COLLECTIONS FROM GEOLOGICAL HERITAGE SITES: A NATURAL BRIDGE BETWEEN PROTECTED AREAS AND MUSEUMS

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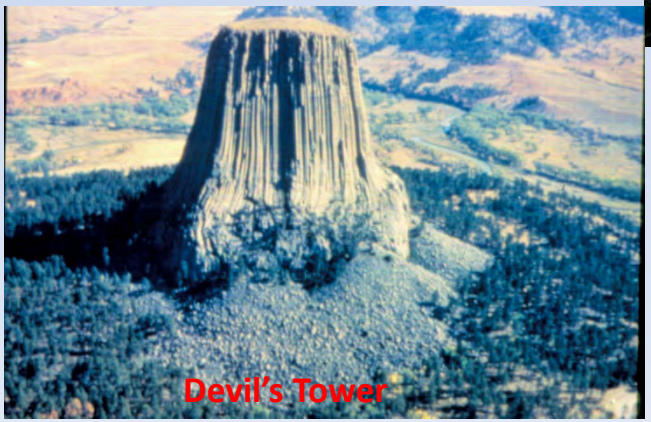
GEOLOGICAL HERITAGE SITES



Geological Processes and Features







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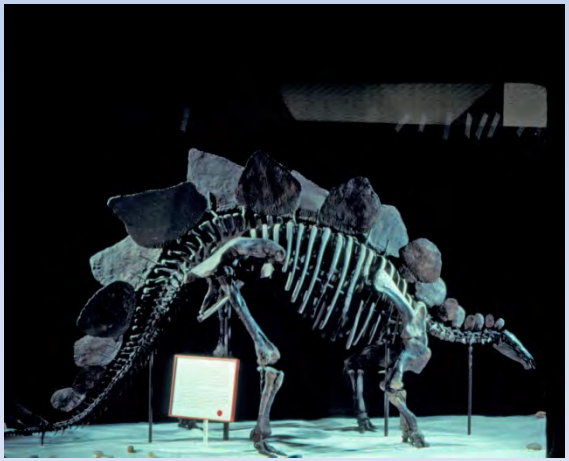
Carnegie Museum
of Natural History

Earl Douglas

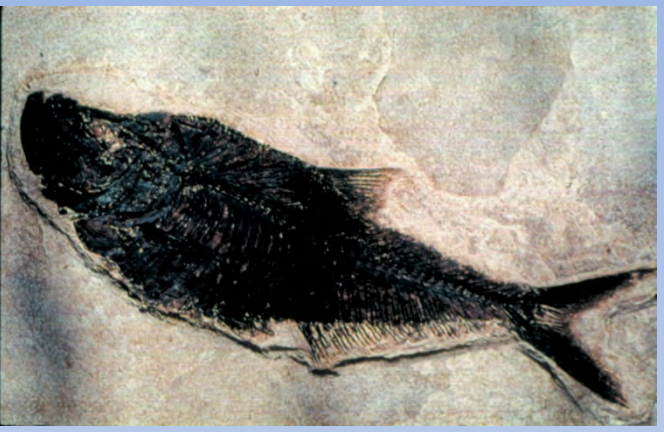
Carnegie Museum
of Natural History

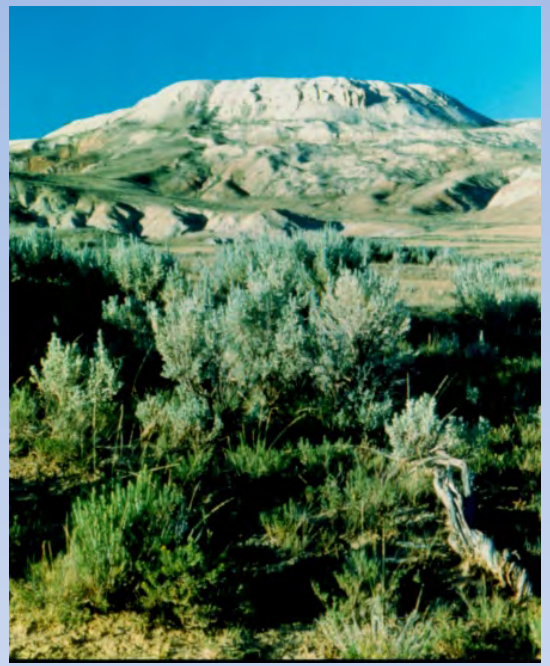


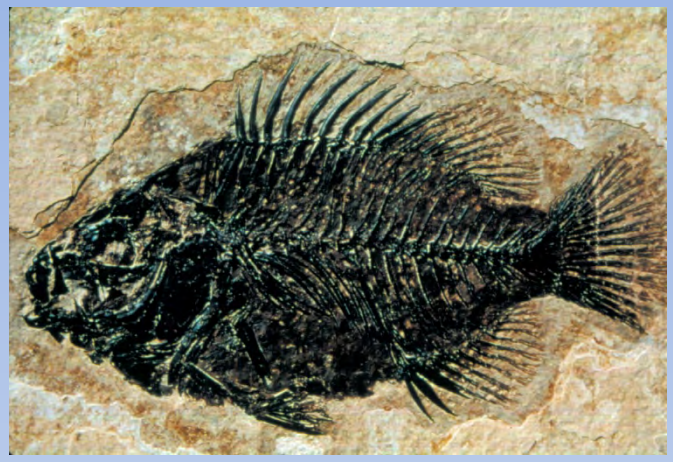
National Museum
of Natural History

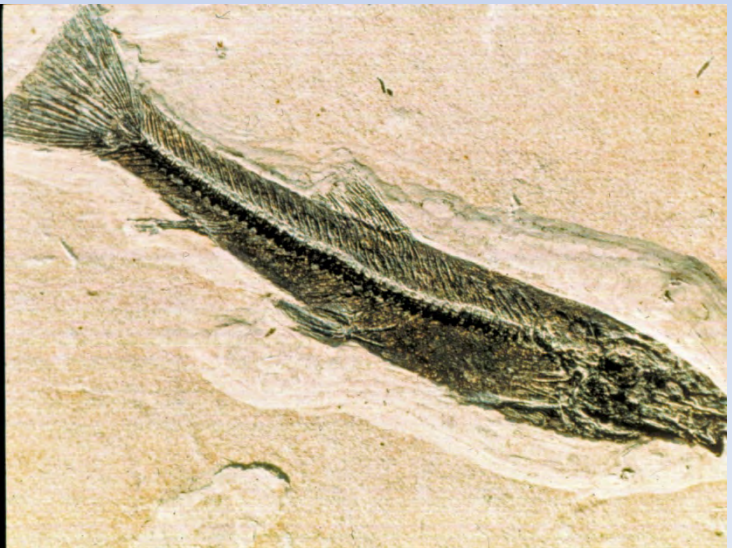
Dinosaur National Monument

Dinosaur National Monument

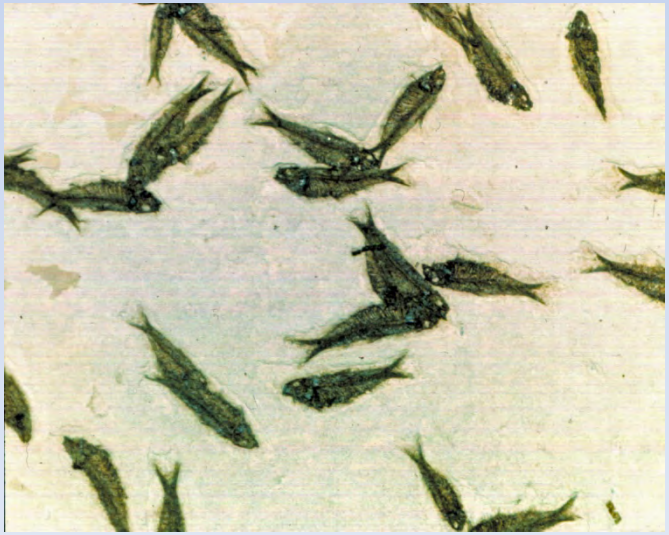








Fossil Butte



Bone Block from Agate Fossil Beds N.M.
Texas Memorial Museum

Moropus Skeleton from Agate Fossil Beds N.M.
National Museum of Natural History

Stenomylus skeleton from Agate Fossil Beds N.M
National Museum of Natural History

Stenomylus Quarry
Agate Fossil Beds National Monument

Smithsonian Excavations
at Hagerman Horse Quarry, 1930's

Equus simplicidens
National Museum of Natural History

Texas Memorial Museum

Natural History Museum
of Los Angeles County

Museum of Comparative Zoology

Hagerman Horse Quarry
Hagerman Fossil Beds N.M.

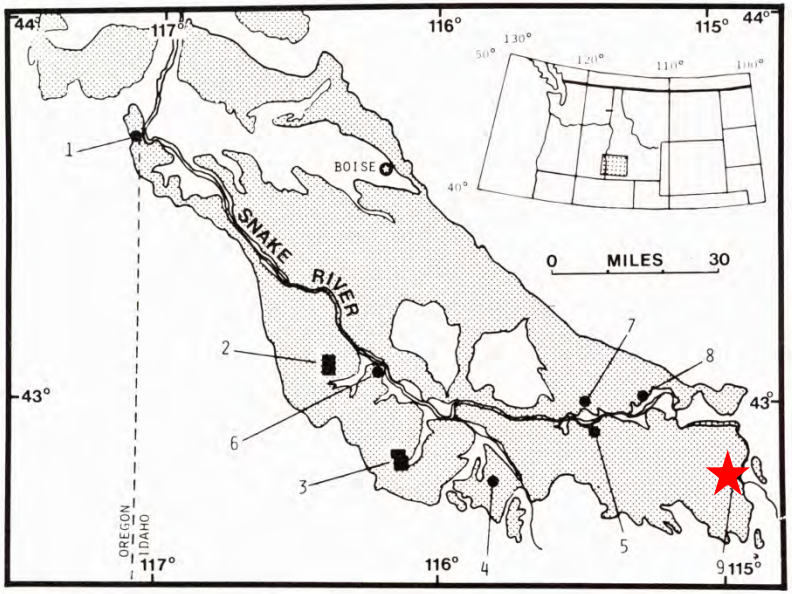


Figure 1. Western Snake River Plain showing the distribution of sedimentary rocks of the Idaho Group (modified from Malde and Powers, 1962) and localities of ash beds reported here. Oregon, Malheur County: (1). Idaho, Owyhee County: (2) Crayfish Hill, Fossil Creek, and Picket Creek localities; (3) Shoofly Creek, Poison Creek, and Twentymile Gulch localities; (4) Horse Hill locality; (5) Sand Point locality; and (6) Jackass Butte locality. Idaho, Elmore County: (7) Bennett Creek locality; and (8) Glenns Ferry locality. Idaho, Twin Falls County: (9) Peters Gulch locality.

Usually, if a site is set aside for preservation, such as with the National Park Service, the site managers responsible for its management must track down:

- **who collected at the site, how many institutions**
- **when were they there,**
- **where did the collecting take place,**
- **how many and what kind of specimens were collected,**
- **where are the specimens now housed,**
- **what notes, photographs and other documentation of the collecting exist,**
- **what makes the site and its specimens scientifically important, or geologically significant,**
- **what has been published on the site,**
- **how can the information provided by the specimens and their associated documentation be used to develop interpretive material about the site for the public,**

This information, often comes from museum collections and helps guide manager's decisions on how to manage a site by providing information on:

- **Spatial distribution of fossils or a specific geological resource**
- **Stratigraphic distribution**
- **Association with a specific lithology**
- **Degree of dispersal of the resource within the designated area: evenly distributed, randomly distributed, multiple localized concentrations, a single local major concentrations i.e. Quarry site**
- **Degree of taxonomic diversity**
- **Mode of preservation of the fossils**

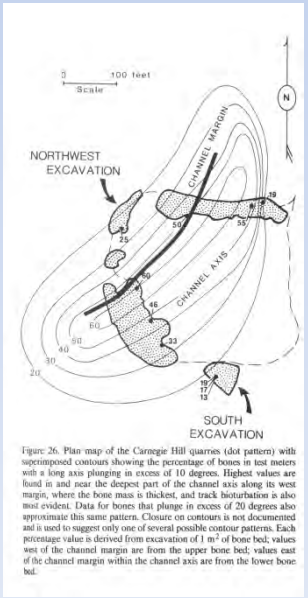
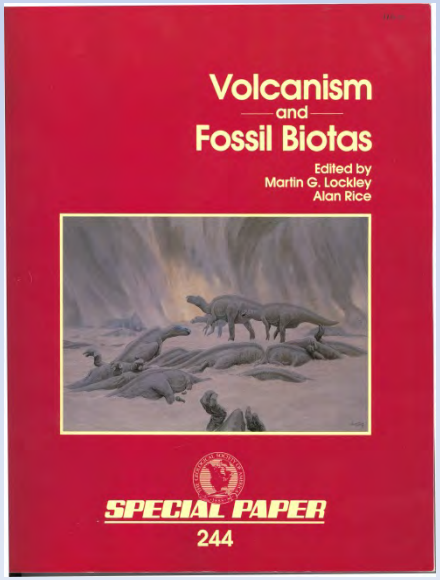


Figure 26. Plan map of the Carnegie Hill quarries (dot pattern) with superimposed contours showing the percentage of bones in test meters with a long axis plunging in excess of 10 degrees. Highest values are found in and near the deepest part of the channel axis along its west margin, where the bone mass is thickest, and track bioturbation is also most evident. Data for bones that plunge in excess of 20 degrees also approximate this same pattern. Closure on contours is not documented and is used to suggest only one of several possible contour patterns. Each percentage value is derived from excavation of 1 m^2 of bone bed; values west of the channel margin are from the upper bone bed; values east of the channel margin within the channel axis are from the lower bone bed.



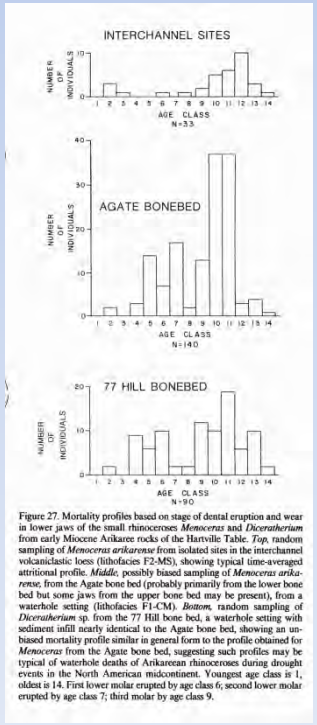


Figure 27. Mortality profiles based on stage of dental eruption and wear in lower jaws of the small rhinoceroses *Menoceras* and *Diceratherium* from early Miocene Arikaree rocks of the Hartville Table. *Top*, random sampling of *Menoceras arikarense* from isolated sites in the interchannel volcaniclastic loess (lithofacies F2-MS), showing typical time-averaged attritional profile. *Middle*, possibly biased sampling of *Menoceras arikarense*, from the Agate bone bed (probably primarily from the lower bone bed but some jaws from the upper bone bed may be present), from a waterhole setting (lithofacies F1-CM). *Bottom*, random sampling of *Diceratherium* sp. from the 77 Hill bone bed, a waterhole setting with sediment infill nearly identical to the Agate bone bed, showing an unbiased mortality profile similar in general form to the profile obtained for *Menoceras* from the Agate bone bed, suggesting such profiles may be typical of waterhole deaths of Arikareean rhinoceroses during drought events in the North American midcontinent. Youngest age class is 1, oldest is 14. First lower molar erupted by age class 6; second lower molar erupted by age class 7; third molar by age class 9.

In contrast after specimens have been collected from a site, transported to a museum or university, prepared and curated, interest in the site by the institution often ended. The site had fulfilled its purpose in providing specimens for the institution's collections and exhibits.

The need or desirability for long term preservation of a site was often not considered.

Other than the historical connection, institutions with specimens from a site are often not actively involved with the site after making their collections nor with the process of it's preservation.

What is the "value added" or relevance to institutions that are historically linked with a site through the collections they made after it is recognized and preserved as part of our geological heritage?

Geological Sites and the Collections from these sites are two sides of the same coin, each is important and are complementary in terms of contributing to a complete understanding of a site's geological history.

The preservation of sites that have been collected for fossils or other geological samples like minerals and the preservation of those specimens in museum collections are mutually supportive in terms of understanding the history of the earth.

They may serve this purpose at different scales, and because of this difference in scale there is also a difference in scale in terms of how they are managed and the cost to achieving successful management.

But despite the difference in the scale, both are finite resources, which once lost can never be regained.

As sites and the collections derived from them are complementary to each other, the loss of one diminishes the:

- **Scientific**
- **Intellectual**
- **Aesthetic**
- **Interpretive**

value of the other

Both require:

Conservation –

- **to keep in safety, or from harm, decay or loss;**
- **to preserve with care;**
- **to preserve in its existing state from destruction or change**

Oxford English Dictionary

The museum collections holding fossils or other geological specimens are part of the primary documentation on the importance of a location as part of our geological heritage

and

The continued preservation of localities from which major museum collections ensures the site can continue to support the scientific value of those collections by providing future researchers the opportunity to revisit the location and restudy the original context from which the museum specimens came and to apply new technology to better understand the site. This can include the type locality of a described taxon, to reexamine the stratigraphic and sedimentary context of quarries that produced large samples as well as the preservation of as yet uncollected specimens.

SOME MODEST PROPOSALS

- **A shared comprehensive database or on-line catalog of specimens from the site with links between the site and the institutions with specimens from the site, especially if multiple institutions have specimens from the site, which would serve both researchers and the public**

- **A shared photo catalog of specimens in collections or on exhibit from the site available on the web with links to the photo catalog from both the site and partner institutions, also molding and casting of specimens**

- **Adding links to the site on institution's web pages, and links to the institution's web pages from the site web page**

- **Include references to geological heritage sites in partner institution exhibits and interpretation at the site can reference exhibits displaying specimens from the site at partner institutions**

- **An on-line bibliography of literature about the site and specimens from the site, including both scientific and popular articles**