

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 subdiscipline 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

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 subdiscipline 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 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 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.