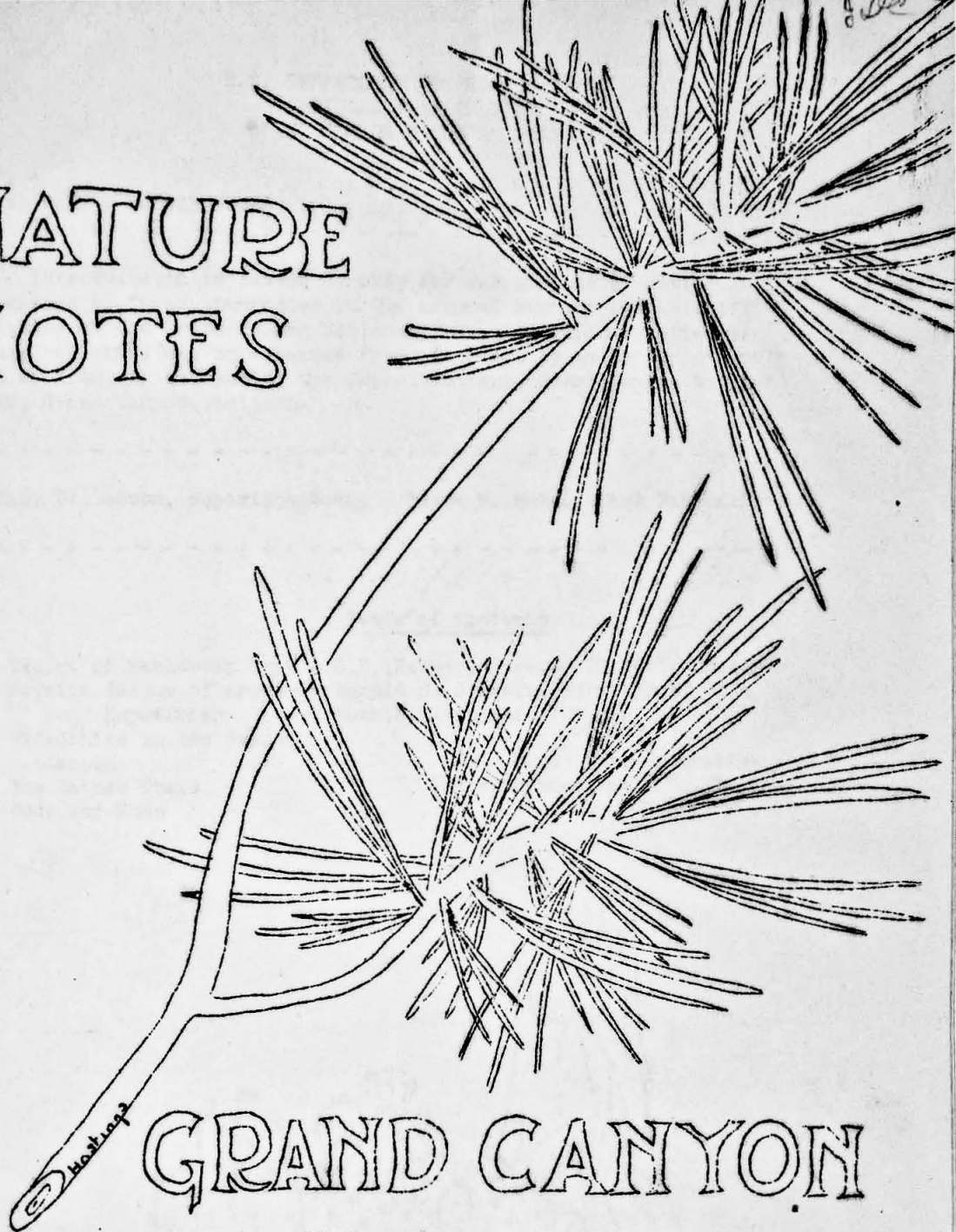


NATURE NOTES



GRAND CANYON

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GRAND CANYON NATURE NOTES

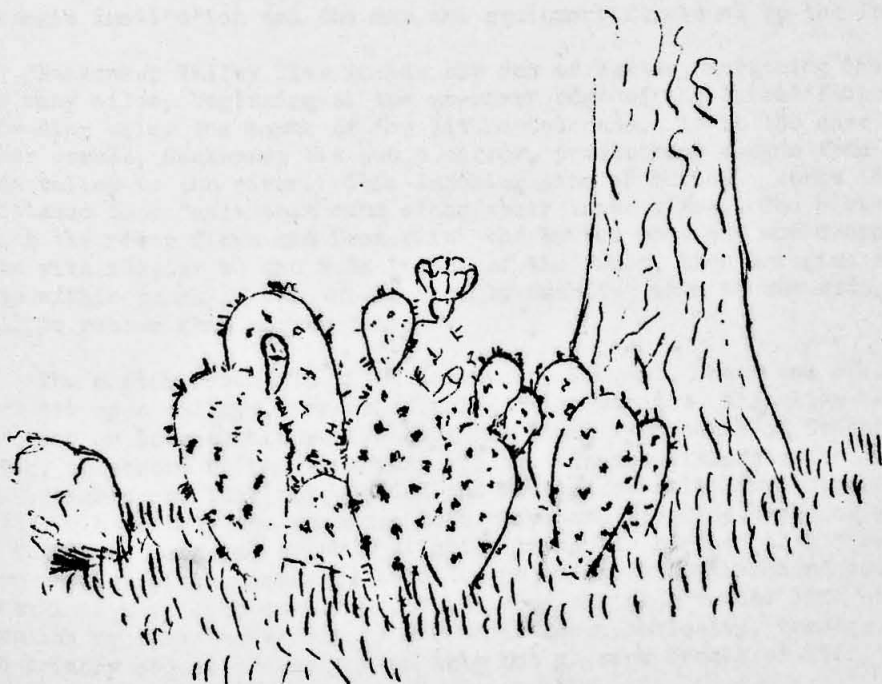
No. 8
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This Bulletin is issued monthly for the purpose of giving information to those interested in the natural history and scientific features of the Grand Canyon National Park. Additional copies of these bulletins may be obtained free of charge by 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

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REPORT OF NANKOWEAP TRIP

By - Dr. C.E. Resser, Curator, U.S. National Museum

It is assumed by the general public, and even by most students, that the history of the major national parks like the Yellowstone or Grand Canyon, is well known. Thousands of people from all over the world, visiting the national parks each year, seek an explanation for the features observed whether they be the rocks - their structure, erosion, or history, or the plants and animals, or human responses. However, in no field is our knowledge as complete as the present status of the sciences permits, and in particular, the geological history of the Grand Canyon is yet quite imperfectly known. The Park Naturalist is using every opportunity to get further information and other geologists come in from time to time to study certain phases that are of especial interest to them.

Forty eight years ago Major Powell, then Director of the U.S. Geological Survey, built a trail into the Nan-ko-weap Valley, in the extreme eastern part of the park, over which it was possible for Charles D. Walcott to enter and study the geology of the region during the winter of 1882-83. Dr. Walcott himself later was Director of the Geological Survey and for the last twenty years of his life Secretary of the Smithsonian Institution. During his long life he published several papers dealing with the stratigraphic history of the Grand Canyon, but as the science of geology has naturally progressed in recent years, thus bringing to bear new principles, new observations are necessary. In fact, much of the published information respecting the Grand Canyon needs revision.

It was my good fortune, in company with Dr. A.A. Stoyanow of the University of Arizona, to restudy the Nankoweap Valley during the latter part of May. This trip was made possible by the generosity of the Carnegie Institution and the men and equipment furnished by the Park.

Nankoweap Valley lies inside the row of buttes, margining the river for many miles, beginning at the up-river edge of the Kaibab Plateau and extending below the mouth of the Little Colorado. As in the case of the other creeks, Nankoweap has cut a narrow, precipitous canyon from the wide valley to the river. This imposing line of buttes shows its existence to a fault that runs along their inner sides. The block in which the river flows and from which the buttes were cut was dropped down with respect to the beds inside of the fault, thus bringing softer beds within reach of the creeks thereby enabling them to cut wide, open valleys rather than narrow canyons.

The softer rocks, in which Nankoweap, Kwagunt, Chuar and other creeks have cut open valleys, are chiefly Algonkian strata. Algonkian beds occur more or less continuously along the river from south of Bright Angel Creek, up stream to the Nankoweap valley. Their thickness was originally considerable and they were folded and faulted shortly after deposition. Today we have only the remnants left above the smoothed Archaean granite or shistose floor and below a slightly irregular surface that resulted from erosion of the upturned beds and on which the Cambrian and younger formations were laid down. Great interest attaches to the life history revealed by these rocks because of their great antiquity, consequently the primary object of our recent trip was to seek traces of life, particularly of animals.

We found a vast expanse of cleanly exposed strata, made up for the most part of materials that could preserve any shells or tests of animals and even retain impressions of soft animal or plant tissues. Since these beds have not been sufficiently metamorphosed or altered by heat or pressure to destroy the fossil record that may have been written into them when they were deposited from the waters of ocean or lake, our finding fossils depended therefore solely on three things, viz. first, whether plants and animals then lived, secondly if one or both had representatives living whether they were so located as to be washed into the waters and entombed in the sediments before decay, or finally, whether we exercised sufficient patience and judgment to find them. Searching for many hours, we discovered abundant evidences of aquatic plant life but unfortunately no trace of animal remains. Thus far no undoubted animal fossils have been discovered in pre-Cambrian rocks anywhere in the world, and geologists are speculating as to the meaning of this.

About 1700 feet of Chuar strata, as the Algonkian rocks of the Nankowap Valley are called, are exposed. In them five distinct types of algal limestones occur at different horizons. Today blue-green algae may be seen at work making Ribbon Falls constantly more beautiful. In the Chuar waters, which may probably have been fresh water lakes rather than the ocean, such blue-green algae also grow precipitating the lime from the water. In some cases they formed irregular crusts which sometimes were broken up by the waves so that instead of the usual piling up of these crusts the chips were tossed together in a haphazard manner. The most interesting algal zone is one that unfortunately can never be adequately illustrated by specimens brought to the rim as the smallest masses representing completely the manner of growth, weigh many tons. In this form the growth begins with a disk perhaps 18 inches in diameter. This is followed by irregular columns about two inches in diameter and perhaps seven or eight inches long, arranged upright on the base but so crowded as to constantly expand the entire mass. The small columns are piled layer on layer until the mass is five or six feet high and of even greater diameter. Finally the whole is topped off by a thick layer of growths that resemble large coalesced heads of cabbage. This strange mass then is in general pear-shaped composed of the disk base, the major portion of upright irregular columns and the botryoidal top. Its spectacular appearance is further increased by the rather bright red mud filling between the whitish columns.

Besides the algal limestones, the finegrained calcareous shales yielded fragments of another algal type. This is not the lime-secreting, blue-green type but is comparable rather with the ordinary seaweeds of today.

Thus while we were naturally disappointed in not finding traces of animal life in the Chuar beds of Nankowap Valley, our trip nevertheless was quite profitable, giving us much new information. A few fragmentary trilobites were found in the base of the Muav formation which indicate definitely that it is Middle rather than Upper Cambrian age as was formerly thought.

Archaeological work in the Grand Canyon region is being carried on this summer by the staff of the Gila Pueblo of Globe, Arizona. This is the first work of this kind to be done in the Grand Canyon National Park.

Mr. Harold S. Gladwin, Director of the Gila Pueblo, and Mrs. Winifred MacCurdy, through whose generosity the work has been made possible, are directing the expedition. Their staff consists of Mr. Munroe Amsden, Mr. and Mrs. E.W. Haury, Mrs. and Mrs. O.C. Havens, Mr. and Mrs. Dennis, and Miss Sangster. Ranger-naturalist Russell Hastings has been detailed by the Park Service as its representative.

WAYSIDE MUSEUM OF ARCHAEOLOGY EXPEDITION

By Harold S. Gladwin, Director of Gila Pueblo, Globe, Ariz.

Our expedition arrived June 2nd. When we visited the site of the ruin near Lipan Point it looked as if it would take at least a week to open a road through the trees and over the rough outcroppings of rock, but Mr. Carrel and his road-crew started work at ten o'clock in the morning and at twelve o'clock a procession of four cars and a trailer, with eleven people wound over the road that had been made, and we lunched in comfort on the camp site.

We should like to take this opportunity of expressing our gratitude and appreciation to those members of the Park Service who have done so much to make the camp possible and convenient. It has given us the greatest pleasure to be able to rely upon their unfailing cooperation.

The tents were hardly pitched before the staff began work on the survey which had been planned. This survey is designed to place the pueblo at Lipan Point, which we have called the Tusayan Ruin, in its proper relation to the surrounding culture. At many of the large ruins in the Southwest there is a sufficiently deep deposit of rubbish, or culture, to be able to make stratigraphic tests and thereby determine the relative age of the ruin by a comparison of the pottery fragments from the upper and lower levels. The Tusayan Ruin, however, was neither occupied for a very long time, nor did it shelter a large population, and in consequence the rubbish deposit is too small to yield stratigraphic evidence. Another method was needed and we have relied on a wide-spread survey of neighbouring ruins to give us the desired information.

The method which we have followed has been to divide our staff into groups and allot to each group an area to be surveyed. The area is covered, first, by making inquiries amongst rangers and old-timers as to known sites; second, by walking through the woods searching for potsherds or house remains. Sherds can often be found in exposed gravel beds, carried down by rain from ruins on the ridges, and it is not

difficult to follow such traces up the washes until the ruin is reached, usually near the top of slopes facing east. In this region house remains are nearly always small, rarely more than one room, and frequently nothing is left to show human activity except a few sherds.

When a ruin is found we collect 150 fragments of pottery, picking up all the various types; the ruin is given a serial number and is photographed; a description is written giving such details as its location, type, size, number of rooms, condition, masonry, general surroundings, etc.

Upon returning to camp, the sherds are washed in muriatic acid, dipped in soapy water, rinsed, and sorted into five parcels, 50 for Gila Pueblo and 25 each to the Wayside Museum, the University of Arizona, the Museum of Northern Arizona and the Laboratory of Anthropology in Santa Fe. The Gila Pueblo parcel is then analyzed as to culture and period, using such diagnostics as type of decoration, paste, and house remains. When we feel that we have at last squeezed a site dry, the sherds are put in storage and a coloured pin is stuck in our map to express our ideas of the culture and period of the site.

It is as yet too early to express an opinion as to general archaeology of the park, but it seems probable that several pockets of development will be found. One such pocket centers around the Tusayan Ruin and is bounded by the Canyon on the north, the Coconino Plateau to the west and south, and the Little Colorado and the Painted Desert to the east. The Coconino Basin appears to have been settled in comparatively early times, Pueblo I at the latest and possibly Basket-maker III, with a later development along the ridges leading up to the Canyon rim, and a late stage at the Tusayan Ruin, late Pueblo II or early Pueblo III.

We are not radiating out from camp, as we have collected over 200 sites within a radius of 25 miles. Monroe Amsden is up in the Marsh Pass district, O.C. Hayens is over in the Hopi country and E.W. Haury is on the North Rim. Each man is collecting sherds and sites for the sole purpose of determining the boundaries and diffusion of the people who once populated this country. We believe that these fundamental problems can only be settled by some such method as we are employing; the finer points of their manner of life and aesthetic achievements can only be learned by careful excavation and deduction. We have just learned that the necessary permits have been granted, and we look forward to July as a period of intensive work in the Ruin.

VANADINITE IN THE GRAND CANYON

By the Park Naturalist

Vanadinite is a rather rare lead mineral of complex composition whose most important constituent is the element vanadium. The latter is used chiefly as a hardening metal since as an alloy it develops in steel great toughness and torsional strength. A yellow pigment known as vanadium bronze and used as a substitute for bronze paint is made from vanadic acid. The vanadium oxide is used as a mordant in dyeing.

In various districts in Arizona and New Mexico, vanadinite is found occurring as a mineral of secondary origin associated with lead veins. It is often a beautiful ruby red in color, but varies to an orange or yellow. Vanadinite deposits of this type are found in the Havasu Canyon - a tributary to the Grand Canyon.

The Red Wall Limestone of the Grand Canyon region is characterized practically throughout its extent by solution cavities, caves and sink-holes. In some localities are also found beautiful examples of recrystallization which accompanied or followed such development. In the Havasu Canyon, mineralization has followed the formation of solution cavities to a particularly great extent. Here very large crystals of calcite and dog-tooth spar were first deposited forming a cave lining and this was later permeated and in some cases entirely replaced by lead and silver. At a still later stage, water bearing vanadium passed through the same areas, coating the original large calcite crystals and leaving mirrors or casts of vanadinite on their faces. Crusts of more massive vanadinite were also formed surrounding the crystals of lead. These deposits though they will probably never be of any economic importance, present an interesting study of the formation in limestone of secondary ores and of a typical occurrence of the rare mineral vanadinite.



KAIAB TRAIL

By Ranger-naturalist E. W. Count

To know the Canyon, go down into it. That adage holds good, no matter how much one may skirt the rim. The newest trail leads from Yaki Point down onto the Tonto Platform, where it meets the trail descending and crossing the river to the mouth of Bright Angel Creek. To tramp this trail when the morning opens briskly; just tramp, with no ulterior motive, is one way to keep from growing old. As you descend or come up, you find it much easier and certainly more entertaining to count your steps in terms of geological formations than of miles. Here are the Paleozoic rocks, piled up like a layer cake, and you bury yourself as you go down into them and exhume yourself as you return.

About seventy-five feet below the rim the other day, where the pinyons and junipers of the Kaibab

limestone are left behind, you might have seen a whole flock of hummingbirds, apparently Rufous and Broad-tailed together, darting and backing and "treading air" among the Scarlet Buglers, probing these trumpets with their long, needle-like bills, and sounding like whimsical telegraph keys.

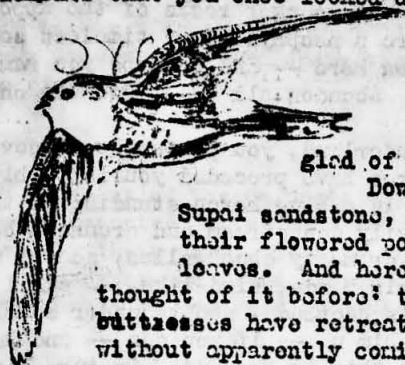
The trail is broad and well-marked, and covered with the deep dust of the formations it crosses. You can tell roughly by the color of the trail when you have finished the whitish-pink Coconino sandstone and have struck the red Hermit shale



at below. Your dust-covered feet suddenly become conspicuous. Later, with your
ets, new roddened, you hit the gray Redwall limestone, and again your feet remind
ou that they are still with you.

if
IT

The battlements that you once looked down upon grow and grow and grow, until they
solemnly stare high over your head, as
sublimely unmindful of your puny
presence as when you were above them.
And you have the humble yet exhilar-
ating experience of feeling lost, and
glad of it.



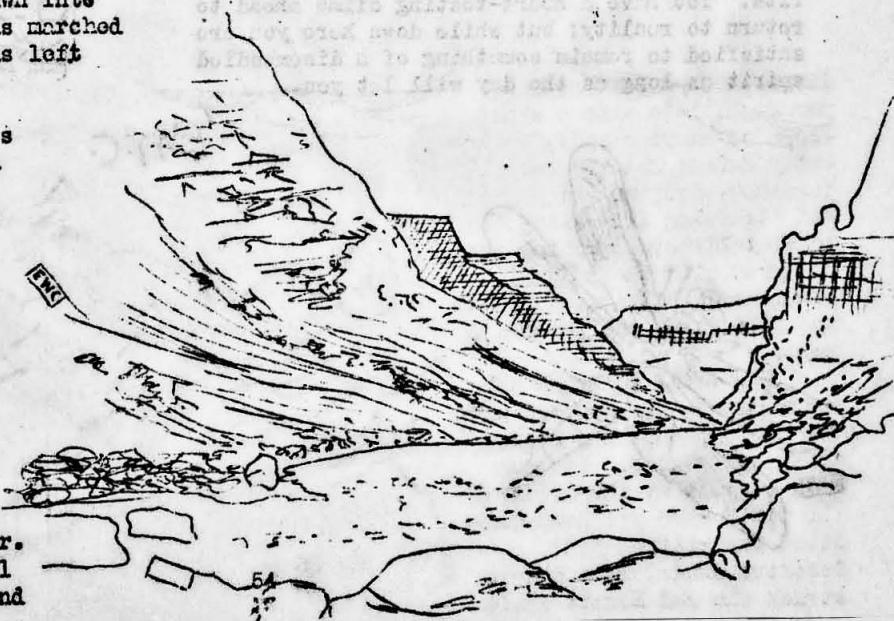
Down you go, and out onto a long spur of
Supai sandstone, where a sparse forest of Agaves point
their flowered poles above a low, bristling crown of spiky
leaves. And here it comes upon you as though you had never
thought of it before: the Canyon is BIG. The citadels, the
battresses have retreated behind you, others ahead are bigger
without apparently coming closer; and you are rejoiced at the
open desolation and the protean solitude. Then it strikes as

fitting that the world was not made for man, but rather man for the world. Per-
haps an alert little lizard scurries off, then stops to view you inquisitively.
It is simply another creature, and so are you, and you are glad of the kinship.

Still down, zigzagging along the Redwall and Muav limestones, the Bright
angel shale, and out onto the Tonto Platform, with its creosote bushes making it
decidedly unkempt. Then you plunge over the Tapeats sandstone, enter the
Algonkian rocks, while the black, green, and pinkish
masses of the hoary Archean rise sheer to meet you.
The Canyon rim is now disappearing, and you imagine,
as you enter this inner gorge, that you are bidding
the outer world goodbye. What, after all, do these
ancients of a billion and more years have to do with
the ancient core of the earth: they still remember a
story of the twilight dawn of the earth
which the younger generation of rocks,
away up there can know but second-
hand. Here, indeed, is a world
apart, a world withdrawn into
itself because time has marched
by and, forgetting, has left
it to its own devices.

Below you now is
the Colorado River, its
murmur swelling as you
bury yourself more
deeply in this ancient
treasure-chest.
Zigzag, zigzag, you
reach a tunnel, the
tunnel ushers you
onto a powerful sus-
pension-bridge, you
trudge across and yet
down a way. You have
reached the bottom.

Here are tons of
boulders, discarded
playthings of the River.
Some day the River will
remember them again, and
pummel them and heave



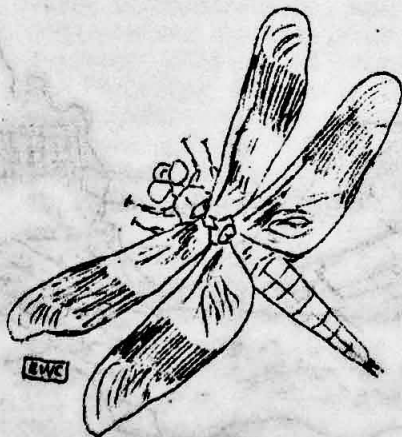


them around some more -- a magnificently gruff game. Now you scramble out upon them, and look upward. The Archean rocks have crowded upon you, as though the lid of a cavern were being closed behind. The younger rocks of the upper walls are forgotten. You are a neophyte in a timeless secret order as long as you are down here -- and perhaps you remain so, even after departing. Abandon all else, you who enter.

Like Alice in Wonderland, you presently discover that all sorts of other creatures have preceded you into this underground hallway. Here is a blue heron standing on the River's edge. It slowly rises and flaps off heavily downstream and around a bend. New and unfamiliar lizards, little whiptails or meaty chuckwallas, scurry under rocks, then turn to peer out at you, cocking their heads, bird-like. A small toad, like a paunchy, retired ranchman sitting on his hacienda, squats under some blades of grass near Bright Angel creek. You pick him up, -- if you can -- and he meekly closes his eyes, as though believing that this is the end. Or turn him on his back in your hand, and he humbly draws up his legs, as helpless as a baby.

Suppose you follow up Bright Angel creek snugly losing yourself in its winding corridor; you wade its charging waters, and turn up into Phantom creek. Here, as all through this esoteric spot, the dragonflies, blue, yellow, crimson-and-gray little airplanes, land around you and take off again. Here the swifts still scramble wonderingly up the cliffs to keep out of your way. Here the little fish and tadpoles wriggle among the algae in the small, neglected pools of the creek.

You clamber back again to Phantom Ranch, with its bright little tourist cabins and its idyllic peach orchard; and you feel that, despite its commercial bent, this place is also lost, and content to be so. It fits. You fit. Everything fits. You have a heart-testing climb ahead to return to reality; but while down here you are satisfied to remain something of a disembodied spirit as long as the day will let you.



EWC

On May 26th the uncommon little Red-breasted Nuthatch and several Dusky Grouse were seen among the timber and snow drifts near Point Imperial, North Rim.

* * *

Members of the Carnegie expedition to the little known Nankoweap Canyon reported having seen many coyote tracks and heard the animals close by their camp. This is the first record that we have received of coyotes in the Grand Canyon bottom. Two Bald Eagles seen on May 26th were also reported by members of this party.

* * *

Two interesting specimens of Trilobites were recently found in the Muav Limestone of middle Cambrian Age. One of these was found in Nankoweap Canyon by Dr. C.F. Resser and the other near Roaring Springs by the Park Naturalist. These probably represent new species.

* * *

Beaver have been seen several times recently near Cottonwood on the Bright Angel Creek. Fresh tree cuttings are numerous in several places in that vicinity.

* * *

The first record of a Barn Swallow in the national park was made by Mr. P. Jenks of Flagstaff on May 30th. A single bird was seen in company with a flock of Violet Green Swallows.

* * *

