

Vol.1 - No.9 1927

By John C. Merriam President Carnegie Institution of Washington

While the National Parks serve in an important sense as recreation areas, their primary uses extend far into that fundamental education which concerns real appreciation of nature. Here beauty in its truest sense receives expression and exerts its influence along with recreation and formal education. To me the parks are not merely places to rest and exercise and learn. They are regions where one looks through the veil to meet the realities of nature and of the unfathomable power behind it.

I cannot say what worship really is - nor am I sure that others will do better - but often in the parks, I remember Rryant's lines, "Why should we, in the world's riper years, neglect God's ancient sanctuaries, and adore only among the crowd, and under roofs that our frail hands have raised?" National Parks represent opportunities for worship through which one comes to understand more fully certain of the attributes of nature and its Creator. They are not objects to be worshipped, but they are altars over which we may worship.

From National Parks Bulletin. December 1926.



U. S. DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE GRAND CANYON NATIONAL PARK

VOL. 1. GRAND CANYON NATURE NOTES

NO. 9 JANUARY 10, 1927.

This bulletin is issued monthly for the purpose of giving information to those interested in the natural history and scientific features of the Grand Canyon National Park. Additional copies of these bulletins may be obtained free of charge by those who can make use of them, by addressing the Superintendent, Grand Canyon National Park, Grand Canyon, Arizona.

J. R. EAKIN - SUPERINTENDENT. G. E. Sturdevant-Ranger Naturalist.

FOSSILS

By - G. E. Sturdevant.

Aside from the Grand Canyon being the magnetic hub that lures well over one hundred and forty thousand people yearly to see the "World's Most Sublime of Earthly Spectacles," it serves as one of Nature"s greatest museums where the successive life-forms of the Paleozoic are beautifully portrayed. Many laymon as well as scientists take a keen interest in the various phases of past life found in the thick horizontal strata that make up the greater part of this enormous gash in earth's grust

The former representatives of life in this region are known as "fossils." Popular interpretation of a fossil generally means something ancient. This is only partly correct. A Roman coin is quite ancient yet it is not a fossil. Likewise the dodo bird, which has become extinct in the life of man, is often regarded as ancient since no living person has ever seen a live specimen. By definition a fossil is "any trace of organism preserved in a deposit in some past geological period."

Fossils are preserved in several ways. The original material is sometimes found such as the hairy mammeth preserved in the Pleistocene ice fields of Siberia. Carbonization of the original plant material is another mode of preservation. All plants critain certain amounts of carbon. Pressure, due to the accumulation of sediments, drives out the water and volatile gasses from the plants causing a concentration of the carbon. Thus, by mining the coal millions of years after it is formed, one can view the carbonized remains of plants ages after they have become extinct. Areas are encountered ocassionally where the original material is encrustated by calcareous material which is chemically the same as limestone. This is especially true around former calcareous springs. Such a prosess can be seen taking place today around the hot springs of Yellowstone National Park. Another method, of preservation of fossils, is by impression. Frequently a leaf drops in the soft mud or an animal walks along leaving his trail. Later the mud or wet sand may become hardened by superimposed sediments preserving the traces of life-forms as impressions for thousands of years. Perhaps the most common form of preservation is by patrifaction or replacement by stone. The original material is removed in fine particles and replaced generally by silica. Petrified wood is not wood turned to stone but wood replaced by stone. Replacement or substitution of a chemical for the woody material takes place at the same rate as the removal. Thus petrified wood oftentimes reveals the actual cellular structure of the species. The most common modes of preservation of the fossils found at the Grand Canyon are by impression and petrifaction.

The animal tracks. invertebrate fossils, and fossil ferns, at the Grand Canyon, free especially mich in species. Each species has its individual history such as its geological range and distribution, as well as its source of origin. Some of the species are so interesting they can be treated as individual subjects.

111

Dolichopodus tetradactylus - Gilmore From drawing by C. W.' Gilmore

The tracks in the rocks are of especial interest. Three successive formations along the Hermit brail contain animal tracks. At present three genera and three species have been classified from the Supai formation, eight genera and ten species from the Hermit shale, and fifteen genera and twenty-two species from the Coconino sendstone. The Coconino sandstone is regarded by geologists as the best Permian fossil track horizon in the world. Dr. C. W. Gilmore of the National Museum, who has done most of the work on the animal tracks, believes the total of tentysix genera and thirty-five species will be considerably increased by further collections.

-2-





3-

Composita subtilita

Productus ivesii

A great many species of invertebrate fossils are found in the walls of the conven. Some are large being four or five inches in length while others are microscopic in size. Some are world-wide in their distribution while others are exceedingly limited. Some of the forms lived for millions of years without any perceptible change while others became extinct after a very short vertical range.

Among the fossil ferns, one or more species of the following genera occur in the Hermit shale; Calliptoris, Gigantoperis, Glenopteris, Pecopteris, Neuroptaris, Tinygpteris, Sphenophyslum, and Walchie. Dr. David White, Senior Goologist of the Guologisal Survey, is promising a paper on the above plants collected at the Grand Canyon during the past summer.



Callipteris conferta

Fossils are not mere curosities of past forms of life that were once prevalent upon the earth. They give a vivid account of the life present at that particular time. In addition some fossils serve as an invaluable aid for geologists in classifying the age of beds. Such fossils are known as "index" fossils or "acrison markers." These instils have a wide distribution with a short vortical range. For instance Callipteris conferta lived exclusively in Fermian time. Two beds of rock exposed in volleys several miles apart may appear as the same bed yet to extablish conclusive proof it is necessary to find the fossils. If oil is discovered in a field at one locality the presence of absence of fossils determines if the same formation is present in an area some distance removed. Fossils tell us of the invasions of ancient seas, their extent, and how long before they withdrew.

A branching incrustation, common along the Bright Angel trail, is often mistaken for a fossil plant. The habit of growth resembles a plant to some extent, if several of the incrustations are studied, however, it will be seen that there is no regularity to the branching,. The incrustations are known as "dendrites" or "pseudo-fossils." They are inorganiz in origin, being deposits of mingunese oxile. The Bright Angel trail follows along a fracture of the earth's crust known as the Bright Angel fault. The rocks on either sile of the fault have been broken to some extent permitting water to deposit manganese oxide.



Dendrite or psoudo-docail (115)

The various trails lead through one of the greatest Paleozoic sections in the vorld. At the various borizons cocur certain assemblages of fossils just as at present are found groups or assemblages of plant and animal life at the various biological zones. In fact the several trails serve as laymen colleges where the individual sees the wonderful traces of past life as he progresses along his route.

S.

CONSERVATION By - C. E. Sturdevant.

Throughout the year, at the Grand Canyon village, can be seen notable examples of conservation. A great many of the park residents provide food and water for their furred and feathered friends.

Perhaps the best place to observe the response to such treatment is at the home of the resident physician, Dr. H. S. Jones. Dr. Jon has prepared a feeding table by mounting a short section of a tree c. legs and placing a half-section of a large cheese box on the upper surface. The table is kept well filled with corn bread, crumbs, and other delicacies that attract the birds. By watching a few minutes one will notice several species of birds and the Abert squirrel come for food and depart with full stomachs. Among the birds will be seen Western Robins, Pygmy and Slender-billed Nuthatches, Thurber and Red-backed Juncos, Mountain Chickadees, Ing crested Jays, Plain Titmice, and White-breasted Woodpeckers. The Nuthatches and Juncos are present in greater numbers. The Nuthatches appear to have lost most of their timidity for man. They will light on Dr. Jones shoulders, feed out of his hands, and even take pinch nuts from his lips. During the summer several more species of wild life can be seen around his residence.

A few days age, while the ground was covered with snow, a scratching noise was heard at my door. My wife opened the door to see an Abert squirrel retreat a few steps only to return as if to voice an earnest appeal for food. A handful of pinon nuts coaned the plumetailed creature into the house. He would pick up a nut, run out on the porch to eat it and then return. He must have been very hungry for he consumed nearly a pint of muts before departing.