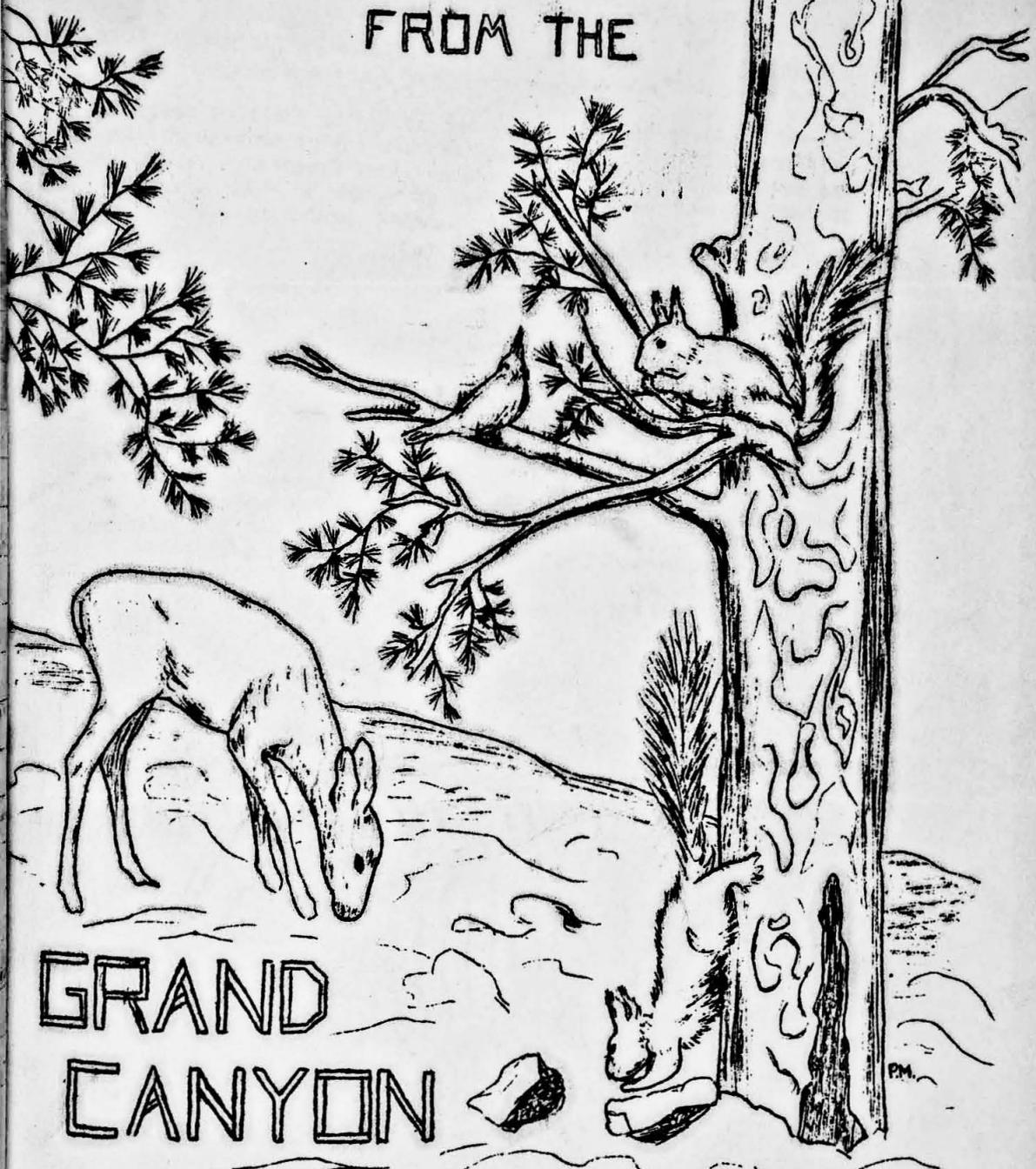


NATURE NOTES

FROM THE



GRAND CANYON

VOL. 5

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GRAND CANYON NATIONAL PARK

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GRAND CANYON NATURE NOTES

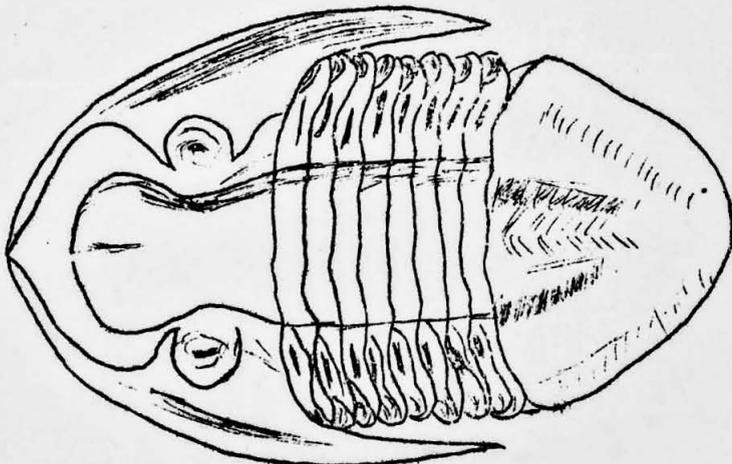
No. 1
November 30, 1930

This Bulletin is issued 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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A Trilobite

THE STORY OF A PEBBLE

By Ranger-naturalist Clyde Searl

While a small group of people was being conducted on a nature walk along the trail leading to the tip of Bright Angel Point on the North Rim of the Grand Canyon, one of the party reached down and picked up a small pebble from the path. The pebble was smooth and rounded, suggesting that it had been rolled in a rapid stream until it had assumed its present shape and polished appearance which are characteristics of all water worn pebbles.

At first the pebble brought forth no comment. However, when the group was asked where the pebble came from, the answers were many and varied. Perhaps some one had brought it from a stream bed or a beach and had accidentally dropped it. Perhaps it had been shipped in for use in the masonry of a nearby foot bridge. By the time several more suggestions had been offered a quantity of pebbles had been picked up, all similar in that they were smooth and water worn, but representing several forms of rock.

One person remarked that a few of the pebbles appeared to be partially polished bits of petrified wood. The surprise was greater when the group was told that it undoubtedly was petrified wood. This was hard to understand inasmuch as the entire trail was cut through Kaibab limestone which is a sea deposit, and the smooth, rounded edges and the texture of the pebbles plainly told that they were foreign to this formation.

When the group was told that the pebbles at one time had been part of a higher formation, the problem was solved for most of the people. They had already been told of other layers of rock which once had covered the present uppermost formations at Grand Canyon and which had been almost completely worn away by the various forces of erosion which later cut the Canyon.

The pebbles were simply part of a conglomerate. The cementing substance, carbonate of lime, had weakened and had been washed or blown away, freeing the pebbles. As the surface on which the pebbles rested was gradually eroded away the pebbles just as gradually settled until they reached the plane on which they had been picked up on the morning in question.

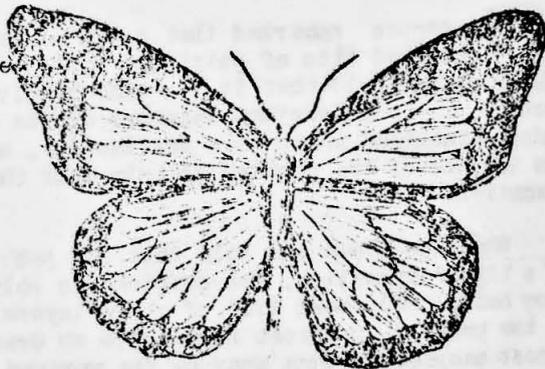
The red and gray pebbles were extremely hard. They appeared to be quartz or quartzite. Some seemed to be very similar to the chert which was so common in the limestone out of which the trail had been cut. It was explained to the group that the formation which had covered the Kaibab limestone locally was that known as the Moenkopi, composed of sandstones and shales which being softer had worn rapidly away allowing the harder rocks which covered it to settle down. The cap of the Moenkopi formation is known as Shinarump conglomerate. The red and gray quartz and quartzite pebbles and the bits of petrified wood which were found on the trail had been a part of this conglomerate.

BUTTERFLIES NEAR THE COLORADO RIVER
IN NOVEMBER

By Ranger-naturalist Pauline Mead

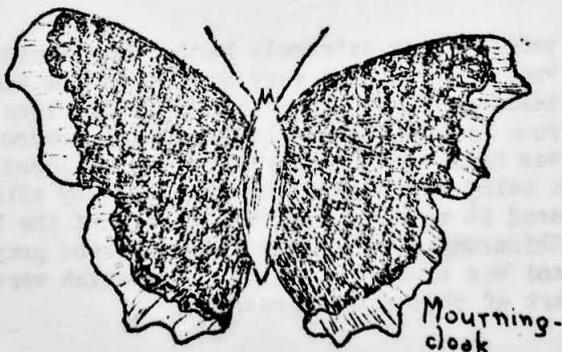
It is difficult to realize when standing on the snow covered rim of the Grand Canyon at this time of year, that down by the Colorado River, a mile below, summer still lingers and butterflies are enjoying the late blooming flowers. As late as November 12th five species of brightly colored butterflies and one moth were seen near Phantom Ranch. The butterflies that were found included the Monarch, Red Admiral, Painted Lady, Mourning-cloak and Sulphur. An Underwing moth with lower wings colored a lovely old rose was also noted.

The Monarch, a rather large butterfly having red-brown wings, edged with a black band a few scattered white spots, is migratory, living in cool, northerly climates in the summer and travelling south to corresponding temperatures in the late fall. It is unique in having milkweed the only source of food when in the caterpillar stage. Concentration on this one food makes the Monarch distasteful to birds so that they seldom attack it. The Viceroy, though not closely related to the Monarch, is colored and marked in a rather similar manner, and by virtue of this mimicry is little preyed upon.



Monarch

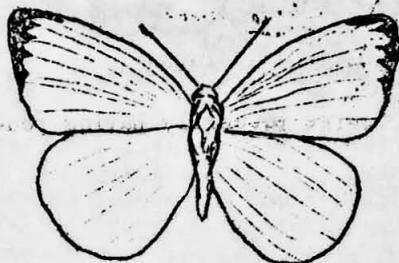
It is not uncommon to find the Mourning-cloak late in the fall since it is a butterfly that does not live through the winter in the chrysalis stage but hibernates in a protected place, perhaps under the dead bark of a tree, in the adult stage. It is, therefore, the last butterfly seen in the fall and the first one to appear in the spring.



Mourning-cloak

The Painted Lady is the most widely distributed of all known butterflies, and because of a hardiness and adaptability which enable it to live in various climates, its late presence at the Grand Canyon is to be expected.

The occurrence of these butterflies in the Canyon in the winter is one of the many illustrations of the climatic difference between the rims and the bottom of Grand Canyon.



Sulphur

GEOLOGICAL and WILD LIFE OBSERVATIONS BETWEEN BASS CANYON
and HERMIT CANYON

By Park Naturalist E.D. McKee

The Expedition:

A trip was organized by Mr. Lincoln Ellsworth to investigate and study the various geological and other natural history features between Bass and Hermit Trails. Five days - October 31 to November 4 - were taken in this work. The party consisted of Mr. Ellsworth, Park Naturalist McKee, packer, and three pack mules. Assistant Superintendent P.P. Patraw joined the party on the second evening.

Route:

- October 31: Down Bass Trail to Tonto, east to head of Serpentine Canyon. Trail rough at base of Redwall.
- November 1: Along Tonto to head of Ruby Canyon and to Turquoise Canyon. Very hard going just east of Serpentine.
- November 2: To Sapphire Canyon and return to Turquoise. Mules unable to climb out so trail had to be built in Turquoise. Unable to reach river down either Turquoise or Sapphire.
- November 3: Along Tonto to Sapphire, Agate, Slate, Boucher, and Hermit. Rough trail between Boucher and Hermit.
- November 4: Up Hermit Trail to South Rim.



Water:

- | | |
|------------|--|
| Serpentine | - Excellent water at head. Easily accessible |
| Ruby | - Very little upstream. |
| Turquoise | - Plenty of water in box. Limy |
| Sapphire | - Plenty of water in box. Limy. |
| Slate | - Water downstream. Hard to reach |
| Boucher | - Good water. Permanent stream. |
| Hermit | - Excellent water. Permanent stream. |

Animal Life:

Wild Burros: Two were seen on Darwin Plateau, seven at head of Ruby Canyon. Tracks near all of the main canyons.

Sheep: Tracks and droppings which appeared to be those of sheep were seen in many places - Serpentine, Turquoise, Sapphire. A ewe's horn was found in Turquoise and a ram's horn in Hermit.

Birds: Desert Sparrow (Bass Canyon); pair of Pigeon Hawks (Serpentine Canyon); Chickadee, Schufeldt Junco (Ruby Canyon); Canyon Wren, Pinyon Jays, Pink-sided Junco (Turquoise Canyon); Pinyon Jays, numerous (Sapphire, Boucher, Hermit); Horned Owl (Hermit).

Reptiles:

A good sized Rattlesnake was seen west of Serpentine Canyon. This appears to be a very late date. A few small lizards (Sceloporus sp.) were seen enroute.

Insects:

A Monarch butterfly - probably in migration, was seen near Ruby Canyon on November 1.

Plants:

A few small, umbrella-shaped mushrooms were found in the dry soil of the Tonto near Ruby Creek.

Bear Grass was found abundant in the western area, even at the altitude of Darwin Plateau. It was found along the Tonto at Serpentine, Ruby, and Sapphire Canyons. The latter canyon marked the farthest extension eastward.

Many of the Narrow-leaved Yuccas (*Yucca baileyi*?) were extremely large and tree-like in the western area. One in Sapphire Canyon was estimated to be 18 feet high.

While the Tonto vegetation as a whole showed the influence of a warmer climate in this western area, the plants found at the heads of many of the canyons because of their sheltered locations were of the types ordinarily found much higher in the Canyon walls. At Slate Creek several Junipers and Pinyon Pines were noted, while Cliff Rose was found in several places. The shrubs listed in Ruby Canyon are typical of most of these creek bottoms. They include Arrowwood (*Baccharis*), Bear Grass, Flowering Ash, Live Oak, (*Q. wilcoxii*), Cottonwood, Cliff Rose, Cat's Claw, and Squaw Bush (*Rhus trilobata*.)

Geology:

Since Dr. L.F. Noble had already covered the general geology of this section in a very careful and detailed manner as shown by Professional Papers 98-I and 131-B of the US Geological Survey, we scarcely expected to make any startling discoveries. Our objective was to gain more detailed information regarding the sedimentation and history of some of the early rocks and to collect specimens of fossils and structural features.

(a). Devonian Rocks: One new locality of Devonian rocks was located. This was a large pocket of the characteristic lavender sandstone to the east of and above Boucher Canyon. This makes a total of 15 known exposures of rocks of this age in Grand Canyon. A search was made for fish remains in the exposure above Sapphire Canyon where Noble had collected them, but only very fragmentary parts, unsuited for exhibit, were found.

(b). Tonto Formations: Special attention was given to the many peculiar tracks and casts such as ripple marks, worm trails, fucoids, etc., and numerous specimens were collected.

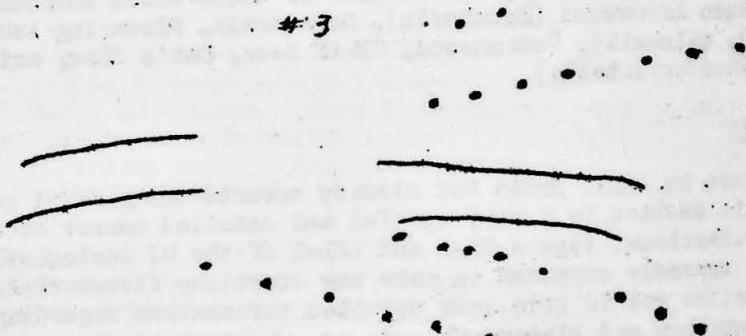
Several excellent and practically indisputable tracks of trilobites were found. On one large slab of sandstone near the base of the Bright Angel Shale were found six distinct series ranging in length between $2\frac{1}{2}$ and $12\frac{1}{2}$ inches (See diagram No. 1)



#1
Small section of animal
trail. From actual
tracing.



2
Trilobite Tracks
Tracing from Sandstone slab



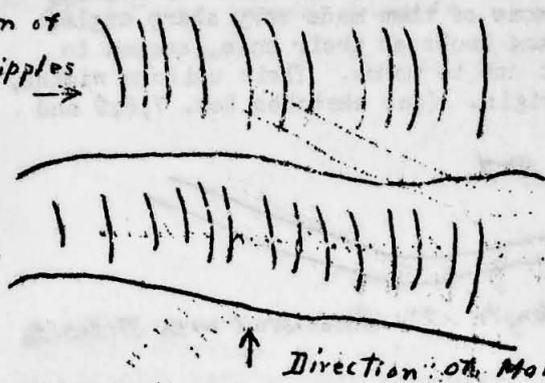
#3
Tracks of Crawling Animals
Tracing from Sandstone slab

Many current ripples of the type in which the crests converge to form a network were found in the basal brown sandstone. One series of ripples with a cross series was of especial interest. (See sketch No. 4). One specimen of current ripple was collected from the mottled brown and white sandy member of the Bright Angel Shale.

Direction of
Cross-ripples
→

4

Tracing from brown sandstone,
base of Bright Angel Shale

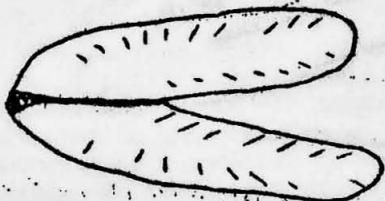


Fucoids such as have been described by Walcott (Smithsonian Misc. Collections, Vol. 67, No. 4) as "the natural casts of annelids" were observed in great numbers. Detailed study in many cases seemed to indicate that they were of seaweed (algae) origin, for: (1) they were repeatedly found to taper; (2) they often branched but in no case ran through one another; (3) and occasionally one stem was found compressed against another. In brief all evidences pointed toward plant and not animal origin.



5

Fucoids believed to
represent seaweeds
Reduced sketch

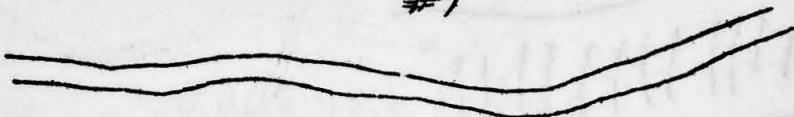


6

A common type of
double fucoid.

Many winding marks which at first strongly suggested worm trails but which later proved to be plants, in many cases, were observed. These were between $\frac{1}{4}$ " and $\frac{1}{8}$ " in width and usually very long. The fact that some of them made very sharp angled turns and that some had round knobs at their ends, seemed to indicate that they were not due to worms. Their uniform widths, however, favored such an origin. (See sketches Nos. 7, 8, 9 and 10.)

#7



Natural size. Total length 12". Associated with Trilobite Tracks.

#8



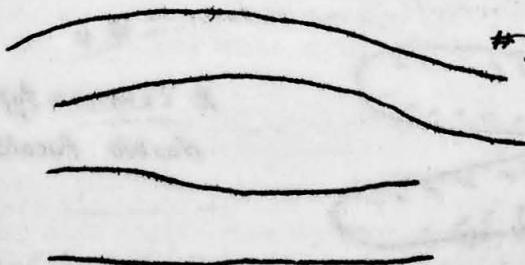
Depth $\frac{1}{5}$ to $\frac{1}{4}$ " Natural size. Note Trilobite tracks above. In coarse Sandstone, 100' above Tapeats.

#9



Natural size. Shows sharp angled turns. (Tracing)

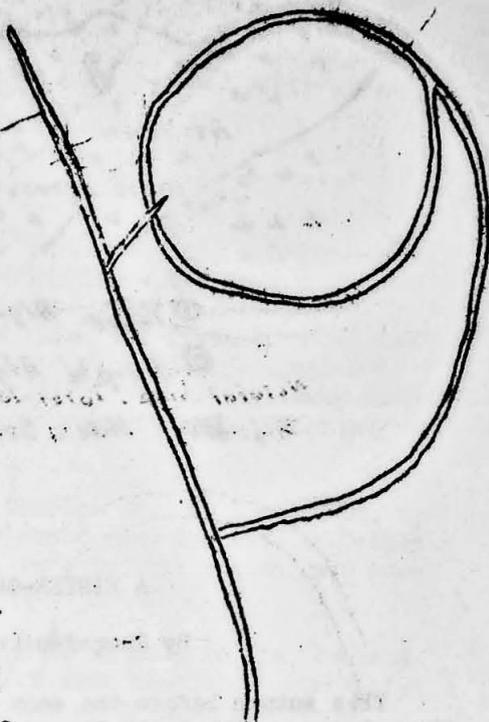
#10



Natural size. (Tracing) Five such grooves of uniform thickness on a sandstone slab 2" x 4". Some 8" long.

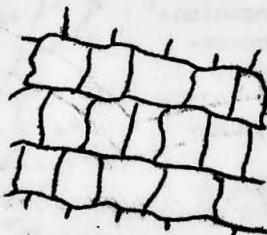
11

Peculiar curving grooves found in
~~sandstone slab - Nat. size (drawing).~~



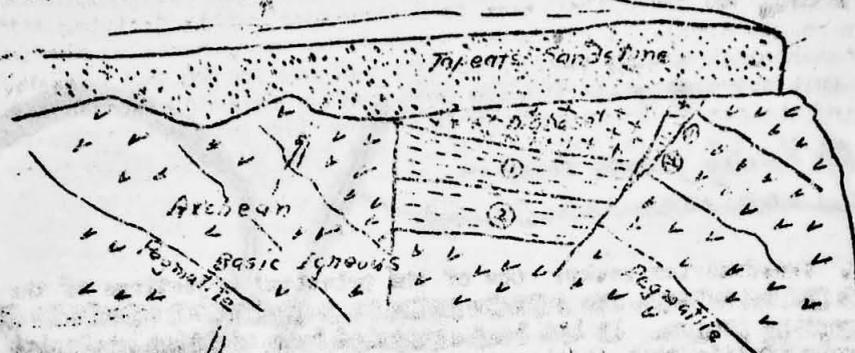
Interference, or cross-ripples as defined by Twenhofel are usually more or less irregular pits arranged side by side. "Some are rectangular, others hexagonal, and these usually occur together. They develop as a result of ordinary waves breaking up into sets of oscillations crossing each other and are found about the ends of bars, stranded logs, etc." Between Turquoise and Sapphire Canyons, about 200 feet above the base of the Bright Angel Shale, an area of about ten square feet was completely covered with such markings. There seems to be no doubt concerning their identity.

12



Several Times Enlarged

(c). Pre-Cambrian rocks: One of the principal objectives of the trip was to examine the Archean rocks at a place near the mouth of Serpentine Canyon. It had been suggested by a visiting geologist of note that in that section as seen from Havasupai Point above, the Archean rocks appeared to be stratified or only slightly metamorphosed. We found that even from very nearby this deciding situation was apparent. A close examination, however, revealed the fact that tilted Algonkian strata had been faulted down into the Archean and that above the Algonkian sediments was a mass of diabase of later age which from a distance appeared very similar to the Archean below.



① Yellow Algonkian Sediments
 ② Purple Algonkian Sediments
 West Side - Serpentine Canyon

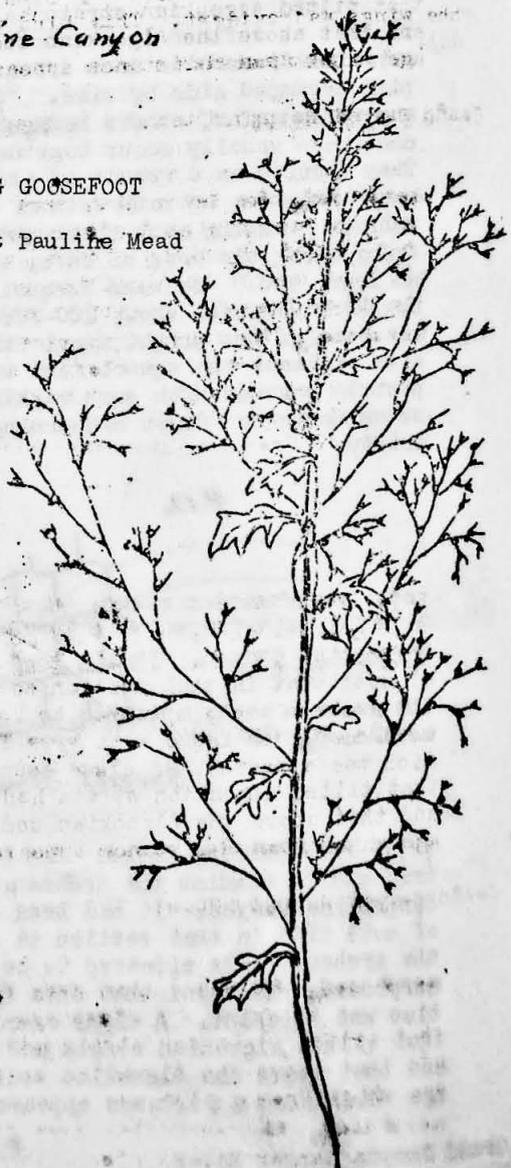
A WINTER-BLOOMING GOOSEFOOT

By Ranger-naturalist Pauline Mead

This autumn before the snow fell many places on the South Rim of Grand Canyon were covered with a feathery purple-red plant that had not been noticed before. Its leaves had fallen and it had a very strong salty odor.

This plant which attracted a great deal of attention, upon examination proved to be one of the commonest weeds of the plateau along the Canyon rim. It is a pigweed or goosefoot, (*Chenopodium cornutum*), a member of the goosefoot family (*Chenopodiaceae*). This family includes many important forage plants as well as many troublesome weeds. The greasewood, shadscale, bugseed, Russian thistle and lamb's quarters are well-known members; also garden beets and spinach. The leaves of most plants in this group have a definite taste - often salty or bitter, and for this reason many species are cooked and eaten as table greens.

The little pigweed that occurs in great numbers on the South Rim of the Canyon is covered with minute sparkling resin globules that are



easily seen under a hand lens. The plant blooms in the fall and winter. The flowers are very small and are situated in the axils of the slender branching stems. They are without petals and the sepals are purple. In the autumn the leaves fall and the stems turn a vivid purple-red.

BRIEFS

On the South Rim of the Grand Canyon on October 22, shortly after luncheon, while searching for a meadowlark which the writer had noted on October 18, near the cooling tank in front of the laundry, a small bird, which proved to be a Mexican Ground Dove, was flushed. A close-up study showed the pink feet and legs, brown spots on the wings and streakings about the neck and breast. In flight the red coloring under the wings was evident. This bird was still present on the following day.

The Meadowlark was still present on October 22. On October 21, a flock of ten Golden-crowned Kinglets were noted near the head of Bright Angel Trail. The Golden-crowned Kinglet, rare in this region, was seen again November 21 near the Park administration building.

The known horizontal range of four-footed animals in the Coconino Sandstone was greatly extended on October 22 when the Park Naturalist found some large footprints in this rock west of Seligman, Arizona. This is the southwestern limit of the Coconino Sandstone and is 65 miles beyond the nearest track locality in the Grand Canyon.

