the nature of fossils as unstable composites, adhesives and molding materials and with effective techniques for use of adhesives and molding materials.

Molding is done to retain the morphological information in the original specimen. Molding must be done thoughtfully and with expertise if critical information is not to be forever lost. Proper molding protocols call for a thin layer of consolidant to protect the bone from silicone or other rubber oils, filling all holes and cracks with an easily removable material, such as Carbowax, and careful mold set-up and molding that accurately captures all the morphological details. If the specimen is covered with a heavy consolidant or molding is not done with skill, there may be no record of the original anatomy if sampling damages or destroys those features. After sampling, when reconstructing the element it is important to show the reconstructed area, inpainting to conceal the damage only confuses future researchers. It is essential that these materials, now an irremovable part of the specimen, be documented, including specific brand and grade names (Silicones, Inc. GI 1100, rather than simply silicone rubber).

Rather than viewing the histological study in isolation, it is important for researchers to understand that everything that happens to the specimen during the process is a permanent part of the history of that specimen. Following best practices in treatment, including consolidation, filling, molding and casting, and reconstruction of fossil materials, before and after destructive sampling, will maintain the specimen for future research.

YOU WANT TO DO WHAT TO THE BONE? ENSURING PROPER COLLECTIONS STORAGE AND MAXIMIZING DATA PRESERVATION FOR BONES USED

Cyrus Green
Fort Hays State University, Hays, Kansas, United States of America
ccgreen@mail.fhsu.edu

Histological studies of limb bones give scientists insight into the growth and metabolic rates of extinct organisms. Despite this, some collections managers are reluctant to allow histological testing on limb bones due to the rareness of limbs in the fossil record and the destructive nature of the methods. This study provides guidelines collections managers can require of researchers to maximize data preservation and provide proper storage of specimens while permitting histologists to perform research on limb material. The following steps were performed with great success on a *Clidastes* (Mosasauridae) humerus obtained from the Alabama Museum of Natural History as part of a larger, ongoing histological study at Fort Hays State University.

1) Before any cuts were made, matrix was removed using water and the humerus was sketched and photographed. A silicone rubber mold was made of the humerus using Smooth-On Mold Max 20 with petroleum jelly as a mold release. A cast was made using Smooth-On Smooth-Cast 321 and measured to ensure that the cast was as similar to the bone as possible to ensure correct measurements of the specimen in the future.
2) A diaphyseal section was sketched, cut, molded, and cast in the same manner described above. The diaphyseal section was embedded in Silmar 41 polyester resin. Thin section slides were made and photographed for histological analysis.
3) An ethafoam lined box was created to house the specimen. Cavities were formed for the intact epiphyseal sections, the casts, the diaphyseal section in resin that was not thin sectioned, and the slides made for the project. A space was also made for the molds. The slides were carefully wrapped in tissue paper and thin cardboard and labeled. A packing list with all materials used in molding, casting, and embedding procedures was included, as well as copies of sketches, measurements, and diagrams of cuts made.

By following these steps, this study ensured maximum specimen data preservation for future study, and ensured that all materials belonging to the specimen remained together during transport and storage while still allowing the important histological tests to be performed.

DIGITAL PHOTOGRAMMETRY MODELING APPLIED TO DINOSAUR TRACKS FROM CERRO DEL PUEBLO FORMATION (LATE CAMPANIAN), COAHUILA, MEXICO: AN APPROACH TO TEST ITS EFFECTIVENESS AS A MEANS OF RESEARCH AND PRESERVATION

José L. Gudiño Maussán[*1], Felisa J. Aguilar[2], and René Hernández-Rivera[3]
[1,3]Universidad Nacional Autónoma de México, Coyoacán, Ciudad de México, México
[2]Centro INAH Coahuila, Saltillo, Coahuila, México
[*]jlgudino85@gmail.com

In the last decade, digital modeling techniques have been shown to be very useful in the study of fossils and their preservation, especially with ichnites (tracks) that are impossible to collect or model by traditional methods, due to deposit characteristics such as size, touristic importance and conservation status. In Cerro del Pueblo Formation (FCdP), a geological unit of the late Campanian, located in the southeast Coahuila, Mexico, there is a great fossil diversity, mainly dinosaur ichnites, which unfortunately have been little studied and are in danger of destruction, due to the erosion and human activities. The goal of this project was testing the effectiveness of a new and low cost technique with no impact for the ichnites. The technique consisted of modeling by digital photogrammetry through the open access software VisualSFM, Meshlab and ParaView. For this purpose, six dinosaur tracks in six different sites (deposits) in FCdP, were recorded. Ten commercial quality cameras (5 to 10 Mp) were used to take photos in each site. At smaller sites with a fewer number of footprints (Cantera Rojas, 26m^2, [4 tracks]; Depósito de la Luz, 37.5m^2, [6]; La Rosa, 60m^2, [9] and Las Águilas B, 70m^2, [12]), individual shots of ichnites were taken. Also a complete photo series throughout the deposit was taken. On the other hand, the largest sites (Paso del Oso, 168m^2, [107]; and Las Águilas A, 340m^2, [220]) were divided into sections to simplify the photographic record. In total, 11,840 photographs were taken, 4960 were used to generate 72 three-dimensional textured polygonal mesh models for the six localities. Models from smaller sites had better quality because of their reduced size, the large number of photos taken and fewer intrusive elements (such as stones and vegetation). In contrast, models from bigger sites lost definition, especially after certain adjustments made to improve their computer processing. During this exercise, reference parameters were obtained, looking toward increasing the effectiveness in photography for photogrammetric processing. We hope in the future to improve the quality of digital models generated.

RESTORATION OF THE SECOND CAST OF "ISAURIA" (*LATIRHINUS UITSTLANI*), THE FIRST MEXICAN DINOSAUR EXHIBITED IN A MUSEUM

René Hernandez-Rivera[*1] and Ricardo Servin-Pichardo[2]
[1]Instituto de Geologia, Universidad Nacional Autónoma de México, Ciudad de México, México
[2]Cuauhtemoc, Ecatepec, México
[*]renedinosaurios@gmail.com

In 1993 the cast of a hadrosaur, nicknamed Isauria, was the first Mexican dinosaur skeleton to be exhibited in a national museum. This first cast is on exhibit at the Museo de Geología of the Instituto de Geología (IGI), Universidad Nacional Autónoma de México (UNAM) in Mexico City. This exhibition was an important factor in increasing dinosaur paleontological studies in Mexico, starting in the 1990's. Three additional casts of Isauria (officially named *Latirhinus uitstlani* in 2012) are exhibited in other Mexican museums. A cast belonging to UNAM science museum had many notable details in its anatomy and supporting structure, but had become seriously damaged throughout the years. Based on its historical importance, the skeleton was restored. Skeletal restoration included: (1) repair of fragmented elements, (2) addition of missing bones, (3) repositioning of elements according to more recent anatomical knowledge, and (4) more accurate remodeling of missing elements. The supporting structure was then adapted to the new position of the skeleton and engineered for greater stability. Missing elements were cast in fiberglass or polyester resin from comparable fossil specimens, or hand-sculpted in epoxy putty. The same fiberglass and epoxy putty were used as the main adhesives in the repair of the fragmented elements. This project was completed in three months (June - August 2016). The result of this work is a more accurate display for public viewing and provides greater accuracy of current paleontological knowledge.

ADVANCED TECHNIQUES FOR THREE-DIMENSIONAL SCANNING USING NEXTENGINE AND SCANSTUDIO

Jaime Hirtz and Edward C. Shelburne
University of Texas at Austin, Non-Vertebrate Paleontology Lab, Austin, Texas, United States of America
*Jaime.Hirtz@gmail.com

Three-dimensional (3D) scanning of fossils is essential for the advancement of technology within paleontology. Digitizing your collection is beneficial for curation through digital preservation and generating 3D prints. While the advantages of using a NextEngine 2020i Desktop 3D Scanner and ScanStudio far outweigh its limitations, this software has its fair share of complications. Files containing 3D scans of large or irregular shaped specimens are often susceptible to corruption and malfunction. At the Non-vertebrate Paleontology Lab, we have developed a technique to overcome these obstacles. We start by capturing the general outline of our fossil with quick low-definition 3D scans. These are aligned and fused together to produce a single scan which will serve as our foundation. Establishing this base is convenient for its minimal file size and easy manipulation. Increasing resolution is accomplished by generating high-definition 3D scans and aligning them to our foundation. We perform one last fuse once all information has been captured and generated within our 3D model. This process of scanning and fusing may be repeated as often as necessary. Executing these steps will minimize your chances of experiencing file corruption and malfunction by reducing file size and saving time while increasing definition. Discussed in this presentation will be the methods and procedures we have developed for 3D scanning specimens of all shapes and sizes in greater detail.

COPYRIGHT IN THE MUSEUM WORLD

Evan Kent
Partner, Mitchell Silberberg & Knupp LLP, Los Angeles, California
emk@msk.com

Copyright rights can be of critical importance to museums and individual paleontologists with respect to fossils, molds and casts of the fossil specimens. Copyrights are of great value as they permit the copyright owner to limit and control the use of the copyrighted work. Additionally, if copyright rights are infringed, the copyright owner can obtain injunctive relief and monetary damages for such infringement.

It does not appear that any specific court decision exists with respect to copyright issues as applied to fossils, molds or casts in a museum setting. However, based upon fundamental copyright law, it is clear that fossils would not be deemed copyrightable since they are considered to be works of nature. Accordingly, a slavish copy of a fossil by means of a mold and cast would not be copyrightable either. In order for such a sculptural work to be potentially copyrightable, it must have "originality".

The United States Supreme Court has recently defined "originality" with respect to copyright protection as follows: "a feature incorporated into the design of a useful article is eligible for copyright protection only if the feature (1) can be perceived as a two – or three – dimensional work of art separate from the useful article and (2) would qualify as a protectable pictorial, graphic, or sculptural work – either on its own or fixed in some other tangible medium of expression – if it were imagined separately from the useful article into which it is incorporated." This means that the work must be imagined separately from the item to which it is added and include imagination and creativity imparted to it by the author of the work. Based upon this definition of "originality," just filling voids or repairing a fossil would likely not be enough to impart copyrightability to the fossil or a cast of the fossil. However, if the preparator could recreate a fossil from his or her imagination, or by, for example, would add color or feathers to a cast, the resulting cast may be copyrightable.

With respect to museums, the use of museum specimens is often couched as a copyright issue. However, the use of the specimens is really a contractual issue, involving, e.g., the terms for access to the specimen, limits on the use of a cast of the specimen and prohibitions on commercialization. In this manner, museums limit and control access to specimens, even though the museum is likely not an owner of any copyright in the specimens. However, museums may have copyright rights in merchandising items depicting an image of a fossil specimen, as long as the items have a degree of originality.

Unfortunately, until there is a definitive court decision on copyright issues with respect to museum specimens and casts of such specimens, the assessment of whether a specimen or a cast would be copyrightable is very subjective.

SORTING MICROFOSSIL CONCENTRATE UNDER ULTRAVIOLET AND DAYLIGHT CONDITIONS USING A SUPPORT VECTOR MACHINE

Olivia Lundelius
Great Neck South High School, Great Neck, New York, United States of America
Olundelius1@student.gn.k12.ny.us

Sorting microfossil concentrate by hand is a time consuming task, so a program was created for classifying color data from images of concentrate as either microfossil or gravel using support vector machines, a step towards automating concentrate sorting. Support vector machines (SVMs) are classification algorithms that predict a data point's classification based on a boundary between classification clusters taken from a set of training data. This boundary is created so that it is at a maximum margin from support vectors at the edge of each classification cluster to optimize predictions. In this study, a light-proof container with a camera mounted inside was used to photograph Pleistocene and Holocene microfossil concentrate, collected from Madura Cave in Western Australia, under simulated natural, ultraviolet, and simulated natural plus ultraviolet lighting conditions. These lighting conditions were used because some fossils are known to fluoresce under UV light, a trait which has been shown to improve human sorting of fossils from rock and unwanted sample. RGB data was extracted from these images by manually identifying one 8-by-8 pixel area for each sample of microfossil or gravel and averaging those values into one RGB data point. For each lighting condition, the RGB data was split in half randomly, with one half being used to train a SVM to distinguish between microfossils and rocks and the other used to test the SVM's predictions. The data was split into training and testing data group twenty times, training and testing an SVM each time. The natural and natural/ultraviolet combination lighting condition SVMs were both highly accurate, with both the natural and natural/ultraviolet SVMs averaging 98.7% percent accuracy. The ultraviolet SVM was significantly less accurate than both natural and natural/ultraviolet conditions (78.8%, $p<0.01$ for both). The high accuracies in differentiating samples makes it likely that SVMs are usable in a machine for sorting concentrate by their RGB image data.

VERY DELICATE MANEUVERS: CONSTRUCTING AN ARCIVAL CRADLE FOR AN ENORMOUS IRISH ELK SKULL

Hillary McLean[*1] and Michael Getty[2]
[1]Denver, Colorado, United States of America
[2]Denver Museum of Nature & Science, Denver, Colorado, United States of America
[*]hillarymclean1@gmail.com

During the summer of 2016, the Irish Elk, *Megaloceros giganteus*, specimen at the Denver Museum of Nature and Science was needed for exhibition as part of an upcoming temporary exhibit. The specimen is approximately 8 feet long from one antler tip to another and 4 feet wide from front of skull to back of antler. The skull was originally collected in an Irish bog in 1800's and was housed for decades on a bare sheet of plywood, leaving it in an exceptionally delicate condition with any handling of the skull by collections staff resulting in multiple cracks and breaks in the specimen. We therefore needed to construct an archival support cradle, which would permanently support and house the skull, and would also be practical for transport and exhibition of the specimen. We began the process by construction of a temporary cradle over the top of the skull and antlers, which enabled us to support the specimen on the dorsal surface while building the permanent support cradle. Working with such a large and fragile specimen proved to be a delicate and difficult endeavor, requiring ten people to help flip the specimen back and forth between the upper and lower cradles. Additionally, various challenges arose during construction such as constructing the jacket layers on the sharp slant of the antlers, as well as difficulties in balancing and supporting the skull at various stages of jacket construction. We document the various steps taken through the complicated but ultimately successful construction of the final archival cradle, which was constructed out of fiberglass mat and gypsum cement (Hydrocal FGR 95), reinforced with hollow steel tubing and lined with archival ethafoam.

COMMUNICATING FOSSIL COLLECTION AND PREPARATION TECHNIQUES TO A WIDER AUDIENCE: A CASE STUDY UTILIZING WEBINARS

Rachel Narducci[*1], Eleanor Gardner[2], and Lisa Lundgren[3]
[1,2]Florida Museum of Natural History, Gainesville, Florida, United States of America
[3]University of Florida, Gainesville, Florida, United States of America
rnarducci@flmnh.ufl.edu

Regardless of professional or hobbyist (amateur) status, paleontologists and preparators always seek more information on fossil collection and preparation techniques. Particularly for those new to the field, it can be difficult to access resources. To address problems associated with accessibility and to help foster collaboration within the paleontological community, the FOSSIL Project developed a webinar series entitled 'Fundamentals of Fossils' that ran throughout the Fall of 2016. FOSSIL (Fostering Opportunities for Synergistic STEM with Informal Learners) is a project funded by the National Science Foundation and headquartered at the University of Florida/Florida Museum of Natural History (FLMNH). The project encourages "social paleontology," which is defined as the shared practice of understanding the natural world through collection, preparation, curation, and study of fossils. One form of social paleontology includes online webinars where participants remotely view a knowledgeable speaker. The 'Fundamentals of Fossils' series, sponsored by the Paleontological Society and facilitated by the iDigBio project, informed and engaged a broad audience of mostly amateurs on best practices for handling fossils. Webinar content grew more detailed as the series progressed. The first one, 'Fossil Collecting: Where, When, and How,' was presented by Jayson Kowinsky, creator of the Fossil Guy website. This was followed by 'Field Notes 101' presented by Bruce MacFadden, curator of paleontology at FLMNH. Next, Dava Butler, education coordinator at Waco Mammoth National Monument, presented 'Excavating Fossils'. The final webinar, 'Fossil Preparation Basics,' was presented by Rachel Narducci, research assistant at FLMNH. Viewers anonymously completed surveys following each webinar. Survey responses revealed that knowledge of content areas increased as a result of each webinar. The final webinar focused on how fossils are prepared and stored in the vertebrate and invertebrate paleontology preparation laboratories at FLMNH. The series successfully communicated best practices to a broad audience and highlighted a desire for more in-depth fossil preparation related webinars.

TRAINING VOLUNTEERS TO REPAIR DAMAGED FOSSILS THROUGH A GROUP WORKSHOP

Michelle Pinsdorf* and Abby Telfer
National Museum of Natural History, Smithsonian Institution, Washington, District of Columbia, United States of America
*pinsdorfm@si.edu

Department of Paleobiology staff at the Smithsonian Institution National Museum of Natural History (NMNH) are training a group of volunteer fossil preparators with a comprehensive suite of skills, to work across various publicly accessible and behind-the-scenes preparation laboratory spaces at NMNH. As part of this training, workshops were held for two groups of volunteers to confer skills and techniques in the repair of damaged specimens.

Topics of discussion and activities conducted were guided by the 'Defining The Professional Vertebrate Fossil Preparator: Essential Competences' document. Skills and techniques were conveyed using two avenues: 1) discussion, with a take-home manual including more in-depth information and references, and 2) hands-on activities reinforcing discussed ideas in practice. Topics covered included critical thinking in strategizing repair processes, utilizing information from past damage, specimen handling, archival materials, chemistry and properties of adhesives and consolidants, types of joins, using the bone bandage technique, documentation, and health and safety.

Hands-on activities involved the repair of broken terra cotta flower pots, which had been seeded with features such as specimen numbers, mismatched fragments, marked join indicators (correct and incorrect), evidence of prior repairs, and matrix adhered to join surfaces. Participants practiced techniques to individually repair a small flower pot, before splitting into pairs to repair a larger flower pot as a team. The team-based activity conveyed the usefulness of documentation to communicate between multiple people working on the same specimen at different times – a common occurrence for large volunteer projects.

Important to the success of the workshops was practicing techniques hands-on, the use of experienced volunteers as teaching assistants, and a quick transition from training into repair of specimens as part of the volunteers' normal work tasks. Training resulted in 21 volunteers learning or improving upon specimen repair skills. Training materials produced are shared with other institutions to the benefit of their volunteer programs.

SHIPSHAPE LOANS: THE ART OF SELECTING MATERIALS FOR HOUSING FOSSILS SENT ON INSTITUTIONAL LOAN

Vanessa Rhue
Natural History Museum of Los Angeles County, Los Angeles, California, United States of America
Vanessa.rhue@gmail.com

Fossils are not always inherently stable objects. They can be fragile, complexly shaped, and vary in size and weight. Furthermore, they are subject to various agents of deterioration, some of which can be mitigated by the choices of their care takers. Thus, as people entrusted with the stewardship of irreplaceable scientific data, it is imperative that we think critically about the materials we use to house fossils – wherever they may be stored, studied, or displayed. Understanding modern conservation principles and ethics is essential to the development of best practices for handling, shipping, and receiving loans. While constraints such as budget, time, personnel, and resource availability may be impediments to shipshape loans, creativity, resourcefulness, and forethought can be invaluable assets. Preparing a fossil for shipment involves assessing its current condition, creating long-lasting supports, and communicating best handling practices to the recipient.

The techniques employed should be simple to execute so that the recipient can easily replicate the process when the fossils are returned. The materials in contact with the specimen should be inert, non-abrasive, and slow to degrade. Familiarity with the properties and applications of archival quality materials, such as closed cell polyethylene foam sheeting and polytetrafluoroethylene (PTFE) artifact wrap can be useful for creating barriers between the specimen and other supporting materials.

Incorporating a mixture of recycled and repurposed items can also serve to further immobilize, cushion, and encapsulate the specimens. Microfossils mounted on pins inside glass vials can be organized and held in place with acrylic lighting grids and plastic wrap. Fragile fish bones exposed on slabs of diatomite may be relatively stable in a specimen tray, but are better secured for shipping in a cavity mount made with Volara and Tyvek. Large skulls and other heavy specimens may require custom built wooden crates or clamshell holders made of FGR-95 plaster, fiberglass mat, and ¼" polyester felt liner. Astutely packed fossils also serve a dual purpose to improve collections storage efficiency.

LONG TERM CONSERVATION CHALLENGES IN THE CARNEGIE QUARRY AT DINOSAUR NATIONAL MONUMENT

Nicole Ridgwell[*1], Howasta Tahiry[2], and Daniel Chure[3]
[1]South Dakota School of Mines and Technology, Rapid City, South Dakota, United States of America
[2]San Diego State University
[3]Dinosaur National Monument, Jensen, Utah, United States of America
[*]nicole.ridgwell@mines.sdsmt.edu

Dinosaur National Monument was created in 1915 to preserve the Carnegie Quarry, a laterally extensive sandstone layer at a 70° dip in the Morrison Formation, containing thousands of dinosaur bones. A building protects the quarry from the elements, however there are many other problems threatening the site.

The most persistent problem is an extensive natural system of cracks with unknown depth and rate of expansion. In one area bedding planes may be a weak point that could allow the upper layer to catastrophically slough off. The expanding cracks also cut across bones - some have been damaged and lost and many others are threatened. Another problem is historic adhesives. The substances used, including asbestos filler and metal epoxy, were not clearly documented, have unknown aging properties, and are potentially hazardous. Other bones were never stabilized and thus are becoming friable. Health and safety challenges include accumulated dust, rodent feces, and accessing the upper reaches of the steep cliff face.

In 2016, condition reports were completed for 975 (~2/3) of the bones in the quarry. A standard assessment form was created and each bone scored based on a list of 13 conditions ranked by severity, resulting in a score on a scale from 0 to 22. Based on this score and observation notes, the bones were placed into one of three categories: Needs Immediate Repair, Needs Preventative Conservation, and Does Not Need Conservation. The reports also recorded all visible adhesives. 57 bones need immediate repair. Another 141 need preventative conservation. Common Issues are expanding cracks, friable bone, separation from matrix, and failure of unknown/hazardous old adhesives.

Moving forward, first steps include at a minimum 1) a plan for asbestos mitigation, 2) repairs on damaged bones, 3) testing of historic adhesives, 4) cyclic cleaning and pest control, 5) regular monitoring of the bones and rock, 6) monitoring crack systems, and 7) an assessment of the structural stability of the quarry. These problems are typical of those faced by in situ fossil vertebrate exhibits, and should be more extensively studied.

ETHICAL COLLECTING – IMPLEMENTING PRACTICE BASED ON POLICY

J. Chris Sagebiel
University of Texas at Austin, Vertebrate Paleontology Lab, Austin, Texas, United States of America
*sagebiel@austin.utexas.edu

Contrary to recent news, one can be entirely within the law, and exhibit unethical behavior. Legality is not the only goal of ethics, it includes working for the greater good and following best practices. Taking short-cuts or exploiting loopholes for the expedience of research or collection building is short-sighted and will reflect poorly both on the research and the institution. In the field, we often get only one chance to collect good data. The same is true of ethics – we have one chance to do it ethically, apologizing later is rarely as simple as doing things properly.

If your outfit is successful, eventually your governance will insist on a level of professionalism that includes museum ethics as endorsed by industry groups such as AAM. As professionals we do not want to be on the outside of this argument. For an institution, the loss of reputation can limit opportunities for research and collections building or worse, affect accreditations and ability to retain collections.

Ethics policies are a beginning. But how do we implement policy into our practices? There are a few small things that can keep everyone on board. First we should have written, standard procedures that include considerations for collections care once the collecting is done. Second, communication and transparency give collectors no excuse to avoid ethical behaviors. We should seek opportunities to educate our close colleagues to avoid having ethical issues. Before collecting is done, the responsibilities of all stakeholders should be clear.

SCAN TIME: INCORPORATING NEXTENGINE 3D LASER SCANNING INTO YOUR LABORATORY WORKFLOW

Edward C. Shelburne* **and Jaime Hirtz**
University of Texas at Austin, Non-Vertebrate Paleontology Lab, Austin, Texas, United States of America
*edward.c.shelburne@gmail.com

Digital modeling of high-value specimens using a NextEngine 3D laser scanner has become an important component of the collection digitization efforts at the Non-vertebrate Paleontology Lab (NPL). On average, it takes 4.5 hours to fully scan a single specimen within the associated program, ScanStudio. The amount of time required to fully scan any individual specimen, however, may range from 1.9 hours to 16.5 hours. A number of factors contribute to the length of time it takes to complete a scan, including the physical size of the specimen, the number of individual scans required, the quality of the individual scans, and the number of concurrent background programs operating on the computer. This variable time-sink must be integrated into the normal workflow of specimen digitization, which includes imaging and database entry. An entire day could be spent scanning one or two specimens, but by addressing critical bottlenecks within ScanStudio, a worker can mitigate these effects on scan times, while maximizing the amount of additional work they can complete during a scan. Adjusting a number of settings within the program, such as scan settings and fuse settings relating to model quality, can substantially reduce the total scan time. The use of a dedicated computer for ScanStudio improves processing speed. Using a second computer allows the worker to focus on other aspects of the digitization process during lengthy scanning steps, such as model fusion and re-meshing. Thus, an otherwise arduous and time-consuming task can be effectively incorporated into the existing digitization workflow within any paleontology lab.

UNWRAPPING THE PAST ONE WHORL AT A TIME: A CASE STUDY OF THE DESTRUCTIVE ANALYSIS OF *ALLONAUTILUS SCROBICULATUS*

Mariah Slovacek[*] and Neil Landman
American Museum of Natural History, New York, New York, United States of America
[*]mslovacek@amnh.org

As nautilids grow, they build successive whorls over that of older shell, ultimately obscuring earlier ontogenetic stages. This is problematic for ontogenetic studies of nautilids where only adult specimens are known, as is the case with *Allonautilus scrobiculatus*. Here we present a systematic, step-wise removal of the younger portion of the shell, which made it possible to observe previous whorls indicative of earlier ontogenetic stages in the species lifespan. The specimen used had already been subject to some destructive analysis (previously used for isotopic analysis having been sectioned down the medial plane). A minimally destructive analysis was devised to preserve as much of the remaining specimen as possible. The breakdown of whorls proceeded in a stepwise fashion. First, separation discs were used to remove successive portions of the outermost whorl in sectorial wedges. Then obscuring nacre and thicker melanin coating were removed with careful application of a small air scribe to fracture off the topmost covering of nacre. Finally, air abrasion using particulate iron was applied to abrade away any remaining melanin. At each complete stage of the breakdown, the specimen was photographed from three viewpoints, side, apertural, and at the ventral. By using this technique, we have been able to more fully document the ontogeny of *Allonautilus scrobiculatus*, for example, the arrangement of color patterns of the species from embryonic to adult.

ETHICAL CONSIDERATIONS FOR RECONSTRUCTION AND RESTORATION

Matthew E. Smith
Petrified Forest National Park, Holbrook, Arizona, United States of America
Matthew_E_Smith@nps.gov

In the field of paleontology the terms 'reconstruction' and 'restoration' are sometimes used interchangeably to describe actions taken with a specimen for purposes of display or conservation. However, these two terms are arguably quite different. Restoration is the repair of a specimen that is damaged or broken. Reconstruction is the†generation of a structure or object in new, uncorrelated materials. The use of both of these practices has proliferated in paleontology with varying results on the scientific integrity of the specimen. In particular, preparators sometimes find themselves tasked with correcting erroneous reconstructions, and character obscuring restorations. From the perspective of paleontology as a scientific discipline and the specimen as data, what ethical considerations should be addressed prior to altering specimens with additive materials?

REVISITING FIELD SITES, PREPARATION, AND INCREASING THE UTILITY OF FOSSIL SPECIMENS

Matthew E. Smith*, Adam Marsh, and William Parker
Petrified Forest National Park, Holbrook, Arizona, United States of America
*Matthew_E_Smith@nps.gov

Careful re-preparation of specimens using additional material collected years after the initial excavations allow preparators to add significantly to our knowledge of fossil taxa. Two examples that illustrate this point well are JODA 7047, a specimen of *Eusmilus cerebralis* housed at John Day Fossil Beds National Monument (JODA) from the Logan Butte area in Oregon, and several specimens of *Acaenasuchus geoffreyi* from Petrified Forest National Park (PEFO). Both demonstrate the potential of tiny fragments of individual specimens collected years to decades apart to influence our interpretation of extinct taxa. JODA 7047 was initially collected in 1998; however preparation did not end until 2001 as fragments of tooth enamel continued to be collected from the field over the next three years. Only by reassembling material from the later collecting efforts in the lab was it realized that the individual was in both an unusual ontogenetic stage and taphonomic setting. JODA 7047 was found to be a functional adult that was in the process of shedding its juvenile canines and was preserved in a carnivore den accumulation. Similarly at PEFO, new fossils of Acaenasuchus were found 18 years after the initial collection by a park partner, and have been determined to be from single individuals through the efforts of preparation. Because there were no field-notes or accurate locality data associated with the original specimens it was assumed that the unsorted bags of fossils represented an amalgamation of many taxa. The relocation of the site was confirmed by fitting together fragments a few millimeters in size found years apart. This allowed PEFO researchers to identify previously unrecognized elements of this poorly known archosaur from the Late Triassic. This new material should allow placement of Acaenasuchus in a phylogenetic tree with a much higher certainty than previously possible. In each case, the synthesis of methods including small-scale spatial field observations, careful preparation, and curation practices over the span of many years enhanced the scientific and educational value of the collection and solved a long-standing curatorial problem.

CONSUMPTIVE OR JUST DESTRUCTIVE? ETHICS, POLICIES, AND BEST PRACTICES WHEN CONSIDERING FOSSIL SAMPLING REQUESTS

Sarah Werning
Des Moines University, Des Moines, Iowa, United States of America
Sarah.werning@dmu.edu

Over the past 25 years, there has been a substantial increase in paleontological research requiring consumptive analysis of fossils (i.e., where a portion of the fossil itself is removed and analyzed in such a way that it is "used up" during the analysis). These projects offer unique insights into the biology of extinct animals that cannot be obtained by other methods; for example, diet (isotope biogeochemistry), growth rates and absolute age (histology/skeletochronology), biomechanics (dental wear, histology), genetic relationships (aDNA), and color and biochemistry (molecular paleontology). Many of these techniques have also been used to improve our understanding of taphonomic processes and fossilization, as well. This explosion of new and valuable knowledge has significantly increased demand for consumptive analysis of museum specimens.

Collections and curatorial staff must assess these requests with an eye towards their current and future uses, which may not be limited to research (e.g., exhibition, education, etc.). Even within research, their decisions must strike a delicate balance between long-term preservation of specimens, advancing science using today's methods, and advancing science using future techniques. These questions do not have easy answers, but they are not new questions for natural history collections. I discuss the type of data that can inform better decisions when provided with a fossil sampling request, and relate them to best practices for genetic and isotopic sampling of zoological and botanical specimens.

DEVELOPING A WORKFLOW FOR TRANSFERRING AND REHOUSING SPECIMENS DURING A CABINETRY UPGRADE: A CASE STUDY FROM THE NORTH CAROLINA MUSEUM OF NATURAL SCIENCES

Jacob Van Veldhuizen*, Patricia Weaver, Lindsay Zanno, and Lisa Herzog
North Carolina Museum of Natural Sciences, Raleigh, North Carolina, United States of America
*javanveldhuizen@gmail.com

The North Carolina Museum of Natural Sciences (NCSM) has an extensive paleontological collection containing over 145,000 specimens of invertebrates, vertebrates, and plants. Until recently, specimens were housed in non-archival, inadequately sealed, metal-sheathed wooden cabinets that were slowly losing structural integrity and producing acidic off-gasses. In 2016, the NCSM was awarded a National Science Foundation Collections in Support of Biological Research grant to transfer its paleontological collection into archival, steel cabinets and to rehouse and stabilize specimens using current conservation best practices. Due to the sheer number of specimens in the collection, and with several staff and volunteers assisting with the rehousing process, a specimen transfer and rehousing workflow was needed. As an example of how the workflow was refined and standardized, we present a case study tracking specimens of Pliocene crayfish, *Pacifastacus chenoderma* (collected under BLM permit OR-50935), through the transfer and rehousing process. The resulting workflow contains seven steps: Step 1, specimens transferred from old cabinetry to staging area; Step 2, specimens evaluated for deterioration (Pyrite Disease, Byne's Disease, or breakage) or the need for additional preparation; Step 3, specimens needing treatment, repair, or additional preparation sent to preparation lab; Step 4, digital data, such as photographs, photogrammetry, or 3D scans, of specimens collected; Step 5, specimens rehoused in archival boxes with cavity mounts or structural support added when needed and given a new archival label; Step 6, database entry for specimens updated; Step 7, specimens transferred into new cabinetry.

DEAD OR ALIVE? NAVIGATING THE PROCEDURAL MAZE AND PREPARATION COMPLEXITIES TO MOLD THE TEETH OF A LIVING DAUBENTONIA

Vicki Yarborough
DLC Division of Fossil Primates, Durham, North Carolina, United States of America
vicki.yarborough@duke.edu

Making molds of the teeth of living endangered animals is a much different endeavor than casting from dried bones. It involves cooperation from veterinarians, vet technicians and the mold maker in order to meet the requirements of government agencies and the host institution. Researchers requested molding and casting of the teeth of a juvenile *Daubentonia madagascariensis* (Aye-Aye) for a project to assess similarities and differences in diet and tooth function of the fossil primate *Propotto*. Unfortunately, no Aye-Aye dentitions were available in the extant collections of the DFP. Fortunately, the Duke Lemur Center (DLC) maintains a population of lemurs, including *Daubentonia madagascariensis*. A living juvenile, Elphaba, was due for her yearly examination to be conducted under anesthesia by the DLC vets. This exam provided an opportunity to make molds of her teeth. To implement this required a complex series of steps including institutional and governmental paperwork, animal handling courses, proof of mumps, measles, and rubella vaccination (MMR), and a negative tuberculosis test. To make the molds, human sized dental trays were considered but even cut down, were too large to fit an Aye-Aye mouth. A dentist provided instruction in applying molding putty to live animal teeth. However, the requirements needed to do the molding made it impractical so another way was sought. A DLC veterinarian volunteered to make molds of the Aye-Aye teeth himself thus avoiding much of the specialized training. To mold the teeth Genie VPS Impression Material Light Body Rapid Set was chosen for its high tear strength, flow, and absence of residue on the teeth. The working time is 1 minute 5 seconds and the setting time is 2 minutes 10 seconds which reduces the time the animal is under anesthesia. Sadly, just before setting the appointment tragedy struck at the DLC as four Aye-Ayes suddenly died of mysterious causes within 24 hours. In one sense, this terrible situation made the molding implementation easier because we will be able to mold the teeth from one of the deceased individuals once we receive its skeleton avoiding the extended preparation procedures.

Ethics Symposium Presenter and Workshop Leader Backgrounds

Ethics Symposium Presenter and Workshop Leader Backgrounds

Kenneth Bader is the Osteology Lab Manager for the Jackson School Museum of Earth History at the University of Texas. He oversees modern skeletal material from specimen acquisition to preparation. Kenneth maintains an active dermestid colony as well as performing maceration and creating study skins. In addition to osteological prep, Kenneth has 18 years of fossil preparation experience, beginning at University of Kansas, Petrified Forest National Park and continuing at UT. He received his BS and MS in Geology from the University of Kansas. His Masters research focused on trace fossils in dinosaurian material from the Morrison Formation.

Chris Bell's research centers on understanding the complex dynamics of vertebrate faunal communities during the Quaternary Period. Chris is interested in investigating patterns of vertebrate evolution, biodiversity and biogeography throughout the Quaternary, and the responses of different vertebrate groups to the various changes in climate that took place during the last two million years. Two major current research areas are: 1) the study of early and middle Pleistocene (Irvingtonian) North American arvicoline rodent biochronology, and 2) the study of anatomy and systematics of extant and fossil turtles and squamate reptiles (lizards, snakes, and amphisbaenians).

Tylor Birthisel is currently the Paleontology Lab Manager, Chief Preparator, and Field Manager for the Natural History Museum of Utah (NHMU). Tylor specializes in the collection and preparation of large Cretaceous vertebrates and Triassic assemblages. Before starting at NHMU in 2013, he managed the paleontology lab and was a preparator for the Grand Staircase-Escalante National Monument for 2 1/2 years. Tylor got his start in paleontology by volunteering and interning with the St. George Dinosaur Discovery Site at Johnson Farm for 7 years. In their preparation lab he worked with late Triassic archosaurs and early Jurassic tracks. Tylor has a BS in geology from University of Nevada at Las Vegas and is working towards his MS in paleontology from the University of Utah.

Matthew Brown directs the collections, laboratories, libraries, and archives in vertebrate paleontology and zoology at the Jackson School Museum of Earth History, managing the museum functions of the collections in support of the research of 47 UT faculty, students, and research associates. The collections and archives have nearly 200 external research visitors per year, and over 2000 active requests for specimen loans or archive searches. Brown joined the team as Laboratory Manager in early 2009, and began by building state of the art fossil preparation and histology facilities centered around research and teaching. He designed an innovative course in paleontology laboratory methods that integrates museum theory, conservation philosophy, emerging technologies, and hands-on training to standardize methodological instruction. In January of 2014, Brown took on the role of supervising all of the VPL labs and collections. Each spring, he teaches GEO 388P, Paleontological Laboratory Techniques. He has previously worked for The Field Museum, the National Park Service, and the University of Chicago. Brown organized the 1st Annual Meeting at Petrified Forest National Park in 2008.

Ethics Symposium Presenter and Workshop Leader Backgrounds – cont'd

Christopher Capobianco is currently the Vertebrate Paleontology Technician and Preparator at the Museum of Comparative Zoology, Harvard University, where he manages the day-to-day operations of the Paleontology Preparation Lab, including its volunteer program. Chris has worked on a variety of specimens throughout his career, preparing everything from Carboniferous microvertebrate fossils up to Late Cretaceous ceratopsian skulls. His prior work at the Royal Tyrrell Museum of Palaeontology led to the creation of a large indoor screen-washing facility for washing large quantities of microvertebrate material and the development of new materials and design for screen-washing boxes to optimize productivity.

Vicen Carrió is the Conservator/Preparator of geological and paleontological material at the National Museums Scotland. Vicen studied Biology at the University of Valencia (Spain) before moving to Edinburgh in 1992. Having first worked with Professor Euan Clarkson in Silurian gastropod fossils, she gained funding to study the conservation of fossils, minerals and rocks. Since 1997 she has developed her career in conservation and has undertaken research in different areas of the collection, presenting numerous talks at conferences and seminars. These conferences have helped her to develop new techniques in conservation and to keep up to date with new products and technology as they are developed and she now has an international reputation as a conservator.

The collection she cares for includes approximately 75,000 minerals, 250,000 fossils and 15,000 rocks. Her responsibilities include providing advice on geological conservation, techniques and preparation to other departments within the museum and to visitors working on our collections.

Her role involves the preparation and conservation of specimens for inclusion in our galleries, temporary or permanent exhibitions, and for research. She is experienced in a variety of physical and chemical techniques including cutting and polishing, making acetate peels, thin sectioning, moulding and casting of fossils and minerals, acid preparation, field techniques, and preventative conservation.

Vicen received her Accredited Conservator-Restorer (ACR), awarded by the Institute of Conservation for demonstrating a high level of proficiency in conservation practice in 2015.

Matthew Colbert's research primarily involves the use of X-ray computerized tomography to visualize and describe vertebrate cranial morphology. He has focused his investigations on patterns of evolutionary and ontogenetic variation in the Tapiroidea (Mammalia: Perissodactyla). His research has also involved establishing methodologies for characterizing and interpreting developmental sequences, and the use of HRXCT to document the taphonomy of fossil vertebrate skulls.

Mike Eklund's interest in geology and fossils began as a youth in the midwest on day trips to Mazon Creek, Devils Lake and Kettle Moraine. These early experiences set the stage for lifelong pursuits in geology, climbing, ski racing and all things outdoors. University life lead to undergraduate and graduate studies in accounting and management as well as the CPA exam. Ironically, the forensic nature of auditing and accounting has been a strong asset in understanding, evaluating and teaching the evidentiary process so critical in all of science. After a four year stretch auditing for Leo Burnett, the next 14 years involved primarily working in financial and insurance services. One interesting component of the new work was the responsibility to develop, implement and educate OSHA and safety related training for commercial and industrial entities of all kinds. Additionally, professional work coaching for the U.S. Ski Coaches Association and and the National Coaches Academy, examiner for EMT (Emergency Medical Technician) certification and owning/managing an artisnal construction company as well as parenting two awesome daughters has led to a unique and broad combination of teaching experiences.

2001 marked the beginning of training and work in paleontology at the Field Museum in both fossil preparation and fieldwork which has included 16 field expeditions throughout the western United States. Nowadays, Mike's work with ThinklabZ involves laboratory consulting and education which has led to providing workshops, training and classes at the SVP annual meetings, AMMP meetings and institutions around the globe.

As a Research Associate at University of Texas at Austin, Mike's research focus is on developing innovative and more productive lab methodology as well as mining better data yield and documentation practices in paleontology. Recent projects include improving documentation and diagnosis tools for paleontology as well as developing methods for preparing, recognizing and defining associated "micro/nano" information on paleontological specimens leading to increased scientific understanding.

When not on the road, he can usually be found in Bozeman, Montana having fun in the mountains with his dog Lucy and his daughters Dana and Tracy.

Marilyn Fox is the Chief Preparator in the Division of Vertebrate Paleontology at the Yale Peabody Museum of Natural History. She is responsible for the VP field program, care of all of the VP collections, is the instructor for Practical Paleontology, and prepares and molds and casts specimens for the research of students and faculty. She has long-standing interests in preservation and materials. Marilyn has a Masters in Fine Arts and Art History, with a specialization in printmaking, from Pratt Institute.

Lisa L. Herzog is the Paleontology Conservation & Operations Manager at the North Carolina Museum of Natural Sciences. She is versed in technical aspects of specimen preparation, paleontological value in material as information, and the scientific rigor involved. Working in a museum setting with responsibilities ranging from educational outreach, volunteer recruitment and training, as well as lab management has provided a clear understanding of the importance of passing this information along concisely and effectively. Currently, Lisa's involvement in paleontology encompasses research, collections advancement, and paleontology in society.

Ethics Symposium Presenter and Workshop Leader Backgrounds – cont'd

Jaime Hirtz is working on her Bachelor of Science in Geological Sciences at the Jackson School of Geosciences at the University of Texas at Austin. She serves as a research assistant at the Non-vertebrate Paleontology Lab producing research quality 3D scans of fossils using a NextEngine 3D Scanner and ScanStudio. She also participated in the Dynamic Virtual Earth Science Collection Project sponsored by the Longhorn Innovative Fund for Technology.

Evan Kent is a Senior Partner and Head of the Trademark Group at the law firm of Mitchell Silberberg & Knupp LLP in Los Angeles, California. Evan specializes in intellectual property law, which encompasses, for example, patents, trademarks and copyrights, with special emphasis on international protection of intellectual property. Evan has a B.S. with distinction in Chemical Engineering from Stanford University and a J.D. degree from the University of Chicago.

Joshua Lively is a Ph.D candidate in the Department of Geological Sciences at the University of Texas at Austin. Josh served as an assistant instructor (lecturer) for the Age of Dinosaurs course, a teaching assistant for numerous classes in the department, and a collections assistant at the Non-vertebrate Paleontology Lab. He received a prestigious Graduate School Fellowship for the 2016-2017 academic year. Josh also taught home school classes in paleontology and earth history, and is heavily involved in outreach efforts for the paleontology research group. His research focuses on the evolutionary dynamics of vertebrates during the Late Cretaceous as an analog for understanding ecosystems during future greenhouse climates. His dissertation research is examining the evolution and anatomical diversity of mosasaurs. Josh has been involved in paleontology fieldwork in the the Cretaceous of the western US for seven years, and currently has an active field project in the Mancos Shale of Colorado. Josh received his BS in geology from Auburn University and his MS from the University of Utah. His master's project focused on the evolution and paleobiogeography of baenid turtles from the Late Cretaceous. As part of his thesis, Josh named three new turtle species from the Kaiparowits Formation of Utah, including *Arvinachelys goldeni*.

Christina Lutz has a background in fine art with a Bachelor of Fine Arts degree from Tufts University. She enjoyed drawing dioramas at the Los Angeles County Natural History Museum and mounts at the La Brea Tar Pits Museum. From this she discovered she could become a volunteer fossil preparator at the La Brea Tar Pits and volunteered in the lab and excavation. After a few years of volunteering, she became a member of the excavation staff at the La Brea Tar Pits and was able to grow her osteological knowledge. Wanting to become a well-rounded fossil preparator she moved to New Haven, CT and began volunteering with Marilyn Fox in the Vertebrate Paleontology Preparation Lab at the Yale Peabody Museum. Over the past year and a half she has been working on collections grants, digitizing specimens, and georeferencing sites from both the Badlands National Park in South Dakota and the Western Interior Seaway.

Jessica Maisano came to The University of Texas in January 2000 after completing her Ph.D. in vertebrate paleontology at Yale University. She is a research scientist associate in the High-Resolution X-ray Computed Tomography Facility (UTCT). Jessie has overseen the implementation of Digital Morphology: An NSF Digital Library (www.DigiMorph.org). This ongoing project involves the construction of an online resource of high-resolution CT-based imagery of a broad diversity of fossil and Recent organisms; currently, the site features almost 700 specimens. Since 2004 Jessie has been a collaborator on Deep Scaly, a project focusing on higher-level systematics of squamates (lizards, snakes, amphisbaenians) that is part of NSF's Assembling the Tree of Life initiative.

Ann Molineux After completing her Ph.D. in the Department of Geological Sciences at UT Austin, it seemed that no occupation could be quite as challenging or exciting as hunting for calcified demosponges (sclerosponges) in the Caribbean. She was mistaken. Fascinated by the wealth of fossil material in the collections, she was infected by a strong desire to develop some way to make the collections more accessible to everyone else. This involves making them accessible both for research, exhibit, and education.

Conni J. O'Connor is the Museum Technician at Florissant Fossil Beds National Monument where, in addition to performing collections-based responsibilities, she specializes in the stabilization and micropreparation of fragile paper shales. She is interested in developing new fossil preparation techniques. Conni is currently on the fifteen-year degree track and is attending classes at the University of Colorado-Colorado Springs majoring in Biology (Ecology and Evolution Option) and minoring in Museum Studies. She is hoping to finally graduate in December of 2018.

Vanessa Rhue is the Assistant Collections Manager for Vertebrate Paleontology at the Natural History Museum of Los Angeles County (LACM). As a professional in the field of paleontology for over 10 years, she has amassed experience in fossil collection, preparation, conservation, and curation. Her background in mitigation paleontology coupled with her fossil preparation skill led her to work on a new exhibit at LACM called the Age of Mammals, which opened in 2010. Since that time she has devoted her energy to the curation and care of a large Vertebrate Paleontology collection. In recent years, she has developed a passion for training volunteers and mentoring interns to assist with the work of preserving scientific specimens and their associated data for posterity. She enjoys thinking of creative ways to promote awareness and advancement of best practices among the professional and amateur communities. She is an active member of the Society of Vertebrate Paleontology (SVP) and an inaugural member of the Association for Materials and Methods in Paleontology (AMMP).

Chris Sagebiel is the Collection Manager at the Vertebrate Paleontology Collections at the University of Texas at Austin. He holds a Masters degree in Geology and has 21 years of experience working in vertebrate paleontology collections, including supervising graduate and undergraduate students and volunteers, and spent 13 years as Curator of Geology at the San Bernardino County Museum. He has 18 years of experience with museum database development. He worked as a database manager, converting museum datasets to relational

Ethics Symposium Presenter and Workshop Leader Backgrounds – cont'd

SQL databases for paleontology, mineralogy, history, and ethnography collections. Chris has extensive experience in developing finding aids to cross reference museum artifacts with associated records. He also has extensive experience in the field, including supervising mitigation projects.

Chase Shelburne is a research assistant at the Non-Vertebrate Paleontology Lab (NPL) at the University of Texas at Austin. The main focus of his work is collections digitization, including database entry and specimen imaging. Along with Jaime Hirtz, Chase has spearheaded NPL's effort to scan and digitally preserve valuable specimens in the collection via 3D scanning.

Matthew Smith is currently the museum curator at Petrified Forest National Park. He has worked as a collection manager, exhibit designer/fabricator, and preparator for over twenty years. If forced to pick areas that he has specialized in during that time they would be micropreparation, mount making, storage systems, molding, and casting. Having worked at several institutions he appreciates how the diffuse, field-based museum system within theN ational Park Service has pushed him to take on many roles during his career that were outside his comfort zone. This in turn has led him to appreciate the role that professional societies such as AMMP play in education of professionals, the dissemination of sound methodology, and the integral role of preparators within the science of paleontology. Matt first picked up an air scribe at the University of Florida where he received his BS in Zoology. Since then he has learned most of what he knows by relentlessly picking the brains of his peers.

Sarah Werning is an Assistant Professor of Anatomy at Des Moines University. She has 15 years of histological sampling experience and has trained numerous undergraduate and graduate students in these methods. Additionally, she has worked the Sam Noble Museum, Museum of Vertebrate Zoology, and University of California Museum of Paleontology as a curatorial assistant for paleobotanical, fossil vertebrate, extant vertebrate, and museum archive collections, and volunteered as a fossil preparator for The Field Museum, University of California Museum of Paleontology, and Bureau of Land Management.

Alan Zdinak is fossil preparator for the Vertebrate Paleontology Department at the Natural History Museum of Los Angeles County (NHMLA). At the NHMLA he's working on preparation and molding and casting of fossil mammals and renovation of the prep lab. Prior to the NHMLA, Zdinak helped renovate the fossil halls at the Smithsonian's National Musuem of Natural History, did micro prep and fieldwork on Triassic reptiles at the Yale Peabody Museum, and received his initial fossil preparation training at the American Museum of Natural History. In previous lives, he was a fine art lithographer and director of children's television. Alan holds a BA in Philosophy and Fine Art from NYU.

AMMP Committee Descriptions

AMMP Committee Descriptions

We need your help to continue to develop and grow, to share our combined knowledge, and to improve the standards of paleontological preparation.

Annual Meeting Committee: This committee is tasked with creating and managing continuity in annual meeting planning, organizing, and budgeting. Members collaborate with convener/host of future meetings to pass along information and provide guidance through the difficult planning process.
2106 Committee Chair: Conni J. O'Connor

Awards Committee: Helps to select recipients of the William W. Amaral Legacy Award, AMMP Service Award, Russ McCarty Student Travel Award, and other awards as they are developed. Also engages in fundraising for monetary awards. Awards are presented at the Annual Meeting of the AMMP.
2016 Committee Chair: Matthew Smith

Development Committee: Members of this committee work to advance the mission of AMMP and strengthen its standing in the community. They ensure that AMMP serves the needs of its members while fostering growth among individuals through targeted development opportunities. They will also promote diversity in membership and fundraise for general funds, awards and travel grants.
2016 Committee Chair: Matthew A. Brown

Elections Committee: Helps to select qualified candidates to fill required positions in the leadership of the organization. Organizes and manages the call for candidate nominations. This important committee will aid in developing the future direction of the association through its leadership.
2016 Committee Chair: Deborah Wagner

Membership Committee: Works with Membership Secretary to maintain detailed records of membership. Publishes member directory, recruits and encourages new membership in the organization.
2016 Committee Chair: Vacant

Publications Committee: Encourages presenters of talks and posters from each meeting to post their work as pdf's on the AMMP website, assists as needed in converting Powerpoint or other files to post-able pdf's, edits postprints for post-meeting publication.
2016 Committee Chair: Marilyn Fox

Resources Committee: Maintains resource display for meetings, maintains lists of archival materials and suggested suppliers. explores the uses of new materials for preparation (e.g., are they archival, what are the ingredients), makes information available
2016 Committee Chair: Vacant

Training Committee: Develops training methods, develops new avenues for sharing knowledge of techniques, standards, and use of materials
2016 Committee Chairs: Carrie Herbel and Alan Zdinak

Website Development Committee: Maintains the AMMP website, assists with posting new and changing information
2016 Committee Chair: Lisa L. Herzog

Notes

Notes