NPS Fossil Resources

PARK PALEONTOLOGY

Volume 4, No. 2 Spring 1998

Surfers Discover Park Fossils

In the last four months Web surfers visiting the **Park Geology** website at **http://www.aqd.nps.gov/grd** have discovered a great deal of new information, especially in the area of **park paleontology**. "***Park Geology***" is a website designed by the Geologic Resources Division to serve as a central hub for information about "**geoparks**" and to link parks from across the System through common geologic themes. The original design was tested using information from fossil parks, and now that a basic framework is in place we would like to see park paleontology features continue to grow.

Park Geology website at **http://www.aqd.nps.gov/grd**

The bulk of the website's pages are park focused content pages called "***geology fieldnotes***." There are currently **more than 150** individual park geology fieldnote pages posted on the site's tour of park geology. The initial content for these pages was taken from park brochures and site bulletins, with the scanning and editing done by students and a contractor. However, many of the park brochures are weak in their coverage of geology, so the work of locating or creating additional text and photos for each park is just beginning. If you can contribute **any** geologic information for the NPS website, please contact **jim_f._wood@nps.gov**.

The website also attempts to highlight the educational value of park geology by using broad themes to link park sites throughout the System. However, most of the material from brochures is park-specific and doesn't take advantage of the multi-park approach to explaining complex geology. One exception is the "***Age of Mammals: Life in the Cenozoic Era***", which is used on several park brochures. Using this illustration rich material, designers were able to experiment with a thematic feature, creating a model for other themes (see http://www.aqd.nps.gov/grd/parks/Age_of_Mammals.htm).

Yahoo! The Park Geology website has recently become more visible to Web users. In December the site was listed by the **Yahoo** search engine and since then it has been added by other search engines. Park Geology is growing in popularity among teachers, students, and visitors that use the Web. The server that hosts Park Geology and NatureNet now records **more than 100,000** "hits" each week. **Linking a park's home page to the geology fieldnotes or to other parks that share geologic themes is encouraged**. The geology fieldnotes already link to each park's website in several places.

Under Construction

There are several projects in the works that could enhance the **park paleontology** information on the Web:

- We are currently testing an on-line searchable photo database that will have more than 400 USGS photographs of park geologic features with descriptions. Photographs of fossils and paleontology projects would be welcome additions.
- A web-based park geology timeline designed by Vince Santucci is being expanded into a National Park

see Website, page 2

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Fairy Tales Can Come True

Dan Chure—DINO

Between 1990 and 1996 the paleontology staff at Dinosaur National Monument excavated and prepared the skeleton of a new species of meat-eating dinosaur. This spectacular specimen is one of the most important ever found in the Monument and one of the best from rocks of Late Jurassic age anywhere in the world. Even so, it was, unfortunately, another "headless wonder" — a skeleton missing the skull; something which happens all too frequently in paleontology. There was no clue as to what had happened to the skull. Was it still buried deep within the rocks of the quarry? Had it been washed away by the river before the skeleton had been buried in sand? Or had the skull been destroyed even before the skeleton had been washed into the river? No one knew and all hope had been lost that the skull would ever be found.

Enter the knight on a white horse, Ray Jones, a radiologist at the University of Utah, with an interest in dinosaurs. Ray knew that small particles, known as gamma particles, can be emitted from fossilized bone and he had developed a machine for detecting these emissions. Ray had used his "dinosaur dowser" successfully with other paleontologists and he came to Dinosaur hoping that he could help us solve our problem. Ray gridded off the quarry and systematically measured gamma emissions over a 30 by 6 foot area. Back at the lab he analyzed the data to remove the emissions from the rock itself. This done, there remained one high reading — a hopeful sign. Was it a fragment of a bone....a piece of petrified wood...or the missing skull? To answer that question, Ray returned to Dinosaur in July 1996 and relocated the spot. He told us the emission reading suggested that whatever was there was close to the surface and that we should proceed carefully. Incredibly, the first hammer blow hit bone, and within an hour it was clear that we were looking at the back of the missing skull. At the end of the day Ray rode off into the sunset with a smile on his face. The staff, needless to say, was ecstatic.

It took many weeks to excavate the skull and ultimately helicopter it back to the lab. By the beginning of 1997 one side of the skull was completely exposed and its was a site to behold; a two-foot long skull, complete with a toothy smile. The remarkable "dinosaur dowser" had lived up to its reputation and we now had the missing piece to our great dinosaur puzzle.

Ray's machine will not find all fossil bones, since some do not emit gamma particles, and others are buried too deep to detect. However, in the right situation, with the right conditions (and a little bit of luck), it can work wonders and we have the skull to prove it!■

Website

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geology time machine, where earth history and the history of life on earth can be experienced through fossil parks.

- The USGS National Mapping Program is supporting the development of park geology pages for several parks. Part of this work will include general geology pages explaining the geologic time scale and providing of plate reconstruction diagrams.

Ideally, the paleontology sections of the website **would help to conserve park fossil resources by creating more informed visitors**. A few ideas that still need authors include:

- Information about collecting and research permits;
- Alternatives to collecting: Museums that hold NPS fossil collections;
- Arranging field trips;
- The work of paleontologists and curators;
- How to get involved: Meetings, preservation issues, general interest publications.

Send

Please get involved in the park geology website by sending in ideas, reports, articles, photos, meeting announcements, and corrections. Expert review and additional material will have to come from people like yourself. The **Geologic Resources Division** can scan text, photos and slides, and prepare new webpages for posting on our server or yours. If you don't have web access but would like to be involved, we can make a CD-ROM with the current website for you to review.

Contacts: **jim_f._wood@nps.gov** or **tim_connors@nps.gov**■

Aquarium in stone

Marcia Fagnant

FOBU

During the summer of 1996, a guided hike to an active research quarry was added to the weekend programs at FOBU. The purpose of this program is to give visitors an opportunity to visit an active site on the monument and interact with a working paleontologist. Because the Monument is surrounded by active commercial fossil quarries (many allow visitors to pay a fee to collect and keep fossils), this program provides an opportunity to introduce the visitor to concepts associated with the scientific study of fossils.

At the quarry, visitors are provided with a background and history of the site and how it fits into the larger stratigraphic context of Fossil Basin. The park paleontologist or a research assistant describes the scientific methods of collecting fossil specimens and associated scientific data. Visitors are then invited to assist the scientist in the collection of specimens and recording data.

The two hour quarry program attracted 65 participants in 1996 and in 1997, program participation more than doubled with 158 visitors.■

Florissant Fossil Beds compiles new database

Herb Meyer —FLFO

Fossil plants and insects have been collected from the Florissant fossil beds since the 1870s, long before the establishment of the National Monument in 1969. These large collections of fossils are housed in museums throughout the country and include thousands of published type specimens upon which 1200-1500 new species were based. These new species often originally were described without illustrations, or those that were illustrated were done with line drawings or artistic renditions. The publications in which they were described number in the hundreds, and only limited information has been available to draw this vast array of information into a single format. Some of the museums do not maintain their own computerized databases. In some instances, entire collections have been moved to different museums since their original citation in publication, making it difficult for researchers to locate needed specimens.

Beginning in 1995, Florissant Fossil Beds National Monument initiated a project to develop a new integrated database that will document all of the published specimens from Florissant in order to facilitate future research and provide a meaningful taxonomic inventory of Florissant's diversity. The project is still underway, and to date 3500 specimen records have been added. In all cases, new original photographic transparencies are being taken and eventually will be digitized. Time-consuming on-site visits have been necessary to record specimen data and to complete photography. Museums that have been visited so far include University of Colorado Museum, Denver Museum of Natural History, University of California Museum of Paleontology, American Museum of Natural History, U.S. National Museum of Natural History, Natural History Museum of London, Harvard Museum of Comparative Zoology, Yale Peabody Museum, Florida Museum of Natural History, San Diego Museum of Natural History, California Academy of Sciences, and National Museum of Scotland. We are striving to establish a close working relationship with each of these museums, and all of them have been very generously supportive of the project.

The database includes information inherent to each individual specimen (taxon, museum numbers, collector, locality, etc.) as well as all information pertaining to the publication history of the specimen (original publication and all subsequent citations in publication). Many cataloguing problems are being recognized and corrected in the process, and publication inconsistencies are often resolved according to the International Codes of Botanical and Zoological Nomenclature. We expect that the project will be on-going for another two to three years. Internet access to the database is one of our long range objectives. For more information, contact Florissant's paleontologist:
<Herb_Meyer@nps.gov>■

John Day Fossil Beds yields unique primate tooth

www article

A tiny tooth recently found on an isolated peak in central Oregon represents the youngest known fossil primate in North America.

The 4mm (0.15 inch) specimen was found within John Day Fossil Beds National Monument during routine prospecting under the direction of the park's paleontologist Ted Fremd. It was discovered by John Zancanella of the Bureau of Land Management who was working in the park on an interagency team.

During cataloguing this fall, when several other new kinds of animal fossils were also identified, this tooth "jumped out as something we've been looking for with very little hope, for many years," Fremd said. After 130 years of collecting in the John Day Basin, this is the only one of its kind. "This is about as rare as fossils get," Fremd added.

The isolated lower molar is unique because it is the only North American primate fossil of the late Oligocene Epoch (28 to 24 million years ago) to be found in proximity to volcanic ash layers. Using new, high precision argon isotopes, scientists are able to date these ash tuffs. Previously described evidence of this animal in the Pacific Northwest was limited to a fragmentary maxilla with minimal stratigraphic data.

"We try to continuously examine fossil-bearing rocks to collect scientifically significant fossils on federal lands. Otherwise, weathering and other factors will destroy them," said Fremd.■

Teaching fossils through the mail

Marcia Fagnant
FOBU

Fossil Butte National Monument's most successful outreach program involves teachers and students from all over the United States. Teaching Paleontology in the National Parks, Monuments, and Public Lands is a curriculum guide that travels with many teaching aids, such as; replicas, slide shows, posters, a computer game, fossil rubbing plate, and a fossil preparation kit (a replica). It is designed to aid teachers presenting concepts of time, past life, and fossils to students in the second and third grades.

The program began in the fall of 1994. Through the generous support of the Dinosaur Nature Association, fifteen kits over the last four years have reached approximately 4,000 children from the first through ninth grades in thirty states and Canada. One hundred and sixty teachers have requested that the kit be sent to them. It has been a wonderful way for "the keepers of our fossil heritage" to spread understanding of a very unique resource.■

Dinosaur bonebed discovered at Big Bend National Park

Andrew Stanton
FOBU

Recent excavations at Big Bend National Park have unearthed a bonebed of *Alamosaurus*, a sauropod dinosaur from the late Cretaceous of North America. Anthony Fiorillo of the Dallas Museum of Natural History says that the bonebed is believed to consist of three individuals, an adult and two juveniles, both of which are half of the adult's size. The bones at the sight show signs of being trampled, such as abrasions, and some bones being on end rather than laying flat. It is believed that the bonebed may represent an ancient watering hole.

According to Fiorillo, the bonebed offers "new insights into the life history of *Alamosaurus*." The site is significant because it has yielded new material, "giving portions of *Alamosaurus* anatomy that have never been seen before." It is also the first time a group has been found together, as well as a juvenile being found with an adult. Fiorillo believes that may indicate social behavior in *Alamosaurus*.

Alamosaurus is the only sauropod dinosaur known from the late Cretaceous of North America. It was a Titanosaur, a family of sauropods that mostly inhabited the southern continents of Africa, South America, and India. After other families became extinct in North America earlier in the Cretaceous, Titanosaurs entered from a land bridge to South America just before the dinosaurs became extinct at the close of the Mesozoic.■

Paleontology at Delaware Water Gap National Recreation Area

Christian George
Franklin & Marshall University

In the summer of 1997 the paleontological resource data from Delaware Water Gap National Recreation Area were incorporated into the parks geographic information system. Using data from a comprehensive survey conducted from 1979 to 1980 of the paleonotological resources of the park, a database was populated and the locations of the fossil sites were digitized.

This survey identified 130 sites which contained fossil bearing rocks. Most of the fossils found in the park are Ordovician and Silurian invertebrates, including brachiopods, sponges, bryozoans, corals and trilobites. In addition to the invertebrates the dermal plates of Devonian fishes are preserved in several locations.

This information was used to create a database which was then linked to the geographic information in ArcView. This gives the park a digital record of the paleontological resources and makes it quickly accessible to any personnel who may need it. An interpretive display was then developed to show examples of some of the fossils found in the park.

This project was undertaken by Christian George an intern in archeology and GIS. He was advised by John Wright, park archeologist and Keith High, resource management.■

Park Paleontology Recognition Pin

staff writer

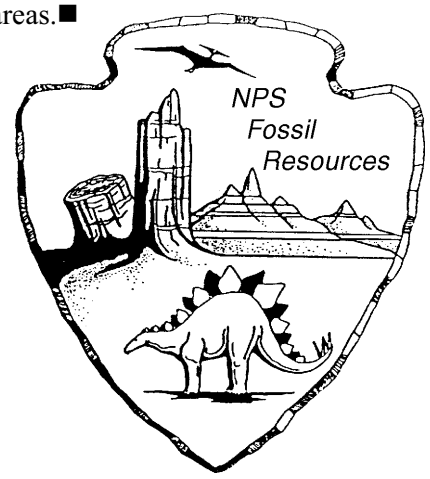
In an effort to acknowledge individuals making positive contributions to the National Park Service Paleontological Resource Program, two recognition pins have been created to reward these individuals. Both pins are modeled after the PARK PALEONTOLOGY Newsletter logo.

The first version of the pin is black and gold and will be presented to individuals making noteworthy contributions to promote paleontology in the national parks. A solid gold version of the pin will be presented to individuals making significant contributions to the National Park Service Paleontology Program.

The first recipient of the gold PARK PALEO pin is Rachel Benton, paleontologist at Badlands National Park. Among the many accomplishments by Rachel, she has coordinated two Fossil Resource Conferences.

The second pin recipient is Greg McDonald, paleontologist at Hagerman Fossil Beds National Monument. During 1997, Greg obtained a $50,000 grant from Cannon Corporation to conduct an excavation of the Hagerman Horse Quarry.

The third pin recipient is Diann Gese, geologist in the Geologic Resources Division. Through her efforts with the Geologists-In-The-Park Program, Diann has successfully promoted paleontology by placing geology and paleontology student interns in National Park Service areas.■



FOSSIL FORUM

National Parks: Geology Matters

The following two letters were published in *GEOTIMES*. The original letter by David Applegate was printed in the August 1997 issue. The reply by Roland Gangloff was printed in the June 1998 issue. The letters do not necessarily reflect the opinions of the National Park Service or any other agency, however, the letters address key issues related to the management of geologic/paleontologic resources on federal lands.

The need for increased public awareness of the value of geoscience research has become a mantra across our community in this time of tight federal budgets. The recent threat of elimination faced by federal geoscience agencies stemmed largely from a genuine lack of understanding of what they do. Short-term efforts to inform congress must continue, but long-tern support for the geosciences will depend on convincing the public that geology truly matters.

The recent crop of dinosaur and volcano disaster movies that feature climatic scenes in which the hero, in time of crisis, shouts "Get me a geologist!" are great. But we cannot rely on Hollywood to keep delivering the goods – or much reality for that matter.

So where should our educational efforts begin? Many of us treasure the geology field trip as our favorite learning experience. The prospect of millions of our fellow citizens voluntarily going on field trips certainly would be a good start! And millions already do. Each year, large numbers of Americans travel to type sections, unique fossil localities, and other prime examples of geology at its most splendid. Our national park system presents a tremendous opportunity for public education about the geosciences, but it is an opportunity largely untapped.

GEOLOGY BUT NO GEOLOGISTS

One big obstacle is the overly low profile held by the geosciences within the National Park Service, which employs only 40 geologists. Compare that to the agency's 900 biologists, a number that was even higher before the creation of the National Biological Survey (now the Biological Resources Division of the U.S. Geological Survey) absorbed many of the Park Service's biological research staff. The scarcity of geoscientists means that in even the most geologically spectacular parks including the Grand Canyon, none are available to train interpreters, develop educational materials, and provide resource and hazard evaluations.

Fully one quarter of the 874 units in the national park system – which includes national parks, monuments, seashores, historical parks, recreation areas, and other sites – were created solely for their geologic qualities, and 140 of the units contain significant geologic features. Geology and the parks should have a special relationship, but where are the geologists?

As an agency within the Department of the Interior, the Park Service relies on geoscientists at the U.S. Geological Survey, whose principal mission is to meet the research and information needs of its sister agencies. This separation of science from management and regulatory functions is, of course, designed to ensure credibility and objectivity. But it can also leave managers and regulators unaware of what scientists have to offer and scientists unclear about the needs of managers and regulators. Although individual projects have been successful and the relationship should be strengthened, the lack of daily contact and resulting familiarity may limit the arrangement's effectiveness.

SMALL STEPS FORWARD

The need for better communication between scientists and managers was one of many issues raised by a 1992 National Research Council study titled *Science and the National Parks.* The report noted scientists' lack of influence among policy-makers and the lack of a coordinated approach to research in support of research management. In response to the latter criticism, the Park Service created Natural Resources Program Center to provide scientific assistance in the management and protection of natural resources in the parks.

Geologists in the National Park Service were consolidated into the center's Geologic Resources division. They are working with the geoscience societies to raise awareness of the division's activities and promote collaboration in research and public education.

In partnership with the Geological Society of America (GSA), division geologists have developed a summer internship program that allows undergraduate geoscience students to spend several months in a national park working on research projects, cataloging collections, or developing interpretive materials. GSA sponsored two internships this summer with matching funds from the division, which is funding several additional internships itself. Projects include developing a paleontological database for Denali National Park in Alaska and working on public education projects at Badlands National Park in South Dakota.

A promising new science scholars program funded by the American Association for the Advancement of Science, Canon, and the National Park Foundation invites graduate students in the biological, physical, and cultural sciences to investigate specific research topics using the parks as laboratories. Unfortunately, this year's program failed to designate any topics related to the geosciences. Efforts are underway to correct that omission.

A CALL FOR ACTION

In the November 1995 issue of GSA Today, Paul and Heidi Doss urge academic geoscientists working in national parks to assign a higher priority to educating the public about their research. Although many geoscientists conduct research in units of the national park system, their interaction with park personnel is often limited filling out an annual Investigator's report or collecting permit.

The Dosses suggest ways to incorporate outside scientists into the park's educational process, working with interpreters and other park staff. They describe their own success in developing training programs at Indiana Dunes National Lakeshore and Acadia National Park, and argue that such programs can effectively inform the public and park service interpreters about geologic research and geology. They point out that these educational efforts "may be the public's first and only direct exposure to taxpayer-funded science."

The call put out by the Dosses should be echoed throughout our community, not just for academic geoscientists but for professional geologists and all others with an interest in increasing public awareness of geology. For example, volunteering to brief interpretive staff on the geologic history and processes at work in a park can make them more comfortable sharing that information with the public.

With a mission focused on preservation rather than multiple use, the national parks have largely been left out of the debates over fossils, mining, and other public lands issues. But the parks represent a very different sort of resource in the form of 268 million visitors a year. Because so many of those visits could represent the geologic field trip of a lifetime, no better opportunity exists for increasing public awareness of the science and capturing the public's imagination.

Gazing over the edge of the Grand Canyon for the first time is as awesome an experience as most people are likely to get. Sciences like astronomy and oceanography have successfully mobilized public support through the "wow", or wonder, factor. It is time for us to do the same.

David Applegate
AGI Director of Government Affairs

■

Fossil Forum (continued)

I read [the] article in Geotimes (August 1997) concerning the lack of geologists and geological training within the National Park Service (NPS). I would also call your attention to lack of same in the Bureau of Land Management (BLM). I write from the perspective of over 25 years [of] work in the Mojave Desert, Alaska, Wyoming, and Nevada. The situation is particularly bad in Alaska. There is not a single geologist or paleontologist based at BLM in the entire state. Archaeologists have a lock on most positions remotely related to geoscience matters and permit issuing, etc. In fact, there is only one partially trained paleontologist-archaeologist in the entire western region at a managerial level. It is a very low level at that. ... I have been working on dinosaur fauna from Northern Alaska since 1987 and still find very little attention or support available for geologic or paleontologic resources.

It is my conclusion that this [situation] is a direct result of the tradition of relying on the U.S. Geological Survey (USGS) for most geoscience investigations until the last decade, when the USGS was methodically gutted in such areas of expertise. However, NPS and BLM have very poor grasps of their geologic potentials and resources. This was very clear from presentations given in 1994 at the Partners in Paleontology Conference, held in Colorado Springs. However, I have not seen much progress over the last three years by any of the participating agencies. Now that the USGS has "enfolded" the biologic survey and has been directed toward more "pragmatic" avenues,it will be interesting to see if the balance of specialists within our NPS and BLM divisions changes in response to this reorganization of the USGS. I think we (American Geological Institute, Geological Society of America, Paleontological Society, and the Society of Vertebrate Paleontology) should be more activist and politically savvy and make our voices heard. I commend you for pointing to steps now being taken, small though they be. I also commend [the] article in general. You are right on! —

Roland A. Gangloff
Curator, Earth Science Collections
University of Alaska Museum
and associate professor of geology
University of Alaska-Fairbanks.

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Invitation for contributions

To keep Park Paleontology News letter 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:

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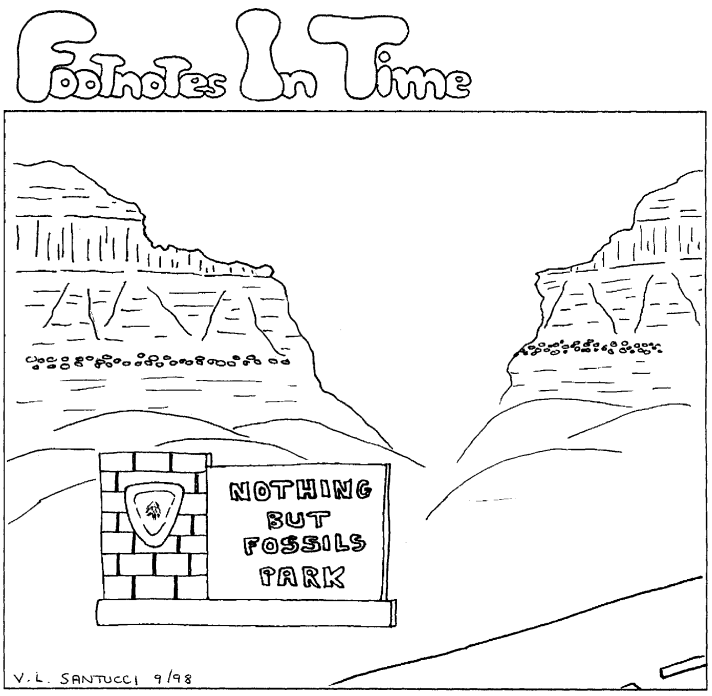
P.O. Box 592
Kemmerer, WY 83101
VINCENT_SANTUCCI@nps.gov

Park Paleontology's schedule is quarterly. The summer issue is planned for publication in July, 1998. Written opinions regarding the Fossil Forum topic are also welcomed.■



Superintendent B. Crat decided not to hire a paleontologist at the park, but rather another biologist to study the adverse effects that fossils may have on the biological resources.

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