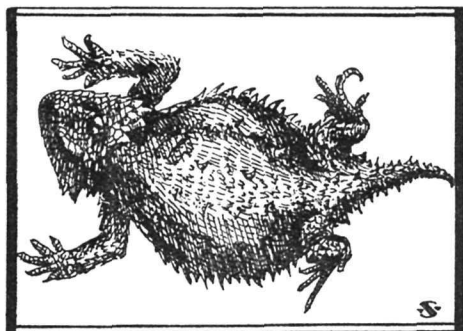


GRAND CANYON NATURE NOTES



Ejects blood from eye ↔ See Page 76.

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GRAND CANYON NATURE NOTES

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M. R. Tillotson,
Superintendent.

Edwin D. McKee,
Park Naturalist

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Illustrations by Florence Satterwhite

A "REPTILE STORY"

By A. R. Croft, Ranger Naturalist

"REPTILE STORIES", like "Bear Stories", constitute a group of so-called experiences, questionable statements, and proverbial hearsay. Most every individual has a supply of such stories which he brings to his rescue when good fellows exchange "whoppers" on appropriate occasions. Where most of these stories come from originally, we usually do not know. Of such stories, one reptile authority has said: "If we discard all the popular ones we shall probably be nearer the truth than if we should believe any".

One such story concerns the Horned Lizard, the Grand Canyon species of which is commonly called the Short-horned Horned Toad (*Phrynosoma douglassii*, Bell). The story is: "Occasional specimens of Horned Lizard have been seen to eject a thin stream of blood from the corner of the eye, taking place when the specimen has been disturbed or annoyed".

The veracity of this statement is often questioned, principally because the phenomenon is so rare, and very exceptional, nevertheless it can be placed with that small group of "Reptile Stories" which are founded on facts.

Early in July 1932, one of a party of hikers being conducted on a field trip by the author, picked up a Horned Lizard and the much questioned stream of blood was ejected from the left eye with considerable force and without the slightest provocation. The amount of blood ejected was about two cubic millimeters.

The cause of this unusual reaction is not known. Many Horned Lizards have been subjected to various kinds of stimuli in an effort to induce the reaction but it seems that no one has been rewarded with a demonstration in response to such attempts. It is probable that the reaction is due to a specific stimuli but at the present time no one seems able to even suggest what it might be.

At any rate, this is one "Reptile Story" which is true.

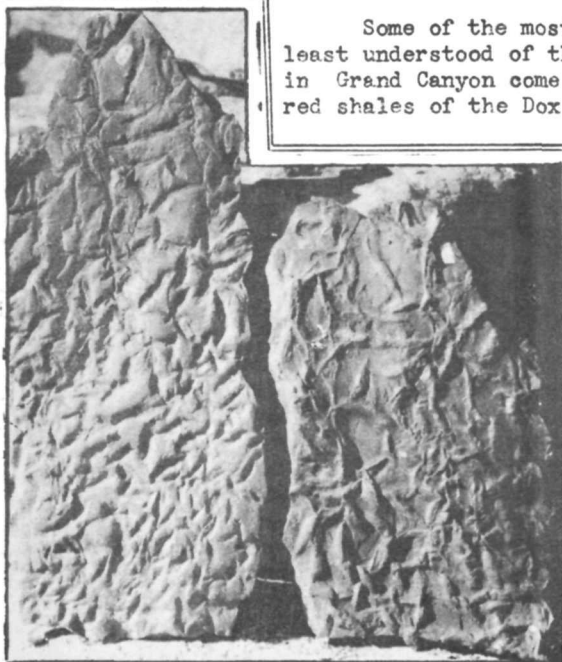
SOME FUCOIDES FROM GRAND CANYON

By Edwin D. McKee, Park Naturalist

IN MANY of the sedimentary formations of the Grand Canyon are found peculiar worm-like ridges of varying shapes and sizes whose origins have been a matter of considerable speculation. Some of them are known locally as "worms". Geologists call them "fucoides" because of their resemblance in shape to certain seaweeds, especially those of the family Fucaceae. As a matter of fact some of the so-called fucoides may have been formed from the impressions of such plants, but many of them very definitely had other origins. The term now serves admirably for a "loop-hole" in referring to any structure of that general nature regardless of its origin.

Some of the most interesting but least understood of the fucoides found in Grand Canyon come from the bright red shales of the Dox formation (Algonkian age).

As with most fucoides, they represent the natural casts of depressions occurring on the old mud surfaces. They average about one inch in length, taper to a point at each end and curve, often in two directions. They are found associated with the casts of ripple marks, the square moulds of salt crystals



Peculiar Casts and Moulds in Dox Formation \$\$\$ Photo by Grant

and the casts of shrinkage cracks in mud. Because of the possibility that they may be of organic origin and because of the remarkable scarcity of fossil plant life together with the entire lack of traces of animal life in rocks of Algonkian age, they are of especial interest. Possibly, however, they represent merely mud curls or lumps, or perhaps the moulds formed from the impressions of some mineral crystals. Our commonest mineral, ice, is known to leave such impressions (though not curving) and certain fucoides found in the Portage shale of New York state are believed* to have been formed in that manner. Further investigation may disclose some valuable information regarding these peculiar and somewhat similar structures of the ancient Algonkian age.

Among the green shales on the lower part of the Tonto Platform of Grand Canyon are found some very large and spectacular fucoides. They vary extremely in size and shape but for the most part are about as large as a person's finger and are curving and bending. Dr. Charles Walcott of the Smithsonian Institution, who collected many of these from the Chuar Valley of Grand Canyon, considered** that they were, for the most part, the natural casts of annelid worm trails. A few varieties which occurred in pairs, however, he attributed to burrows made by Trilobites. Dr. Walcott presents a very interesting word picture of the ancient Cambrian beach on which these were formed - where the Trilobites pushed their way through the soft sand seeking their prey, the annelid worms. He also points out the great variations in the tracks of the same animal caused by creeping, running, or wallowing in sediments of varying material, hardness and consistency, and he gives some interesting comparisons with the tracks of modern creatures. Most of the fucoides recently collected from the Tapeats sandstone of Grand Canyon suggest by their character that Dr. Walcott interpreted them correctly. Those attributed to Trilobites occasionally even show delicate, nearly parallel ridges crossing both fucoides in the pair and representing the depressions of the animal's appendages. Those of the annelid worm type often occur in great masses - individuals overlapping one another and branching. Their sides are smooth and their widths are remarkably uniform over distances of six inches and more -- good evidence that they were formed as burrows.

Other interesting fucoides are found abundantly in the



Fucooides from the Tonto Platform << Photo by Grant

Muav limestone. There they are small and often rod-like. They vary extremely in size, shape and character, however, and deserve to be given careful consideration and study. At present it seems unsafe to venture any conclusions concerning their origin.

Some of the most peculiar fucooides or fucooid-like structures found in the Grand Canyon occur on the inclined laminae of the Coconino sandstone near the uppermost fossil footprint horizon in Hermit Basin. The individuals found here range in length between a few inches and nearly a foot. In width they average about one-half inch, but they vary considerably and often taper. A few of them appear to lie on top of others but they do not branch. Nearly all have a lumpy appearance. Several dozen of this type occur in a very limited area -- perhaps not more than ten square yards.

Regarding the origin of the fucoid-like structures in the Coconino sandstone, worm borings are disproved by specimens which branch but never pass through each other, by tapering ends and by the lack of any individuals cutting through the inclined laminae. Inorganic materials such as mud curls or balls resulting from shrinkage due to sun's heat seem unsatisfactory in explanation since the Coconino is so free from clay and other fine clastics. Plant origin also seems unlikely because of the general lumpy appearance and because of the probable conditions under which they were formed. Coprolites (fossil excrement), on the other hand, seem to satisfactorily explain the peculiar shapes and to be very logically expected considering the association with the abundant footprints of vertebrate animals.

In certain sandy phases of the Kaibab limestone are found very long, branching forms of fucoides with diameters of half an inch or less. Because of their shape, and tendency to taper they are considered to have probably originated from the impressions of seaweeds.

In this short article a complete survey and description



Coprolites from Coconino Sandstone ↔ Photo by Grant

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of Grand Canyon fucoïdes is not attempted; nor have conclusions been reached in every case concerning the origin or significance of those described. Nevertheless, because of the puzzling nature and the general interest of the structures to all observers - laymen and scientists alike - it is thought worthwhile to briefly state a few of the problems and to give the conclusions reached by some detailed studies made by the writer.

* Clark, J. M., New York State Museum Bul. 196.

** Walcott, Charles D., Smithsonian Miscellaneous Collections, Vol. 67, No. 4, Cambrian Geology and Paleontology, Dec. 1918.

DEMONSTRATION LIFE ZONE GARDENS

By Donald Edward McHenry, Junior Naturalist

ONE OF THE outstanding features of the Grand Canyon region is the existence of six of the seven classified climatic life zones found in the world. The only zone not represented here is the tropical. Three of these zones are so evident in the canyon that even the average visitor traveling from rim to rim by trail is easily able to distinguish the differences both by changes in temperature and by the general character of the vegetation.

Unfortunately not every visitor to Grand Canyon is able to cross by trail. In order to show those people who cannot make the trip the kind of plant life growing in the various zones, live plants typical of these places were collected during 1930 and planted in three representative gardens just outside of Yavapai Observation Station on the south rim. One of these gardens features the Canadian Zone (plants living in a climate similar to that of central Canada); another the

Upper Sonoran Zone (plants living in a climate similar to that in central United States at sea level); and the third the Lower Sonoran Zone (plants living in a climate similar to that of desert Mexico).

Thousands of visitors to the south rim of Grand Canyon this past summer have shown a great deal of interest in this display of plant life. Probably very few realized the difficulties involved in building up such gardens. In the first place, truck loads of suitable soil had to be hauled to this location. Then there were the plants.

The plants representing the Upper Sonoran Zone were, of course, gathered and grown with comparative ease, for that is the zone in which the gardens are established. In fact, the problem concerning them soon resolved itself into the job of keeping too many individuals from developing from the seeds carried in from the immediate surroundings.

Transferring the plants from the other two zones presented a different and more difficult problem. The Canadian plants could not easily be transported from the north rim; therefore, it was more convenient to bring them from the Canadian Zone on the side of the San Francisco Peaks. Even this involved a distance of more than a hundred miles. It necessitated very careful preparation of the specimens for the journey. That all such plants would live was more than could be expected, consequently the representation in this garden is not inclusive. We hope to be able to get additional plants from the north rim next summer. They will have to be trucked about 230 miles, part way through the Painted Desert.

The plants from the Lower Sonoran Life Zone have presented a problem of even greater difficulty. Some of them were trucked in from the nearby Painted Desert, but others which are found in this region only in the bottom of the canyon could not be obtained in this manner. The writer has tried bringing those plants up the trail in boxes on pack mules. Many difficulties were involved. Often it was hard to inveigle the mule into cooperation while placing the plants in the boxes. Then the motion of the mule walking up the trail tended to work the roots of the plants free from the soil which they so greatly needed for protection against loss of moisture. Again, plants from a lower zone seemed to suffer



more by transfer to a higher zone than did plants moved the opposite way. Altogether we consider ourselves fortunate in having many survivors in the Lower Sonoran garden, nevertheless, we will keep on experimenting for we believe that the gardens mean a great deal to our visitors, and represent an important ecological study to us.

Following is a list of the plants which are now growing in the Life Zone gardens: See also accompanying chart showing the present arrangement.

CANADIAN LIFE ZONE GARDEN

Me.	Meadow Rue	<i>Thalictrum fendleri</i>
Q.	Quaking Aspen	<i>Populus tremuloides</i>
E.	Elderberry	<i>Sambucus microbotrys</i>
D.	Douglas Fir	<i>Pseudotsuga taxifolia</i>
Co.	Columbine	<i>Aquilegia coerulea</i> leptocera
W.	White Fir	<i>Abies concolor</i>
Cr.	Cranesbill	<i>Geranium richardsonii</i>
Sn.	Snowberry	<i>Symphoricarpus are-</i> ophilus

UPPER SONORAN LIFE ZONE GARDEN

Cl.	Cliff Rose	<i>Cowania stansburiana</i>
G.	Globe Mallow	<i>Sphaeralcea ambigua</i>
Sp.	Spanish Bayonet	<i>Yucca baccata</i>
P-c.	Pincushion Cactus	<i>Coryphantha arizonica</i>
H.	Hedgehog Cactus	<i>Echinocereus poly-</i> canthus
S.	Sagebrush	<i>Artemisia tridentata</i>
P-P.	Pinyon or Nut Pine	<i>Pinus edulis</i>
Pr.	Prickly Pear	<i>Opuntia polyacanthus</i>
U.	Utah Juniper	<i>Juniperus utahensis</i>

LOWER SONORAN LIFE ZONE GARDEN

T.	Tree Cactus	<i>Opuntia whipplei</i>
Pr.	Prickly Pear	<i>Opuntia rhodantha</i>

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Be.	Beaver-tail Cactus	<i>Opuntia basilaris</i>
CU.	Cucumber Cactus	<i>Echinocereus</i> <i>fendeleri</i>
Ba.	Barrel Cactus	<i>Ferocactus lecontei</i>
N.	Narrow Leaf Yucca	<i>Yucca baileyi</i>
Ce.	Century Plant	<i>Agave utahensis</i>
BU.	Burro Brush	<i>Coleogyne ramosissima</i>
Ca.	Cat's Claw	<i>Acacia greggii</i>
M.	Brigham or Mormon Tea	<i>Ephedra torreyana</i>



MOUNTAIN LION POSES FOR AUTO CARAVAN

By Ralph A. Redburn, Ranger Naturalist

OUR GREAT AMERICAN CAT, the mountain lion (*Felis cougar*), is very seldom seen in the wild state by the traveler to the canyon and mountain areas where it abides. Yet this cat is said to be somewhat prevalent throughout the various Rocky Mountain states and also in numerous others. Along both rims of the Grand Canyon a species of mountain lion (*Felis concolor hippolestes*) roams freely, undisturbed by man since it is within the boundaries of a National Park where it is well and wisely protected.

It was an unexpected pleasure to me and to the members of an automobile caravan which I was conducting on the north side of Grand Canyon, when on July 14, 1932, we chanced to come upon one of these "cougar cats" as mountain lions are sometimes called. Grand Canyon has long been noted for the numbers of them that apparently live along its rims, yet never before, as well as I can determine, has any large group of visitors here had the pleasure of seeing one running wild through the forest. Very suddenly we came upon this one as it stood in the middle of the road and our first car approached within two hundred yards of it. The cat then ran

into the woods, but accommodatingly waited behind a tree some two hundred feet from the highway. All cars stopped, occupants got out and cautiously walked in its direction. The people from the first car, being closer to the animal to begin with, were first on the scene and able to get with-



in 150 feet of the lion. It did not appear very much alarmed, but sat upright like an ordinary house cat and casually looked us over. As many members of the caravan were arriving at the scene of interest, the cat became frightened and ran away, and as it left, various people yelled thinking that they might scare it up a tree. It was not interested in such procedure at that particular time, however, but continued on its way toward the great cliffs of the Canyon. The last that was seen of the cat was its long graceful tail waving at us as the animal dropped down over a rock ledge.

When the various individuals in our party yelled, a large deer jumped out from under the foliage of the nearby Aspen trees. The deer was lying down and had not been seen until it started to run. It was a buck, probably four or five years old, with a large spread of antlers, and when scared away, ran in the opposite direction from that taken by the lion.

After investigation of tracks and consideration of the trend of events, we concluded that the mountain lion had been stalking the deer. Probably the reason the cat did not run away when first sighted was because it was loath to relinquish its noon-day meal of venison.

