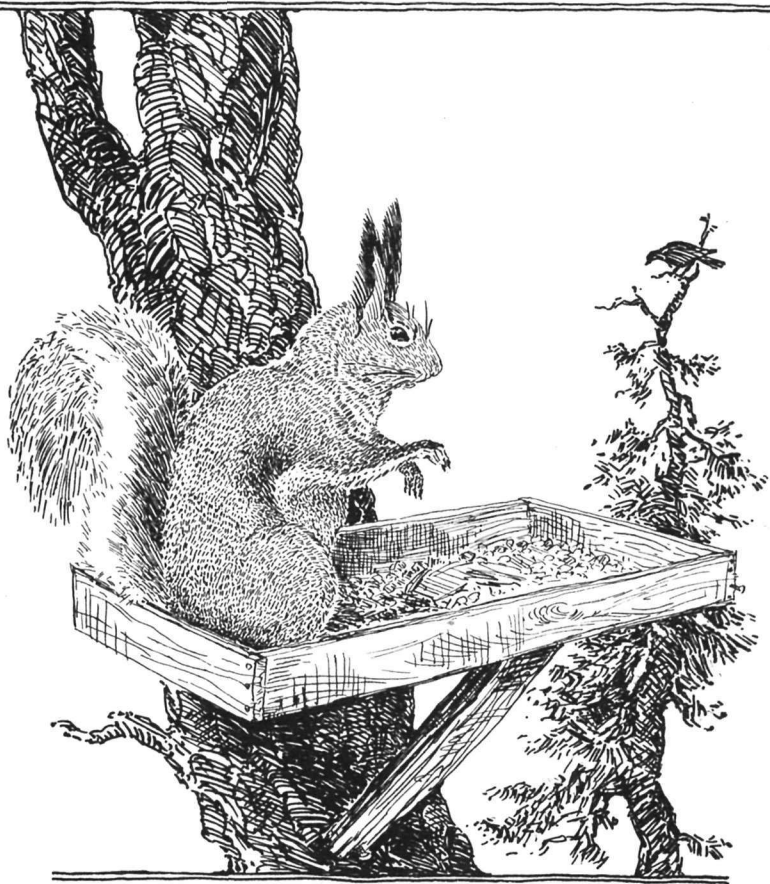


Grand Canyon NATURE NOTES



Vol.8 No.11 February 1934

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Grand Canyon, Arizona

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M. R. Tillotson,
Superintendent.

Edwin D. McKee,
Park Naturalist

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A Probable Influence on Life in the Kaibab Sea

By Edwin D. McKee, Park Naturalist.

THE origin of chert, that flinty, siliceous rock which occurs so commonly as bands or as nodules in many sedimentary rocks, has long been a question of considerable controversy among geologists. Some have contended that cherts represent original deposits of silica, others that they are of secondary origin, formed through the work of underground waters at a time long after that when the encompassing sediments were deposited. Again, some geologists hold the direct or indirect action of plant and animal organisms to be the cause of chert formation, while others suggest that it is entirely the result of inorganic processes. It is today apparent that most if not all of these theories are correct for certain types of chert, and that each type must be considered a problem in itself.

Throughout most of the six hundred foot thickness of sand and limestone which makes up the Kaibab formation of Grand Canyon, silica occurring chiefly in the form of chert is a very conspicuous feature. Many of the locally abundant fossils have shells which are petrified showing that unquestionably in some cases lime has been replaced by silica as a secondary development. Furthermore, many of the abundant concretions and nodules, some of which are developed about sponges, suggest secondary origin. On the other hand, certain cherts which occur as bands and which are chalky white except where a brown iron rust has developed on the surface, are almost surely the result of the original deposition of silica. The prominent bands of this hard but brittle material actually form in the area of Grand Canyon Village nearly 50% of the great massive cliff that constitutes the upper part of the formation. It is this chert and its significance which the writer wishes to briefly discuss in this paper.



PHOTO BY GRANT

KAIBAB FORMATION SHOWING ALTERNATING BANDS OF CHERT AND LIMESTONE, FORMING UPPER CLIFF

If we consider as a unit the massive, sandy limestone which forms the largest cliff of the Kaibab formation, we find that the sea whose deposits it represents varied considerably from east to west in the short distance represented in Grand Canyon National Park. Toward the west the chert bands are at a minimum and fossils of an open sea type are most abundant; toward the east, near the Kaibab trail, the reverse is true. As might be expected, the nature of these sediments continues to change eastward but as yet enough detailed study of them has not been made to justify at this time any statements concerning their character.

A second very noticeable and undoubtedly very significant relationship between chert and fossils is to be found in a vertical section of the formation. If one examines the great cliff of Kaibab limestone along the Bright Angel trail, for example, he finds layers of grey sandy limestone full of concretions, in places, alternating with bands of white chert containing tongues of yellow sandstone. In general chert and limestone are of about equal thickness-averaging about eight

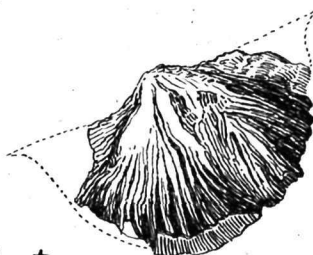
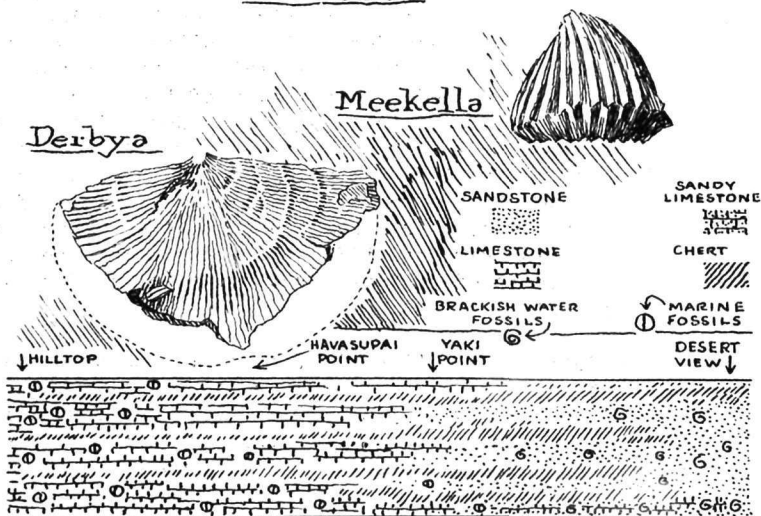
feet. The chert is barren of fossils and so also is the lower half of the limestone, for the most part. In contrast to this, the upper part of each limestone bed usually contains abundant fossils, thus forming very definite fossil zones throughout the formation.

From the testimony of the sediments as described above, it appears to the writer that of all the many theories which have been advanced to explain the origin of cherts, that offered by Tarr¹ in connection with certain cherts of Missouri is also the most plausible in the case under consideration. Prof. Tarr attributed those beds of chert to silica derived from the land and transported to the sea by streams in the form of a colloid and he noted that areas of low-lying or peniplaned land would be particularly favorable for supplying the increased amounts of colloidal silica. This substance would be precipitated in the ocean, by the action of alkaline salts in the sea water. Fossils that fell into the colloidal mass would be perfectly preserved.

To return to the picture of the Grand Canyon region during the time of the Kaibab Sea (Permian), it is quite definitely known as a result of various studies that the land-areas of this region were at that time remarkably low and flat. This would make a very favorable condition for streams to gather colloidal silica from the rather pure sands and would account for the marked concentration of the chert beds, resulting from its precipitation, on the borders of the sea. This factor in turn suggests a reason for the lack in that area of the remains of lime-secreting animals whose shells are found so abundantly in the less siliceous deposits farther west. To be sure, here and there in the cherts are found marine fossils very beautifully preserved but they are uncommon and as suggested by Tarr, probably fell accidentally into the silica-gel.

The very definite zonation of fossils in the upper half of each limestone layer further demonstrates the plausibility of Tarr's theory. It suggests that the silica was poured into the sea or concentrated there in rather regular cycles and that these were times when the waters were most unfavorable

Common Fossils of Open Seas During Kaibab Times

PugnoidesCompositeProductusChonetesDerbyaMeekella

MAIN CLIFF OF KAIBAB FORMATION IN THE GRAND CANYON

to the normal life of the ocean, thus driving away or killing all marine animals. As conditions changed to normal once more, lime began to be deposited but the sea life was not as quick to respond. In the course of time, however, the waters were repopulated. Some of the old types of animals and some new ones gathered over the floor of the sea, only to be banished in a similar manner with the next concentration of silica.²

A petrographic study of the white, banded cherts of the Kaibab formation helps to confirm the theory of their primary deposition since dolomite crystals which are quite numerous are seen in some cases to have developed around, hence after the cryptocrystalline silica. The chert as seen in thin-section appears to have roughly regular and intermingling zones of calcareous and siliceous material with a few clastic minerals throughout.

It is hoped that this brief sketch of certain conditions in the Kaibab sea will give something of a picture, and one of reasonable accuracy, of a small part of that most unusual and remarkable period, the Permian. It is realized that with present limited knowledge this description must necessarily be far from complete, nevertheless it is hoped that with continued studies and observations the facts will gradually accumulate to give us a better understanding of true conditions.

1. Tarr, W. A., Origin of the Chert in the Burlington limestone; Amer. Jour. Sci., 4th Ser., vol. 44, pp. 409-451, 1917

2. It should be borne in mind that not only the silica but also the fresh water of the streams which presumably brought in the silica would be objectionable to the marine animals.

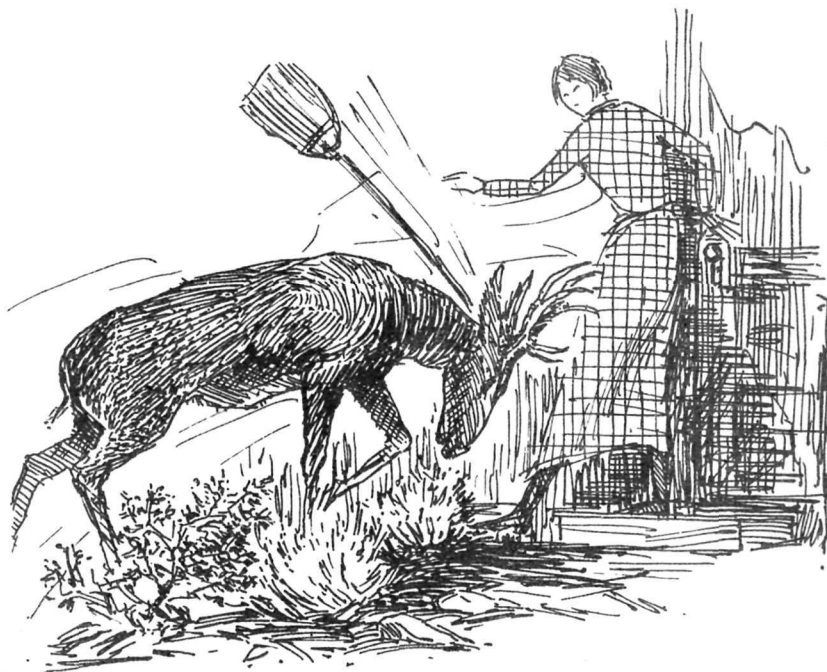
Bucks Grow Bold

By Barbara H. McKee, Grand Canyon.

THAT the buck mule deer at Grand Canyon, are very zealous in guarding their mates was amply demonstrated last November. As the rutting season advanced these bucks developed as usual, into powerful beasts with swollen necks and towering antlers. Their dispositions became quite pugnacious - a fact which was especially noticeable since during the greater part of the year these same animals are tame and gentle. Because of constant association throughout the year with the people of Grand Canyon Village, these mule deer even when their very nature changes, do not fear human beings, so it is the better part of valor for the people to avoid all love-sick bucks.

One evening, just at dusk, a handsome buck was standing guard over one of his harem - a lame doe. Mrs. J. P. Brooks, the wife of the Chief Ranger, saw "Lamey", the doe, lying under the low hanging branches of some juniper trees and started down to give her a handful of raisins. Not until almost there did Mrs. Brooks notice the buck. At that very instant he lunged toward her, then snorted and stamped on the ground with his two front feet planted stiffly before him. Mrs. Brooks managed to reach her front porch in safety, and once inside the house became quite angry to think that one of her special pets of a few months previous should have forgotten all her kindnesses. Getting her broom, she decided to chastise him. She had no more than left the house, however, than the buck charged her again and she was forced to retreat. The next day rangers roped this over-zealous buck and dehorned him to avoid any accidents.

One other case of a buck mule deer offensively on guard was reported last fall. In this instance as in the other,



the buck had his doe nearby and took exception to the presence of a human being. Ernest Ensor, trail caretaker at Indian Gardens in the Canyon, early one morning in November, went out to the deer and antelope feeding grounds and started to put hay into the racks. Without warning a huge buck which had been standing a short distance away, leaped over the feeding trough and catching Mr. Ensor by the arm and leg with its antlers, dragged him some 30 feet into the underbrush. The sleeve of Mr. Ensor's leather jacket and his shirt sleeve were torn and his arm was cut. Fortunately the other antler merely tore his trousers and did not penetrate to the skin.

In these two instances we see how the ordinarily timid and gentle deer becomes a creature of courage and passion when he believes his mate is in danger. Fortunately for us who live in close contact with these animals, their season of mating lasts for only a short time.

Regarding the Nankoweap Trail

AN article entitled "On Canyon Trails" in an earlier issue of Grand Canyon Nature Notes (Vol. 8, No. 5), the writer gave brief reference to the building of the hazardous Nankoweap trail in the extreme northeastern part of Grand Canyon. Since publishing this article attention of the writer has been called to an interesting account by Dr C.D. Walcott¹ himself, of the development of this trail. The article is here quoted in detail. (It should be noted that the date as given in the previous article of Nature Notes was incorrect.)

"During the month of November, 1882, the Director of the Survey had constructed, under his immediate supervision, a horse trail from the brink of a lateral cañon on the east face of the Kaibab Plateau, Arizona, down to the more level cañon bed or Nan-ko-weap valley 3,000 feet below. Encamped in the snow, often concealed for days in the driving frozen mist and whirling snow, the party gradually overcame the apparently insurmountable obstacles in the way, and Nov. 24th, camp was formed in the supposed inaccessible depths of the head of the Grand Cañon, a day of reconnaissance and rest. Then the director headed his party of faithful, energetic men and left the writer, who, through illness, had been unable to share in the building of the trail, with three men and outfit to explore and study the inner cañon valleys between the Kaibab Plateau and the Marble Cañon, and the Grand Cañon as far as could be reached south. Seventy-two days of constant work gave some of the information wished, a portion of which is used in this article."

E. D. McKEE

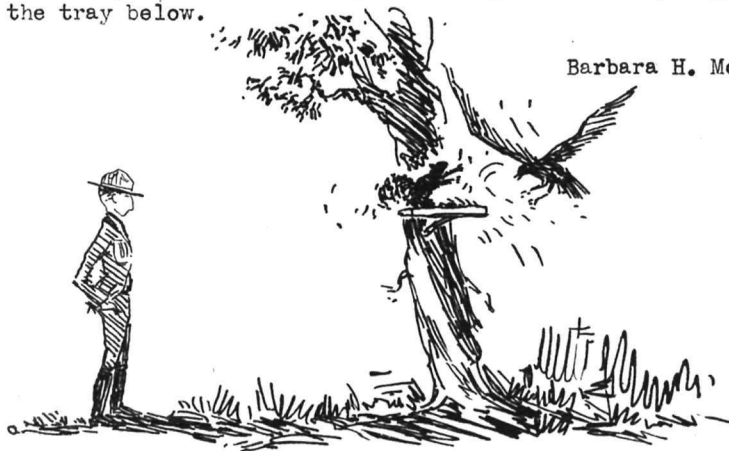
1. Walcott, Charles D., "Pre-Carboniferous Strata in the Grand Cañon of the Colorado, Arizona, Amer. Jour. Sci., Vol. 26, p. 437.

Raven vs. Squirrel

FOR three years Chief Ranger Brooks has been feeding a pair of ravens in the trees near his house. Chunks of suet and meat have induced the comical birds to stay in the vicinity throughout the entire year. Just lately they have become tame enough to come down from the trees to the ground, and even to eat pinyon nuts from the bird feeding trays which are frequented primarily by the smaller nut-eating birds and squirrels.

Not long ago Mr. Brooks happened to see a fight take place between one of the ravens and an Abert squirrel. Both wanted absolute possession of the tray full of pinyon nuts, and each determined to have his own way. The squirrel was finally victorious in this encounter because of his strategy. He would rush between the raven's legs and practically upset it. With such maneuvers the raven could not compete and was forced to retire to the tree top, croaking derisive remarks, such as only a raven can make, at the squirrel busily engaged in the tray below.

Barbara H. McKee



Report on Rattlesnake Specimens

IN the November 1933 issue of Grand Canyon Nature Notes¹ mention was made of the collecting of two specimens of rattlesnakes from areas in which the reptile is little known, the north and south rims of the Grand Canyon. These specimens have since been sent to Mr. L. M. Klauber of the San Diego Museum who has kindly examined and passed judgment on them.

Concerning the rattlesnake collected near Havasupai Point on October 9, Mr. Klauber makes the following statement-"the smaller specimen from the South Rim seems to me to be rather closer to C.c. confluentus (Prairie Rattlesnake) than to C.c. abyssus, (Grand Canyon Rattler) and this corroborates findings based on previous specimens, for heretofore the specimens of confluentus found at such points further south as Anita and Valle."

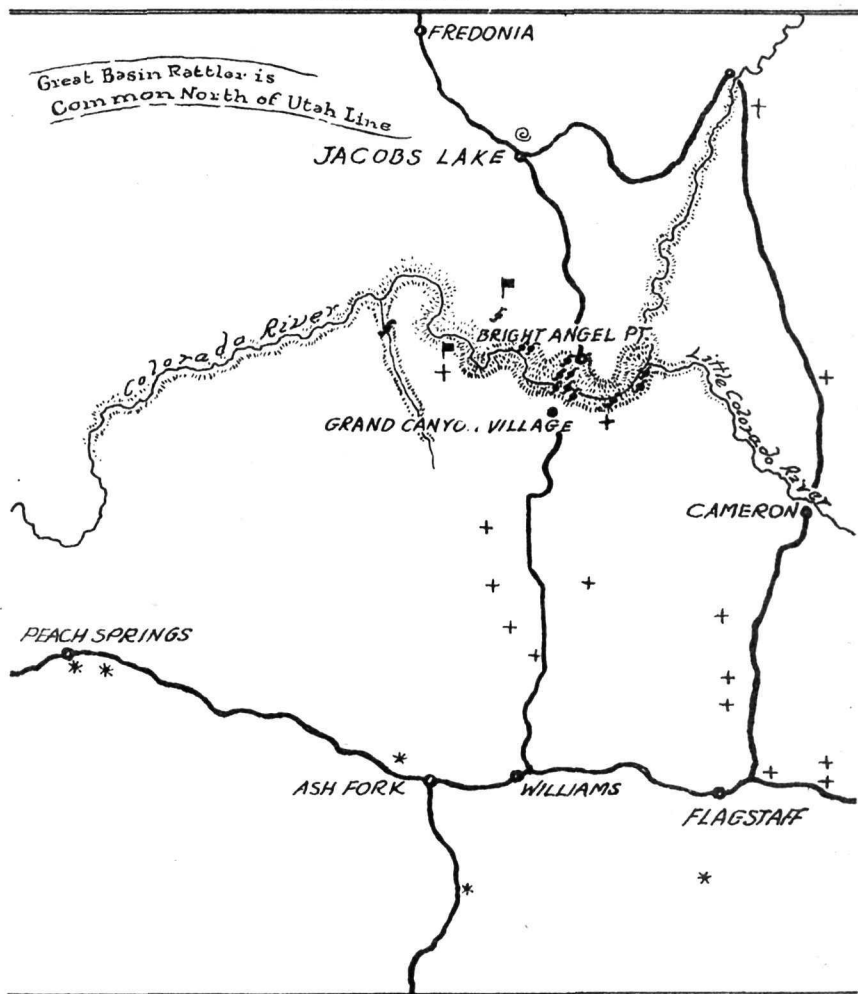
The skin collected from the vicinity of Swamp Point on the North Rim is, according to Mr. Klauber, "undoubtedly abyssus, as in color and lack of spots, it is quite typical of an adult of that sub-species. It also agrees in coloration with specimens that I have seen from Shinumo Creek and Burro Spring - - ."

The importance of the specimens under discussion will be realized if reference is made to the accompanying map showing known ranges of the species of rattlesnakes found in this region. Also brought out by this map is the need for material for study from certain intermediate and critical areas which as yet have furnished no specimens of rattlesnakes.

1. Grand Canyon Nature Notes, Vol. 8, Number 8, Nov. 1933, page 213.

SKETCH MAP SHOWING LOCATIONS IN WHICH RATTLESNAKE RECORDS OF THE GRAND CANYON REGION WERE MADE

*After Klauber ~1931
with additions*



■ Reported in this
Article

- ~ Species not certain (Great Basin Rattler?)
- ♂ ~ Abyssus (Grand Canyon Rattler)
- + ~ Confluentus (Prairie Rattler)
- * ~ Oreganus (Black Rattler)

