PARK PALEONTOLOGY

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GEOLOGIC ASSESSMENT OF NATIONAL PARKS: THE INVENTORY AND MONITORING PROGRAM

The Natural Resource Inventory and Monitoring (I&M) Program was established to gather information and develop techniques for maintaining the integrity of the approximately 250 National Park Service units with significant natural resources. Since its inception in 1992, the I&M Program has funded mapping of geologic features; compiling park-based bibliographic databases; initiated several prototype monitoring and inventory programs; and developed data management standards and protocols.

http://www.nature.nps.gov/im/index.html

The National Park Service (NPS) Geologic Resources Inventory is a cooperative endeavor between the Geologic Resources Division(GRD), Inventory and Monitoring Program, U.S. Geological Survey (USGS), and state geological surveys to implement a systematic, comprehensive inventory of the geologic resources in NPS units. The inventory consists of four main phases: (1) a geologic resource bibliography and maps called GeoBib; (2) an evaluation of geologic maps, and geologic resources including paleontology; (3) the production of digital map products and information; and, (4) a report with basic geologic information, hazards, and existing data and studies. The importance of these inventories is fundamental in resource management strategies.

The GRD and the I&M Program sponsored a workshop in baseline geologic data in Denver in the fall of 1997 to receive information from the NPS, the USGS and state survey personnel about needed baseline geologic data. At the meeting, Colorado, North Carolina, and Utah were chosen as pilot project states.

The collection of existing geologic maps and literature in each NPS unit for the GeoBib and the publication of the data on the Internet are in progress (see web address). Index maps for the location of associated geologic maps are being prepared for the parks in Colorado and Utah. Pilot geologic meetings by park teams were organized in 1998 to evaluate the resources in Colorado parks and are organized for the parks in Utah during 1999.

Upon completion of an inventory in a park, the available geological literature and data from the NPS, USGS, state, and academic institutions will be documented in a summary report. The inventory report will contain summaries of the exploration history, geology, paleontology, disturbed lands issues, geologic hazards, and other issues to describe the geologic resources of each park. Additional sections will include summaries of ongoing programs such as the paleontological inventories in the NPS.

The Geologic Resources Inventory is being developed in cooperation with the USGS and state geological surveys, but may reveal many other opportunities for collaboration with other agencies or institutions. The diversity of geologic resources in the National Park Service will provide a continuing challenge for management. ■

Table of Contents

Paleontology and the U.S. Presidents

staff writer

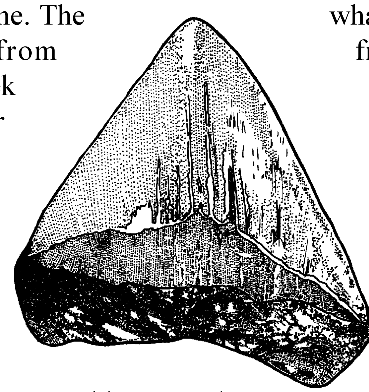
"*To The Secretary Of State: Wednesday Afternoon [March 21, 1792]. Dear Sir: Tomorrow I shall be engaged all day; but will, in the course of it, fix a time to view the Big bones at Doctr. Wisters.*"

George Washington

This excerpt is taken from Fitzpatrick's *The Writings of George Washington*. Washington is not generally recognized for his interest in paleontology. This passage reflects the first president of the United States was interested in many facets of the natural world.

Around 1784, George Washington was too busy with the Continental Army to inspect the "giant animal's grave" that the Reverend Annan had discovered. Washington inquired about the Reverend Annan's familiarity with the graveyard of giant animals at Big Bone Lick, Kentucky. One of the Big Bone Lick teeth, a mastodon tooth, was a prized memento in his study at Mount Vernon.

In the late eighteenth century, Philadelphia was the cultural and learning center in North America. The American Philosphical Society (APS) was established in 1743 in Philadelphia and became the preeminent learned society in the New World. In 1787, Benjamin Franklin, president of the APS, was presiding over a meeting when Caspar Wistar, a Philadelphia physician, presented a large, dark, heavy bone. The bone was from Woodbury Creek in Gloucester County, New Jersey. The rich, fossiliferous marl beds of southern New Jersey had yielded this find. George Washington, who had previously viewed Dr. Wistar's fossil finds in 1792, was present with a group of individuals to examine the bone. After speculating on this oddity, the members decided that it was the thigh bone of an extremely large human. The specimen was placed into the APS collection. Many years later, the bone was identified as the left metatarsal of a hadrosaurian dinosaur by Dr. Donald Baird. The bone is currently in curation at the Academy of Natural Sciences in Philadelphia.



The American Musuem of Natural History has a skull of a Miocene baleen whale on display that was excavated from the grounds of the George Washington Birthplace in the 1900's. The curatorial staff at George Washington Birthplace report fossil shark teeth in their museum. There is no confirmation that George Washington collected these teeth. For that matter, there is little information on how the fossils arrived at George Washington Birthplace in the 1700's.■

We solicit any information on Paleontology and the Presidents that the reader may wish to share. Please contact: Vince Santucci at Fossil Butte National Monument; 307/877-4455.
Email: vincent_santucci@nps.gov

GEOLOGY IN THE NATIONAL PARK SERVICE: AN ADMINISTRATIVE HISTORY

staff writer

Many of the national parks were established to recognize and protect the nation's outstanding geologic features. Of equal importance to the entire spectrum of park management are all geologic resources in the National Park Service, which consist of the materials of the Earth, the processes that act on those materials, the chemistry and composition of its constituent materials, and the history of the planet and its life forms since its origin. The administrative history documents the role of geological science and geological scientists in the establishment, development, and operation of national parks and the National Park Service as well as the relationship of the parks to/with the U.S. Geological Survey. Studies include significant topics in geological history, paleontological research, prominent developments and trends in the history and philosophy of the geosciences, and historical events and their interrelationship with national parks and the geosciences.

A proposed study will emphasize important issues relating to the development and expansion of geological science and geological professions during the conception and expansion of the National Park Service. The study will assess changes and trends in NPS organization and management and the impact of these developments on the geosciences, policy formulation, and change relating to management of geological resources in the national parks.

Research for the study will be conducted in a variety of repositories housing archival collections and published source materials. An examination on significant files and records in national parks will be conducted. Individuals who have played a significant role in the development of the geosciences in the National Park Service will be interviewed. The knowledge gained by this study will be of particular value to NPS administrators and managers, as well to the broader geological community in the U.S. NPS personnel will better understand circumstances and make better decisions regarding geologic and paleontologic resources.■

Dino Innards: More Fuel to the Warm-Blooded/Cold-Blooded Discussion

staff writer

Using an 80-watt ultraviolet (UV) lamp, a respiratory physiologist coaxed out internal patterns in a juvenile dinosaur imperceptible in ordinary light. Outlines of intestines, liver, trachea, and muscles of the theropod from Italy, *Scipionyx samniticus,* were revealed. Identifying the arrangement of the internal organs, some researchers believe that dinosaur lungs were structurally simple, similar to modern crocodilians.

In the 120 million-year-old raptor *Scipionyx samniticus*, the liver expanded from the top to the bottom of the abdominal cavity, just behind the lung-heart cavity and the muscle next to the pubis bone. In modern crocodiles this muscle runs from the pubis to the liver and helps move the liver back and forth like a piston, causing the lungs to expand and contract. An airtight layer of tissue (the diaphragm) separates the liver and lungs. This organization is called a hepatic piston diaphragm (HPD). Finding a HPD in theropod dinosaurs rules out the possibility that they breathed with complex bird-like lungs. Recent work by other researchers indicates that a well-ventilated reptilian lung might be capable of high rates of gas exchange.

The only extant animals with HPD are living crocodilians. The lead scientist of this study suggests ancestral crocodiles were dynamic, bipedal land dwellers whose present languid, aquatic lifestyle is a secondary adaptation. The idea is that land dwelling crocodiles utilized a HPD for vigorous activity as dinosaurs might have.

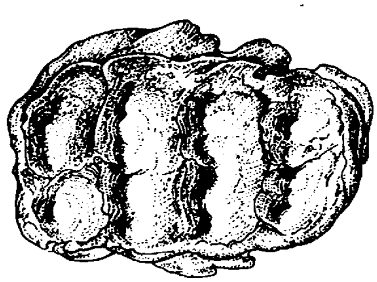
This analysis would imply these animals were basically cold-blooded. The lead scientist has offered an interesting idea. He thinks these elementary lungs were able to energize periods of intense activity and high metabolism; suggesting a composite of cold and warm-blooded metabolisms.

The concept of a metabolically hybrid dinosaur is appealing. For more information, the 22 January 1999 issue of *Science* discusses this technique of UV light and related discussions on the metabolism of dinosaurs.■

Missing Mastodon Tooth at COLM

staff writer

Has anyone seen the missing Mastodon tooth from Colorado National Monument?



The tooth was discovered by Dr. Jack Roadifer in the late 1960's as he was walking up a streambed in No Thoroughfare Canyon. Dr. Roadifer was leading an introductory geology field trip from Mesa State College in Grand Junction, Colorado. Roadifer stated he looked down at the right moment and the tooth was lying on its side in a jumble of rocks. It is believed that the tooth was returned to the Monument staff soon after it was examined at Mesa State College. The current whereabouts of this tooth is unknown. If any one has any information, contact Pat Perrotti at NP-COLM.■

Your Man in the Field at Zion National Park

staff writer

Mention the words, "dinosaur tracks" in Zion National Park and it's likely that Joshua Smith, paleontology intern, will enthusiastically respond! Josh has been reconnoitering Zion National Park for paleontological resources, and has hit pay dirt in the form of dinosaur tracks. Josh puts in long days and his worn boots reveal treks off the beaten pathways. He spends most of his time in the field searching for stratigraphically probable areas where tracks, and other paleontological resources, may occur. Occasionally these areas are just a few minutes hike, but it is likely that several hours and miles of rugged terrain are involved in reaching these sites. Using a systematic approach with extensive field notes, sketches, photodocumentation and GPS data, Josh is gathering a wealth of information on the paleo resources in Zion National Park.

Josh has located phytosaur teeth and bone fragments in the Triassic Chinle Formation. Moving up the stratigraphic column, in the Whitmore Point Member of the late Triassic/early Jurassic Moenave Formation, Josh has located numerous track sites. Most of these are theropod tracks, probable *Grallator*, and/or *Eubrontes.* The Springdale Member of the Moenave Fm. has ceded unusual tridactyl ornithopod tracks and possibly *Anomepus* tracks. Also in the Moenave Fm. are curved scratches that appear to be swimming traces of a large crocodile-like aquatic or semi-aquatic reptile.

The early Jurassic Kayenta Formation has yielded an intriguing horseshoe-shaped trackway. Josh is working out the possibility that these may be some sort of juvenile sauropod swim track or fish feeding traces. He also found gar scales and theropod tracks in the Kayenta Fm. All of the tracks he has located are accompanied by invertebrate traces of some kind.

Josh has compiled some invaluable information. Working with personnel in the park and informed persons outside of the park, Josh has located several significant paleontological resources. Josh is furthering identification and evaluation of fossil resources within Zion National Park, crucial steps in paleontological resource management.■

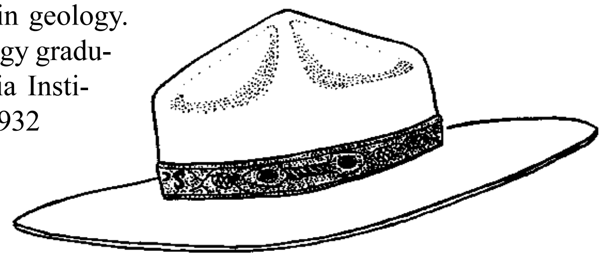
Death Valley National Park's First Ranger-Geologist: H. Donald "The Kid" Curry

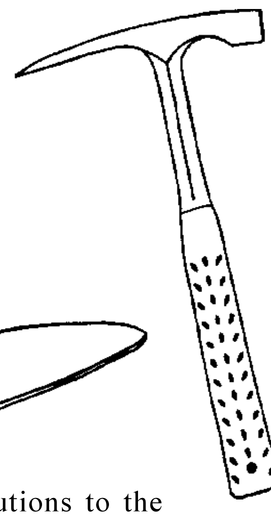
staff writer

Most geologists working in Death Valley National Park recognize the contributions that H. Donald Curry has made to the understanding of the regional geology. In 1999, original unpublished Death Valley maps produced by Curry during the 1930s were donated to the National Park Service.

Curry attended the State University of Iowa between 1925 and 1932, receiving B.A. and M.S. degrees in geology. He then enrolled in the geology graduate program at the California Institute of Technology between 1932 and 1934. As a student, Curry learned to map with the U. S. Geological Survey. Notably in this time period, a geologist that worked for the U.S. Geological Survey had rigorous field training--for a geologist seeking field experience could obtain it in such quantity and variety nowhere else.

On February 11, 1933, President Herbert Hoover proclaimed Death Valley as a national monument. The following year, Don Curry was hired as the first ranger naturalist at Death Valley National Monument. Curry is possibly the first professional geologist to wear the ranger uniform. He presented interpretive programs to the public in the evenings and performed geologic work during the day.





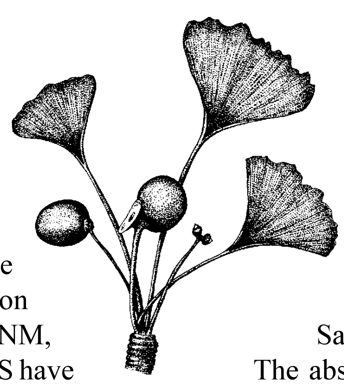
Curry made many contributions to the understanding of Death Valley's geology. He produced numerous plane table contour and cross-section maps, first described the "Turtleback" structures in the Black Mountains, and was the first to recognize the rich paleontological resources in Death Valley. Curry is credited with the discovery of titanothere remains in Titus Canyon, fossil plant material from the Furnace Creek Formation, new Tertiary fish fossils, and three fossil vertebrate track localities, most notably the Copper Canyon Tracksite. Two fossil species have been designated *curryi* in his honor: a fish, *Fundulus curryi;* and a titanothere, *Protitanops curryi.*

Curry's career with the National Park Service was interrupted by his participation in World War II. He was documented as a staff member until his departure to work for the oil industry. In 1941, Curry joined Shell Oil Company as a geologist and later became a Senior Geologist with the company. He maintained his interest in Death Valley geology and in Tertiary fossil tracks and published numerous articles on these subjects. Don Curry passed away at the age of 90 in January 1999 leaving a rich legacy as a ranger – geologist with the National Park Service.■

Carl Sandburg's Gingko

staff writer

After a decade of tracking down fossils in National Park Service areas, it is becoming more challenging to add to our list of 123 parks with paleontological resources. Recently, Independence NHS, George Washington Birthplace NM, DeSoto NM, and San Juan Islands NHS have been identified as parks with fossil resources. During a recent visit to Carl Sandburg Home NHS, North Carolina, the typical inquiries were made relative to any potential fossils linked to the site or the family. A tour of the home revealed that the Sandburg's were attuned to the natural world. Pine cones, seashells and rocks decorated shelves throughout the home. Was there a fossil hidden in the collections, is there a reference in one of Carl's poems? Unfortunately, interviews with park staff failed to reveal any ties between Sandburg and fossils.



The absence of a fossil discovery during the tour of Sandburg's home did not diminish our hopes. At the end of the interpretive tour, VIP Dorothy Hall directed visitors to notice the Gingko trees in the Sandburg's yard - trees that existed during the time of the dinosaurs. I knew there had to be a link!■

Invitation for contributions

To keep the Park Paleontology Newsletter fresh and informative we would like to hear from you. If you have paleontological news relevant to the national parks please write a few paragraphs and send to:

Vince Santucci
Fossil Butte National Monument
P.O. Box 592
Kemmerer, WY 83101
VINCENT_SANTUCCI@nps.gov

Written opinions regarding the Fossil Forum topic are also welcomed. Park Paleontology is a quarterly publication. The summer issue is planned for publication in August 1999. ■

Fossil Forum

LISTEN TO THE ECHOS FROM THE PAST: INTERPRETING ANCIENT LIFE

As the first hints of Spring emerge and the interpretive embers are re-kindled, I reflect upon the arrival of springtime over the previous eons. Many images come to mind from the observations and experiences I have gained during my 40 encounters with spring. A moments reflection upon the sights, sounds, and smells identified with spring leads me to ponder the characters of life that are not preserved in the fossil record.

Our understanding of the history of life comes largely from the fragmentary pieces of bone, teeth, shells, petrified wood and other similar types of evidence. These prehistoric remains known as fossils, combined with information gained from the enclosing rock provide the ingredients for interpreting ancient landscapes and lifeforms. Fossils serve as the foundation upon which our imaginations reassemble body parts, resculpt the flesh and breath life into ancient organisms.

Our dreams, and perhaps nightmares, about prehistoric creatures may sometimes be more vivid than the science might be willing to accept. Although the rules of science define the way that scientists should conduct research, my guess is that even some of the "stuffiest-shirt" paleontologists play with their plastic dinosaurs when nobody is looking.

We do need to recognize that the testability principle is an important and valuable aspect of science. The testability principle states propositions can be examined and proved as false or workable. This principle keeps us all on the same playing field, keeps us honest, and is open minded enough to allow realignment of our understandings. Our understanding of the history of life is only as good as the previous field season! That means as we discover new fossils, we can better assemble our paleontological puzzle.

As we attempt to interpret the fossil record, we utilize a wide range of tools for communicating concepts, ideas, and stories. There are challenges with developing effective paleontology exhibits, publications, or campfire chats for the public. Often the curious visitor's interests straddle both the scientific and the imaginative boundary. Some individuals may be turned off by complex scientific discussions or unfathomable concepts. Occasionally, someone may raise the untestable questions in paleontology.

Figure from Carpenter, et. al. 1994. Dinosaur babies.

Do we hide behind the rules of science to avoid addressing the untestable questions in paleontology? Do we find it taboo to relate to both the right-brained and left-brained perspectives of the fossil record? If you are slightly jarred by these questions or find yourself a little on edge by this discussion - perhaps it is time to mellow for a moment.

Let us release our burden of scientific dogma and take advantage of our ability to think of the primitive world from a broader vantage-point. What sounds would we hear from the insects or amphibians after a rainfall in a Triassic swamp? What types of scents would be emitted by a Miocene flower? How would you feel to view the first flight of a young pterosaur or to watch a Cambrian trilobite cruise along the seafloor creating *Cruiziana* traces? What would it be like to be awaken by the trumpeting of a wooly mammoth on a cold ice-age morning or to hear the "peetrified birds a-singin their peetrified songs sittin' in the petrified trees" that mountain man Jim Bridger reported on in the early 1800s? Could you imagine watching a butterfly emerge from a coccoon during the Eocene and display wonderful coloration? Perhaps your stroll in the Cretaceous lowlands is interrupted by a stampeding group of ceratopisians.

We may never be able to test the "Runny Nose Theory of Dinosaur Extinctions" that may have occurred during the pollen emitting heyday of the angiosperm revolution, BUT SHOULD WE BE AFRAID TO ASK?

The methods of science have provided us with a wonderful understanding of the ancient world. Advancements in technology may be able to help us address some currently unresolvable questions in the future. Perhaps not all questions need to be answered by science.

During our interpretive opportunities, focusing on paleontological themes, we should be clear to differentiate the testable and non-testable questions. Likewise, we should strive to incorporate the greatest level of current scientific understanding in our presentations. However, if we limit our interpretation to preaching the facts, at times we may lose the opportunity to inspire. Although paleontology deals with old stuff, we should strive to keep our interpretive contacts fresh. Ultimately, our imagination may be the only means of relating to aspects of past life not preserved in the fossil record. ■

GRD PALEO RESOURCE SURVEYS

staff writer

In the Geologic Resource Division's attempts to better understand the scope of paleontological resources within the national parks, two types of inventories have been implemented. The first type of inventory is directed towards comprehensive park specific paleontological resource surveys. The Yellowstone Paleontological Survey was initiated in 1996 and published in 1998. This was the first paleontological survey at Yellowstone and the format serves as the prototype for similar surveys in other NPS areas. Paleo surveys are currently underway at Death Valley, Arches, Big Bend, Zion and other park areas.

A second type of paleontological resource inventory is directed towards thematic resource surveys. The first servicewide thematic paleo resource inventory was directed towards identifying fossil vertebrate tracksites in NPS areas. During 1998, fossil vertebrate tracks and footprints were identified in 23 national park areas. This data was presented at the Society of Vertebrate Paleontology annual meeting and at the 5th Conference on Fossil Resources and published in a Proceedings Volume.

Additional servicewide thematic paleontological surveys are currently underway including: paleontological resources associated with NPS caves, paleobotanical specimens (fossil plants) in parks, fossil birds in parks, and an inventory of fossil "type specimens" from NPS areas. In conjunction with these surveys, a list of repositories containing NPS fossil specimens is being compiled.

The GRD and the Ranger Activities Division have partnered to conduct a servicewide assessment of paleontologic resource theft and vandalism incidents throughout the national parks.

Data acquired through both the park specific and the thematic paleo resource surveys will increase our understanding of the significance of paleontological resources within the national parks and in turn increase our ability to manage and protect these valuable non-renewable resources.■

Park Paleontology Recognition Pin

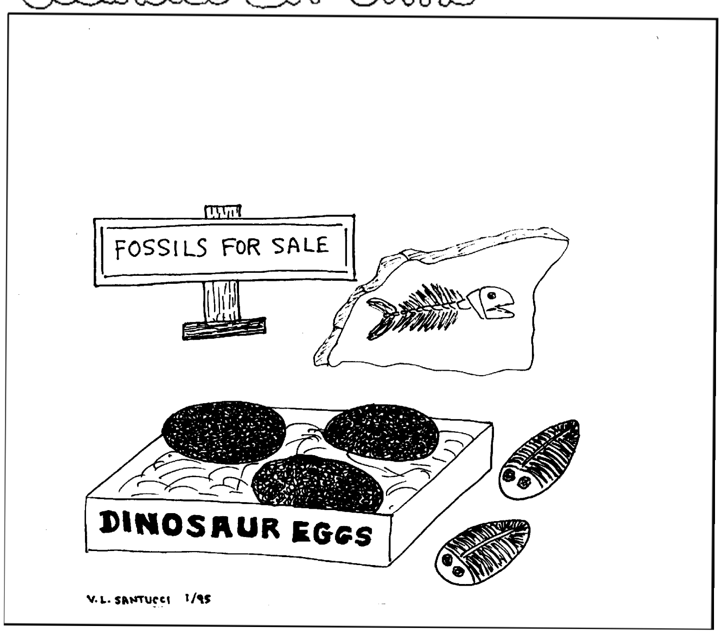
staff writer

Individuals making noteworthy contributions to promote paleontology in the national parks and to the National Park Service Paleontological Resource Program are recognized and rewarded with gold pins modeled after the Park Paleontology Resource logo.

Karyl Yeston, a NPS Ranger at **Arches National Park**, has strived to build relationships among agencies in protecting paleontological resources. Her endeavors in resource management have been crucial in preserving the paleontology in Arches NP and surrounding areas.

Jim Wood and **Tim Connors**, **Geologic Resources Division** in Denver, have provided tremendous assistance and innovation in paleontology and geology in the national parks. They have drafted a paleontological database, developed a GRD web site (which contains park paleontology publications and news items), provided technical support and assisted in visual images for park publications.■

Footnotes In Time



Poached Dinosaur Eggs!

Park Paleontology
c/o Fossil Butte NM
P.O. Box 592
Kemmerer, WY 83101