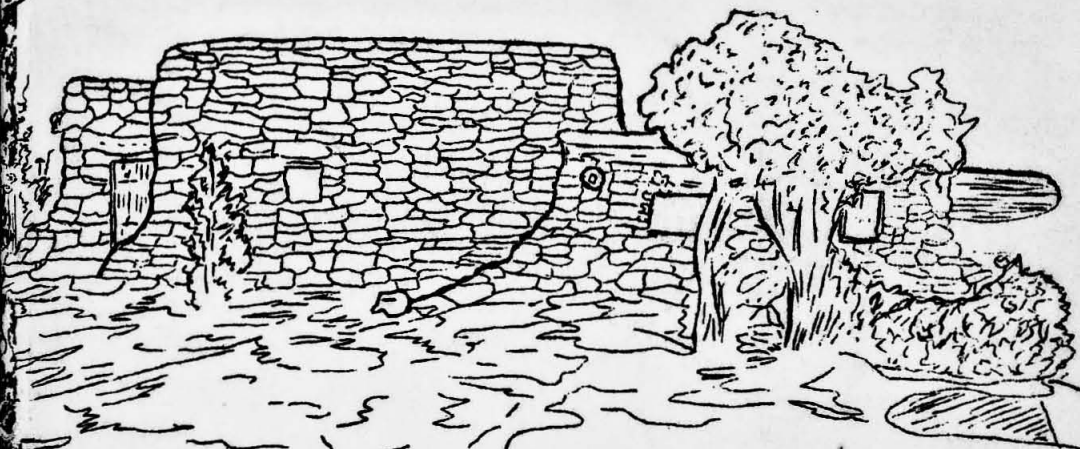


NATURE
Notes
from the
GRAND
CANYON



THE
Observation
Station

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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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YAVAPAI OBSERVATION STATION

By Asst. Superintendent P.P. Patraw

The purpose of the Yavapai Observation Station is, as its name implies, to serve as an observatory, from which may be seen the things that tell the story of the formation, birth and growth of the Grand Canyon. The Grand Canyon is the one great exhibit. Mineral, fossil and other specimens are placed in the building, but not as museum specimens; rather, they act as assistants in the interpretation and recitation of the story.

After an exhaustive study made by Doctor John C. Merriam, Chairman of the National Park Service educational committee and his associates, as to the most suitable location, Yavapai Point was selected as the site best adapted to the purpose. The site is ideal from all standpoints. From it may be plainly viewed the five great features of the story - erosion, deposition, crustal movement, ancient life and modern life. There is the Colorado River, the power that cut and carried away the materials leaving the great void called the Grand Canyon, still alive and carrying on its work which will not be completed until the mass within its ultimate reach is once more at sea level. A sandbar may be seen, deposited from the river, and telling a story today in the same words in which the story of the building of the strata composing the walls of the Canyon was told. There is the great Bright Angel Fault telling of crustal movement which to a much greater extent is depicted in the walls of the Canyon, once beneath the level of the sea. There are the places in which the fossil remains of paleozoic life are found, telling of the development of life existing at the time the walls were formed. There is the wide range of modern life zones, varying from the Lower Sonoran at the bottom to the Canadian at the rim. Thus, we see movement in apparent stability, youth and age, side by side.

The station is operated by the National Park Service as an integral part of the Park's educational program, under the direction of the Park Naturalist. Lectures on the various phases of the story are delivered daily. An attendant is at hand during regular hours to supply detailed information to individuals. The equipping of the building is not yet complete. Eventually there will be mounted on the parapet a battery of several telescopes and pointers, fixed on specific objects of interest in connection with the general story; beside each will be an exhibit arranged to bring to the observer's hand a specimen of the object of observation. More detailed exhibits, centered around transparencies will be on display in the exhibit room further to illustrate those objects.

The construction of the building was started in September, 1927, and completed in July, 1928. The exterior is of native limestone, carefully selected for weathered surfaces, and so closely harmonizes with the Canyon wall above which it rises that the structure seems to be a living part of the wall itself. Funds and cooperative assistance for the project were provided by several agencies, principally American Museums Association, Laura Spelman Rockefeller Foundation, National Academy of Sciences, and Carnegie Institution of Washington. There were also donations by individuals for the three "picture windows." The building was designed by Mr. Herbert C. Maier, American Museums Association, who also supervised its construction.

However, they soon adapted themselves to their new surroundings, becoming more chummy with the deer from day to day, feeding alongside them at the grain troughs, and nibbling from the same stalks of hay. This was apparently acceptable to the deer, but the rabbits, not entirely satisfied with the arrangement, wanted a still closer bond to exist. They made up to the deer in many ways, bedded down alongside and amongst them, nestled close to them and climbed on their backs, and often standing on their hind legs, nosed the faces of the deer. The older deer accepted this attention with more or less disgusted tolerance, often getting up and moving from their comfortable bed and pleasant ruminating when the rabbit attentions became a nuisance. One could readily see from the actions and the registered expressions of the mature deer that this was an overstepping of the bounds but what to do to stop this fraternizing on the part of the rabbits was beyond them. The fawns, however, were more amenable. They would nose, even lick the rabbits with apparent signs of friendliness and affection.

When the deer left the feed yards at sundown, on their nightly rambles through the adjacent forest, the rabbits accompanied them and returned with the band at daylight. The deer, apparently accepting the company, would lift their feet and carefully place them so as not to strike the rabbits jumping in and out under them.

CLIMBING DEER

By Ranger-naturalist S.B. Jones

The mountain goats and mountain sheep generally go the credit for skill in climbing. The writer made an excursion last summer from Grand Canyon Lodge to the Kaibab Trail along the limestone ledges of the east side of Bright Angel Point, and he feels that deer are entitled to some credit for their agility. The entire slope is criss-crossed with deer trails, some so well beaten as to be almost thoroughfares. The writer scared up a number of bucks and away they bounded through the scrub oak, locust and maple. When he endeavored to follow them he slipped on loose rocks, scratched himself on locust thorns, beat against branches through which the deer, despite their antlers slipped easily. Whenever he attempted to take a short cut, he invariably found that the deer had chosen the best way. By the time he reached the Kaibab Trail he was convinced that it was not so much the topography of the Canyon that acts as a barrier to the immigration of deer from rim to rim, as it is the temperatures and perhaps the lack of shade and suitable forage in the lower parts. If a deer sets out to cross the Canyon, it could undoubtedly make it, but a deer is a practical and not a visionary animal and moves but slowly from place to place as forage requires.

PINYON PUZZLE

By Ranger-naturalist E.W. Count

The Pinyon Pines on the rim between Grand Canyon village and Yavapai Point show little apparent rime or reason in the arrangement of their cones. They themselves are gnarled and twisted by either wind or starvation. The male cones are not growing on the lower branches and the female on the upper, but go so far as to grow together on the same end-tuft. There are plenty of cones, too. Once in a while a tree has only male cones growing, with last year's opened female cones still hanging. Some trees have only green female cones, although that may mean that they have simply lost the male; on the other hand, the male cones remain on the tree for weeks after shedding their pollen. The farther back from the rim one goes, the straighter the trees, the less the cones and the more orthodox their position, which is as one would expect. The female cones straggle among the upper branches, while the lower branches often show no signs even of having had any this year. Here the trees are a little crowded, although the lower branches receive sunlight a good part of the day. This is a rest-year for these pines, as last year and the year before the cones were plentiful. But why this behavior among the cliff pines? Can it be that so much fitful wind makes this separation of cones, which theoretically may insure cross-pollination, a mockery? The trees appear healthy though stunted; so lack of food hardly seems a sufficient answer.

WINTER ROBINS

"Have you had your iron today?" asked Mrs. Robin as she and Mr. Robin were dining from crumbs in one of the Park feed trays. "Let's go over to the Chief Ranger's and see if they have put out any raisins." Sure enough little piles of sweet seedless raisins were here and there among the other food in the tray, and the robins ate their fill with apparent relish.

These two robins stayed all winter at the Canyon and ate only raisins if these were available. In February, the Chief Ranger reports that he put out six pounds of this fruit, which quickly vanished before the hungry hordes of migrating robins.

THE YOUTHFUL GRAND CANYON

By the Park Naturalist

The question of the age of the Grand Canyon is one which is asked frequently by visitors to this region who have given more or less thought to its geological story. The most usual answer seems to be nine or ten million years - quoted from I know not where, by those who dare to place an approximation on this very uncertain and questionable date in the earth's history.

The history of the Grand Canyon as known today contains two very definitely recognized cycles of erosion occurring since the Mesozoic which

is the last great era of deposition in this region. These cycles were first described by Dutton and appropriately termed the Plateau Cycle and the Canyon Cycle. During the first of these, all of the Mesozoic strata were stripped from the surface of the present Grand Canyon region by a gradual recession of high escarpments. Today the extent of this recession is well shown by Echo Cliffs to the east and Vermillion Cliffs to the north. The second or Canyon Cycle involved the cutting of the present Grand Canyon and was accompanied by a second general uplift of the region.

The geological period during which the original uplift of this area occurred - the uplift by which deposition ended and denudation began, has been considered with good reason by Dutton to have taken place during Eocene time. (Tertiary History of the Grand Canyon District page 217). The plateau must have been covered by base-levelled Permian and Lower Triassic strata at the close of this cycle though these have since been removed. The period of relative quiescence between the cycles, Dutton then attributed to late Miocene or early Pliocene (Tertiary History, pages 77, 221). From this we see that the second great uplift resulting in the cutting of the canyons, the rejuvenation of landslides along certain Triassic escarpments, and the stripping of soft surface deposits from the plateau, must have taken place somewhere in early or middle Pliocene time.

The translation of geological periods to age estimates in terms of years is a process involving many uncertainties. Numerous methods have been employed in making such determinations though the latest and most generally approved one - that of radio-activity, places the age limits of various geological occurrences considerably farther back in history than did former calculations. By this new method we have today a fairly definite scale of time - approximate to be sure, yet probably fairly accurate, upon which we may base our estimates. The results of this scale place the age of Grand Canyon somewhere between seven and nine million years and are as follows:

PERIOD	EPOCH	No. of Years (Obtained by Barrell on radio-activity)	Grand Canyon History
Quaternary	Recent		Continued canyon cutting & widening
	Pleistocene	1,000,000-1,500,000	" "
	Pliocene	6,000,000-7,500,000	Glaciation to north Second uplift with start of canyon cycle
Tertiary	Miocene	12,000,000-14,000,000	Periods of relative quiescence, great denudation, much volcanic action
	Oligocene	16,000,000	Uplift with start of Plateau cycle of erosion
	Eocene	20,000,000-26,000,000	

The principal value of this estimate of the Canyon's age is found not in its accuracy as an exact number, but in its use as a comparable figure to show the relation of the Canyon's age to that of other features of the region. We find for example, that the time when the uppermost stratum in the Canyon walls was formed, must have been somewhat over two hundred million years ago, and by the same scale, that the old crystallines of the Inner Gorge-- rocks of the earliest era in geological history, date back over a billion years. What then is the life of our mighty Grand Canyon? Its depths - the results of a youthful stream and the occurrence of recent times by comparison, merely serve to show us the real abysmal depths of time which penetrated inconceivably far back in history, and serve perhaps even better to place before us the reality of our own insignificance.

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