

NATURE

NOTES

FROM THE

GRAND

CANYON

JULY 1930

VOL. 4

NO. 9



EWG

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

Vol. 4  
GRAND CANYON NATURE NOTES

No. 9.  
July 31, 1930

-----

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.

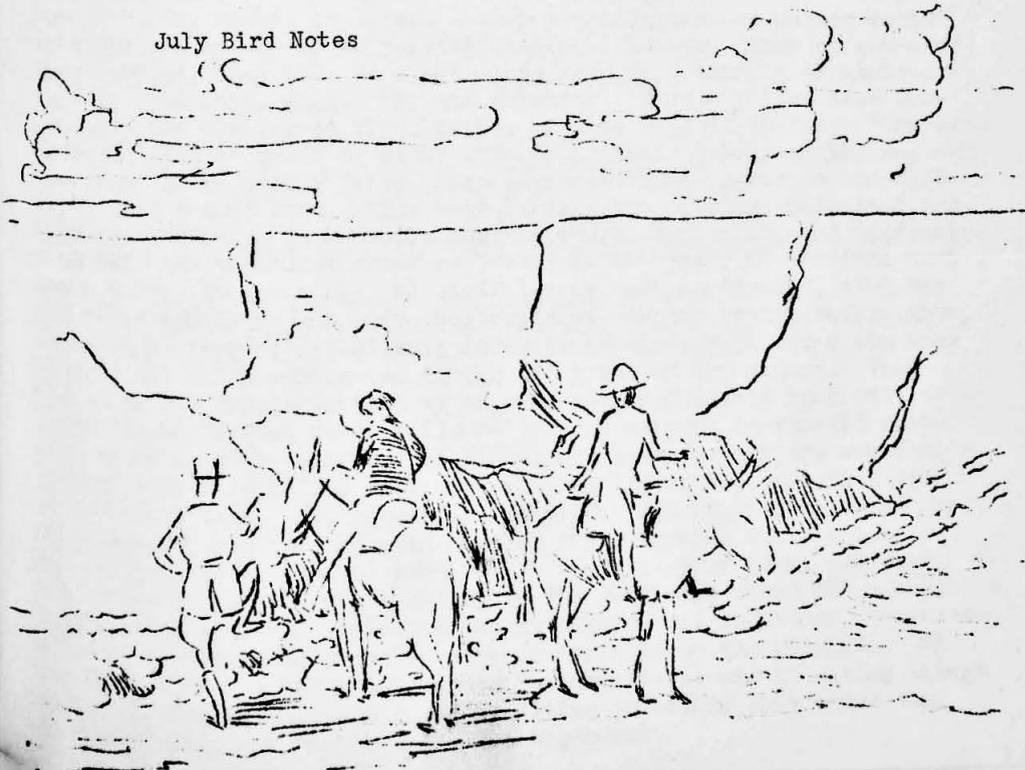
-----

M.R. Tillotson, Superintendent, Edwin D. McKee Park Naturalist

-----

Table of Contents

A Living Conquest	Ranger-naturalist E.W. Count
Fossils & What They Tell -	Ranger-naturalist R.L. Nichols
Copper Deposits of Grand Canyon	Park Naturalist
July Bird Notes	



## A LIVING CONQUEST

By - Ranger-naturalist E.W. Count

When the first Indians halted in stolid and stupefied humility before the awful silence of the Grand Canyon, their naive but powerful imaginations responded to a multifold mystery and built those flights of poetry that are the myths of the Southwestern Indians. They naturally did not suspect the greater and more actual mysteries that lay locked in the soils beneath them; for these Canyon rocks - an immense cemetery on which present life works out its destiny, unconscious of past and future alike - bury the records of past climates, landscapes, and living things; while on their inhospitable backs and faces crawl and climb other living plants and animals, determined to occupy every fragment of surface that they either can change or come to fit.

To the student of living things, the less obvious tale of how these present forms of life have scaled the inanimate is no less significant than the story of a long-vanished past; for here, where trees have marched in and now possess the land, a vanishing line of lowlier pioneers have lived, worked, and conquered and died.

Hear, then, the story of a living conquest, where from humble beginnings and at uncounted cost, living nature has contrived to turn even this hot and dry region into a place where it is good to dwell.

The wanderer along the rim sees the orange-colored lichens and their black dead remains clinging to the bare rock surfaces. These lichens are life's vanguard. Their body acids slowly eat into the sandy limestone, until they have formed a thin, slight soil. They have no roots, stems, or leaves - they have no place to anchor roots and therefore no way of supporting stems and leaves. They do not need them; instead, they live as a shapeless scab by gathering themselves together from rock, rain, air, and sunshine. They may live thus precariously for unmeasured time, until, at last when death fades them out, seeds of a higher order of plant life reach their debris by chance; and from these there slowly emerge such flower-bearing plants as are willing to lead a hard life. They must exploit the pittance inherited from their predecessors; their roots must be tough, spreading, and aggressive to explore the slightest crack or pocket in the rock; their stems must have a heavy, shaggy bark; and their leaves must be "tough", that the rare water-specks do not leave too rapidly. As the lichens before them, they must do their body-building in those precious days after the snow melts in the early spring and during the rains of the summer. They must stand the disappointment of an over-meager rainfall that will evaporate almost as soon as it falls so that it conveys no benefit whatever; or of an over-abundant one that bears down through the ravines, carrying with it precious soil, and escapes before its potentialities can be seized upon. But as the end of winter and the middle of summer bring these plants two separate seasons for gathering their water, some of them bloom and make seeds twice a year. They grow; and their roots take advantage of more cracks in the rock, and crowd the rock to pieces. They die; and their remains give more soil for other and greater but less pioneering hosts to move in and take up the struggle. At last the pine-trees tramp in and, in the ungrateful way of living things they overshadow those who made their living possible; they drive down the cliff-roses, the fern-bushes, the sagebrush.

Where the flowers are, come the bees, butterflies, moths, and beetles to draw food and, incidentally, to pollenize and continue the plant race. The flowers vie to produce the most attractive colors and the richest flow of honey to catch these all-important visitors. The blue flowers seem to have the advantage; while the red ones would lag hopelessly behind were it not for the "red-seeing" butterflies and birds.

Where the bark grows, come the beetles to bore and lay eggs. The moths lay their eggs where the hatching caterpillars may eat the leaves. Thus the plants pioneer, while the animals move into the heritage, and only in some cases do these latter help the plants in turn by more than their excreta.

Many animals are parasites, and would literally eat their own race to starvation and death were it not that there are in turn other preying animals to keep their numbers down. The pigmy and slender-billed nuthatches hop up and down the tree-trunks, head up or down - it makes no difference--to clear the bark of insects. The chickadees, and titmice, in mixed flocks, comb the twigs and branches. The flycatchers sit waiting on a limb until a hapless insect hums by; when out they dart, to return with a satisfied bill. Or the scateate flickers and other woodpeckers, tireless avian miners, probe the inner bark for lurking grubs. The violet-green swallows and the little bats relieve each other, the ones taking the day shift and the others the night, in the task of clearing the air of whatever insects are flying. And even the ichneumon-fly probes the trunks of trees to deposit its eggs among those of some other insect, that its own young may feed upon the grubs of the latter. The little, blue-bellied swifts and the "horned toads" do their humble but effective best in securing the ground clear of insect pests.

But again life is artless; and on the pines and junipers come the seeds of the (Razoumofstya) mistletoes. They reach their degenerate little roots down into the juicy branches of the trees to draw their water supply; and grow their berries that the birds will swallow; but the seeds thereby discharge into new territory yet again, the Abert Squirrel may at one time be burying the plump sedentary seeds of the pinyon, which later may sprout to new trees; or still again he will be chewing off the succulent twigs and unripe cones on that same tree.

Nature, you observe, is inconsistent; how much more rapid the conquest if there were no dissention in the invading ranks! But perhaps - may there not be in Nature a deeper philosophy, a more subtle kind of cooperation than limited and therefore necessarily "efficient" man at first surmises?

Besides - Nature is a warrior, not a general.

## FOSSILS AND WHAT THEY TELL

By - Ranger-naturalist R.L. Nichols

Originally a fossil was any rock, mineral or other object dug out of the earth, but today the term has a much more limited application. A fossil is the remains of a plant or animal or the trace of its presence, preserved in the rocks of the earth's crust and this plant or animal must have lived before the dawn of history.

Early men - Babylonians, Greeks, Egyptians and Romans - came in contact with fossils, for the Mediterranean region is one particularly rich in them. It is most interesting to learn how these people looked upon them and what they considered the fossils to be. Some of the early Greek thinkers believed that fossils were the result of the interaction of star light shining on soil. It seems that star light had some mystical power and by shining on soil these curious objects now known as fossils were produced. Others looked upon fossils as the discarded work - the mistakes of God - who made them only to find them not to his liking and hence he thrust them out. During the 15th and 16th centuries the Italians recognized fossils as closely resembling living forms, for example they found above sea-level and far inland mud-like shells similar to those they found living on the beach, and so the Flood in the Bible was appealed to. According to them these were merely animals and plants which were killed by the Flood. But according to the Bible the Flood was of relatively short duration, the waters prevailing upon the earth only 190 days. Geologists have literally found fossiliferous beds of rock thousands of feet thick and of course thousands of feet of limestone, sandstone and shale could not have been accumulated and formed in 190 days.

Leonardo da Vinci, that universal genius, was among the first to explain fossils correctly. While engaged in the construction of some canals in central Italy he came across many fossils and he correctly explained them as the remains of former life which had been preserved by chance in the rocks of the earth's crust.

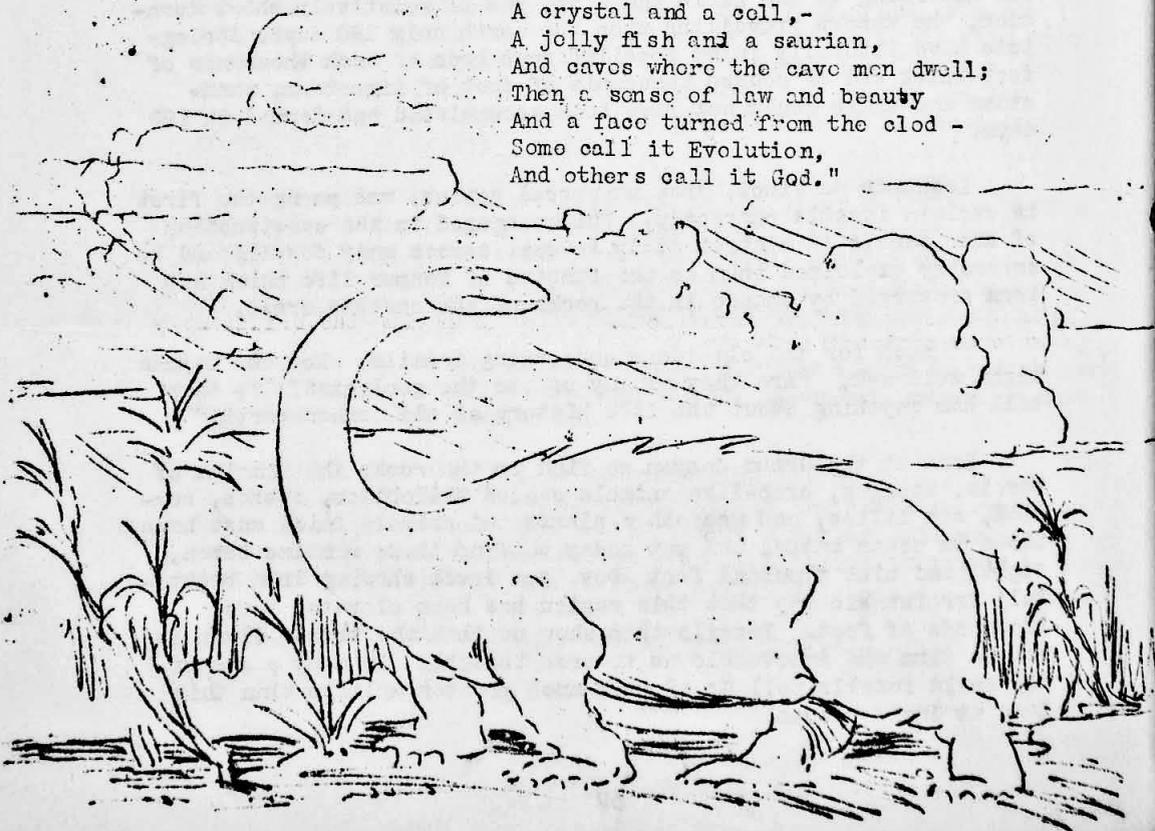
So much for the old ideas concerning fossils. Now the layman might well ask, "Are they of any use to the geologist? Do they tell him anything about the life history of old mother earth?"

Here at the Grand Canyon we find in the rocks the remains of corals; sponges; crab-like animals called trilobites, fishes, seaweed, sea lilies, and many other plants and animals which must have lived in ocean water, and yet today we find these remains seven, eight, and nine thousand feet above sea level showing in a beautiful, irrefutable way that this region has been elevated these thousands of feet. Fossils then show us that the terra firma is not so firm and immovable as we once thought. In many parts of the world fossils tell us of even much greater uplifts than this here at Grand Canyon.

Then too fossils tell us much about ancient climates. When we find coal in Greenland and fossil ferns in Spitsbergen, we know that in the geological past when the coal was forming and the ferns growing, these countries must have had very different climates from what they have now. Indeed in the opinion of many geologists when we find the remains of Walrus in Arkansas and Hairy Marmoths in Florida, both animals completely adapted to an Arctic climate, it tells us that the climate at the time these animals were alive was much different than the present in these two localities.

The fossils tell us furthermore that plants and animals have changed continuously and progressively through geologic time. The very oldest rocks that the geologists know anything about (rocks found at Grand Canyon in the Inner Gorge) contain no fossils, which means that either life did not exist or if it did that its remains have been destroyed. In the next series of rocks, some of which are also found at the Grand Canyon, the first fossils, remains of very simple plants, appear. As we get into younger and younger rocks the fossils become more and more complicated and advanced, and finally in almost the youngest rocks we find the first remains of man. He appears for the first time only a minute ago, geologically speaking. This progressive, continued change in life as recorded by the rocks is what the geologists and biologists call the evolution of life. It is not something which they have read in a man-made book, nor is it the child of their imagination, but they learn of it from the pages of old mother earth's diary - the very rocks themselves. Fossils tell the geologists, then, of earth movements, of past climates, of the evolution of life, and of much more.

"A fine-mist and a plant,-  
A crystal and a cell,-  
A jolly fish and a saurian,  
And caves where the cave men dwell;  
Then a sense of law and beauty  
And a face turned from the clod -  
Some call it Evolution,  
And others call it God."



## COPPER DEPOSITS OF GRAND CANYON

By - The Park Naturalist

Much of the world's exploration has been prompted by the lure for precious ores. The Grand Canyon itself was discovered by the Spaniards in 1540 as the indirect result of searches for gold and a large part of the influx of pioneer prospectors to and through the Grand Canyon late in the nineteenth century may likewise be attributed to a desire to find metallic ores. Today visitors to the rims of the Canyon almost daily ask the question, "What minerals does it contain?"

Somehow the Grand Canyon with its tremendous size, its fantastic buttes and temples, and its rugged, rocky slopes appears to the casual observer to be a place that must contain a wealth of valuable ores. But most of its walls are of a sedimentary type - rocks formed by the accumulations of sands, limes and silts, and therefore not liable to possess original ore deposits. Lavas and other igneous rocks which are the common bearers of the metallics form but a small percentage of the mass. True, gold occurs in small amounts in the Colorado River and may be panned there, though not in paying quantities. Other ores - particularly coppers and lead may be found in several of the formations and these have been prospected by many a man. But the Canyon is a rough country, full of hardships and hazards, and has ever been a barrier to the economic exploitation of these minerals. Natural obstacles to operation, and difficulties of transportation have shown time and again that mining was impractical.

Regardless of economic value, the ores, particularly copper of the Grand Canyon, present an interesting study concerning their origin and history. They have been found in rocks representing four different periods and at elevations ranging from top to bottom of the Canyon. At the foot of the Bass Trail in the western part of the National Park, the copper sulfide, chalcocite, and the copper-iron sulfides, bornite and chalcopyrite, are found associated with rocks of Archean age. At the eastern end of the Canyon near the Little Colorado copper ores occur in faulted areas in the old Algonquin lava flows. Below Grandview the brilliantly colored carbonates form pockets in the Red Wall Limestone, while on the North Rim both at Point Sublime and at Jacob's Lake malachite and azurite occur as surface deposits in the Kaibab Limestone.

Obviously the origins of the various Grand Canyon copper deposits are as varied as are their localities. Those found in the Redwall and Kaibab Limestones apparently are unassociated with any igneous rocks and probably were deposited in solution cavities or by replacement of the limestones. Circulating meteoric waters probably brought them down from the Red-bed Formations which once covered the Grand Canyon region. On the other hand, those copper deposits found among the lavas, schists and granites of the Canyon's bottom, had a very different origin. They apparently bear a direct relation to the old faults of those rocks though the specific causes that brought about the circulation of the mineral bearing solutions are not yet understood. All in all, the Grand Canyon offers some very interesting studies in the origin of ore deposits.

## JULY BIRI NOTES

A large Wood Ibis was seen by Major Brady and Mr. P. Jenks of Flagstaff, near Trash Tank on the South Rim of Grand Canyon, July 13. "It stood nearly three feet when erect, and a toe mark in the track which it left was about three inches long. The head and neck were a dirty grey; the rest of the body white. A pair of these birds had been seen for a week or two previously by a ranger of the National Forest." This is the first record of this tropical bird from the Grand Canyon National Park.



*Wood Ibis - a stork*

\* \* \*

Two Dusky Grouse were seen near the Grand Canyon Lodge, North Rim, on July 16. (Park Naturalist).

\* \* \*

July 17th - a Three-toed Woodpecker was found at work near the Ranger Station, North Rim. (Park Naturalist).

\* \* \*

A pair of Mearns Woodpeckers at Hull Tank and a Greater Yellow-legs at Trash Tank were reported July 13. (P. Jenks, Flagstaff).

\* \* \*

A solitary Killdeer was seen July 20 flying vociferously over about an acre of territory in the neighborhood of the South Rim postoffice. The soil there is deep and free of junipers and pinyons in fact, a small piece of thin meadow-land in the broad ravine followed by the railroad. Trailing the Killdeer would not dislodge it, but I could detect no signs of nesting behaviour. (E.W. Count)