

**The Association for
Materials&Methods
in Paleontology**

2016

9th
Annual

Fossil Preparation
& Collections Symposium

Colorado Springs, CO

Host Committee Chair

Conni J. O'Connor

Event Committee

Gregory Brown

Matthew A. Brown

Marilyn Fox

Lisa L. Herzog

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Association for
Materials&Methods
in Paleontology

Acknowledgements

- **Logo:** Thanks to Conni J. O'Connor, Mariah Slovacek, Angella Thompson, BJ Nicholls for designing this year's logo design and illustration.
- **Refreshments:** Special thanks to the Fossil Craft Beer Company for their generous donation of specialty beers
- **Host Hotel:** We would also like to thank Stephanie Howard and Shenae Arbuckle of the Doubletree, Colorado Springs Hotel who helped to organize and plan the on-site arrangements.
- **Donations:** The future stability of the Association wouldn't be possible without the excellent donations to the Silent auction. We thank all for their support.
- **And YOU:** Finally, this organization would not exist without the interest and participation of Association Members and Annual Meeting presenters, and participants.

Social Media



Join our FaceBook group:

Association for Materials and Methods in Paleontology

Your source for up-to-date information regarding AMMP.



Our twitter username is: **@AMMPaleo**

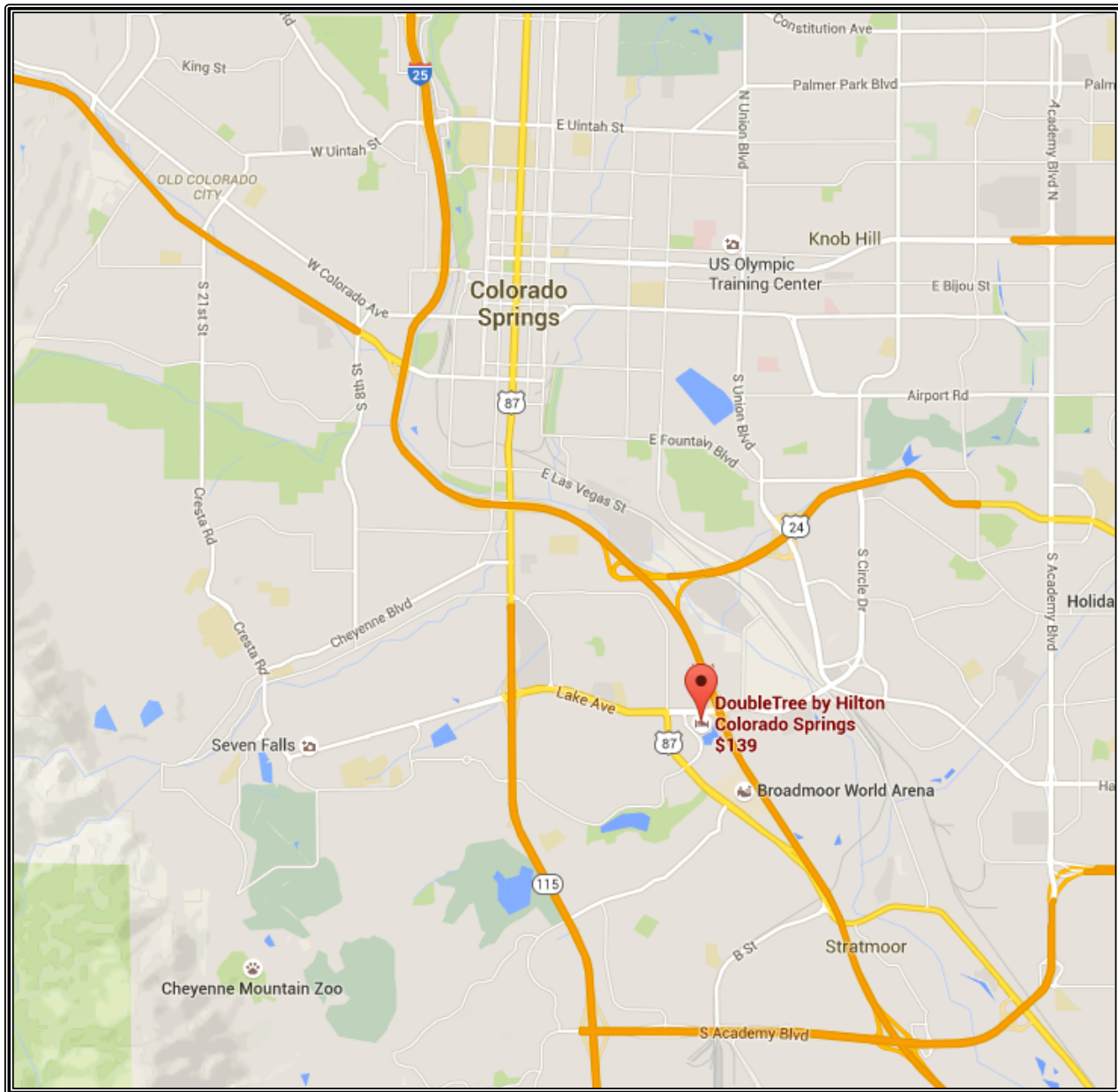
For comments, pictures and sharing during the conference use:

#AMMP9 - and don't forget to mention **@AMMPaleo**

Table of Contents

Acknowledgements and Social Media.....	2
Area Map	4
Host Hotel Map	5
Restaurants Within Walking Distance of the Hotel	6
Schedule of Events	7
Overview.....	8
Pre-Conference Photogrammetry Workshop.....	9
Back to Basics Workshops	10
<i>Defining the Professional Vertebrate Fossil Preparator: Essential Competencies</i>	<i>11</i>
Open Reception/Poster Session	17
Thursday – Platform Presentations	18
Thursday – Workshops and Round Table Discussions.....	19
Friday – Platform Presentations	21
Friday – Workshops, Round Table Discussions, and Tours.....	22
Trivia Night	20
Closing Banquet/Silent Auction	23
Field Trips	25
Workshop, Round Table Discussion, and Tour Descriptions	26
Field Trip Descriptions	33
Abstracts, Alphabetical by Primary Author	38
Back to Basics Speakers and Afternoon Session Leaders	70
Exhibitors and Vendors	79
AMMP Committee Descriptions	82
Blank Pages for Notes.....	85

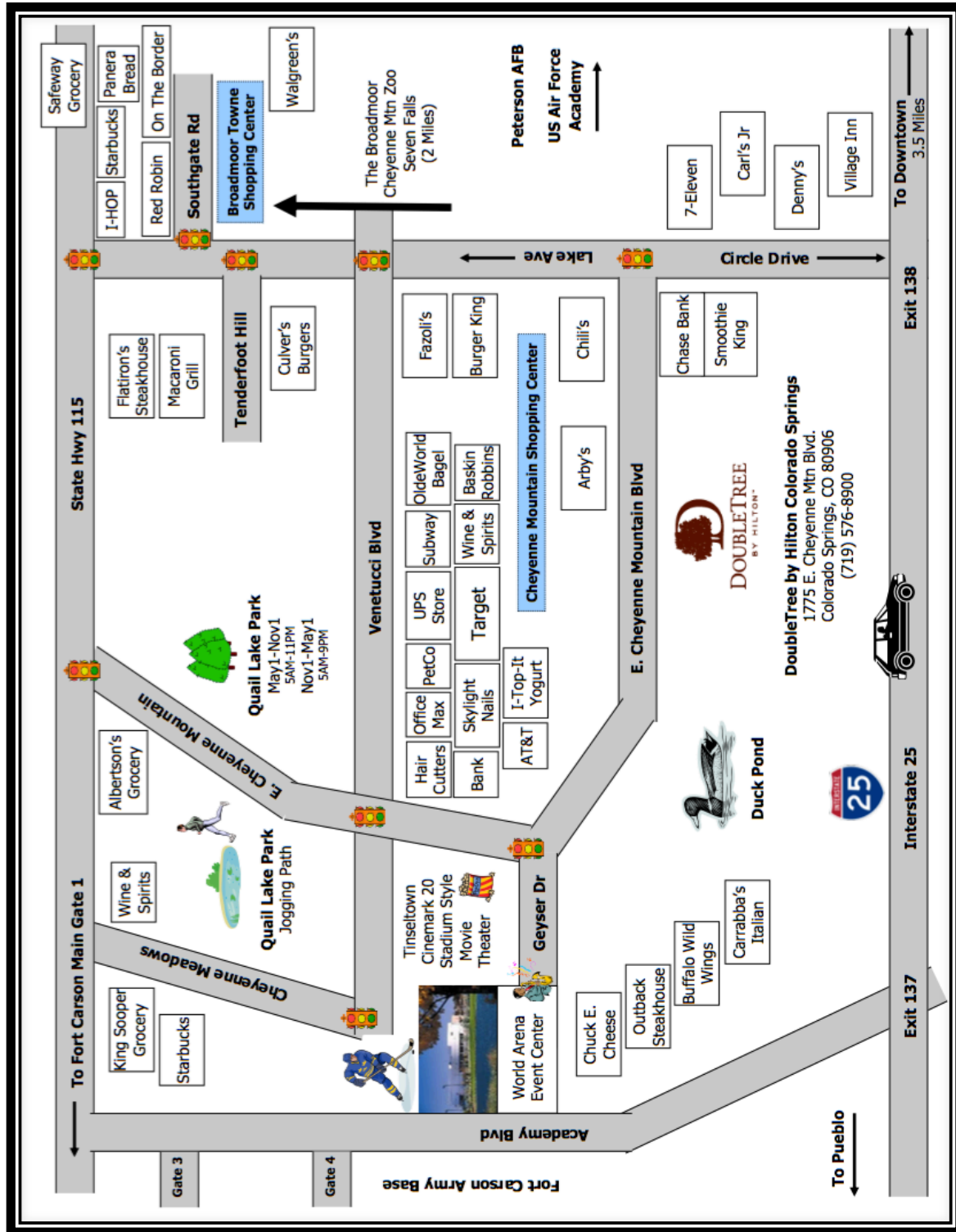
Area Map



Host Hotel Map



Restaurants Within Walking Distance of the Hotel



Schedule of Events – Overview

Monday – April 18		
Photogrammetry Workshop - Day 1	Hotel – Windows	9:00AM-5:00PM
Sponsored Dinner Event	Fossil Craft Beer Company (with Bite Me Sausage)	6:00PM-10:00PM
Tuesday – April 19		
Photogrammetry Workshop - Day 2	Hotel – Windows	9:00AM-5:00PM
Early Registration	Hotel – Lobby	6:00PM-8:00PM
Wednesday – April 20		
Registration	Hotel – Outside Park	7:45AM-8:45AM
Welcome/Announcements	Hotel – Park	8:50AM-9:00AM
Back to Basics Workshops	Hotel – Park	9:00AM-5:00PM
Opening Reception/Poster Session	Hotel – Elevations	6PM-?
Thursday – April 21		
Late Registration	Hotel – Outside Park	8:00AM-8:30AM
Welcome/Announcements	Hotel – Park	8:45AM-9:00AM
Platform Presentations	Hotel – Park	9:00AM-10:30AM
Break		10:30AM-11:00AM
Platform Presentations	Hotel – Park	11:00AM-12:00PM
Lunch	On your own	12:00PM-1:30PM
Workshops – Session 1	Hotel – Various (See pg. 19)	1:30PM-3:00PM
Break		3:00PM-3:30PM
Workshops – Session 2	Hotel – Various (See pg. 19)	3:30PM-5:00PM
Trivia/Game Night	Hotel – Elevations	8:00PM-10:00PM
Friday – April 22		
Welcome/Announcements	Hotel – Park	8:30AM-9:00AM
Oral Presentations	Hotel – Park	9:00AM-10:30AM
Break		10:30AM-11:00AM
Oral Presentations	Hotel – Park	11:00AM-12:00PM
Lunch	On your own	12:00PM-1:30PM
Workshops – Session 1	Hotel – Various (See pg. 22)	1:30PM-3:00PM
Break		3:00PM-3:30PM
Committee Meetings	Hotel – Various (See pg. 22)	3:30PM-5:00PM
Closing Banquet/Silent Auction	Hotel – Elevations	6:00PM-10:00PM
Saturday – April 23		
Field Trip – Lunch Provided	Bus leaves promptly at 8am!	8:00AM-6:00PM
Comanche National Grassland		
Denver Museum of Nature & Science		
Morrison Museum		
Pueblo/Cañon City		

Schedule of Events – Monday and Tuesday, April 18 and 19

Pre-Meeting Workshop

Photogrammetry: Digital Data Collection in the Field, Lab, and Museum

Photogrammetry is a powerful and relatively inexpensive tool for the 3D documentation of the appearance and condition of fossil resources during any step of the curatorial process. The purpose of this workshop is to familiarize participants with the methodology, applications, and products of photogrammetry as it relates to collection, preparation, and curation of fossil material as a tool for specimen documentation and recordation, as well as digital data archiving.

The general concept of the workshop is to provide an overview of photogrammetry and requirements of image capture. The workshop will begin with a discussion of the basics of stereo photography and what makes photogrammetry work; followed by an overview of the photogrammetric process, camera/equipment, simple to complex project designs, importance of camera calibration, examples of project layouts and results, and what can be done with the data. The hands-on part of the workshop will allow participants to use their own cameras to collect digital data using photogrammetry of various types of specimens and then a walk-through of some of the basic processing; AgiSoft Photoscan Professional will be utilized; allowing participants to actually see some of the processed data from their photogrammetric work. Participants will have the chance to process some of their own data and utilized 3D data for analysis, such as generating 3D output files and color depth maps, using CloudCompare, an open source software). Generating and utilizing 3D data will provide a better understanding of the monitoring and conservation opportunities photogrammetry provides for the field of vertebrate paleontology. Participants are encouraged to bring their own digital cameras, laptop computers (Windows and Mac).

Organizers:

Neffra Matthews

Geospatial Section
National Operations Center
Denver Federal Center

Brent H. Breithaupt

BLM Regional Paleontologist:
WY, ID, MT, ND, SD, NE

John "Jack" Wood

GIS Specialist/Geologist, Guest Scientist
Geologic Resources Division

Schedule of Events – Wednesday, April 20 – Park *Back to Basics Workshops*

7:30-8:45	Registration open
8:50	Conni J. O'Connor – AMMP Host Committee Chair OPENING REMARKS
9:00	Matthew A. Brown I. PURPOSE AND SCOPE 1. CRITICAL THINKING
9:30	Matthew E. Smith 13. FIELDWORK
10:00	Lisa L. Herzog 3. FOSSILS AS BIOLOGICAL MATERIALS AND DATA 4. FOSSILS AS GEOLOGICAL MATERIALS AND DATA 5. PARTICIPATION IN THE SCIENCE OF PALEONTOLOGY
10:30	BREAK
11:00	Gregory Brown 6. CONSERVATION PRINCIPLES AND ETHICS
11:30	Matthew A. Brown 7. DOCUMENTATION AND RECORD KEEPING
12:00-1:00	LUNCH
1:00	Steve Jabo 2. APTITUDE FOR FOSSILS AS MATERIALS 8. USE OF PREPARATION TOOLS AND TECHNIQUES
1:30	Amy Davidson 9. USE OF ADHESIVES
2:00	Marilyn Fox 10. USE OF MOLDING AND CASTING MATERIALS AND TECHNIQUES
2:30	BREAK
3:00	Alan Zdinak 11. USE OF ARCHIVAL LABELING, HOUSINGS, AND STORAGE ENVIRONMENT
3:30	Michelle Pinsdorf 14. HEALTH AND SAFETY
4:00-5:00	DISCUSSION

DEFINING THE PROFESSIONAL VERTEBRATE FOSSIL PREPARATOR: ESSENTIAL COMPETENCIES

I. Purpose and Scope

Vertebrate paleontology requires the skilled preparation of fossils for research and educational purposes. The Society of Vertebrate Paleontology (SVP) Bylaws, Article 12, Code of Ethics, Section 3 [see Appendix 1] states that “fossil vertebrate specimens should be prepared by, or under the supervision of, trained personnel,” and National Park Service Directive 77 Paleontological Resource Management Policy [see Appendix 2 for more information] states that “fossil preparation is a specialized sub-discipline of paleontology and preparation should only be performed by professionals with suitable training.” The SVP Constitution Article 2, Section 1. Mission Statement puts forth standards for collection, documentation, and curation [see Appendix 3]. Currently, there is no definition of a trained or qualified professional preparator.

Preparation is a process with the dual goals of revealing the information contained within matrix enclosing a fossil with a minimum of loss, while at the same time preserving that information for future research. This document defines a professional vertebrate fossil preparator (fossil conservator) as an individual with specialized skills, knowledge, training, and experience that qualifies them to prepare vertebrate fossils for scientific research and education.

This document identifies the competencies that are fundamental to the definition of the qualified professional preparator. While most preparators develop specializations in response to the job requirements of the research programs they serve, it is understood that these fundamental competencies are held in common by preparators of all specialties. It should be emphasized that possessing each separate competency is not in itself sufficient, but that the preparator combines the breadth of knowledge, methods and abilities to maintain their skill set at the highest standards accepted within the profession.

Qualified preparators may have an undergraduate or graduate degree or equivalent experience in a related field, and are expected to have proficiency in critical thinking, communication, managing laboratory resources and projects. Beyond this basic proficiency it is assumed that the preparator will have had additional education and training relating to the field of preparation and to one or more specific areas of specialization.

II. Essential Competencies for the Professional Vertebrate Fossil Preparator

1. Critical Thinking

The judgments and actions of the qualified preparator are guided by a methodology that places a priority on enhancing, not diminishing the scientific value of the specimen. Critical thinking allows the application of the knowledge, skill, and experience of the preparator to assess the specimen, the task at hand and the desired end product before commencing preparation and during every stage of preparation. The preparator must be able to continually monitor the immediate physical impacts upon the specimen by treatments, handling, examination, and consider the long-term effects of the materials and techniques applied to the specimen. The qualified preparator has the ability to conceptualize, think creatively and evaluate information in a systematic, purposeful, efficient manner. The preparator also has an appreciation for their own limits and knows when and where to seek guidance.

2. Aptitude for Fossils as Materials

Competent preparation requires an intrinsic sensitivity and feel for fossils as physical, often fragile material. The preparator combines this innate aptitude with an understanding of the scientific value of fossils, and a lack of competency in this area cannot be offset by knowledge of preparation and conservation theory.

3. Understanding of Fossils as Biological Materials and Data

The qualified preparator has the ability to exercise good judgment when interpreting the distinction between biological remains and matrix, and is guided by a fundamental knowledge of vertebrate anatomy, physiology and evolution. The preparator can recognize that fossil specimens are the physical representations of primary paleontological data. A preparator has a basic understanding of fossils as an individual's remains and the biological data contained therein. A qualified preparator uses correct anatomical terminology to document preparation and communicate with researchers.

4. Understanding of Fossils as Geological Materials and Data

A qualified preparator should have an understanding of fossils and matrices as the products of geological processes and as geological data. This should include knowledge of taphonomy, basic geological principles, and different modes of preservation. Preparation usually requires removal of matrix from bone, and some fossil evidence such as trace fossils, root-casts, phytoliths and soil structure are contained within the matrix. Therefore, the preparator should have an awareness of data contained within the matrix and understands that any modification of matrix is a potential loss of data.

5. Participation in the Science of Paleontology

A qualified preparator is conversant in the specialized vocabulary, terminology, and research goals of paleontology, and can alert researchers to evidence and assist in its interpretation. The preparator understands the pertinent scientific references, and is able to share and receive relevant information with other subject matter experts.

6. Understanding of Conservation Principles and Ethics

The preparator is also a conservator and makes every effort to ensure that the prepared specimen will resist deterioration for as long as possible. The qualified preparator recognizes the agents of deterioration and understands the principles of preventive and remedial conservation. The preparator is familiar with the current literature, principles, ethics, and specialized vocabulary of conservation.

7. Documentation and Record Keeping

The qualified preparator understands that preparation is part of the scientific process and ensures that all data generated within the laboratory, including identifications, photographs, preparation records, and housing materials are documented and archived. The preparator keeps identifying numbers in association with specimens throughout the preparation process. The preparator keeps records of all tools, techniques, and materials used to prepare or house the specimen that might impact physical or chemical interpretation, or that might have to be removed in the future. The qualified preparator is able to create publishable documentation of materials and methods for inclusion in scientific descriptions of the specimen.

8. Understanding and Aptitude in the Use of Preparation Tools and Techniques

The qualified preparator can select the most appropriate tools and techniques to skillfully reveal scientific information, and safeguard the long-term well being of the specimen. The preparator should be proficient in the preparation of common modes of vertebrate fossil preservation and in challenging situations should be able to seek further guidance in the preparation and conservation literature. The preparator augments this knowledge through professional conferences and communication with colleagues.

9. Understanding and Use of Adhesives

The qualified preparator is familiar with the range of adhesives available and is able to select the most appropriate adhesive for a given task. The preparator has knowledge of the physical and chemical properties, uses of various adhesives, the setting mechanism and reversibility of adhesives, their solvents, and the advantages and disadvantages conveyed by each kind of adhesive. The preparator should also be familiar with the ethical implications of using adhesives on museum objects and the kinds of scientific data that may be obscured, lost or destroyed by the use of adhesives. A qualified preparator

is conversant in adhesives terminology and nomenclature and is able to justify decisions and correctly document adhesives used on specimens in preparation records and reports for publication. The preparator is able to mitigate and manage the potential health risks associated with the use of adhesives and solvents.

10. Understanding and Use of Molding and Casting Materials and Techniques

The qualified preparator is familiar with the ethical implications of using molding compounds on museum specimens and the kinds of scientific data that may be obscured, lost or destroyed during the molding process. The preparator is able to determine the suitability of the fossil for molding and type of mold produced based on its fragility, morphology, and other physical properties. The preparator is familiar with the physical properties and uses of various gap fillers, separators, molding and casting compounds commonly used in paleontology, is adept in their use and also trained in the management of potential health risks associated with molding and casting.

11. Use of Archival Labeling, Housings, and Storage Environment

The preparator is aware that an essential step in the long-term conservation of fossil material is the use of archival labeling, housing, and proper storage environment. The qualified preparator incorporates specially designed archival housings into their preparation strategy, in collaboration with collection management staff. The preparator is knowledgeable about archival materials and proper storage environments and can recognize deterioration due to improper materials or storage conditions. As the understanding of storage materials evolves, the preparator is able to evaluate and modify storage materials and methods to ensure the long-term stability of the specimen.

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.

13. Understanding Fieldwork

The preparator is aware that specimens should be collected with the goal of obtaining a stable specimen while ensuring that the greatest amount of geological and biological information is preserved, and understands that no fossil should be collected without comprehensive documentation. The preparator ensures that specimens are collected in a manner that facilitates preparation in the laboratory. The preparator knows and practices proper health and safety procedures while working out of doors in varying climatic conditions.

14. Health and Safety

The qualified preparator has the training to ensure their own safety and the safety of their coworkers and visitors by determining and mitigating physical and chemical hazards in the paleontology laboratory. The preparator should be able to comprehend Material Safety Data Sheets and select appropriate personal protective equipment and environmental controls, and have basic knowledge of emergency response and first aid.

2/23/2012 FINAL DRAFT Matthew Brown, Amy Davidson, Marilyn Fox, Steve Jabo, Matt Smith

Supported by the 2011 Society of Vertebrate Paleontology Preparator's Grant, The University of Texas at Austin, American Museum of Natural History, Yale Peabody Museum of Natural History, National Museum of Natural History, and Petrified Forest National Park

III. Appendices

Appendix 1.

Society of Vertebrate Paleontology (SVP) ARTICLE 12. CODE OF ETHICS Preamble

Several goals for the Society of Vertebrate Paleontology follow from its mission statement (Articles of Incorporation, Article 2, Section 1):

1. To advance the science of vertebrate paleontology throughout the world;
2. To serve the common interests and facilitate the cooperation of all persons concerned with the history, evolution, ecology, comparative anatomy and taxonomy of vertebrate animals, as well as the field occurrence, collection and study of fossil vertebrates and the stratigraphy of the beds in which they are found;
3. To support and encourage the discovery, conservation and protection of vertebrate fossils and fossil sites;
4. To foster the scientific, educational and personal appreciation and understanding of vertebrate fossils and fossil sites by avocational, student and professional paleontologists and the general public. Fossil vertebrates are usually unique or rare, nonrenewable scientific and educational resources that, along with their accompanying contextual data, constitute part of our natural heritage. They provide data by which the history of vertebrate life on earth may be reconstructed and are one of the primary means of studying evolutionary patterns and processes as well as environmental change.

Section 1. Professional standards in collection of fossils It is the responsibility of vertebrate paleontologists to strive to ensure that vertebrate fossils are collected in a professional manner, which includes the detailed recording of pertinent contextual data, such as geographic, stratigraphic, sedimentologic and taphonomic information.

Section 2. Adherence to regulations and property rights It is the responsibility of vertebrate paleontologists to assist government agencies in the development of management policies and regulations pertinent to the collection of vertebrate fossils, and shall comply with those policies and regulations during and after collection. The necessary permits on all lands administered by federal, state, and local governments, whether domestic or foreign, must be obtained from the appropriate agency(ies) before fossil vertebrates are collected. Collecting fossils on private lands must be done only with the landowner's consent.

Section 3. Fossil preparation Fossil vertebrate specimens should be prepared by, or under the supervision of, trained personnel.

Section 4. Deposition of fossil specimens Scientifically significant fossil vertebrate specimens, along with ancillary data, should be curated and accessioned in the collections of repositories charged in perpetuity with conserving fossil vertebrates for scientific study and education (e.g., accredited museums, universities, colleges and other educational institutions).

Section 5. Publication and education Information about vertebrate fossils and their accompanying data should be disseminated expeditiously to both the scientific community and the interested general public.

Section 6. Commercial sale or trade The barter, sale or purchase of scientifically significant vertebrate fossils is not condoned, unless it brings them into, or keeps them within, a public trust. Any other trade or commerce in scientifically significant vertebrate fossils is inconsistent with the foregoing, in that it deprives both the public and professionals of important specimens, which are part of our natural heritage.

Appendix 2.

Excerpt from NPS Directive 77, Paleontological Resource Management

<http://www.nature.nps.gov/rm77/paleo/ProgramGuide.cfm#Research>

Although collection will prevent the natural destruction of a fossil specimen, preparation in the lab is often required before the specimen is available for scientific evaluation and study. Fossil preparation is a specialized sub-discipline of paleontology and preparation should only be performed by professionals with suitable training. Locality files should be maintained for all specimens collected.

Because of the wide range of preparation techniques and the ever-changing list of consolidants and preservatives used in paleontology, detailed preparation records should be kept whenever possible. All preparation techniques and methods should be recorded and retained as part of the museum records. Refer to the NPS Museum Handbook, Part II, Chapter 3, for guidance. Such data will be invaluable to those undertaking future preparation and long-term conservation of these specimens.

Appendix 3.

Society of Vertebrate Paleontology (SVP) Constitution Article 2. Purpose Section 1. Mission

The purpose of this Society shall be to:

1. advance the science of vertebrate paleontology throughout the world;
2. serve the common interests and facilitate the cooperation of all persons concerned with the history, evolution, ecology, comparative anatomy and taxonomy of vertebrate animals, as well as the field occurrence, collection and study of fossil vertebrates and the stratigraphy of the beds in which they are found;
3. support and encourage the discovery, conservation, and protection of vertebrate fossils and fossil sites;
4. foster the scientific, educational, and personal appreciation and understanding of vertebrate fossils and fossil sites by avocational, student and professional paleontologists and the general public.

Guidelines from the SVP Ethics Committee

Guidelines from the Ethics Education Committee for collecting, documenting and curating fossils —The SVP Bylaws (Bylaw 12, Sections 1-6) state clearly the responsibility of vertebrate paleontologists, and specifically SVP members, to uphold professional standards in the collection, documentation and curation of vertebrate fossils.

Professional standards in collection of fossils include obtaining the proper permits and permissions to conduct fieldwork on public or private lands, whether domestic or foreign. The collection of fossils from field localities includes not only retrieving fossils with care but also documenting their provenance in terms of stratigraphic, geographic, taphonomic and paleoenvironmental information. This approach is important for both professional and amateur paleontologists to follow in collecting scientifically significant fossils, even if the fossils legally remain in private collections for some time. The scientific and educational value of the fossils depends on their contextual information as well as their morphology.

Field data, whether in the form of notebooks, electronic files or any other format, should accompany the fossils collected from public lands (and from private lands if so stipulated) to their deposition in a qualified, publicly accessible repository. This means that original field data (or a legible copy of it) must become part of the deposited fossil collection. Fossils and their contextual data must be accessioned and curated in an institution, the mission of which is scientific study and education in perpetuity. Fossils should be accessioned in a timely manner.

Curation entails the proper housing and labeling of fossils, as well as maintaining the association between the fossils and field data about their provenance. This information must be made available to the scientific community and the interested public within a reasonable period of time.

Schedule of Events – Wednesday Evening, April 20 – Elevations *Opening Reception/Poster Session*

6:00 PM

Adam Behlke

ANALOG FOR FOSSIL PREPARATION: AN UPDATE TO PREVIOUS REPORTS ON TRAINING WITH COMMON MATERIALS

Calla Carbone, Darren Tanke, and Amy Kowalchuk

A USEFUL SCRATCH-BUILT WHEELED HANDCART FOR TRANSPORTING MEDIUM-SIZED LOADS OUT OF THE FIELD

Patrick Kline, Margie Kline, and Angela Osen

PALEONTOLOGY LABORATORY EQUIPMENT, MATERIAL, AND METHODS FOR UTILIZING ULTRAVIOLET LIGHT IN FOSSIL PREPARATION

Ian McDonald and Ian Morrison

DRAINING LAKE TRICERATOPS: UNIQUE CHALLENGES OF EXCAVATING A WATERLOGGED DINOSAUR QUARRY

Lorna O'Brien and Tyler Eddy

SOLUTIONS TO THE INCREASED NEED FOR ELECTRICAL AND AIR SERVICES IN THE ROYAL TYRRELL MUSEUM OF PALAEONTOLOGY'S LARGE PREPARATION LABORATORY

Michelle Pinsdorf, Steve Jabo, Pete Kroehler, Matthew Miller, Deb Wagner, Alan Zdinak, and Aaron Giterman

ARMATURES OLD AND NEW FOR VERTEBRATE FOSSIL MOUNTS IN THE FOSSIL HALLS OF THE NATIONAL MUSEUM OF NATURAL HISTORY

Rhian Russell

STABILIZATION OF AN OVER-PREPARED *BRACHYLOPHOSAURUS CANADENSIS* FOR LONG TERM DISPLAY

Rebecca Sanchez, David Lloyd, and Brandon Strilisky

STORAGE SOLUTIONS: THE PERPETUAL PROBLEM OF PALAEONTOLOGY

Allison Vitkus and Nicole Ridgwell

FINDING HOMES FOR FOSSIL FOOTPRINTS: STORAGE SOLUTIONS IN THE UNIVERSITY OF COLORADO MUSEUM OF NATURAL HISTORY FOSSIL COLLECTION

Hors d'oeuvres

Domestic Cheese Board – Cheddar, Swiss, Provolone, Pepper Jack, Dill Havarti, Goat, with Grapes, Assorted Crackers, Crostini & French Bread

Italian Platter – Prosciutto Ham, Salami, Pepperoni, Olives, Pickled Onions, Provolone & Parmesan Cheese, with Artichokes, Roasted Asparagus, Stuffed Grape Leaves, Mild Peppers, Balsamic Mushrooms, Bread Sticks

Fondue Platter – Cheese, Crab & Artichoke Spinach Dip, Apple, Assorted Vegetables, Artisan Bread, Herb Crostini

Full Cash Bar

Schedule of Events – Thursday Morning, April 21 – Park Platform Presentations

8:45	Welcome/Announcements
9:00	JP Cavigelli USING A TRIPOD AND CHAIN HOIST TO MOVE HEAVY JACKETS
9:15	Ben Borkovic and Joe Sanchez THE MOULDING AND CASTING OF THREE MULTI-SPECIFIC DINOSAUR TRACKWAYS FROM ALBERTA TO MITIGATE FLOOD RISK TO FOSSIL SITES, WITH TIME-LAPSE VIDEO OF THE CASTING PROCESS
9:30	Joe Sanchez and Ben Borkovic WADING THROUGH HISTORY – FOSSIL HUNTING ALONG RIVERS AFFECTED BY THE 2013 SOUTHERN ALBERTA FLOOD
9:45	Darren Tanke SUCCESSFUL USE OF A POWERED CONCRETE WIRE SAW TO SUBSTANTIALLY REDUCE MASSIVE SANDSTONE BLOCKS CONTAINING BOTH HALVES OF A LATE CRETACEOUS HADROSAUR SKULL COLLECTED FROM SPIRIT RIVER, NW ALBERTA, CANADA
10:00	Emily Frampton CONSULTING PALAEOLOGY IN ALBERTA, CANADA: AN OVERVIEW OF THE PROCEDURES, FIELD METHODS AND RESULTS OF PALAEOLOGICAL ASSESSMENT FOR INDUSTRY
10:15	Matthew A. Brown RULES, RULES, RULES: FOSSILS AND THE LAW
10:30	BREAK
11:00	Claudine Bugnon, Oulfa Belhadj, Aude-Laurence Pfister, Rudolf Stokar, Véronique Rouchon TESTING ACIDIC TREATMENTS FOR USE ON FOSSIL FISHES FROM THE LADINIAN SCALTRICH BEDS OF MONTE SAN GIORGIO, SWITZERLAND
11:15	Carrie Herbel THE IMPORTANCE OF INSTITUTION SPECIFIC MANUALS
11:30	Christina Lutz and Marilyn Fox A CASE STUDY IN MICRO-EXCAVATION: SMALL CRITTERS FROM PETRIFIED FOREST NATIONAL PARK
11:45	Amy Davidson TWO REPORTS: A CONFERENCE ON VOLATILE BINDING MEDIA (CYCLODODECANE AND MENTHOL) AND DETERIORATION OF POLYETHYLENE FOAM BY FLUORESCENT LIGHT AT THE AMERICAN MUSEUM OF NATURAL HISTORY
12:00-1:30	LUNCH (on your own)

Schedule of Events – Thursday Afternoon, April 21

Workshops and Round Table Discussions

1:30 – 3:00	Session 1 – Session assignment is indicated on the reverse of the name badge.
	Air Abrasion Organizer: Mike Eklund Location: Fountain Creek
	Cavity Mounts 101: Thinking Inside the Box Organizer: Alan Zdinak Location: Cherry Creek
	Friends Don't Let Friends Keep Bad Data Organizer: Angella Thompson Location: Cripple Creek
	Field and Jacketing Techniques Organizer: Tylör Birthisel Location: Park
	Making Complex Molds Organizer: Marilyn Fox and Adam Belhke Location: Teller
	Vendors and Exhibitors Location: Pueblo
3:00 – 3:30	BREAK
3:30 – 5:00	Session 2 – Session assignment is indicated on the reverse of the name badge.
	Microscopy 101: Step Away from the Optivisor Organizer: Matthew A. Brown Location: Fountain Creek
	Inherent Vices Organizer: Lisa L. Herzog Location: Cherry Creek
	Basic Preparation Techniques Organizers: Steve Jabo and Matthew E. Smith Location: Cripple Creek
	Institutional Advocacy Organizer: Chris Sagebiel Location: Park (1/2)
	Volunteer Round Table Discussion Organizer: Vanessa Rhue and Matthew T. Miller Location: Park (1/2)
	Conservation Principles Organizer: Gregory Brown Location: Teller
	Vendors and Exhibitors Location: Pueblo

Schedule of Events – Thursday Evening, April 21 – Elevations *Trivia Night*

Fossil Craft Beer Company has generously donated the beer for tonight's event.

Two complimentary drink tickets are provided in your registration packet. They can be used for beer, wine, or soda. Drinks will also be available for purchase for those extra thirsty registrants.

Limited Snacks (not meant to replace evening meal)
Street Taco Bar



Please form teams. The trivia team to correctly answer the most paleontology-based trivia questions will win a prize.

Schedule of Events – Friday Morning, April 22 – Park Platform Presentations

8:45	Welcome/Announcements
9:00	Thomas Nolan HAND-ARM VIBRATION SYNDROME
9:15	Robert Evander PATHOLOGY AND THE SKILLED HANDS OF PREPARATORS
9:30	Matthew T. Miller, Kathy Hollis, Steve Jabo, Pete Kroehler, Amanda Millhouse, Michelle Pinsdorf, and Deborah E. Wagner DECONSTRUCTING THE NATIONAL FOSSIL HALL AT THE NATIONAL MUSEUM OF NATURAL HISTORY
9:45	Michelle Pinsdorf, Kathy Hollis, Amanda Millhouse, Christyna Solhan, and Siobhan Starrs VISITOR ACCESS AND INCIDENT REPORTING POLICIES FOR SPECIMEN SAFETY IN PALEONTOLOGY EXHIBIT SPACES
10:00	Lee Hall, Amanda McGee, and Michael Ryan CRUISIN' THE DEVONIAN HIGHWAY: THE 50 TH ANNIVERSARY OF THE I-71 DIG
10:15	Mike Getty DEVELOPING A NEW MULTI-USE LAB AT THE DENVER MUSEUM OF NATURE & SCIENCE, LARGELY DESIGNED AND CUSTOMIZED FOR THE PREPARATION OF VERY LARGE VERTEBRATE PALEONTOLOGICAL SPECIMENS
10:30	BREAK
11:00	Tylor Birthisel OVERCOMING CHALLENGES WITH GROWING AND MAINTAINING A PALEONTOLOGY LAB VOLUNTEER PROGRAM
11:15	Alan Zdinak TOP TEN TIPS FOR MAKING PREP INSTRUCTIONAL VIDEOS
11:30	Chris Sagebiel MODERNIZING DATA MANAGEMENT AND ARCHIVES FOR THE TEXAS VERTEBRATE PALEONTOLOGY COLLECTION: ADVENTURES IN FORENSIC COLLECTIONS MANAGEMENT
11:45	Marilyn Fox, Acting President/Vice President AMMP BUSINESS MEETING
12:00-1:30	LUNCH (on your own)

Schedule of Events – Friday Afternoon, April 22nd

Workshops, Round Table Discussions, Tours

1:30 – 3:00

Session 1 – Session assignment is indicated on the reverse of the name badge.

Complete Air Abrasion: From Setup to Fossil Finish

Organizer: Mike Eklund

Location: Fountain Creek

Cavity Mounts 101: Thinking Inside the Box

Organizer: Aaron Giterman

Location: Cherry Creek

Professional Development Round Table Discussion

Organizer: Matthew A. Brown

Location: Cripple Creek

Backing Methods and Materials

Organizer: Marilyn Fox

Location: Park

Choosing an Adhesive: Case Studies

Organizer: Amy Davidson

Location: Teller

Vendors and Exhibitors

Location: Pueblo

3:00 – 3:30

BREAK

3:30 – 5:00

Session 2 – AMMP Committee signup sheets are located at the AMMP exhibitor table.

TBD Committee Meeting

Organizer:

Location: Fountain Creek

TBD Committee Meeting

Organizer:

Location: Cherry Creek

TBD Committee Meeting

Organizer:

Location: Cripple Creek

TBD Committee Meeting

Organizer:

Location: Park

TBD Committee Meeting

Organizer:

Location: Teller

Vendors and Exhibitors

Location: Pueblo

Schedule of Events – Friday Evening, April 22

Closing Banquet/Silent Auction

- 6:00** **Silent Auction Viewing and Bidding Open**
 Full Cash Bar Open
- 7:00** **Silent Auction Officially Ends**
 Pens Down
 Winning Bids to Cashier for Payment
- 7:30** **Dining Begins**

Banquet Menu

Salads

Mixed Field Greens ~ Ranch and Raspberry dressing

Boston Bib Salad ~ Grilled Pear, Gorgonzola Cheese, Pickled Red Onion, Pecan Vinaigrette

Entreés

Flatiron Steak ~ Smoked Cheddar Mashed Potatoes, Caramelized Onion, Bourbon Demi Glaze

Herb Roasted Breast of Chicken ~ Carrot Parsnip Mashed Potatoes, Stewed Vegetables, Sage Jus

Roasted Vegetable Gnocchi ~ Portobello Mushrooms, Scallions, Mild Alfredo Sauce

Desserts

Cider Poached Apple ~ Candied Walnuts, Bourbon Syrup

Chocolate Torte ~ Espresso Cream

Schedule of Events – Friday Evening, April 22 – Elevations *Closing Banquet/Silent Auction – Cont'd*

8:30-9:00 **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.

New Award Announcement

Proceeds from this year's silent auction will assist in funding the **Russell 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 AMMP membership, complementary registration, and a stipend to help support travel to present at the AMMP annual meeting. 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, committee reports

Entertainment

René Hernandez, Harmonica

Schedule of Events – Saturday, April 23

Field Trips

7:30 AM	Transportation will arrive outside the hotel.
8:00 AM	<p>All field trips depart from Host Hotel at 8:00AM SHARP!</p> <p><i>Your field trip assignment is indicated on the reverse of your name badge.</i></p> <p>Your chosen lunch will be provided on all field trips</p> <p><u>FIELD TRIPS</u></p> <p>1. Comanche National Grasslands Field Trip Organizers: Steve Miller and Thomas Nolan</p> <p>2. Denver Museum of Nature & Science Field Trip Organizers: Joe Sertich, Mike Getty, and Adam Belhke</p> <p>3. Morrison Natural History Museum Field Trip Organizer: Matthew Mossbrucker</p> <p>4. Pueblo/Cañon City Field Trip Organizers: Bob Odien and Chris Rudnick</p>
6:00 PM	Approximate scheduled return to hotel. Actual time may vary slightly.

Thursday Afternoon, April 21

Workshop and Round Table Descriptions

BASIC PREPARATION TECHNIQUES

Organizer: Steve Jabo and Matthew E. Smith

Location: Cripple Creek

Session: 2

So, you have a fossil and need to prepare it – what do you do? In this roundtable workshop, we will discuss and demonstrate how to get started with basic manual, microscopic, and aircscribe preparation strategies and methods. The topics covered will be:

- Approaching and planning the work
- Health and safety protocols
- Proper specimen support
- Tool handling and basic tool maintenance
- Ergonomics
- Considerations for consolidation and repair

We will also discuss which of the preparation competencies come into play for each topic and why. In addition, there will be a Q&A session for specific preparation case studies from the attendees.

CAVITY MOUNT 101: THINKING INSIDE THE BOX

Organizers: Alan Zdinak

Location: Cherry Creek

Session: 1

Cavity mounts are an increasingly popular strategy for housing small to medium sized fossils. This workshop will introduce you to the materials, tools and critical thinking skills necessary to execute a museum quality cavity mount. We'll focus on basic cavity mount design, and explore optional methods and more complex housing problems and solutions.

This workshop involves the use of sharp knives. Neither workshop leaders, conference organizers, nor the host venue will be liable for any injuries.

COMPLETE AIR ABRASION: FROM SETUP TO FOSSIL FINISH

Organizer: Mike Eklund

Location: Fountain Creek

Session: 1

Air abrasion is a fossil preparation technique that has been in use for well over 100 years. This technique has, at times, an unparalleled ability to remove obscuring matrix down to the smallest detail without the normal risk of mechanical pressure or damaging vibration that air scribing or even pin vising can introduce. Unfortunately, air abrasion is often misunderstood and implemented in a manner which puts the users health and the specimen at risk of harm. This workshop will address workstation ergonomics, safe air handling, proper magnification, understanding different air abrasion machines as well as the different types of powders available. Live video under magnification will be incorporated to demonstrate the core principles of proper modern technique and tactics.

Thursday Afternoon, April 21

Workshop and Round Table Discussion Descriptions – cont'd

CONSERVATION PRINCIPLES AND PALEONTOLOGY

Organizer: Gregory Brown

Location: Teller

Session: 2

What actually causes damage to fossils collections? What can you do to prevent it? Understanding the agents of deterioration and the proper application of preventative and remedial conservation principles will allow you to make reasoned and appropriate decisions regarding how you treat the paleontology specimens in your care. Relying on word of mouth, advertising claims or anecdotal tradition puts your collections, and the data they preserve, in jeopardy. If you think you know what to do, but not why, it's time to brush up on some basic principles of conservation!

FIELD AND JACKETING TECHNIQUES

Organizer: Tylör Birthisel

Location: Park

Session: 1

This workshop takes a look at common tools and techniques used in fossil excavation including the creation of field jackets. Proper opening techniques and safety practices will also be demonstrated and explained. Open discussion into the groups personal techniques during the workshop will be encouraged.

FRIENDS DON'T LET FRIENDS KEEP BAD DATA

Organizer: Angella Thompson

Location: Cripple Creek

Session: 1

Since the National Science Foundation announced an initiative to increase accessibility to biological collections, much work has been done to assist museums reach this goal. Seeing statistics available from GBIF, iDigBio and VertNet, some of us are able to leverage these numbers while others are left wondering where to start, or how to improve. In this workshop, participants will learn to use tools organize their historic data, how to upload data into a database, and create digital datasets for the web. Also covered will be image handling, recording preparation actions and how to use metadata as a to way help others discover relevant data about your work. Computers are required for this workshop. Participants will be given software to install and should have completed the installation process before the start of the workshop. Software used in this workshop will be a preformatted version of the Specify database, OpenRefine, and a tool for bulk-addition of image metadata.

INHERENT VICES

Organizer: Lisa L. Herzog

Location: Cherry Creek

Session: 2

Inherent vice is the tendency in physical objects to deteriorate because of the fundamental instability of the components of which they are made, as opposed to deterioration caused by external forces. [Wikipedia] Some fossils, particularly those affected by pyrite decay and salts, are more prone to deterioration. This workshop will discuss the causes of this instability and methods to control it.

Thursday Afternoon, April 21

Workshop and Round Table Discussion Descriptions – cont'd

INSTITUTIONAL ADVOCACY ROUND TABLE DISCUSSION

Organizer: Chris Sagebiel

Location: Park

Session: 2

Volunteers devote their time, energy, and talent to improving fossil collections across the nation and the globe. Many institutions invite volunteers to assist staff in a variety of tasks from collecting fossils in the field, to preparing and conserving them in the laboratory, to cataloging and managing data records in an office. Regardless of the task assigned, each volunteer helps to make a lasting difference in the care of fossils held in public trust.

Join us for a round table discussion aimed at networking and supporting volunteers. Whether you just started volunteering last week or at the beginning of the Cenozoic, we invite you to share with us your wisdom and experiences. This guided discussion will also be applicable to those wishing to start a volunteer program at their home institutions. Time permitting we'll touch on the subjects of volunteer training, workflow, skill set assessment, and educational resources. You are also encouraged to bring your own questions for the group!

MAKING COMPLEX MOLDS

Organizers: Marilyn Fox and Adam Belhke

Location: Teller

Session: 1

Moldmaking is a skill required of the competent preparator and yet is one of the most difficult skills to master. Complex, multi-part molds are often undertaken by inexperienced preparators; sometimes to the detriment of the specimen. Because of the time intensive nature of complex mold making (requiring several days for one mold), training has been limited to either on-the-job training or workshops that teach only simple molding techniques. This workshop will attempt to clarify choices and concepts through a combination of PowerPoint and pre-made examples showing the steps and the thought processes involved in creating a variety of complex molds. Participants will leave with an understanding of the concepts necessary for safely creating complex molds and handouts describing techniques as well as samples of materials used in this type of moldmaking.

MICROSCOPY 101: STEP AWAY FROM THE OPTIVISOR

Organizer: Matthew A. Brown

Location: Fountain Creek

Session: 2

Every interaction with fossil specimens is associated with a high risk of damage, perhaps none more so than during the preparation process. During preparation, specimens are subjected to mechanical and chemical alteration, and are frequently broken unintentionally during handling. The use of binocular microscopes is common during documentation and research phases of paleontology, but is less reliably part of standard laboratory practice. Inexpensive microscopes dramatically improve the quality of preparation, and should be considered a necessary component of the preparator's workstation.

Thursday Afternoon, April 21

Workshop and Round Table Discussion Descriptions – cont'd

VOLUNTEER ROUND TABLE DISCUSSION

Organizers: Vanessa Rhue and Matthew T. Miller

Location: Teller

Session: 2

Volunteers devote their time, energy, and talent to improving fossil collections across the nation and the globe. Many institutions invite volunteers to assist staff in a variety of tasks from collecting fossils in the field, to preparing and conserving them in the laboratory, to cataloging and managing data records in an office. Regardless of the task assigned, each volunteer helps to make a lasting difference in the care of fossils held in public trust.

Join us for a round table discussion aimed at networking and supporting volunteers. Whether you just started volunteering last week or at the beginning of the Cenozoic, we invite you to share with us your wisdom and experiences. This guided discussion will also be applicable to those wishing to start a volunteer program at their home institutions. Time permitting we'll touch on the subjects of volunteer training, workflow, skill set assessment, and educational resources. You are also encouraged to bring your own questions for the group!

Friday Afternoon, April 22

Workshop, Round Table Discussion, and Tour Descriptions

AMMP COMMITTEE MEETINGS

Location: Various rooms

Session: 2

These spaces will be available on a first-come, first-served basis for newly-formed committees to meet and discuss their agendas. Sign-up sheets will be available during the meeting at the AMMP exhibitor table.

BACKING METHODS AND MATERIALS

Organizer: Marilyn Fox

Location: Park

Session: 1

Many delicate fossils require extra permanent support to prevent breakage. On large specimens, this can be done with external supports, such as support jackets and bone bandages. However, there are techniques to add structural support to small and delicate specimens that are simple and almost invisible. Reemay, mulberry, and kozo papers, and thin fiberglass are all archival materials that can be used. Pre-gluing, drying, and re-activating with heat or solvents are methods that make application simpler. These methods will be demonstrated with hands-on examples. Participants will leave with a sample pack of materials.

BEHIND THE SCENES TOURS: FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

Organizers: Conni O'Connor

Location: Florissant, CO

Sessions: 1 and 2

Florissant Fossil Beds National Monument was established in 1969 to protect one of the world's rare lagerstätten. The Florissant Formation is home to ~1,800 different species of flora and fauna (mostly plants and insects). In 2013, a new visitor center was unveiled to the public. This tour will cover the new collections area, preparation lab, and exhibits (if time allows).

**The shuttle will leave from the hotel at 12:30PM sharp! Please plan your lunch accordingly.*

BEHIND THE SCENES TOUR: ROCKY MOUNTAIN DINOSAUR RESOURCE CENTER

Organizers: Anthony Maltese

Location: Woodland Park, CO

Session: 1 and 2



The Rocky Mountain Dinosaur Resource Center is a museum devoted to dinosaurs and fossils, and a working preparation, molding, casting, and mounting lab. Visitors will also see preparators working on the latest discovery – fresh from the field.

**The shuttle will leave from the hotel at 12:30PM sharp! Please plan your lunch accordingly.*

CAVITY MOUNT 101: THINKING INSIDE THE BOX

Organizers: Alan Zdinak

Location: Cherry Creek

Session: 1 and 2

Cavity mounts are an increasingly popular strategy for housing small to medium sized fossils. This workshop will introduce you to the materials, tools and critical thinking skills necessary to execute a museum quality cavity mount. We'll focus on basic cavity mount design, and explore optional methods and more complex housing problems and solutions.

This workshop involves the use of sharp knives. Neither workshop leaders, conference organizers, nor the host venue will be liable for any injuries.

Friday Afternoon, April 22
*Workshop, Round Table Discussion, and Tour Descriptions –
cont'd*

CHOOSING AN ADHESIVE: CASE STUDIES

Organizer: Amy Davidson

Location: Teller

Session: 1

What is the best adhesive or consolidants for your particular specimen? Usually the answer to this question is “it depends”. And often “there is more than one way to skin a cat”! In this 1.5-hour workshop various specimens, preparation tasks and problems will be presented for guided group discussion. The goals will be to articulate:

- Why is an adhesive or consolidant necessary and what it needs to do?
- Which one to choose and why it is the most appropriate?
- How should it be applied?
- Other considerations

Case studies will include:

- Adhesive joins on very tiny and also very large specimens
- Adhesive join of thin bones with minimal surface contact
- Consolidation of very porous bones with and without supporting matrices
- Consolidation of fragile bones in exploded and otherwise unstable matrices
- Consolidation in wet conditions
- Applying coatings for molding

COMPLETE AIR ABRASION: FROM SETUP TO FOSSIL FINISH

Organizer: Mike Eklund

Location: Fountain Creek

Session: 1

Air abrasion is a fossil preparation technique that has been in use for well over 100 years. This technique has, at times, an unparalleled ability to remove obscuring matrix down to the smallest detail without the normal risk of mechanical pressure or damaging vibration that air scribing or even pin vising can introduce. Unfortunately, air abrasion is often misunderstood and implemented in a manner which puts the users health and the specimen at risk of harm. This workshop will address workstation ergonomics, safe air handling, proper magnification, understanding different air abrasion machines as well as the different types of powders available. Live video under magnification will be incorporated to demonstrate the core principles of proper modern technique and tactics.

PROFESSIONAL DEVELOPMENT ROUND TABLE DISCUSSION

Organizer: Matthew A. Brown

Location: Cripple Creek

Session: 2

Typical fossil preservation and collection involves the stabilization and remediation of bony remains. Field methods are tailored to this type of collecting and many individuals are not prepared or aware of proper collecting strategies appropriate for encounters with soft tissue remains or sample purity for future molecular analysis. This workshop will be an overview of molecular-analysis techniques and strategies for fossil specimens. These types of methods are gaining ground in paleontological analysis and are part of an overall base knowledge in materials and methods in paleontology.

Field Trip Descriptions

COMANCHE NATIONAL GRASSLANDS

Field Trip Organizers: Steve Miller and Tom Nolan

- ☒ Introduction to the rocks and fossils of the Greenhorn Cyclothem as exposed in the Comanche National Grassland of southeastern Colorado
- ☒ Overview of the history of the area by looking at a homestead built of fossiliferous rocks on the remote prairie
- ☒ Overview of the history of geological and paleontological knowledge by looking at influential maps and documentation as they relate to the area
- ☒ Produce replicas of track fossils from the Dakota Sandstone using the collapsible foam method described by Nolan, et.al. in *Proceedings of the First Annual Fossil Preparation and Collections Symposium*, 2009



Sponsored in part by the Western Interior Paleontological Society (WIPS)



Field Trip Descriptions – cont'd

DENVER MUSEUM OF NATURE & SCIENCE

Field Trip Organizers: Joe Sertich, Mike Getty, and Adam Behlke

8:00am Depart Colorado Springs from DoubleTree hotel

9:30am Arrive at Denver Museum of Nature & Science front entrance, met by Joe Sertich, Mike Getty, and Adam Behlke

Welcome and introductions in Museum's West Atrium (participants can leave coats, non-valuable personal items in Harry T. Lewis Room on 3rd floor)

10:00am-12:00pm Fieldtrip Group will be split into two smaller groups (*check the reverse of name badge for group designation*):

Group 1: Tour of existing collections spaces, then the new Avenir Collections Center with Joe Sertich



Group 2: This group will split for 1-hour tours of preparation spaces.

- Group 2a will start with Mike Getty in the new Oversize Preparation Lab.
- Group 2b will start with Adam Behlke in the Schlessman Family Earth Sciences Lab, then follow Adam to the Oversize Preparation Lab to switch.

12:00pm-1:00pm Lunch in the Harry T. Lewis Room, 3rd Floor, West Atrium.

1:00pm-3:00pm Fieldtrip groups will switch.

Group 1: This group will split for 1-hour tours of preparation spaces.

- Group 1a will start with Mike Getty in the new Oversize Preparation Lab.
- Group 1b will start with Adam Behlke in the Schlessman Family Earth Sciences Lab, then follow Adam to the Oversize Preparation Lab to switch.

Group 2: Tour of existing collections spaces, then the new Avenir Collections Center with Joe Sertich

3:00-4:30pm Entire group is free to visit the Prehistoric Journey exhibit on the 3rd Floor or other exhibits and Museum Gift Shop.

Interested participants can meet Adam Behlke in the South Atrium at 3:15pm for a brief tour of the new Molding and Casting lab (maximum 10).

4:30pm Depart from DMNS

Field Trip Descriptions – cont'd

MORRISON MUSEUM OF NATURAL HISTORY

Field Trip Organizer: Matthew Mossbrucker

8:00am Depart Colorado Springs from DoubleTree hotel

9:00am Arrive at Morrison Natural History Museum (MNHM) main entrance.

10:00am- 11:00am Orientation at Red Rocks Park – A short walk that introduces participants to the geologic setting of the west Denver Basin, focusing on the Morrison Formation and the historic and modern investigations on the ridge known as the Dakota Hogback.

11:15am - 12:00pm “Saurian 5” visit – Participants will be acquainted with the sandstone site that produced the original type specimen for Stegosaurus. Historic collection methods will be discussed, along with a modern interpretation of the depositional environment.

12:15pm - 1:00pm Lunch at Morrison Natural History Museum

1:15pm - 2:00pm “Clay Saurian No. 10” visit – conditions permitting

2:15pm - 3:00pm Brief tour through MNHM & preparation lab – Participants will be introduced to the materials and methods MNHM staff employs to prepare difficult sandstone from fragile bone. This unique, accessible space also allows for meaningful informal science education.

3:00pm - 4:30pm Free time to explore MNHM & walk trails

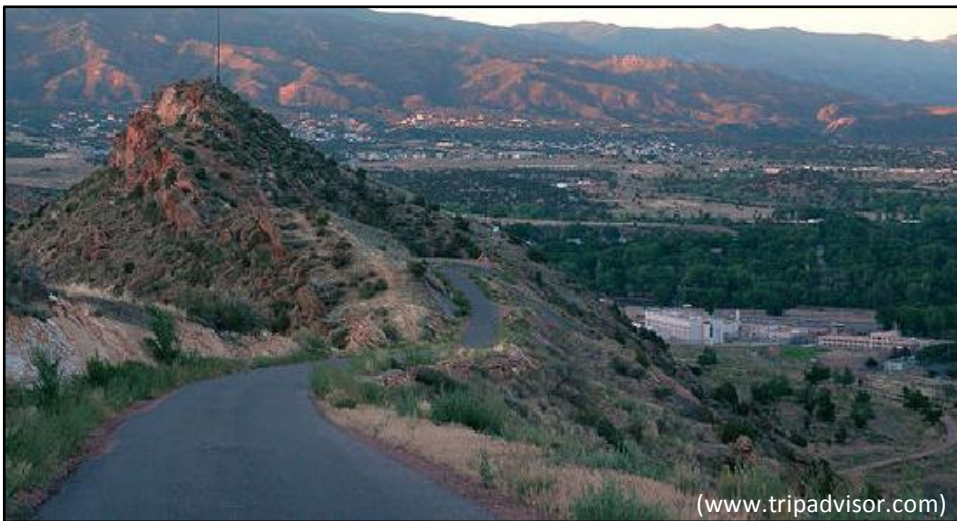
4:30pm Depart from Morrison



PUEBLO/CAÑON CITY

Field Trip Organizers: Bob Odien and Chris Rudnick

- ☒ Visit the Garden Park Fossil Area – Cleveland Quarry and Marsh Quarry
- ☒ Visit Skyline Drive
- ☒ Collect fossils at Baculite Mesa near Pueblo



← Skyline Drive

Baculite Mesa →



Abstracts: Barnett - Behlke

FOSSIL PREPARATION IN A SMALL LAB: A CASE STUDY OF PREPARATOR TRAINING AT THE STERNBERG MUSEUM OF NATURAL HISTORY IN HAYS, KANSAS

Jessica Barnett

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The process of fossil preservation is exhaustive, meticulous, and demands knowledgeable specialists. In small museums, the preparation staff can often be limited by the absence of tools, funds, and experience. Although online resources are available, it can be difficult for novice preparators to find information in a single location. This case study highlights the development and field-testing of preparatory resources to train novice students at the Sternberg Museum of Natural History. The Sternberg Museum has a backlog of fossils requiring preparation and a need for volunteers trained in fossil preparation, making it an ideal location. At the start of training, student volunteers were provided with a workbook containing guidelines, common mistakes, and tips on preparatory techniques. A teaching manual was also compiled, detailing lesson plans to guide the trainer through a series of workshops and pedagogical techniques for training different types of volunteers. Over the course of four two-hour sessions, students learned techniques for assessing fossils and their matrix, how to determine the appropriate tools to use for any given sample, proper use of materials and tools (including hand and pneumatic), and molding and casting techniques. The students were also given a list of resources if they had questions and the lab manager was not available. Qualitative skill assessments were based on final prepared specimens, knowledge of methods, and a self-assessment at the end of the fourth session. At the completion of all sessions, students were able to satisfactorily prepare a variety of specimens. The course material successfully trained the beginnings of a preparation corps of volunteers for the Museum and allowed for greater engagement with the public by more consistently populating the preparation laboratory. The simplistic and methodical nature of the materials produced educated students with ample time for practice, assessment, and improvement. The versatility and scope of the materials provide an easily downloadable and free resource for museums of any size to train and educate new preparators in proper fossil preparation techniques.

ANALOG FOR FOSSIL PREPARATION: AN UPDATE TO PREVIOUS REPORTS ON TRAINING WITH COMMON MATERIALS

Adam Behlke

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Fossil preparation is an acquired skill. It takes time to teach new preparators mechanical preparation techniques. During their training, a new preparator will likely mar the surface of a fossil as they hone their fine motor skills and hand-eye coordination. As each fossil is unique, standardization and objective assessment of the skill and competency of each new preparator as they learn the techniques is difficult.

To obtain standardization, I investigated a method to teach fossil preparation to new preparators with non-fossil materials. I presented a preliminary version of this technique at previous AMMP and SVP conferences, where I used pieces of wood in plaster of Paris as an analog for a fossil in matrix. Through helpful discussions at those conferences, I refined the techniques to the final product discussed below.

I developed a simulated fossil in a chalk matrix (e.g., Niobrara Formation) with materials found in most hardware stores; terra cotta pots, black enamel spray paint, petroleum jelly, and plaster of Paris. Broken

pieces of terra cotta pots act as the “fossil”. A coating of black spray paint provides a high contrast coating that scratches easily to identify damage to the “fossil”. A light coating of petroleum jelly seals the terra cotta and provides separation between the terra cotta and the plaster of Paris. A thicker coat of petroleum jelly produces a thicker layer of separation. Plaster of Paris acts as the “matrix”. I mixed a small batch of plaster of Paris and pushed in the “fossil”. Once the plaster of Paris dried, we have a little bit of black “fossil” poking out of the “matrix”.

This fossil analog works well to teach new preparators to use small hand tools like pin vises and dental tools. The addition of sand to the plaster alters the matrix sufficiently to facilitate training on aircsribes. With the high contrast between the orange terra cotta and black paint, the new preparator receives constant feedback on the development of their skills. Using inexpensive and readily available materials, any lab can provide a consistent means to assess the abilities of their new preparators without the destruction of priceless fossils.

OVERCOMING CHALLENGES WITH GROWING AND MAINTAINING A PALEONTOLOGY LAB VOLUNTEER PROGRAM

Tylör Birthisel

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Maintaining and growing the paleontology volunteer corps at the Natural History Museum of Utah is essential as volunteers play an integral role in the functioning of the preparation lab. Challenges that arose in the training, retention and guidance of volunteers lead to the development of new programs and approaches to address volunteer needs in the paleontology lab. The issue of volunteer selection has been addressed by reviewing past training classes and experiences. Pre-screenings, interviews and new training regimens have helped to successfully select individuals who are committed and appropriately suited to the lab. Updated training classes that are tailored to specific subjects effectively broaden skills while illuminating each individual's strengths and weaknesses for proper specimen assignment. Unfortunately, no program has full volunteer retention. Observations and inquiries into volunteer loss reveal that volunteers sometimes become frustrated working on a specimen, feel uncomfortable with a particular specimen, or object to the working environment. Establishing new forms of guidance over volunteers has been a key implementation for better volunteer retention. Guidance now includes a volunteer mentoring program to aid newer volunteers. In addition, more time is devoted to orienting volunteers to lab protocol and options to customize tools or areas to fit their needs. Overall, a more comfortable environment is established where the work is fun and unpressured. Finally, through closer observations in training, more appropriate specimen assignment has improved volunteer levels of comfort and excitement for the specimen they are preparing. By targeting increased volunteer retention, and adjusting accordingly, participation has grown and stabilized.

Abstracts: Borkovic - Brown

THE MOULDING AND CASTING OF THREE MULTI-SPECIFIC DINOSAUR TRACKWAYS FROM ALBERTA TO MITIGATE FLOOD RISK TO FOSSIL SITES, WITH TIME-LAPSE VIDEO OF THE CASTING PROCESS

Ben Borkovic* and Joe Sanchez

Royal Tyrrell Museum of Palaeontology, Drumheller, Alberta, Canada

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Three multi-specific dinosaur trackways (maximum size 3.5 m x 1.5 m) were moulded in latex rubber in the field and cast in Aqua-Resin at the Royal Tyrrell Museum of Palaeontology. Found on the banks of the St. Mary River in southern Alberta, Canada, under the context of the Southern Alberta Palaeontological Flood Mitigation Project, the trackways are hosted on fallen slabs of sandstone from the Late Cretaceous St. Mary River Formation. The proximity of the slabs to the river posed a flood risk to the trackways so they were moulded in the summer of 2015 and cast in early 2016 in order to preserve a record of the sites and to permit detailed study of the casts under controlled lighting. To create the latex peels the sandstone slabs were gently cleaned before a layer of Chemionics 1000 series water-based latex was applied by dabbing with a paintbrush, and left to cure. Two more layers were applied in a similar manner, and then a fourth layer applied with a double layer of cheese cloth pressed into it before it cured. A final layer of latex was applied and then any large depressions were filled with a blend of latex and vermiculite. Once peeled, the flat latex sheets were rolled and carried out of the field. To create the casts in the lab the latex was unrolled and cleaned, and then sprayed with Mann Release Technologies Ease Release 200. A preparation of Aqua-Resin (L + S3) with milled fibre was applied in three successive layers. The first layer was dabbed on with a paintbrush to prevent trapped air bubbles. Hydrocal FGR-95 Gypsum plaster with chopped strand fibreglass was used to coat fibreglass strips which were laid down under and over light metal pipe and half sections of foam pipe insulator, which were used to strengthen the backing of the casts. Once the latex was peeled away, the Aqua-Resin casts revealed high fidelity replicas of the trackways and slab surface. The entire process of creating one of the casts was recorded with GoPro cameras and a time-lapse video was then created.

RULES, RULES, RULES: FOSSILS AND THE LAW

Matthew A. Brown

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Fossils are subject to a broad range of legislation at national, state, and local levels, and international treaties regulate the transfer of specimens across borders. United States customs officials have increased the seizure of illicit specimens and prosecution of perpetrators in recent years. Federal land management agencies have begun to promulgate new regulations for the collection and curation of fossil resources in accordance with the Paleontological Resources Preservation Act of 2009 (PRPA). While the intent of PRPA was to standardize policies across land management agencies, the legislation was controversial among diverse groups of stakeholders within paleontology. Much of this controversy was based on misinformation or misunderstanding of both preexisting and new laws and regulations. Awareness of the roles and responsibilities of land management agencies is critical to professional, avocational, and amateur paleontologists. The US Forest Service (USFS) response to public comments published alongside the new USFS rules in the Federal Register on 04 April 2015 (taking effect 18 May 2015) serve as an effective primer for better understanding the requirements for research and hobbyist use of resources on public land.

TESTING ACIDIC TREATMENTS FOR USE ON FOSSIL FISHES FROM THE LADINIAN SCELTRICH BEDS OF MONTE SAN GIORGIO, SWITZERLAND

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Acids are commonly used to treat paleontological specimens embedded in calcareous matrices. The behavior of these acids on fossils, however, is still poorly understood. The goal of this research was to improve upon established methods while testing acidic treatments for possible use on fossil fishes from the Sceltrich beds. It was hypothesized that the type of acid and pH value would determine the efficiency of the solution. Therefore, 15 acidic solutions were tested for effectiveness and side effects; pure calcite powder, matrix samples from the Sceltrich beds and fossil fish scales from Angeac-Charente, France, were immersed into acetic, formic, sulfamic, citric and tartaric acid solutions, each at pH 1.5, 2 and 3. When the calcite powder was immersed, dissolution of the powder and effervescence were observed. During immersion of the matrix samples, effervescence and pH variations of the solutions were assessed. Loss of weight, surface alterations and weakening of the matrix were also observed. At the same pH value, formic acid was the most effective at dissolving calcite, followed by acetic and sulfamic acids. Citric and tartaric acids, while also effective, caused calcite to transform into other compounds, namely calcium citrate and possibly calcium tartrate. Effervescence occurred when the fossil fish scales were immersed, which suggests the occurrence of dissolution. Highly acidic solutions caused fragmentation and surface alterations in the scales while low acidic solutions caused color alterations. None of the 15 tested solutions proved to be ideal for use on the fossil material from the Sceltrich beds. However, this study demonstrated that both the type of acid used and the acidity [pH and molarity] of the solution correlate to the effectiveness of the treatment. Most importantly, the pH value of the solution should be closely monitored to determine whether the solution is still effective (the pH increases) or not (the pH remains stable). Choosing the wrong acid at the wrong pH value could cause surface damage and color alteration to the fossil. Finally, any preparators consider that a solution is no longer effective when the effervescence stops. Our experiments showed that dissolution can occur, even if no effervescence is visible.

A USEFUL SCRATCH-BUILT WHEELED HANDCART FOR TRANSPORTING MEDIUM-SIZED LOADS OUT OF THE FIELD

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Hauling medium-sized plaster jackets or other heavy field gear in rugged terrain is a technical issue for field workers everywhere. Devices used to facilitate these actions must be strong enough to handle heavy loads without being so massive that they become onerous to use. Prebuilt devices often do not accommodate these needs. For over a decade, the Royal Tyrrell Museum of Palaeontology has successfully used a custom-built hand cart in the badlands to haul a variety of medium-sized plaster jackets, tools, and supplies. The cart is made from repurposed aluminum scaffold framing, with a simple axle made of half-inch threaded rod clamped to the frame and two pneumatic tires held in place by nuts. It is composed of one main piece of 4.5' (1.4 m) long scaffolding with wheels, with two additional pieces that can be easily inserted and locked with retainer clips to extend the length of the cart, making

Abstracts: Carbone *cont'd* – Carrió

it both travel- and weight-friendly. Fully assembled, it is 12' (3.7 m) long, 2.4' (0.7 m) wide, weighs 46 lb (21 kg), and can carry items roughly eight times its own weight. The cart functions using one or both of the additional sections depending on circumstances and crew size. The use of scaffolding for the frame facilitates the use of ropes to secure items, and provides space for multiple crew members to assist. The design is also highly modifiable to accommodate other needs, as rope can be added for handles and towing, and plywood can be latched on to adjust the frame size for smaller blocks. This cart was successfully used several times in the 2015 field season including the collection of a 330 lb (150 kg) trionychid turtle jacket through roughly 0.6 miles (1 km) of the Alberta badlands, and the transport of equipment to and from a field locality in Southern Alberta. Unusual to look at and seemingly of limited use, this cart is cost-effective, versatile, and has successfully facilitated the transport of several medium-sized blocks and heavy gear out of the badlands.

TETRAPOD WORLD: EARLY EVOLUTION AND DIVERSIFICATION (TW:EED) PROJECT FIELDWORK: CONSOLIDATION OF DAMP SPECIMENS FOR TRANSPORTING USING PRIMAL WS24 AND FABRIC MEDICAL BANDAGES AS FIELD JACKETS

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The Natural Environment Research Council (NERC) funded TW:eed project is a study of fossils and environments from the earliest Carboniferous (350 million years ago) when tetrapods were beginning to move from water onto land. Little is known about this period but recently, a number of sites found in Northumberland and the Borders Region of Scotland, have generated a wealth of fossils, not just tetrapods, but also fish, plants and arthropods. One such site was in the bed of the Whiteadder River near Chirnside and last summer an excavation was carried out there as part of the TW:eed project.

Part of the Whiteadder River was barricaded and pumped out to allow access to the fossiliferous beds. Sedimentary logs, photographs, and a 3D laser scan of the dig site were done prior, during and after the excavation. Slabs from the most significant areas were collected, wrapped and transported back to the museum to be examined and prepared in the lab.

Problems arose as soon as the material was extracted from the wet siltstone. The matrix dried out very quickly and needed to be consolidated immediately to prevent the fossils from crumbling. Primal WS24 (an acrylic copolymer colloidal diluted at 10 to 15 parts water to one part liquid) was used as a consolidant. Fragile pieces were consolidated using different concentrations and reinforced with out-of-date medical bandages saturated with Primal WS24 as jackets to protect the slabs during transportation to the lab. The fabric bandages were faster and simpler to use on the large number of small specimens than conventional plaster jackets, and had less impact on the environment. Acid-free paper, plastazote foam and bubble wrap were used to give extra protection and padding to the material for transportation.

Once in the lab, after the specimen was dried, the bandages were easily removed. Acetone was used to remove the Primal WS24, which is not re-soluble in water. Paraloid B72 at 10/90 w/w in acetone was used to consolidate the material after removal of the bandages.

The specimens we have prepared so far include tetrapod bones, plant fossils and a scorpion. There are still 10 pallets and many more plastic crates full of material to prepare.

USING A TRIPOD AND CHAIN HOIST TO MOVE HEAVY JACKETS

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In the field of paleontology, very heavy jackets occasionally need to be moved, both in the field and in the lab. Helicopters, cranes and other heavy machinery can be used, but tend to be cost prohibitive and/or logistically limiting. The Tate Museum has created a fairly cheap heavy duty tripod used in conjunction with a two-ton chain hoist (less cheap) to help lift jackets that are too heavy or awkward for hand carrying. With the help of Casper College's maintenance team, we used a threesome of street signposts and a homemade head piece. The head piece holds the three legs together and holds the chain hoist in place to lift the jackets. Details of the construction and use have been fine tuned over the years of using this set-up. Safety concerns include (but are not limited to) keeping the legs from spreading or sinking, keeping the whole structure from tipping over, making sure the load is not too much for the system, keeping the area below the load clear, and anticipating potential problems. This system is useful in the field, in the lab and in the museum proper. It is limited by terrain, weight and number of field hands available.

USING JOHN DAY FOSSIL BEDS NATIONAL MONUMENT AS A GUIDE TO FOSSIL PREPARATION RECORD KEEPING

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Data acquisition is fundamental to the science of paleontology. Without accurate data collection, it is not possible to produce accurate scientific results. Preparators play an important role in the collection of information about the specimens they prepare, and therefore keeping detailed preparation records is essential. John Day Fossil Beds National Monument (JODA) has an exemplary method of recording all significant information regarding fossils under preparation. Along with the typical information recorded (i.e., specimen numbers, materials and tools used), the preparator is asked to provide on the preparation record: 1) a detailed description of the condition of the specimen upon receipt; 2) a comprehensive narrative of daily work including date, hours worked, any procedures done to the specimen (including tools, chemicals, methods, and materials), and a description of the area of the specimen that was worked on using correct directional and anatomical terminology; and 3) high resolution photographs, with scale bar, of the specimen at the end of every preparation session. The condition of the specimen upon return is then assessed and recorded by the curator. All written records are typed into a computer and housed with the digital photographs that were taken of that specimen throughout the preparation process. Finally, the record is linked to the Interior Collections Management System database of fossil specimens so that any visiting scientist can pull up and view the preparation record for any specimen they are studying in JODA collections. By providing excellent scientific records, preparators can further demonstrate that they are a vital part of the scientific process.

Abstracts: Davidson - Evander

TWO REPORTS: A CONFERENCE ON VOLATILE BINDING MEDIA (CYCLODODECANE AND MENTHOL) AND DETERIORATION OF POLYETHYLENE FOAM BY FLUORESCENT LIGHT AT THE AMERICAN MUSEUM OF NATURAL HISTORY

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Cyclododecane (CDD) and menthol were the focus of an interdisciplinary conference entitled “Subliming Surfaces: Volatile Binding Media in Conservation”, held in April 2015 in Cambridge, England. CDD has become increasingly useful in fossil preparation despite persistent questions about safety. The author attended this conference in order to present how fossil preparators use CDD to a larger conservation community, to learn how CDD is used in other fields and to gain more information about safety. Of particular interest to fossil preparators were presentations on the extensive use of CDD as a field consolidant in archaeological block lifting and the potential use of menthol as a field consolidant in wet conditions. The presentations on CDD safety can be summarized as follows: CDD is non-poisonous, lipophilic and accumulates in fat cells and the liver. It is safe to use with common sense measures to minimize the cumulative dose by avoiding inhalation, particularly when working with molten CDD. Nitrile gloves are recommended. CDD has a low flashpoint; avoid heating above 80°C (176°F) and use a double boiler for melting.

In January of 2016, a collections staff member discovered extensive embrittlement of polyethylene foam in the Vertebrate Paleontological collections of the American Museum of Natural History (AMNH). The damaged foam is on open shelving under fluorescent light (no windows) and includes two inch Ethafoam plank, 1 inch Plastazote plank and 1/4 inch Ethafoam sheet. While little yellowing is readily observable, the damaged foam crunches and compresses permanently when probed with a finger, and some of the thin foam sheets have developed parallel tears perpendicular to the edge. By probing the foam everywhere on the shelves it became clear that the cause of the damage is exposure to fluorescent light, as the areas masked under specimens and under paper trays sitting on top of the foam are not affected. Deterioration is estimated to have occurred within fifteen years. The problem is currently under investigation by museum conservation staff. Polyethylene foam is commonly used in all types of collections; the AMNH presents this preliminary report as an alert to other institutions.

PATHOLOGY AND THE SKILLED HANDS OF PREPARATORS

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The skilled hands of preparators demonstrate subtle functional anatomy. The lumbrical muscles and the interosseous muscles of the fingers have complex functions within each digit. These tiny intrinsic muscles flex the metacarpophalangeal joints while at the same time extending the proximal interphalangeal and distal interphalangeal joints. In all of these motions, these tiny intrinsic muscles are opposed by large muscles in the forearm. The resulting imbalance predisposes the hand to overuse injuries. One form of overuse injury is tendon or ligament stretching, resulting in such maladies as boutonniere deformity and swan's neck deformity. Such deformities become apparent when one of the fingers will not curl into the palm when making a fist. Fortunately, such injuries respond well to splinting by a qualified hand therapist. Permanent, noninvasive cures are available. Nerve entrapments are more serious overuse injuries that, if left untreated, can lead to permanent disabilities. Fortunately, nerve

entrapments typically demonstrate gradual onset. When identified early, the permanent disabilities can be limited and sometimes avoided. The pathological mechanism of nerve entrapment seems to involve disruption of the blood supply to a peripheral nerve, often at a characteristic location. Both disrupted circulation and nerve pathology are marked by “pins and needles” sensation to the hand and forearm, but disrupted circulation has a generalized distribution, while nerve pathologies have characteristic one-side-of-the-hand distributions. Such ‘pins and needles” sensations may be early warnings of nerve damage, and should not be ignored by preparators who experience them. Finally, overuse injuries can be prevented by avoiding preparation routines that are overtly repetitive. Keep some variety in your work. Prevention is always better than a medical cure. If a medical cure is necessary, move beyond the orthopedic surgeon to whom you will be referred to obtain a second opinion from a neurologist. Ideally, find a qualified hand therapist such as a physiatrist or an occupational therapist to assess your symptoms.

CONSULTING PALAEOLOGY IN ALBERTA, CANADA: AN OVERVIEW OF THE PROCEDURES, FIELD METHODS, AND RESULTS OF PALAEOLOGICAL ASSESSMENT FOR INDUSTRY

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Consulting palaeontology is a legally-required assessment conducted for any activity that has the potential to alter, damage or destroy fossil resources in Alberta. These activities typically include industrial development such as the building of pipelines, roads, bridges, subdivisions, or windfarms. In Alberta, fossils are considered historic resources that are susceptible to modern activities and the effects of time. The non-renewable nature of historic resources has long been recognized, and with the passage of the Historical Resources Act in 1973, the framework and procedures for preserving and studying historic resources were put in place. To conduct a palaeontological assessment, the project is screened using geological and topographical maps to determine fossil resource potential. If the potential is high, a requirement for field studies is issued. This could include a pre-impact survey to determine if fossils occur, a mitigation study to remove any fossils at risk, or salvage of any fossils uncovered onsite during construction. A report of all activities and descriptions of collected fossils is submitted after project completion. Fossils discovered and collected in the course of palaeontological assessments and industrial development have been significant. Field surveys often take consultants to marginal and remote areas that have not been previously examined. Industry development can also create deep excavations that can expose fossils in situ. Large collections of fossils can be made as consultants have industry support in the form of remote camps, helicopters and heavy equipment. A few examples of finds resulting from palaeontological assessment include a mine in northern Alberta yielding a suite of invertebrate fossils, a windfarm in southern Alberta yielding several microsites from an area with few bedrock exposures, and a mine in northwest Alberta yielding the first vertebrate and invertebrate fossils ever from that location. Without palaeontological assessments, none of these fossils would have been identified or collected. As new assessments are conducted, the number of fossils collected and studied can only increase.

Abstracts: Getty - Hall

DEVELOPING A NEW MULTI-USE LAB AT THE DENVER MUSEUM OF NATURE & SCIENCE, LARGELY DESIGNED AND CUSTOMIZED FOR THE PREPARATION OF VERY LARGE VERTEBRATE PALEONTOLOGICAL SPECIMENS

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In 2014 the Denver Museum of Nature and Science finished construction of a new wing, featuring the 63,000 square foot Avenir Collections Center, which includes several new lab spaces to support specimen preparation and artifact conservation. Shortly before the opening of the building, we began plans to develop this space into a multipurpose lab, which we now refer to as our oversize preparation lab. The majority of the space is dedicated to preparation of very large field jackets, which cannot be transported through the museum to our main preparation lab due to constraints on floor loading capacity. Over the past year we have outfitted the lab to accommodate very large specimens in a flexible workspace, where nearly every piece of equipment and furniture is easily movable on casters. Three portable vacuum units with dual hoses provide dust extraction for six customized preparation work stations, while two ceiling mounted extractors provide additional air circulation and filtration to remove fine aerial particulates. Three of the workstations feature customized 4,000 lb capacity lift tables with a working height which ranges from 11-30 inches, which enables us to position specimens of a wide range of sizes and shapes into comfortable working heights for preparation. A 9'x3' 10,000 lb capacity sand box was custom designed by one of our volunteers to handle the construction of support cradles for oversized prepared material for storage in the collection center. Two air-abrasion stations featuring a small and large cabinet and vacuums for dust collection were also set up in the lab, as well as a large sink and drying racks for screen washing matrix for microvertebrate fossils. The lab also includes some storage area for specimens, equipment and necessary supplies. We began preliminary preparation work in the lab in January 2016 and expect it to be fully functional by April 2016.

CRUISIN' THE DEVONIAN HIGHWAY: THE 50TH ANNIVERSARY OF THE I-71 DIG

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2015 marked the 50th anniversary of the initiation of the Interstate 71 (I-71) Project, a large scale paleontological salvage operation conducted by the Cleveland Museum of Natural History in cooperation with the Ohio Department of Transportation between 1965 and 1968. Construction of I-71 uncovered hundreds of vertebrate, invertebrate, and plant fossils from the Cleveland Shale Member (Fammenian) of the Devonian Ohio Shale, which preserves remnants of a shallow to moderately deep, anoxic sea bottom. The project recovered fossils from an area approximately 8.8 km long and several meters wide, and down to a depth of more than 15 m below the surface, making it one of the longest continuous excavations ever undertaken in North America. The vertebrate fossils recovered include arthrodires, sharks, and ganoid fish, many of which are more complete and exhibit anatomical features not previously seen prior to this excavation, including remarkable soft tissue preservation, gut contents, and 3-D cartilaginous elements. Although the total excavation was not precisely mapped, the intensity of the collection program and the large area covered provides one of the best records of the distribution of vertebrate remains along an epeiric sea bottom ever documented. Fifty years hence, much of the collected specimens have been prepared and will be highlighted as part of the museum's Centennial Transformation Project. However, the volume and condition of the I-71 collection presents ongoing

Abstracts: Hall *cont'd* – Herbal - Kline

challenges, both in terms of preparation and collections management. In the mid 1990's several specimens from the Cleveland Shale Member were treated for rampant pyrite disease via combinations of reagent alcohol, methanol, polyvinyl acetate and Butvar, all of which proved ineffective. The long term storage of I-71 specimens in the collection is an ongoing process of pyrite disease mitigation and remediation.

THE IMPORTANCE OF INSTITUTION SPECIFIC MANUALS

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A two-decade long career in the field of fossil preparation has resulted in some suggestions regarding standard laboratory protocol. Instances of missing equipment manuals, lack of institutional protocols, as well as lab design and functionality create challenges to operating safely and efficiently within the lab. The current model of fossil preparation training leads most fossil preparators to become professionals through hands-on experience and word-of-mouth. Because of this 'hand's on' training model, documented institutional information is often lacking. While readily available online sources for general materials and methods can be accessed fairly easily, institution specific guidelines or protocols cannot (e.g., location of main valve that controls airflow). Members of the Association for Materials & Methods in Paleontology strive to improve the standards of our practice. Developing a set of institution specific guidelines is a requisite component of those standards (such as cleaning/repairing a specific air scribe or where to cost-effectively order supplies). Written guidelines should be freely available and easily accessible to volunteers and lab assistants. Providing a quick reference "trouble shooting" list is recommended for emergency situations. Institutional practices should be incorporated in training/information documents. A list of items for laboratory documentation include: Material Safety Data Sheets (MSDS) for all chemicals present in the lab, Occupational Health and Safety Administration (OSHA; or OH&S in Canada) based safety standards applicable to the lab specific operations, disaster plans, and building layout. Each preparation lab is unique, but proper education of co-workers and accommodation for transitions should be at the forefront of maintaining a frustration-free working environment.

PALEONTOLOGY LABORATORY EQUIPMENT, MATERIAL, AND METHODS FOR UTILIZING ULTRAVIOLET LIGHT IN FOSSIL PREPARATION

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In an effort to facilitate and broaden the use of Ultraviolet (UV) lighting techniques in preparation of fossils, several experiments were conducted utilizing various lighting methods and wavelengths from both visible and non-visible light. This research was primarily performed on a nearly complete *Stylomys nebrascensis* tortoise recovered in 1994 and donated to the Heard Natural Science Museum in 2013 for preparation and display. The specimen was collected from the White River Group bentonite sediments of the Brule Formation. The bentonite matrix was a uniform gray color and the fossils contained within were of a similar neutral grey coloration; any contrast between bone and matrix was difficult to discern

Abstracts: Kline *cont'd* - Lutz

under visible light. UV light in the high range (UVA, 395 nanometers [nm]) was found to be most effective and would greatly enhance the quality of fossil preparation. The source of the light was critical when using UV as light emitting diodes (LEDs) produced a focused beam on the specimen that excited the electrons of the matrix and bone in different ways. Incandescent or fluorescent light sources had a minimal effect and were inferior compared to LED illumination. When viewed through UV filter glasses, the matrix absorbed the UV light turning the uniform gray color to a dark brown while the bone reflected the light resulting in a pale blue, nearly white shade. The remarkable contrast in hues gave the laboratory volunteers a valuable resource to use and provided the confidence needed to remove deposits without incurring damage to the fossil. In addition to the initial research on the White River specimens, further experiments have concluded that the benefits of UV light during preparation also extends to other specimens within clay composition deposits. Any exposure to additional UV light can be harmful and although we are working with UVA at very low wattage (3 watts) and limit our UV sessions to four hours, each preparator is required to wear gloves and UV filter glasses (ANSI standard Z87.1XXXX) to protect the skin and eyes from potentially harmful radiation. A typical lab station would include a desk lamp equipped with a three watt, 395 nm UV LED bulb(s), and UV filter glasses.

MICRO-EXCAVATION: SMALL CRITTERS FROM PETRIFIED FOREST NATIONAL PARK

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In 2014, the Yale Peabody Museum team working in the Petrified Forest National Park discovered a microsite. Ranging from 3–15 mm, the very small size of these specimens present challenges in both excavation and preparation. After crawling the surface, we attempted to find the layer from which the fossils had eroded. The initial instinct was to dry screen matrix from the surface of the area. After one day only one more bone was found. After some effort the layer of origin was located. Finding more fossils, we abandoned the screening method and carefully began digging into the hill. Collecting the remains was soon the next challenge. In addition to an unconsolidated, unstable matrix with layers of gypsum, the bones are disarticulated and randomly scattered. As soon one tiny bone was uncovered for removal, another bone would reveal itself, thus the jackets grew, literally bit by bit. This and the difficulty of discerning the difference between tiny bone and tiny rock made for very slow excavation. Most work was done with shaped drill blanks, and #10 X-Acto blades. After two field seasons working at this site, we feel that we are finally nearing the source of the specimens. Back in the lab, preparation proceeds by gridding the surface of a newly opened jacket, printing a life size photo, mapping removed bones on the photo and organizing them accordingly. The unstable nature of the matrix was again challenging. Encapsulating the entire jacket in a plastic bag to decrease evaporation, Butvar B-98 5% w/w in ethanol was used as a consolidant. The fossils have an iron-oxide matrix encapsulating them. This makes matrix removal yet another challenge as the matrix adheres tightly to the tiny bones and bone may flake off on removal. With specimens this small even a tiny flake may be a great loss of information. I plan to use the Waller Method, which chemically reduces the iron sediment and have begun by testing the bones to make sure that they are not damaged by immersion in water. Work continues on preparation and will continue in the field this summer. There is possibly more than one taxon present at the site, making this a challenging, puzzling, but very rewarding microsite.

DRAINING LAKE TRICERATOPS: UNIQUE CHALLENGES OF EXCAVATING A WATERLOGGED DINOSAUR QUARRY

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Over the course of two field seasons in the summers of 2014 and 2015, the Royal Ontario Museum (ROM) excavated a disarticulated but closely associated skeleton of *Triceratops prorsus* from the upper Hell Creek Formation deposits 10 miles north of Buffalo, South Dakota. Roughly 50% of the skeleton was present, surrounded by thick ironstone nodules. Overburden was relatively minimal, but over 30m³ of mudstone were removed during the excavation of the specimen. The excavation took approximately 40 days with a four to five-person field crew.

The collection of the specimen presented a number of special challenges; the site was in a topographic low point making drainage of the quarry increasingly difficult as the excavation progressed. In 2014 the quarry was initially drained using buckets to bail the water until this became unfeasible. In the 2015 season the crew came prepared with a gas-powered pump. However, once the water was removed there still remained a large amount of viscous clay/ash-rich mud that could not be shoveled efficiently and so was removed with bare hands and buckets. The mud also made footwear impractical and small scale bailing was a daily chore.

The regular flooding and wetness of the sediment made excavation of the fossils relatively easy, but made the collection of large blocks difficult and required special safety considerations. Although the saturated mudstone had the advantage of being relatively easy to dig through, it meant that the pedestal could easily fail. The pelvis (~1 ton in weight, 2m x 2m x 1 m) presented the biggest challenge. In order to ensure that the block could be pedestalled safely, it was braced on all sides using stacks of 1' x 6' lumber cut to desired length and nailed together. These laminated piers were stable, adaptable, easy to construct, and fairly inexpensive. The extraction of the pelvis block was achieved by chaining it to large tractor, which performed the flip and subsequently dragged it out of the quarry.

DECONSTRUCTING THE NATIONAL FOSSIL HALL AT THE NATIONAL MUSEUM OF NATURAL HISTORY

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The National Fossil Hall at the Smithsonian Institution National Museum of Natural History (NMNH) is undergoing the most significant renovation to the building structure and exhibits since the opening in 1910. De-installation of all specimens, artwork, and exhibit structures from the halls required planning and scheduling far in advance, involving staff from 11 offices within the Smithsonian, as well as multiple outside contractors. The scheduling of work included two-week time buffers for major milestones, allowing for unexpected delays and better flexibility. Communication between participants and a shared calendar of events allowed for quick alterations to work schedules. Each specimen received a unique identifier number and specimen label that allowed individuals to track all fossils, including those not cataloged prior to exhibition. Temporary specimen tags included basic specimen data: ID number, name, catalog number (if known), where it was on exhibit, a reference image, and a scale for photography. Challenges associated with de-installation efforts were both physical and data related. Discrepancies in specimen data were corrected after long hours of research using decades old accession ledgers, card

Abstracts: Miller *cont'd* – Nolan – O'Brien

catalogs, and publications. Issues regarding specimen access, egress, conservation during demolition, and working with historic materials were addressed through sharing of equipment and advice between museum departments and contractors, cooperation among museum staff, and good communication to ensure efficient workflow and workplace safety. These challenges highlighted many exhibit design methods that should be avoided in future builds. These efforts resulted in the safe de-installation of over 2000 collections and exhibits objects over the span of 19 months.

HAND-ARM VIBRATION SYNDROME

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An occupational hazard of using pneumatic impact tools is the possibility of developing Hand-Arm Vibration Syndrome (HAVS). Previous symposia have warned us about HAVS but offered little in the way to prevent or reduce its onset. Orthopedic doctors have not studied HAVS and report that it can be difficult to diagnose due to symptoms overlapping with several better studied hand and arm ailments. Presented here are devices, methods and exercises offered by several orthopedic doctors and therapists at the University of Colorado Hospital, Aurora, Colorado. that may prevent or reduce the effects of HAVS. Tool wraps and cushions and anti-vibration or shock dampening work gloves reduce the amount and severity of the vibration transmitted to the hand and arm. While effective for bulk removal of matrix, these devices may not be appropriate for use under a microscope where fine control of the scribe is required. Proper handling and maintenance of tools are essential. Forcing any power tool to do work is tiring to the operator. The operator should guide the tool not force it to do the job. If the operator's hands are white-knuckled during preparation, the tool is being held too tightly. If force is needed for the tool to do its work, the cutting edge is dull and needs sharpening. Proper handling and maintenance reduces the stress on muscles, tendons, blood vessels, and joints. Taking breaks often and doing stretching exercises relaxes muscles and tendons and reduces tension in the whole body. See your doctor or orthopedic specialist if you feel the onset of numbness, white finger tips, or pain in your hands and arm that persists after work has stopped.

SOLUTIONS TO THE INCREASED NEED FOR ELECTRICAL AND AIR SERVICES IN THE ROYAL TYRRELL MUSEUM OF PALAEOLOGY'S LARGE PREPARATION LABORATORY

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The preparation laboratories of the Royal Tyrrell Museum of Palaeontology were purpose built and state of the art in 1985 when the museum opened. The laboratories are divided into three areas with the largest originally comprising the preparation space for large specimens and a welding area. To accommodate heavy specimens, the lab has a 3-ton ceiling hoist that can be moved to any area in the main space (59' x 49'). As the hoist prevents dropdown services from the ceiling, two short (2' tall by 16" wide) pillars located to one side of the lab each containing an air line, four 110V plugs, and two 220V plugs, provided power and air to the main floor space. As these pillars were insufficient to supply all stations that were in the central part of the room, a series of poles were installed in the floor to bring service lines overhead to stations from the outer walls. As the welding area is no longer in use, in spring

2015 the lab was reorganised, removing the welding screens and associated equipment. This allowed for expansion of the number of work stations to 17 but also increased the demand on the service pillars. At the same time an Occupational Health and Safety (OH&S) inspection recommended the removal of the overhead wires due to potential safety concerns. This resulted in a network of wires along the floor, and although within cable covers, they were potential tripping hazards. The increased demand on the pillars, as well as a 30-year-old panel, led to electrical outages when many stations were being used simultaneously. To deal with ongoing safety concerns and increases in demand for services, the two pillars were replaced with nine aluminum in-floor service boxes that each houses an air line, two 220V and two 110V outlets. The boxes are set out in a grid across the central space in the lab and are watertight and capable of supporting more than 500 lbs when not in use. The boxes are set 24 inches into the ground and required extensive concrete cutting and refinishing the entire lab with epoxy floorcovering. The electrical circuits in the lab were all upgraded and the pillars removed, thus allowing better flexibility, better use of the available space, and eliminating safety concerns.

ARMATURES OLD AND NEW FOR VERTEBRATE FOSSIL MOUNTS IN THE FOSSIL HALLS OF THE NATIONAL MUSEUM OF NATURAL HISTORY

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Armatures for mounting fossil vertebrate specimens in life positions are complex structures inherently tied to the strength, stability, and scientific usefulness of a specimen over its period of display. While nuances of armature design are proprietary to a builder or team of builders, the general designs, materials, and appearances of mounting armatures can be grouped into categories useful for their identification and strategizing reverse engineering during the de-installation of a mount. Using specimens dismantled during the renovation of the Fossil Halls at the Smithsonian Institution National Museum of Natural History (NMNH) as examples, armature designs were categorized into internal, external, and plaque mounting styles. The structures of armatures were diagrammed across several mounts, forming a useful 'road map' to the armature structure of mounts that are still existing. The advantages and disadvantages of each mounting style in relation to the scientific use of mounted fossils during and after public display were described. Common mount materials including metals, paints and coatings, padding materials, fillers and aesthetic additives, and adhesives were described and the consequences of their use to fossil chemical and physical stability are examined. Armature designs and materials used in the past were compared with those preferred today, to show a shift towards archival materials and designs that reduce the chance of physical damage to specimens from weight loading, abrasion, and seismic activity. Lessons learned by the NMNH vertebrate fossil preparation team during the dismantling of different types of mounts included the process of strategizing reverse engineering of mounts, and tools useful in mount dismantling. This information can serve as a reference to preparators and exhibit designers when working to remediate issues with or to disassemble old mounts, and design new mounting structures.

Abstracts: Pinsdorf - Russell

VISITOR ACCESS AND INCIDENT REPORTING POLICIES FOR SPECIMEN SAFETY IN PALEONTOLOGY EXHIBIT SPACES

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The Department of Paleobiology at the Smithsonian Institution National Museum of Natural History (NMNH) has undertaken work in two unusual situations: closing the National Fossil Halls for renovation, and documenting and imaging a loaned *Tyrannosaurus rex* skeleton in a public exhibit space. These events have generated unprecedented public interest and wide-ranging opportunities for media access, guided tours, and fundraising events. Simultaneous activities in project spaces included specimen de-installation, exhibit demolition, photography and 3D scanning, and academic research. Management of visitor access to space, specimens, and staff was an issue that involved multiple NMNH departments, including administration, fundraising, facilities management, security, exhibits, and paleobiology staff as well as outside contractors and stakeholders. NMNH Paleobiology and Exhibits staff collaborated to produce and enforce a visitor access policy for these spaces. The policy was distributed to parties generating access requests, and clearly defined limits on group size, equipment use, staff supervision, and accessible hours. Paleobiology Collections Management and project team staff managed and approved access requests. This streamlined system avoided scheduling conflicts and allowed unique opportunities for media and visitor access, while emphasizing specimen and personal safety. To reduce the risk of damage to specimens in project spaces, NMNH Paleobiology staff produced an incident reporting system, training, and series of specimen triage kits. Instructions on how to report incidents and use the triage kits were posted in project spaces, along with the kits themselves. Incident report worksheets designed for layperson use allowed for sketches and photographs of damage to be submitted. Triage kits included boxes, specimen tags, and padding to facilitate collection and storage of damaged objects. Training informed all who accessed project spaces of their responsibility in specimen and personal safety. Use of this system resulted in proper reporting of damage incidents, and directed further training efforts to reduce damage from specimen handling.

STABILIZATION OF AN OVER-PREPARED *BRACHYLOPHOSAURUS CANADENSIS* SKULL FOR LONG TERM DISPLAY

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When preparing a fossil from its matrix, there is a fine line between revealing the specimen and ensuring its stability and long-term preservation. Over-preparation results in a lack of support for the specimen, increasing its sensitivity to handling and its risk of being damaged under its own weight. A complete skull of *Brachylophosaurus canadensis* (TMP1990.104.0001) was requested for display in an upcoming long term exhibit at the Royal Tyrrell Museum of Palaeontology. The skull had been completely prepared out of its matrix. While this revealed all the scientific and aesthetic detail of the skull, it also rendered the specimen fragile and difficult to handle or move. However, the exhibit required that the object be tilted to a 45 degree angle for ease of viewing, and remain on public display for the next decade. It would also need to be accessible for research, meaning that none of the supports could be permanent. The skull was stabilized using 20% w/w Paraloid B-72 in acetone, cleaned, and infilled in several places with a mixture of fine sand and 50% w/w Paraloid B-72 in acetone. Several acrylic rods had previously been attached between the lower jaws with epoxy putty to provide support. These were replaced with fibreglass and FGR-95 plaster support jackets that conform to the skull and

are fully removable. Another removable support jacket was fitted around the lower jaws and bolted to the original field jacket to allow the skull to be tilted for display. The original jacket was painted with white acrylic paint, and the edges of all the jackets were patched with Gypsone bandages to improve the appearance. Finally, the skull was mounted on a custom made L-shaped metal support angled to 45 degrees for viewing. Over-preparation of specimens increases the risk of damage and creates many challenges for future handling, display, and research. These risks should be considered throughout the preparation process, and proper support maintained at all times.

**MODERNIZING DATA MANAGEMENT AND ARCHIVES FOR THE TEXAS VERTEBRATE PALEONTOLOGY COLLECTIONS:
ADVENTURES IN FORENSIC COLLECTIONS MANAGEMENT**

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Potentially invaluable museum collections are valueless without supporting documentation. Without proper data management these data, and thus collections they support, are at risk. Because of this concern, curatorial efforts in the Texas Vertebrate Paleontology Collections are now directed toward re-organizing supporting data into standard formats.

The Texas Vertebrate Paleontology Collections were founded in 1888, and have endured various changes through the years. Dr. John Wilson began to gather vertebrate paleontology collections at The University of Texas as a unit in the late 1940s. To the Texas collections he added collections from UT faculty, the Works Progress Administration (WPA), and the Texas Memorial Museum. Record keeping among collections was not uniform, but fortunately there was little overlap among catalog numbers. Wilson applied the simple numbering scheme inherited from the Texas collections to the entirety of the Texas collections. Under this system, specimen and locality data are clearly segregated, but accession data, collector data, and associated metadata are not systematically organized. Provenience data may be buried in field notes or correspondence. Ownership and donation records may also be buried in correspondence or locality files. The physical records may themselves be distributed among faculty, archives or other researchers, rather than centralized. This leads to cumbersome problems when confronting collection ownership and use questions.

Building properly-constructed accession files for the Texas collections coincides with archive-building efforts. These inchoate efforts involve a degree of forensic collections management, often leading to peripheral and sometimes unexpected benefits. Organizing data into common database records (via Specify) helps clarify metadata surrounding individuals (e.g., staff, students, and volunteers). Physically organizing records helps with conservation, storage and housing for the myriad forms of media that record collections history. Ultimately, we aim to modernize and improve collections management in the Texas collections while also creating a modern archive as an off-shoot of this effort.

Abstracts: Sanchez

WADING THROUGH HISTORY – FOSSIL HUNTING ALONG RIVERS AFFECTED BY THE 2013 ALBERTA FLOOD

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The flooding of several southern Alberta river systems in 2013 affected hundreds of thousands of Albertans across dozens of communities and caused billions of dollars in damage. A lesser known impact of the floods is that the destructive effect of the water also led to the exposure of many new fossils in the rivers' banks. The discovery of a complete *Leptoceratops* skeleton in the flood-ravaged banks of the Oldman River spurred an effort to seek other specimens that might have been brought to light by the floodwaters. Over the past two years the Royal Tyrrell Museum of Palaeontology (RTMP), in conjunction with the Government of Alberta, has undertaken a field project to prospect numerous river systems in Southern Alberta in order to find and collect these newly exposed fossils and protect them from future flooding events. With tens of thousands of kilometers of rivers in southern Alberta, it was integral to prioritize which rivers, and what parts of those rivers, to focus on. A set of criteria was created to help prioritize which rivers would be prospected. First, we wanted to focus on rivers that were affected by the 2013 flood, which data could be obtained from the Government of Alberta. We then determined which of those rivers, and where along them, fossils have been previously found in order to maximize the likelihood of recovering at-risk specimens. To obtain this information, we used the RTMP collection and GIS databases. For those rivers with no to little previously known fossil localities, Alberta Geological Society maps were used to determine where the largest stretches of exposed outcrop of the right age could be found. Under the context of this project, over 175 km of river bank has been prospected in twelve rivers and creeks. In and along these waterways, 144 palaeontological sites have been discovered and documented, resulting in 63 groups of specimens collected and accessioned at the RTMP.

STORAGE SOLUTIONS: THE PERPETUAL PROBLEM OF PALAEOLOGY

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Since 1985, the Royal Tyrrell Museum of Palaeontology (RTMP) has been the main repository for Alberta's fossil material. Today, with over 150,000 catalogued specimens, the facility's storage space has reached critical mass. In 2015, the RTMP received funding to implement two projects to help address this issue. Surrounded by coulees in a provincial park, the RTMP is limited in access to space and buildable land. Park permits to build new structures are not always guaranteed, and any new structures outside the park would not be easily accessible to the collections facility and preparation lab. An existing outdoor open air storage compound was identified as being ideal for conversion to long-term covered storage, and mobile storage units (sea cans) were chosen as an outdoor storage solution. Twelve sea cans, 40'Lx8'Wx9.5'H steel shipping containers, were purchased for use by various museum departments, four of which were initially dedicated to collections use and an additional two for the preparation lab use. This allowed material that was not sensitive to temperature and humidity, such as unwashed matrix and field equipment, to be removed from storage and placed in the sea cans. Moreover, material from other departments that was being housed in collections storage was able to be moved to the sea cans. Additionally, new racking and a larger capacity forklift were purchased to replace some of the older racking in the unprepared storage collections. The new racking is wider and sturdier than the older racking, allowing each shelf to house larger and heavier specimens. The new racking also

Abstracts: Sanchez *Cont'd* – Tanke - Vitkus

allows for larger specimens to be housed on the ground shelf, instead of in the middle of the room. Having more room for pallets on the shelves allows more specimens to be stored, freeing up floor space and allowing specimens to be more easily moved in and out of storage. These initiatives allowed for the decluttering of collections; creating new storage space, improving access to existing specimen storage, access to emergency exits at all times, and temporary storage for exhibit change outs.

SUCCESSFUL USE OF A POWERED CONCRETE WIRE SAW TO SUBSTANTIALLY REDUCE MASSIVE SANDSTONE BLOCKS CONTAINING BOTH HALVES OF A LATE CRETACEOUS HADROSAUR SKULL COLLECTED FROM SPIRIT RIVER, NW ALBERTA, CANADA

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A complete hadrosaur skeleton was encased in a cracked sandstone concretion weighing ~54,000 lbs (24,500 kg). Two massive blocks weighing 9,900 lbs (4491 kg) and 8,600 lbs (3901 kg) split naturally through the skull in the axial plane. Both blocks contained forelimbs. Significant block reduction was required, first by rock saw and then with drilled holes and hammered-in splitting wedges. Some health and safety issues existed and interfering depositional bedding planes made this work inefficient. Continuous-type cable saws are used to cut concrete into smaller pieces. A concrete cutting company provided equipment and crew over a two-day period. They reduced the blocks to 3550 lbs (1587 kg) and 1786 lbs (810 kg) respectively. The blocks remained large (but safer and manageable) due to uncertainties of skull morphology and forelimb orientations. Rope was wrapped tightly around the block at the position of the required cut and the rock marked on either side of the rope where both touched. An angle grinder cut deep along the marks and the rock in between chiseled out. The resultant grooves were cable guides. The saw "blade" consisted of a braided wire cable with a steel and rubber covering and regularly spaced steel "beads" with embedded industrial diamonds which abrade through the rock. Precise cuts can require much setup time. Cable travel speed varies, in our case 32-39' (10-12 m)/second. The machine that spins the cable also provided tension. Cutting time went fast, ~1.75sq m of rock cut in ~45 minutes. An overhead crane manipulated the blocks and supported the cut off rock. The work was moderately noisy and messy with lubricating/cooling water and slurry on the floor, muddy "fog", and whirling cable spray. Mitigation efforts like curtaining the work area with tarps, disconnecting and covering of all electricals, use of wet shop vacuums and floor squeegees were necessary. Working outside is recommended. Wearing of Personal Protection Equipment was required. No one could be near the cable when it was moving. Cable saws provide a logical option for oversized jobs. The work can be seen at: <http://canwestconcrete.com/royal-tyrrell-museum-rock-cutting>

FINDING HOMES FOR FOSSIL FOOTPRINTS: STORAGE SOLUTIONS IN THE UNIVERSITY OF COLORADO MUSEUM OF NATURAL HISTORY'S FOSSIL TRACK COLLECTION

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The fossil track collection at the University of Colorado Museum of Natural History (UCM) in Boulder possesses a variety of unique storage needs. The UCM track collection includes over 5,000 specimens,

Abstracts: Vitkus *cont'd* - Zdinak

including original material as well as replicas, molds, and tracings. The vast majority of this collection was transferred from the University of Colorado at Denver between 2011 and 2012. In a short period of time, UCM needed to accommodate this large collection in limited collections space, and needed to integrate a large amount of specimen data from a different institution into its own fossil records. Original specimens were stored within metal cabinets alongside their plaster and resin replicas and latex molds. The cabinet drawers were lined with Ethafoam and additional Ethafoam strips were placed to cushion the sides of the specimens while conserving space. Latex molds were stored in archival polyethylene bags to protect the latex from handling and to contain off-gassing. Specimens too large to be stored in the cabinets were placed on heavy duty metal shelving. Tracings, both paper and transparency, were wrapped in archival paper and organized by number within metal cabinets. Data associated with the new track specimens, including digital scans of all of the 1,500 trackway tracings, was integrated into the UCM paleontology database, and specimens were catalogued as a separate collection from the vertebrate and invertebrate fossil collections. Original CU Denver specimen numbers were retained to prevent confusion, as many specimens had been published prior to their arrival in Boulder.

TOP TEN TIPS FOR MAKING PREPARATION INSTRUCTIONAL VIDEOS

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Consensus in the fossil preparation community has set standardization of basic competencies and best practices as a key goal. One step toward achieving that goal is to produce authoritative instructional videos on preparation technique and make them available online. The 2014 SVP Marvin and Beth Hix Preparators Grant funded the assembly of a basic equipment kit – camera, microphone, tripod, and lights – for the production of such videos. The grant also facilitated the making of several videos to serve as exemplars of style and scope. Two of these videos, on archival housing, have already been completed. The outcome of production coupled with 20 years working in the film industry has informed ten basic tips for the efficient production of effective instructional videos. The tips are as follows:

1. Write a script, do not ad-lib. Ad-libbing almost invariably causes problems in editing.
 2. Record video at the highest resolution format the camera can deliver and that your editing software will accept.
 3. Eliminate shaky footage by shooting with the camera on a tripod whenever possible.
 4. Use the camera's manual control settings to avoid unintended shifts of autofocus and auto-exposure.
 5. Avoid mixing daylight and incandescent lighting in the same shot as they render colors differently. Fluorescent lighting can be mixed with either.
 6. Vary your camera framings into wide, medium and close-up shots for easier editing.
 7. If you shoot an action in multiple framings, make sure the action moves in the same direction in each shot.
 8. Use on-camera "slates" to ID each take/shot and keep script notes on each take for reference in the edit.
 9. Record video and voiceover audio in separate sessions for more flexible editing. Try to record each in a single session. Recording in multiple sessions risks noticeable differences in the qualities of the recordings.
 10. If a cut isn't working in the video edit, transition between shots using a dissolve effect.
- Following these tips will help keep the project organized and produce a professional quality outcome.

Speakers and Leaders

Adam Behlke is a Preparator at the Denver Museum of Nature and Science where he runs the Molding and Casting Lab. He works with hundreds of volunteers in the Schlessman Family Laboratory of Earth Sciences and on field expeditions across the West from New Mexico to Montana. Adam learned fossil preparation and molding and casting at the University of Wisconsin – Madison before he graduated with a BS in Zoology and Geology & Geophysics. He refined his skills in micropreparation, molding and casting, and fieldwork at the Yale Peabody Museum while in graduate school where he earned a MPhil in Geology from Yale University. Adam currently lives in Denver, Colorado, with his wife, Mary, and their cat, Carnifex.

Tylör Birthisel is currently the Paleontology Lab Manager, Chief Preparator, and Field Coordinator for the Natural History Museum of Utah (NHMU). Before starting at NHMU in 2013, Tylor managed the paleontology lab and was a preparator for the Grand Staircase-Escalante National Monument specializing in preparation of late Cretaceous fossils 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. Tylör has a BS in geology from UNLV. In addition, he is basically the best there is or ever will be. Boom. Mic drop.

Brent Breithaupt is the Regional Paleontologist for the Bureau of Land Management (BLM) in Cheyenne, Wyoming, where he administers BLM policy for the state and region. He did his undergraduate work at the University of Wisconsin-Milwaukee and his graduate work at the University of Wyoming in Laramie. His research focuses on the history of vertebrate paleontology in Wyoming and the West and the documentation and understanding of the Mesozoic Era vertebrate faunas. In addition, he has worked with Neffra Matthews to pioneer the use of photogrammetry (using stereo photography) for the state-of-the-art documentation of fossil footprints (especially dinosaur and pterosaur tracks) throughout the West. Formerly, he was the Director/Curator of the University of Wyoming Geological Museum, where he worked for 29 years. Brent is a strong proponent of public awareness, ethical practices, and partnerships in the field of paleontology.

Gregory Brown was Chief Preparator at the University of Nebraska State Museum until retiring in 2014. His career with the museum began in 1978 as a field and laboratory assistant excavating and preparing numerous complete articulated Miocene skeletons of rhinos, horses, camels, birds and other animals from the Ashfall Fossil Beds lagerstätte and later focused on developing in-situ preservation strategies for this and other sites. He has extensive experience in both soft- and hard-matrix preparation, micropreparation and molding and casting. Over the past 20 years he has taken several professional development courses and workshops dealing with the conservation of geological and paleontological specimens and has continued to advocate for the application of conservation principles to paleontology collections by authoring and presenting numerous papers and workshops. Greg has not yet retired from *that* pursuit.

Speakers and Leaders, *cont'd*

Matthew A. Brown, Director of Museum Operations, oversees the Vertebrate Paleontology Collections of the Jackson School Museum of Earth History, including the fossil and modern skeletal collections, libraries, archives, and conservation laboratories. He has twenty years of experience managing academic, federal, and museum laboratories and collections, as well as professional staff, volunteers, and graduate and undergraduate students. He sits on the Museums Advisory Board of Ghost Ranch, and has also contributed to development of best practices and policy for laboratory and collections through the Society of Vertebrate Paleontology. Matt organized the first meeting of the Association for Materials and Methods in Paleontology.

Amy Davidson is a vertebrate fossil preparator and has worked as Senior Principal Preparator for the Paleontology Division of the American Museum of Natural History since 1993. She specializes in small dinosaurs and mammals in difficult matrices including loose sandstones, exploded mudstones and very hard volcanoclastic rock. She has collaborated with conservators since 1994 to adapt conservation materials and methods to fossil preparation, resulting in numerous presentations, workshops and publications. Prior to her current position she apprenticed for three years in fossil preparation with William Amaral at the Museum of Comparative Zoology, Harvard University. Amy has a background in sculpture and modelmaking. She holds a BA from Oberlin College.

Mike Eklund's interest in geology and fossils began as a youth on family day trips in the midwest to places like Mazon Creek and Devils Lake. These early experiences set the stage for lifelong interests in climbing, ski racing and all things outdoors. After high school, training and work in emergency medicine as well as backcountry rescue proved to be very rewarding and remains useful to this day. Eventually, university work led to studying business and accounting as a more solid means to support adventures in life. Undergrad, grad work, the CPA exam and 4 years accounting working at Leo Burnett advertising left him feeling like big company politics and long train commutes were not very interesting. Ironically the forensic nature of auditing and accounting work has been a strong asset in understanding and evaluation of the evidentiary process so important in science. Mike spent the next 14 years primarily working in financial and insurance services. One interesting component of the new work was to educate and implement OSHA and safety related training for commercial and industrial entities of all kinds. Along the way, professional work in artisanal home building, coaching for the U.S. Ski Coaches Association and the National Coaches Academy, as well as parenting two awesome daughters has led to a unique combination of teaching experiences. Since 2001 he has logged over 30 weeks of field expedition work throughout the western United States with the Field Museum in Chicago. Mike started working with the University of Texas at Austin in 2009 with a focus on more productive lab methodology and better data yield in paleontology specimens. Recent projects include improving documentation and diagnosis tools for paleontology specimens as well as developing methods for finding and defining associated "micro/nano" information on specimens leading to better scientific interpretation. 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.

Speakers and Leaders, *cont'd*

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 degree in Fine Arts and Art History, with a specialization in printmaking, from Pratt Institute.

Aaron Giterman has worked as a fossil preparator at the American Museum of Natural History in New York City and the Smithsonian National Museum of Natural History in Washington, DC. He will be starting a new position in May 2016 as Chief Preparator, Paleontology Research Lab at the North Carolina Museum of Natural Sciences in Raleigh, NC. Prior to that he was also an art teacher with a BFA in film and animation. However having possessed a passion for science in general and dinosaurs in particular since a very young age, he is now thoroughly enjoying the opportunity to combine all of his interests in fossil preparation.

Lisa L. Herzog is a classically trained fossil preparator with a master's degree in Sociology. She is currently enrolled as a Zoology Master's student at North Carolina State University. Her skill set in paleontological specimen care encompasses not only myriad techniques, but includes the conservation of specimens from localities around the world. She is versed in technical aspects of specimen preparation, paleontological value in material as information, and the scientific rigor involved. The importance of understanding chemical compounds, their reactions, as well as ultimate degradation is a key component to how she approaches fossil preparation and training. 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 utilization, and paleontology in the broader audience and social contract.

Steve Jabo received his Bachelor of Science degree in Bio-Geology from The Pennsylvania State University in 1984, and started working for the Smithsonian Institution's Natural History Museum in the Department of Paleobiology as a fossil cataloguer in 1989. Two years later, he landed in his current position as a vertebrate fossil preparator. He plans and conducts expeditions to discover and collect vertebrate fossils and as much associated data as possible from the surrounding rock formations. He prepares them to make them available for study, and conserves them for long-term storage. He also molds and casts them, and occasionally mounts them for exhibit. Steve also helps maintain the wellbeing and database tracking of the fossil collections. He has published papers on volunteer preparator training and vertebrate conservation techniques, and given many talks on preparation and training methods.

Speakers and Leaders, *cont'd*

Anthony Maltese is the Curator of the Rocky Mountain Dinosaur Resource Center and has nearly 19 years of preparation and fieldwork experience, primarily with the late Jurassic Morrison Formation and late Cretaceous Niobrara, Judith River and Hell Creek formations. He has a BA in Geology from Kansas University. While not assisting in publications on long dead fish, Anthony enjoys trailbuilding and annoying his golden retriever Annabelle.

Neffra Matthews has been involved in science and photography since childhood. Growing up in Kentucky, Neffra's father was an avocational geologist/paleontologist and her mother was a professional photographer. This combination of family interests influenced her education, career, and endeavors in paleontological resource documentation. Neffra has a M.S. in Geology from the University of Kentucky in Lexington and currently works for the BLM in Denver, Colorado. She has over 20 years of experience in photogrammetry and the geospatial sciences. Neffra has used photogrammetry to document fossil trackways and has made numerous presentations at professional conferences around the world.

Matthew T. Miller was trained in fossil preparation, collections management and fossil law and policy at South Dakota School of Mines and Technology. He has previously worked for the National Park Service both as a fossil field worker and as a writer of fossil resource management policy. In November 2012 Matthew began as a volunteer at the National Museum of Natural History (NMNH), and was quickly put in a position to supervise other volunteers conducting fossil preparation. After a series of temporary jobs working on the deinstallation of the National Fossil Hall for NMNH collections management and the Vertebrate Paleontology Lab, Matt was awarded the permanent position of Collections Volunteer Coordinator late in 2015.

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 currently on the twenty-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. Her hobbies include: annoying her husband and her supervisor (not necessarily in that order), corrupting her son into the paleontology realm, and digging up fossils. Conni's favorite place to look for fossils is the Kaiparowits Plateau in Utah. This year will mark the fifth consecutive year in her attempt to find 3.5 new species in order to fulfill a promise to an infamous paleontologist friend. She is a hell of a lot of fun in paleo camp and in the quarry. Oh, and she loves 80s hair bands, especially Poison. Her favorite phrase is "I know, right?" primarily because it showcases her superior intelligence while also acknowledging someone else's temporary ascension to that plane of knowledge. Conni earned a Certificate of Paleontology from the Denver Museum of Nature and Science after many years of late night classes and almost falling off of a cliff during the 2012 Field Methods Class.

Speakers and Leaders, *cont'd*

Michelle Pinsdorf is a vertebrate fossil preparator and Museum Specialist, working with the Department of Paleobiology at the Smithsonian Institution National Museum of Natural History since 2012. In addition to performing research preparation, collections conservation, and field work, she is part of a team currently renovating NMNH paleontology exhibit space. Prior positions include seasonal field work at Badlands National Park, fossil preparation at the South Dakota School of Mines & Technology Museum of Geology, and two internships at The Mammoth Site of Hot Springs, South Dakota, Inc. Michelle holds a BS in geology from SUNY Albany, and an MS in vertebrate paleontology from the South Dakota School of Mines & Technology.

Angella Thompson grew up Chicago, Illinois. She began volunteering at the Field Museum of Natural History around the turn of the century, as a collections volunteer. After taking a break from the museum world, she returned to the field in 2007 as a Collections Assistant at the Non-Vertebrate Paleontology Lab at the University of Texas at Austin. Necessity and opportunity conspired to provide a more technological career path, focusing Angella's attention more on concepts of data preservation, database principles, and 'open access collections use. The dataset she maintains for her lab on GBIF has nearly 100,000 records and has been accessed over 2,000 times. In her spare time, Angella does paleo-themed leatherworking and teaches classes on leather carving and belt making at her local TechShop.

Vanessa R. Rhue is the Assistant Collections Manager for Vertebrate Paleontology at the Natural History Museum of Los Angeles County. She has over 10 years of paleontology experience, working throughout southern and central California. At the museum she has been involved with preparing specimens for exhibit and curating a large collection of fossil fish, amphibians, reptiles, birds, and mammals. She is passionate about training volunteers and mentoring student interns – the future generation of collections care workers. Vanessa routinely offers training workshops to equip volunteers with essential skill sets that prepare them to make significant contributions to collections care projects.

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 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.

Matthew E. 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

Speakers and Leaders, *cont'd*

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 the National 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.

John "Jack" Wood is a geologist and GIS specialist currently working on contract with the Geologic Resources Division of the National Park Service (NPS). His primary objective at the National Park Service is providing support to the leads for the Geologic Hazards and Paleontologic Resources programs. Jack is using computational imagery methods to improve understanding of features found within various NPS units that range in size from natural rock arches down to microfossils. Jack's other main goal with photogrammetry is to help parks and regions adopt the technology for their own use by providing processing documentation/"how-to's", training and project consultation. Prior to the NPS Jack worked in industry as an Environmental Compliance Specialist and more recently, as a graduate researcher/geomorphologist. Jack received an MA in Earth and Environmental Sciences at the University of Illinois – Chicago and a BS in Chemistry at Purdue University.

Alan Zdinak is a fossil preparator currently contracted with the Smithsonian National Museum of Natural History. At the NMNH he specializes in dismantling vertebrate fossil mounts and housing them utilizing a variety of methods. He also trains and supervises volunteers in rehousing collections. Prior to the NMNH, Zdinak did micropreparation, molding and casting and fieldwork on Triassic reptiles at the Yale Peabody Museum. He received his fossil preparation training working on dinosaurs 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.



The Association for Materials & Methods in Paleontology (AMMP) is a non-profit organization of persons interested in the field of paleontological collections care and methodology, including conservation, preparation, sampling, and collection of fossil animal remains. Members promote better understanding of the profession by the general public and those persons requiring such services and increase the respect for the profession by maintaining and encouraging high standards of competence and ethics.

Website: www.paleomethods.org



The Bureau of Land Management (BLM) may best be described as a small agency with a big mission: To sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations.

Website: www.blm.gov



Since 1916, the National Park Service (NPS) has been entrusted with the care of our national parks. With the help of volunteers and partners, the NPS safeguards these special places and shares their stories with more than 275 million visitors every year.

Website: www.nps.gov



The Society for the Preservation of Natural History Collections (SPNHC) is an international society whose mission is to improve the preservation, conservation and management of natural history collections to ensure their continuing value to society.

Website: www.spnhc.org

Vendors

Disclaimer: The inclusion of vendors does not imply endorsement by the Association for Materials and Methods in Paleontology.



PaleoBond produces structural adhesive and penetrant stabilizer for fossils, minerals, jewelry, aquariums, and more.

Website: www.paleobond.com



Silicones, Inc. combines state-of-the art two-component room temperature vulcanized (RTV-2) silicone rubber technology with a solid commitment to individualized service and product development.

Website: silicones-inc.com



Titan Robotics builds large 3D printers using precision machined steel and the highest quality components.

Website: www.titan3drobotics.com



Triebold Paleontology, Inc. is a full-service lab involved in the preparation, restoration, molding, casting, and mounting of paleontological specimens. They also provide cast skeletons for sale and rent, and traveling exhibitions available for booking.

Website: www.trieboldpaleontology.com

We need your help to continue to develop and grow, to share our combined knowledge, and to improve the standards of paleontological preparation. Committee signup sheets are located at the AMMP exhibitor table.

Annual Meeting Committee: Meets with convener of next meeting, passes along information learned at previous meeting

Committee Co-Chair: Matthew A. Brown

Committee Co-Chair: Conni J. O'Connor

Committee Members:

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

Committee Chair: Matthew E. Smith

Committee Members:

Development Committee: Responsible for fundraising for general funds, awards, travel grants

Committee Chair: Matthew A. Brown

Committee Members: Gregory Brown

Elections Committee: Helps to select candidates to fill positions in the leadership of the organization. This important committee will aid in developing the future direction of the association, through its leadership.

Committee Chair: Deb Wagner

Committee Members:

Membership Committee: Creates and sends out a surveys to update information

Committee Chair: Ana Barcarcel

Committee Members: Marilyn Fox

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

Committee Chair: Marilyn Fox

Committee Members: Conni O'Connor

AMMP Committees – cont'd

Resources and Materials Research 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

Committee Chair: Marilyn Fox

Committee Members:

Strategic Planning Committee: Develops plans for growing AMMP, explores new ways in which AMMP can be of use to its members, promotes diversity in membership

Committee Chair:

Committee Members:

Training Committee: Develops training methods, develops new avenues for sharing knowledge of techniques, standards, and use of materials

Committee Chair:

Committee Members:

Website Development Committee: Maintains the AMMP website, assists with posting new and changing information

Committee Chair: Lisa L. Herzog

Committee Members: Conni O'Connor

Notes
