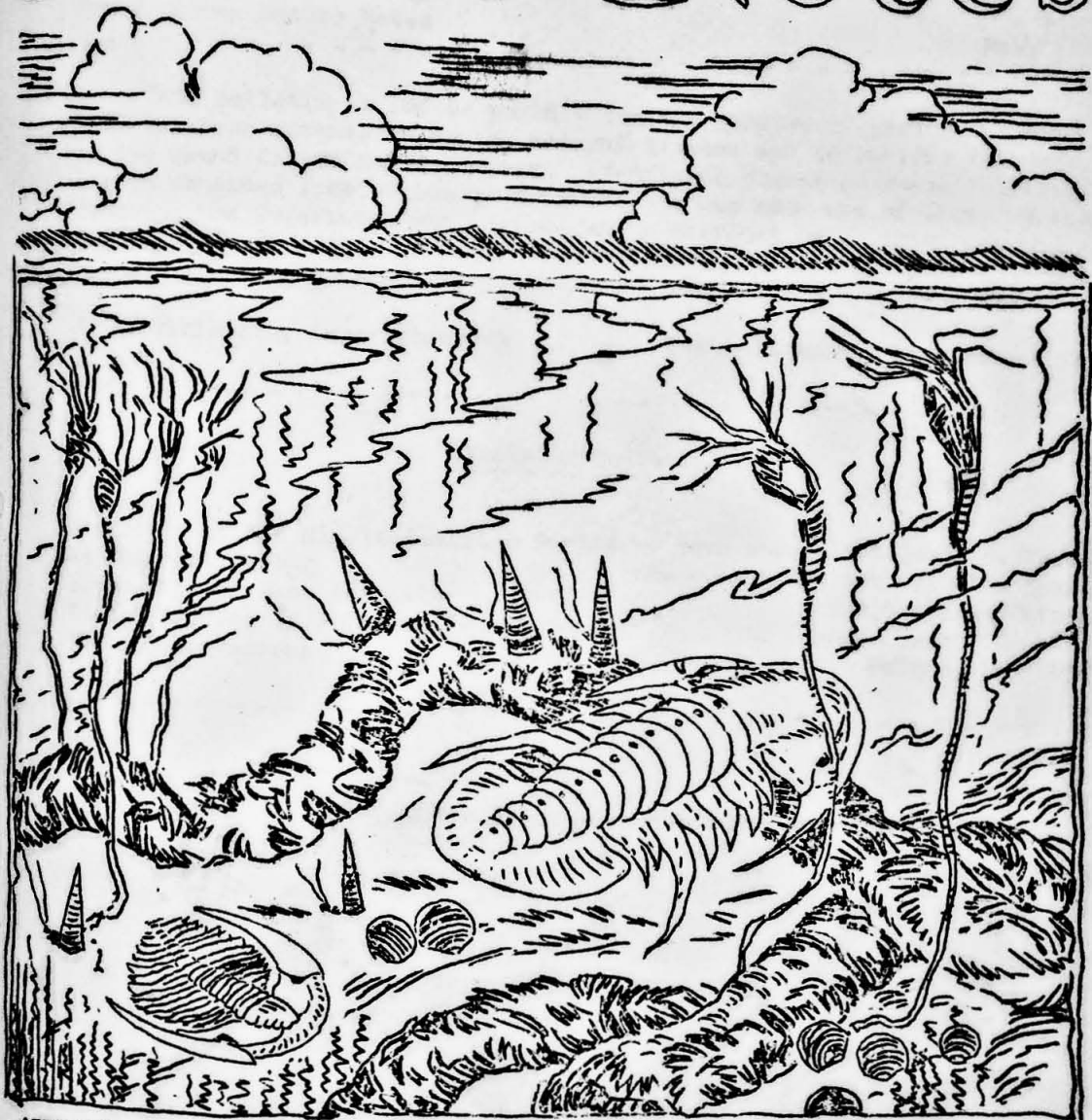


GRAND CANYON Nature Notes



ATTEMPTED RECONSTRUCTION OF MID-CAMBRIAN LIFE ~ GRAND CANYON REGION

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M. R. Tillotson, Superintendent

Edwin D. McKee, Park Naturalist

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GEOGRAPHY OF THE MIDDLE CAMBRIAN PERIOD

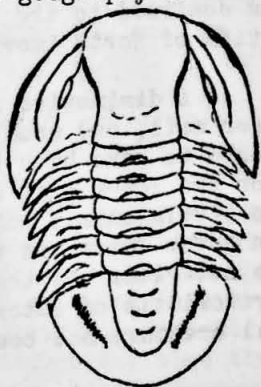
By Edwin D. McKee, Park Naturalist.

The application of superlatives such as the largest, the smallest, the youngest or the oldest invariably commands interest in an object which otherwise might be passed by as ordinary and therefore relatively uninteresting. An excellent example of this is seen in a group of fossil animals found in a particular layer of rock far down in the walls of the Grand Canyon. The sea shells and crab-like creatures which make up this assemblage are not only the oldest animal fossils found in the Canyon but also represent some of the earliest types found anywhere in the world. It is for this reason primarily that they attract the interest of many visitors to the region..

During a very early period of geologic history known to the scientist as the Middle Cambrian, a shallow sea swarming with primitive animal life covered the present Grand Canyon area. Among the muds, sands and limes which were accumulating on its bottom the remains of these animals were buried -- often in great numbers. The sediments in time formed the stratum which now appears as the Tonto Platform (Bright Angel shale), and in a section of this formation not over five feet thick, the remains of many hundreds of these primitive creatures have been found. That they were exceedingly prolific seems evident, though it should be remembered that many of the remains found, especially unattached heads and tails, were deposited as the result of the shedding of outer shells by individuals, and not necessarily by the death of these animals.

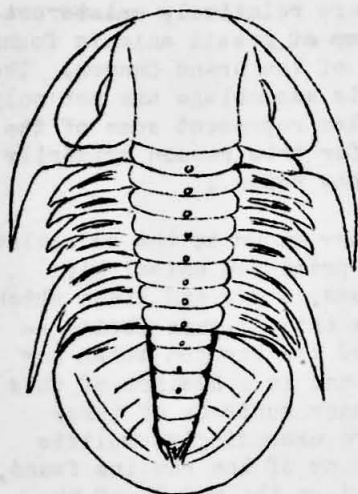
Despite the abundant fossil remains found near the bottom of the Bright Angel shale, only six species of animals appear to be represented there. Of these, three are primitive crab-like animals (trilobites), a fourth is a round, shelled animal (brachiopod), a fifth is cone-shaped and belongs to the snail family (Hyolites), and the sixth is a plant-like creature known as a Cystid. These animals are of exceptional interest to the geologist, in spite of the limited number of varieties which they represent. Not only do they show stages of evolutionary development and peculiar zoological characteristics, but also they tell us most of what we know concerning the geography of the region during that early day in which they lived.

Dolichometopus productus is the name that has been presented to the most common animal of the group under discussion. It is a trilobite with large round head and almost equally large tail, and with seven segments between. Its known geographical range is large. In the west it has been found at five localities in Tooele County, Utah; at three localities in Millard County, Utah; at one place in Nevada (Lincoln County), and within the Grand Canyon of Arizona. Rather remarkable is the fact that this same species is found also in Hawkins and Knox Counties in Tennessee and at two places in Floyd County, Georgia. Its presence in the Eastern rocks is considered by



*Dolichometopus
productus*

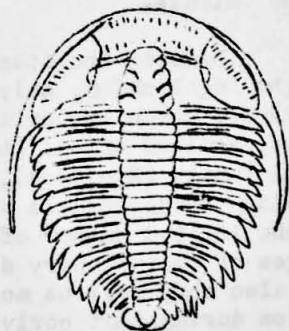
some geologists to represent a great extension of the shallow continental seas of the west during Middle Cambrian times. Others believe that the Rocky Mountain and Eastern seas were connected by separate channels to a common marine body to the north. In either case, it is clearly evident that the Western and the Tennessee-Georgia seas were isolated from those of the Atlantic Province of the same age which contained very distinct animal types.



Anoria tontoensis

A trilobite which is closely related to and found associated with the one just described is called Anoria tontoensis. He must have been king of the seas for he greatly excelled his contemporaries in size. Several specimens from the shales of Grand Canyon measure three and one half inches in length. They differ from Dolichometopus in that the fourth segment of the body is greatly enlarged and spines occur in the center of each segment. Minor differences are also found in the shape of the cheeks. The large size of the tail and the few segments in both species are considered indications of evolutionary advancement over their small-tailed, many segmented predecessors. The extreme size and ornamentation of Anoria undoubtedly are demonstrations of over-specialization and probably account for the fact that this species is known only from the Grand Canyon.

Associated with the two trilobites already described but of much less common occurrence is a more primitive form known as Alokistocare althea. This trilobite is distinguished by nineteen segments of the body and a very small tail. While this species is limited to the Grand Canyon area, other members of the genus have been found in western and northern Utah, in central Nevada, and in north central Montana. It appears to have been confined to the interior seas of the western portion of North America.



Alokistocare althea

A diminutive round shelled animal - smaller than a person's little finger nail, and usually black appears to have been very common in the lower part of the Bright Angel Shale was formed. This little animal had a thin outer layer and several inner ones composed of chitin it lived, the limy shells, characteristic of later sea animals, had not developed. This small creature has been given a



Obolus chuarensis
(Enlarged)

in color when fossilized - mon in the great sea body in Bright Angel Shale was formed. strong shell formed by a inner ones composed of chitin it lived, the limy shells, mals, had not developed. This big name - Obolus chuarensis.

Although interesting animals other than those already described undoubtedly lived in company with them, their remains found in the Bright Angel shale have been so fragmentary and so imperfectly preserved that it has been impossible to identify them specifically.

Of especial interest to the paleo-geographer is the fact that in the Grand Canyon between the layers of shale which contain the assemblage of animals just described and a higher layer of limestone which contains a trilobite called Dorpyge are about 1,000 feet of sediments. In the House Range and in the Wasatch Mountains of Utah are found both groups of animals separated by a similar thickness of lime and shale, but to the south in central Arizona all traces of rocks and fossils of this age appear to be missing. Still further south is an area in which are found Middle Cambrian rocks but a very distinct group of fossils. From these facts, together with the knowledge that the formations become increasingly more sandy and coarse as central Arizona is approached - it is implied that that area was a land mass and a barrier to migration during Middle Cambrian times and that great, shallow seas extended to the south and far to the north. Thus a glimpse of the geography of the far distant past is obtained thru an acquaintance with the fossil life preserved from that time.

* * * * *

AN INTERESTING BUG

By Ranger Naturalist Clyde Searl

Although the word "bug" means to the layman any insect that creeps or flies, for the sake of this article it must be made clear that in scientific parlance such is not the case. Correctly applied, "bug" denotes one group of insects, namely the order Hemiptera, which embraces the squash-bugs, assassin-bugs, water-boutmen, bed bugs, acadas, scale insects, lantern-flies, leaf-hoppers, and many others. The mouth parts of bugs are distinctive in that they are in the form of a tube through which food is sucked, differing from the biting and chewing mouthparts of other kinds of insects, such as beetles and grasshoppers.

Since the first week in around Grand Canyon village have type of insect. It is a cicada, by many people. (The true locust group.) Although the cicada has Grand Canyon village for several to be very abundant and keeps up tree. Its sudden occurrence is this particular insect has lived although its last appearance may years ago.

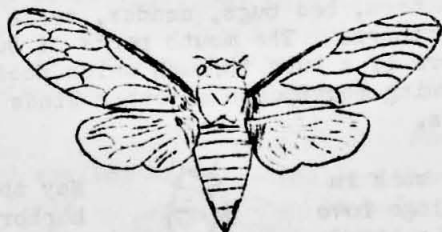


May the trees and shrubs harbored miriads of a noisy erroneously called a locust is a member of the grasshopper been practically unknown at years past, this year it appears a constant clicking in every easily explained. Undoubtedly at Grand Canyon for some time, possibly have been a number of

In this connection, it is believed that cicadas have the longest life cycle of any insect. The one called the seventeen-year locust received its name from the fact that it takes seventeen years to reach the adult stage. The period of metamorphoses, however, depends largely upon environment. In the warm southern range of the seventeen-year locust, the adult stage is reached in about ten years.

With the exception of the varying number of years required for metamorphosis, the life history of all cicadas is practically the same. The female lays her eggs in slits which she pierces in twigs or fruit. After these have fallen to the ground, the eggs hatch and the larvae crawl beneath the surface where they feed upon the humus, and occasionally on the juices of roots. Molting sometimes takes place during the underground life. Usually however, shortly before the insect reaches the stage where wings are developed it crawls up and attaches itself to a tree trunk, the side of a house, or, in fact, anything which happens to be near at hand. Almost immediately the skin of the larva begins to split down the back, and soon the adult cicada crawls out. As in the case of many insects, some time has to be spent at rest before the wings are strong enough to carry it in flight. After a few short days of life, and after the female has laid the eggs, the adults die, or perhaps become the prey of other insects or birds.

Cicadas offer great sport to the insect collector. Probably none are any easier to collect than the ones now at Grand Canyon. They are so gentle, if such a term may be used, that they can be picked off the trees with comparative ease. In contrast to these, some species are so wary that one can not approach within a number of feet before they take flight. Strange as it may sound, some of the tropical species which like to rest high up on the trunks of trees, can be collected only by dust shots fired from a small rifle. The writer has collected numbers of tropical cicadas in this way,



Cicada

BROOM-RAPE, A ROOT PARASITE

By Pauline Mead Patraw.

Between Yaki and Grand View Points near the Canvon rim, I found a little yellowish-purple, leafless plant growing near a group of sage-brush. It was in bloom, the flower was a dull yellow color with purple veins and the petal lobes were purple tipped. At first sight I thought recklessly, "A member of the Indian pipe family". But upon closer examination I saw that the tubular flower was irregular, two-lipped; more like that of a figwort.

After considerable digging I found that this plant was parasitic on the roots of sage-brush (*Artemisia tridentata*). It was attached to the end of the main root. In some cases this root was swollen where it had been attacked and there was an excess growth of small laterals.

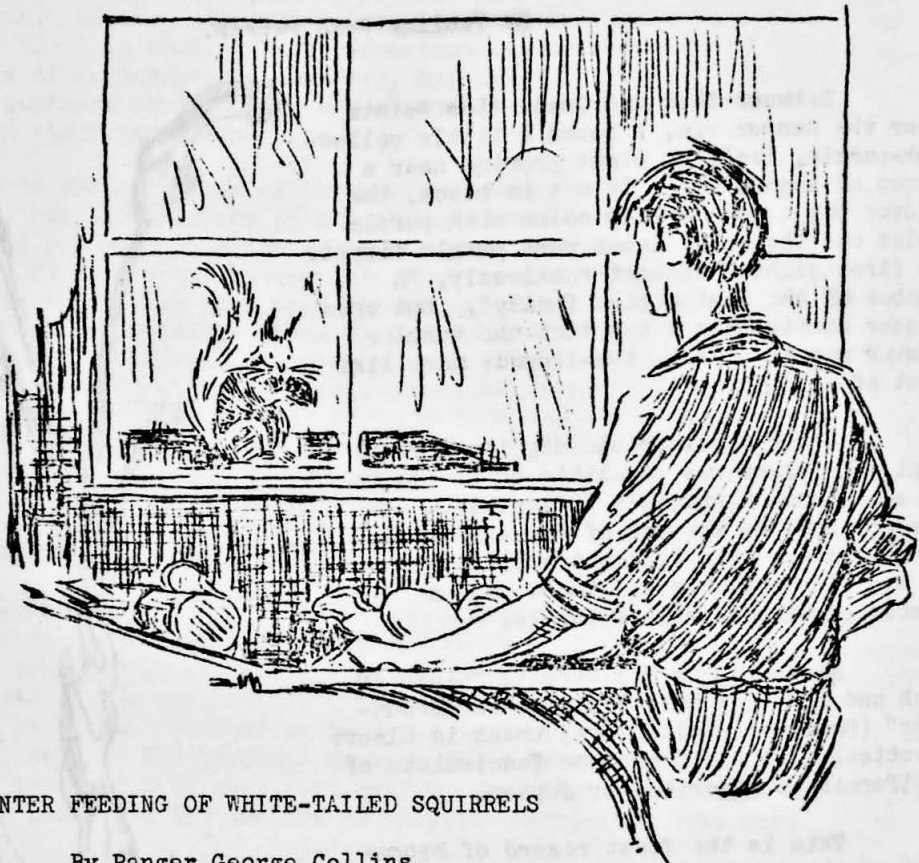
According to Tidestrom's "Flora of Utah and Nevada"; this parasite is "broom-rap" (*Orobanche multiflora*) which is almost identical with the *Orobanche fasciculata* of California as described by Jepson.

This is the first record of broom-rap at the Grand Canyon and the only member of this family (*Orobanchaceae*), found here thus far. The position of this family in the plant kingdom is between the figworts (*Scrophulariaceae*) and the Madders (*Rubiaceae*). Broom-rap is closely related to the cancer-root (*Thalesia*) of the same family.

Broom-rap is an attractive little plant, though because of its color it is inconspicuous and rather hard to find. It is from 3 to 7 inches high. The stalk, near its base, is covered with several thick purplish scales - the reduced leaves. There are several flower stalks to one plant and one flower on the end of each stalk. The flower tube is 1 to 1-1/2 inches long with a two-lobed upper lip and three lobed lower lip. The calyx is purple with awl-shaped lobes. The whole plant is slightly hairy and even the anthers are woolly.

Broom-rap judging from the number and position of the specimens found is probably parasitic on roots of other plants as well as sage-brush. In those cases observed this parasitism did not appear to have any injurious effect on the host.





WINTER FEEDING OF WHITE-TAILED SQUIRRELS

By Ranger George Collins.

Two pairs of white-tailed Kaibab squirrels enjoyed the hospitality of, and afforded interesting company for the rangers at Bright Angel Ranger Station on the North Rim of Grand Canyon this past winter. Their presence was very pleasing to the human occupants of that station since the North Rim - though in summer a place teeming with life - is, during the long winter season, shrouded with the soft quiet of an unfound wilderness. Any living creature, therefore, necessarily became of considerable importance to the few inhabitants of this region.

The Kaibab squirrels were especially interesting and gratifying to us, the rangers at this station, because they abandoned their usual shyness. It may be that rangers through their constant association with Nature have developed certain attributes that admit of closer relationship to the brotherhood of wild things.

During this past winter it was customary for us to feed the white-tailed beauties as well as the local chickadee colony, on a board placed just outside our kitchen window. This, for observational purposes, was quite ideal since wild life feeding hours corresponded with our dish-washing time. Someone would, of course, invariably be at the sink where he could see everything that happened outside.

The squirrels would exercise the remarkable acrobatic traits of their kind all over that quarter of the station and then usually settle down to the meal one at a time. Those not feeding from the board would either continue the play or nibble at fallen bits at a respectful distance. Whether it was just hunger or a reciprocation of the interest shown in them we cannot say, - we like to think the latter, - anyway the fortunate one would sit on the board, munching pinion nuts, biscuit crumbs, etc., and return the steady scrutiny from within with a certain insolent manner. Occasionally he might even cease feeding for a moment to rise up and stare thru the window at us and our kitchen trappings. We could always admire him especially well then, for he would show to best advantage the large shaggy ears and his glossy black sides which were in contrast to the brownish tinge of his back -- markings as characteristic as the beauty of his long, feathery white tail. Then he would drop down again, satisfied for the time no doubt that our food supply would hold out and that we still looked simple enough to share it with him.

We always managed to bake a few extra hot cakes in the mornings as the squirrels were especially fond of them, and we were always afforded particular enjoyment in watching the procedure of selection and transportation of a cake before it was eaten. For some queer reason the squirrels always carried their hot cakes up to the lower branches of one of the several pines nearby before settling down to eat. Perhaps the size of the cakes and the time necessary for their consumption constituted reason for picking the most comfortable place known to a "white-tail" in which to devour such a large meal. At any rate, the amusing part was to watch the squirrels approach each cake, compare the relative size and taste; then select the best. Always the most aggressive squirrel came first. He would discuss with the world at large the exceedingly fine quality of our hot cakes, (we used sour dough and never washed the griddle) lending emphasis the while with snappy jerks of his tail. Then, like a cowpuncher bundling his bed, he would carefully and tightly roll the chosen cake and waddle off holding it partly with his forelegs and partly with his mouth. If a new layer of soft snow happened to be on the ground he would wallow thru it leaving a track as large as a porcupine's. Getting up the tree was usually accomplished with some difficulty too, and so it would be with evident relief and satisfaction that he would at last "square around" on a favorite limb with his prize.

We had many a hearty laugh at the antics of our "cake eaters". They were something to look forward to each morning with real pleasure - - - - wonder what they thought of us?

- FIELD OBSERVATIONS -

A destructive wood-boring beetle, Dendroctonus valens, is coming out of the logs in the Yavapai Observation Station. Numbers of the little brown beetle can be picked from the floor where they drop, and they can be heard in the log before they come to light.



Wood boring beetle
Dendroctonus valens

-- C. C. Searl --

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A specimen of the little Aiken Screech Owl was taken near Grand Canyon village on May 4. Its stomach contents consisted of the head of a cicada, numerous fragments of June Bugs, and what appeared to be the appendage of a scorpion. This is the first record of this bird from the Grand Canyon National Park.

-- E. D. McKee --

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The two species of blue larkspur found on the South Rim of Grand Canyon are now in bloom. They are *Delphinium menziesii* and *Delphinium scaposum*. The former is the first to bloom. It occurs at somewhat higher elevations than does the latter, but sometimes both are found growing together. With the exception of the leaf characters the two species are quite similar. The flowers of *Delphinium menziesii*, however, are a darker color with a more purplish tint than the pure blue flowers of *Delphinium scaposum*. The flower stalk of *Delphinium scaposum* is practically free of leaves. Those which are present are basal, having broad segments which are rounded at the ends. In the case of *Delphinium menziesii*, on the other hand, a few leaves occur on the flower stalk as well as at its base. The leaf segments of this plant are narrow and pointed.



-- P. M. Patraw --

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An Abert Squirrel was seen carrying its young near Grand Canyon village May 13. A description of this will be found in the next issue of Grand Canyon Nature Notes.

-- R. A. Redburn --

Chuckwallas appeared to be especially numerous in the lower parts of Grand Canyon this May. During the week between the 10th and 17th from one to four of these large lizards was seen every day along various Canyon trails.

-- E. D. McKee --

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The life of an insect after it has reached the adult stage is often very short. Because collectors did not happen to be on hand just at the time when certain species were reaching the adult stage, they considered those insects to be rare. A typical instance is at hand. Last year a Hemiptera enthusiast, Robert Usinger, while collecting in the Grand Canyon region succeeded in obtaining two specimens of a small bug, *Eromocoris obscurus*. One was taken on the North Rim on June 17 and the other on the South Rim on June 24. This year, however, on the 13th of May a great number of these insects flew into the open parapet of the Yavapai Observation Station. A good series was collected at that time. Since the 15th not a single specimen has been observed.



True Bug
Family Sygacidae

-- C. C. Searl --

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The first Antelope kid of this year was found by trail-caretaker Lloyd Davis on May 15 above Indian Gardens. The little Antelope was already dead, and although there was a bruise on its head, Davis was unable to ascertain definitely the cause of its demise. He was led to it by the sorrowful mother. A few days later two other kids, apparently doing well, were seen. Davis suspects that there are now still others.

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In large crevices formed by joints in the Coconino Sandstone near the Bright Angel Trail many White throated Swifts have lately been noted to temporarily disappear from sight. It is believed that perhaps this is part of the explanation to the question of where these lightning-like birds, so common to Grand Canyon, nest.

-- E. D. McKee --

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Along the Hermit Rim Road, South Rim, the cliff rose (*Cowania stansburiana*) is now blooming in exceptional profusion where there is sunlight. In the shade, green buds only are seen. Many bushes are so covered with blossoms that the whole effect is that of a mass of plumes.



-- P. P. Patraw --