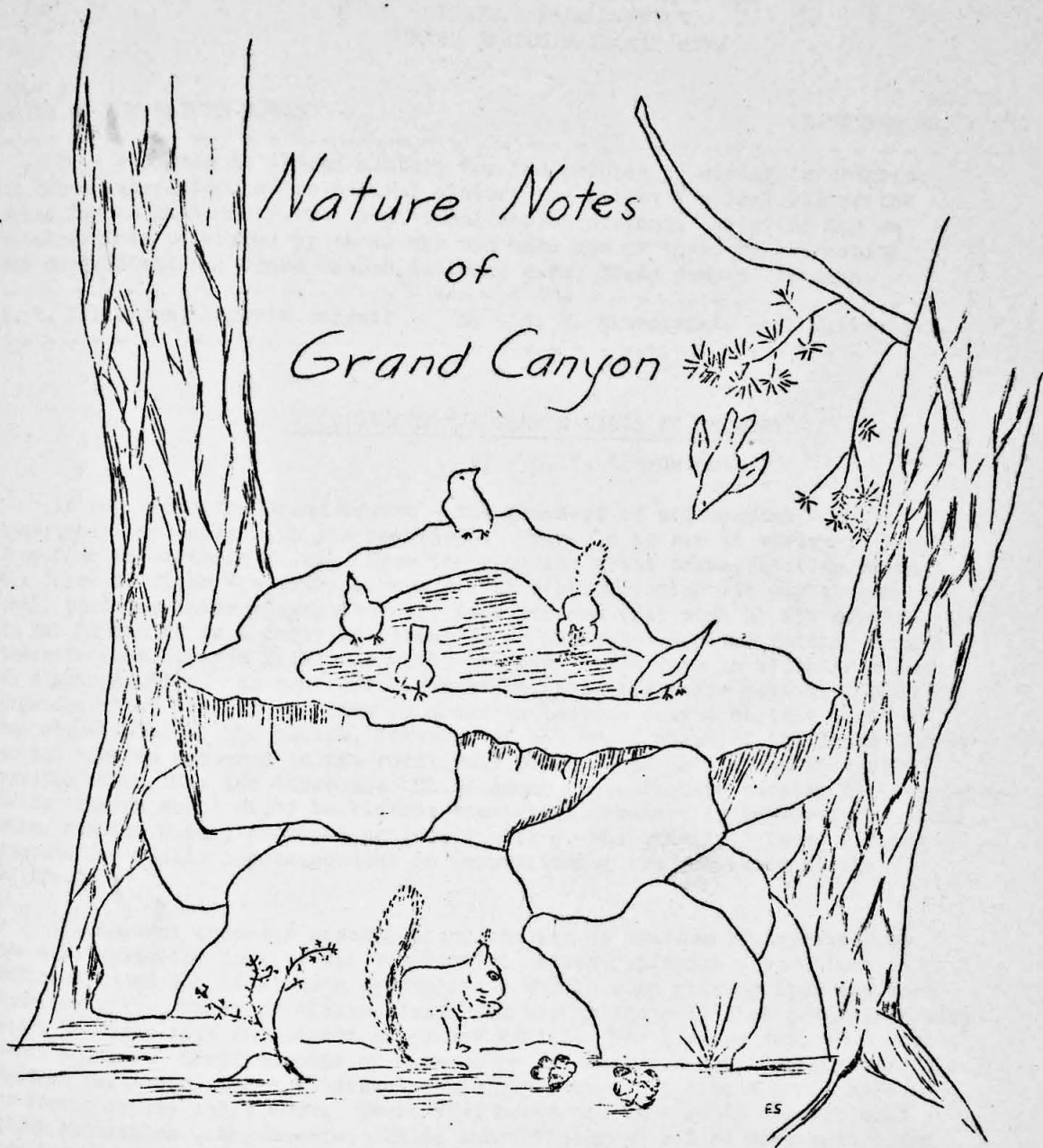


Nature Notes
of
Grand Canyon



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GRAND CANYON NATURE NOTES

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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. By - G. E. Sturdevant, Park Naturalist.

• WHAT CAUSES THE CANYON WALLS TO RECEDE?

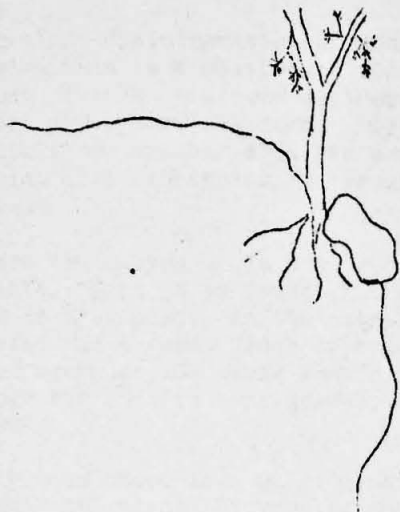
By - G. E. Sturdevant.

As one views the Grand Canyon - the grandest of all canyons - he is invariably impressed with its magnitude. From rim to rim it varies in width from four to eighteen miles. From the rims the great transporting agent - the Colorado River - appears like a narrow ribbon winding its way through a small tortuous inner canyon scarcely four hundred feet wide at its depths. To the layman it is a puzzling situation to analyze - a river cutting a path three to four hundred feet wide while the rims above vary in width from four to eighteen miles. He concludes, therefore, that the river must have been eighteen miles wide at one time in order to leave a canyon of that width at the widest place. The causes, however, of the great width of the Grand Canyon at the rims as compared to the relatively narrow channel are due to various reasons other than the Colorado. Chief among these factors causing the recession of the Canyon walls might be listed; vegetation, changes in temperature, wind, rain, running water, chemical action, faulting, and gravity. These various factors are really interdependent in accomplishing the recession of the cliffs.

A competent observer passing along the rim is thoroughly impressed by the way vegetation hastens the destructive action. Lichens - sometimes referred to as the first rock destroyers - may be seen growing upon the bare rock surfaces. These primitive plants may appear insignificant yet they really start the work that succession of plants finish. The lichens are, in a sense, small sponges. Small amounts of rain water are retarded and the weak carbonic acid of the water starts to dissolve the limestone. In time a small hole is formed in the solid rock. These tiny holes are then ready for the next plant succession - the mosses. These larger "sponges" retard more rain water and larger holes are dissolved in the limestone. A small amount of soil is formed. This soil may be due to constant decay of moss or it may be carried to the hole by wind or running water. The soil may then harbor a tiny seed of some grass or flower. If the seed is successful in growing the roots reach down in the partially decomposed rock. Water filling the enlarged space may become frozen. This expansion of water as ice in time causes a crack to develop. If a seed of some tree, such as a pinon, juniper, or western yellow pine, reaches the crevice and grows, a visible force is seen moving huge

blocks. As the tree grows, the roots increase in size, penetrate deeper, and the crack is enlarged more and more. As the wind sways the tree to and fro,

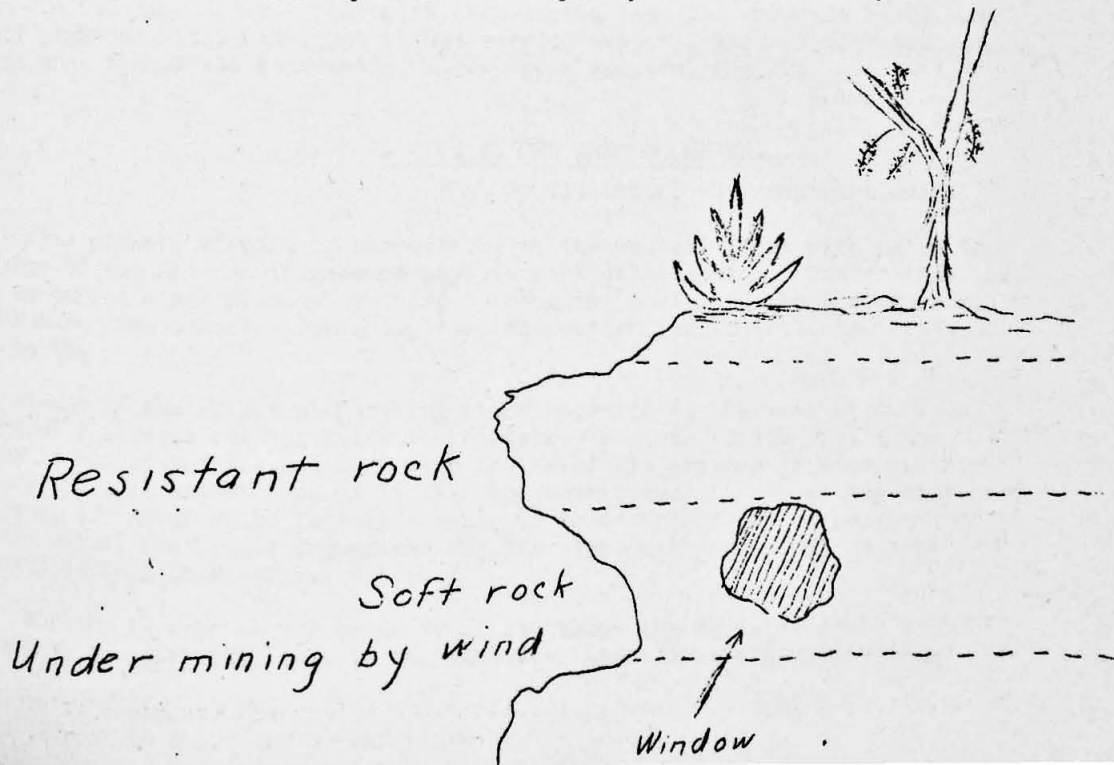
a prying action is manifested. Gradually huge blocks of solid rock are torn asunder and ready for a precipitous plunge into the Canyon. The actual drop may not take place within a year or even a hundred years yet in time it is certain to occur.



Changes in temperature as a factor in the disintegration of rocks in a semi-arid region cannot be overlooked. Each day the bare rock surfaces receive the intensive rays of the sun and within the Canyon, at least, they become too hot to hold in the hand. This heat causes the rocks to expand a small amount. When the sun has settled below the horizon, there is an appreciable change in temperature. The rocks radiate their heat and may even become chilled. This causes the

rocks to contract. Expansion and contraction, in time, causes particles of solid rock to flake off or exfoliate.

Wind action is another appreciable factor causing the recession of cliffs. From the rim one may notice where poorly-cemented soft layers of



rock have been swept out and have actually undermined resistant rock layers. Without a foundation to rest upon, well-indurated and well-cemented rocks break off and roll into the Canyon. Again, near the Canyon rim, one may see where the wind has removed the soft material between resistant layers of rock to the extent of causing openings or windows.

Chemical disintegration of rocks goes on at a much slower rate in a semi-arid region than in a moist one. This action, however, contributes no negligible amount of work as a rock destroyer. Rain water unites with carbon dioxide gas of the atmosphere and forms a weak acid known as "carbonic." Decaying vegetation forms another acid known as "humic." If given sufficient time these acids will etch holes in limestone and finally provide places for roots of plants.

Where the Canyon walls have receded most a much greater force is generally responsible. Here it is found that faults or breaks in the earth's crust have occurred in ages past. As the country was being uplifted, unequal pressure was exerted and a great crack or break took place. Such a break of fault is a line of weakness and along such a line the rocks disintegrate faster and the Canyon rim recedes more quickly. The best example of this is the Bright Angel Fault.

In places there is a sapping action where soft strata are being removed under resistant strata by running water. As the Canyon walls recede the action of running water loses but little time carrying the debris away. In this vicinity the showers, which are mainly torrential in character, come with sufficient force to remove the broken down material to the waiting transport - the Colorado River.

Thus it is seen that the recession of cliffs is due to factors other than the Colorado River. Geologists are agreed that the Colorado River was never eighteen miles wide, yet it has carried away all the material that once reposed as stratified rock where we now see a spacious Canyon.

FIVE PLANETS IN THE AUTUMN SKIES.

By - M. R. Tillotson, Park Superintendent.

Five planets visible in one evening is the unusual sight with which the watcher of the heavens is greeted at this particular season. Two of these are the so-called minor planets or those between the earth and the sun, Mercury and Venus. The others - Mars, Jupiter, and Saturn, are outside the orbit of the earth.

Venus is the brilliant "evening star" seen low in the west at sundown and soon following the sun below the horizon. Because of its brilliance Venus is easily located and seen with the naked eye and the amateur is therefore tempted to expect much of it as a telescopic object. These expectations, however, are never quite fulfilled since it is so brilliant and presents so little detail that it is impossible for the average telescope to present a clearly defined image of its sphere.

Mercury is even nearer to the sun than Venus and while at times quite bright it so constantly lost in the excessive light that the mere seeing

of it is sometimes an achievement for the amateur. The great astronomer Copernicus is said to have died without having beheld it. At present it may be seen shining as a star of about the first magnitude quite close to, west and south of Venus. As a telescopic object it shows almost no detail in a small instrument but it is always of interest to watch for its "phases." Both Mercury and Venus, being inside the orbit of the earth, that is, between it and the sun, assume phases as does the moon.

Saturn still shines in the southwest in its summertime glory "in" the constellation Sagittarius and because of its rings forms a most interesting telescopic object.

Shortly after sunset there rises in the east the largest and, now, most brilliant of all the planets the giant Jupiter, 1309 times the bulk (size) of the earth. This is a most interesting telescopic object principally because of the fact that four of its larger satellites (moons) may be seen even with a low powered field glass, if steadily held. A larger telescope will show the flattening of the planets globe at the poles and the two greater bands or cloud belts.

It is now nearly midnight when there appears on the eastern horizon the great ruddy planet Mars, named because of its blood-red color, for the Roman war god. Mars is "in" the constellation of Taurus and not far from Aldebaran, the fiery red eye of the Bull. No object in our night sky except the moon and one of our small asteroids, comes so near the earth as does Mars at the time of a favorable "opposition." Being outside the orbit of the earth Mars, Jupiter, and Saturn can never exhibit crescent phases as do Mercury and Venus. Mars is, however, a beautiful and interesting telescopic object. While such of its surface markings as the polar ice caps and the so-called canals are visible only with large instruments under favorable conditions its clearly defined image and ruddy light give a peculiar fascination to such faint details as do appear through the telescope of the amateur. And if we amateurs are unable to reach a satisfactory answer to the ever-present question as to whether or not life exists on Mars we at least have an interesting problem upon which to speculate and we have the satisfaction of knowing that, in our failure definitely to solve this problem, we are in a class with the world's leading astronomers.

BIRD BATHS.

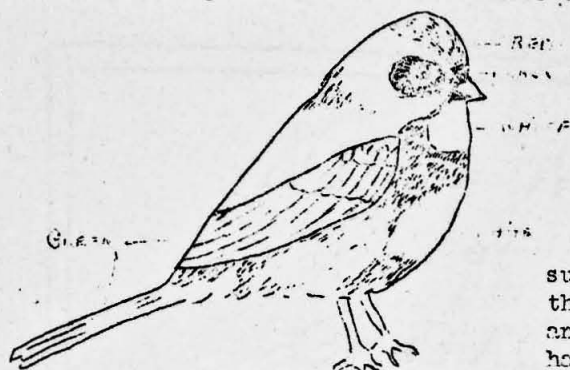
By - Mrs. G. E. Sturdevant.

The animals, birds, and small rodents of Grand Canyon National Park have substantial friends in our Chief Ranger James Brooks and his wife. This summer has been a particularly dry one so if Mr. Brooks had not come to the rescue our park visitors and permanent residents would not have had so much bird life to enjoy.

Mr. Brooks made several attempts to find rocks with natural basins but finding this impracticable he had large limestone rocks chiseled and scrapped graduating them so that the small birds could bathe as well as the larger ones. This idea has certainly been a wise one for the small birds take such a delight in wading into the depth which suits their bathing purposes. This also enables birds of different sizes to bathe at the same time, the larger birds giving

their smaller neighbors a free shower. The Abert squirrel and the Gila chipmunk also find great pleasure in the bath. It is a very common sight to see several species of birds, a chipmunk or two, and a squirrel drinking at the same time. The only disturbing element is the pretty old saucy long-crested jay; all birds and rodents disappear when he announces his presence by a cawky caw from a nearby tree. Once in a while one of the pet deer comes for a drink

but usually he likes to come at eventide when the men folks are at home to feed him bits of apple or other delectable foods.



GREEN-TAILED TOWHEE

Thurber's junco, the desert sparrow, the red-headed woodpecker, the grosbeak, Arkansas flycatcher, red-shafted flicker, western bluebird, the green-tailed towhee, the mountain chickadee, the pinon jay, the long-crested jay, and the permanent residing robins. Mrs. Brooks has been quite amused by an albino robin which comes to drink at her bird bath and eat of the corn bread that she makes for the birds. This freak of nature has also been seen a number of times at the public auto camp ground by park visitors.

At present Mr. Brooks says that he is kept busy meeting the constant demand for these baths. Permanent residents desire them for their ornamental appearance as well as for their practical value.

Nothing could be more attractive to the birds than some of these mossy little pools which they must believe kind providence has provided for them.



RED-BACKED JUNCO