

tonto trail

TO THE CLIFFDWELLINGS

PRICE 15 CENTS
IF YOU TAKE THIS
BOOKLET HOME



TONTO NATIONAL MONUMENT
ARIZONA



Lower Ruins

Tonto National Monument is one of more than 185 areas administered by the National Park Service, U. S. Department of the Interior, including magnificent areas set aside for scenic, scientific, and historical values. They belong to you and are part of your American heritage.

The National Park Service is responsible for preserving the Parks and Monuments in a natural, unspoiled condition so that you and future generations may find enjoyment and inspiration in them. To achieve this high purpose, we must prohibit woodcutting, hunting, grazing, mining, and even flower picking. Please help protect Tonto National Monument by "taking only pictures and inspiration, and leaving only footprints and good will."

KEEP AMERICA BEAUTIFUL

TONTO TRAIL

The Lower Ruins Trail is one-half mile long, and rises 350 feet. It takes you to an outstanding cliffdwelling ruin, built in a natural cave by Indians about 600 years ago.

Along the trail and in the ruins are numbered stakes, indicating features of interest about the Indians or things they knew, and, in many cases, used. Similarly numbered paragraphs in this booklet tell you about them.

Remember, please stay on the trail. Shortcuts are hazardous for you and for others.

1. "MISTLETOE." * This dark green, partially parasitic plant is seen here growing in the branches of a light green paloverde tree. "Mistletoe" extracts water and soil salts from the host plant by means of root-like processes, then produces its own food from these materials through photosynthesis. Photosynthesis, one of the most important chemical processes in the world, enables plants, under sunlight, to unite water and carbon dioxide to form the sugar, glucose, and starch essential to plantlife. "Mistletoe" berries are a favorite food of some of the birds which visit this area.

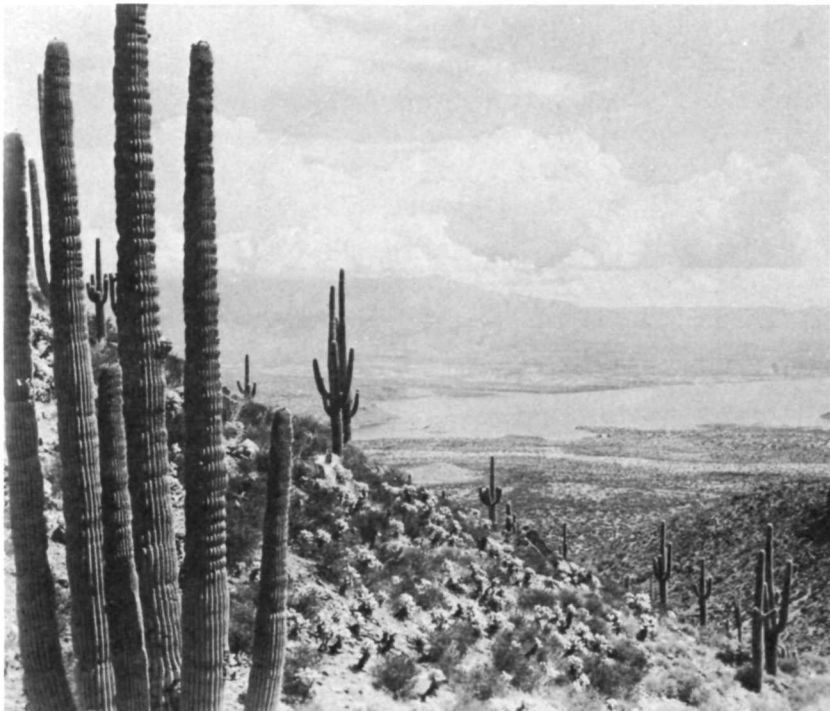
2. YELLOW PALOVERDE, "LITTLELEAF PALOVERDE." Paloverde is Spanish for "green stick." The bark contains enough green chlorophyll to carry on photosynthesis, which is done only by the leaves in most other plants. The tiny leaves appear after rains, and during much of the summer the tree is almost without them. The yellow flowers appear in this locality usually in late May. The beans mature during the summer, and were probably used for food by the Indians. The paloverde is the state tree of Arizona.

* For technical names of plants see last page.

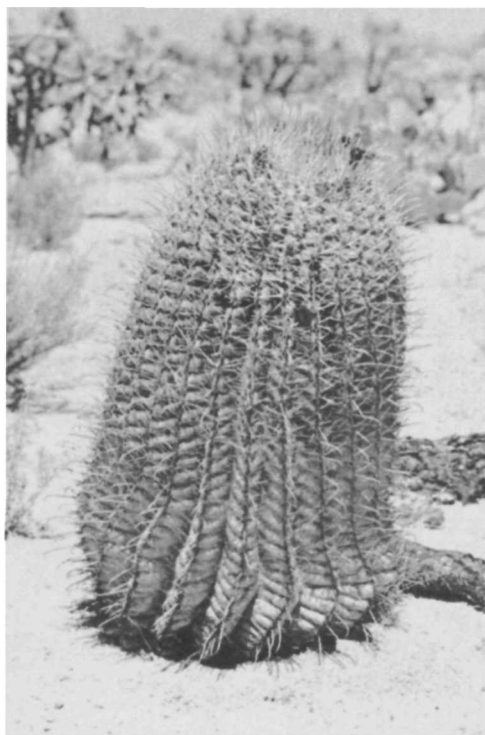
3. **CALCITE-COATED BOULDER.** This boulder is a piece of the cliff above you which broke away and rolled down here. The cliff was formed when this area was faulted, or "broken into sections," leaving blocks of rock with cracks between. The blocks later became cliff faces, and sometimes the cracks became canyons. The rocks, a formation of pre-Cambrian sedimentary rock called Dripping Springs Quartzite, are about one billion years old, and during that time have been subjected to great pressures from earth movements and from the weight of overlying geological formations. Seeping water laden with calcite in solution from the erosion of lime-bearing formations lying above the quartzite, deposited the calcite in cracks, coating and cementing the shattered areas.

The face of this boulder is coated with calcium carbonate. It was deposited in a deep crack, thus coating the vertical face of this block when the solution evaporated, before it fell from the cliff.

View of saguaros and Salt River Valley from trail



4. SOUTHWEST BARREL-CACTUS. Also called "compass cactus," because it leans slightly south toward the sunlight, this plant blooms in midsummer and in early autumn. Some people think that it is a good emergency water source. It actually does have a moist, pulpy interior. Under extreme conditions one might hack off the top of the plant and obtain some liquid by squeezing the chopped-up tissues. However, no desert plant should be relied on in this respect, as the amount of water contained in the plant varies with its size, and recency of rainfall.



Southwest barrel-cactus

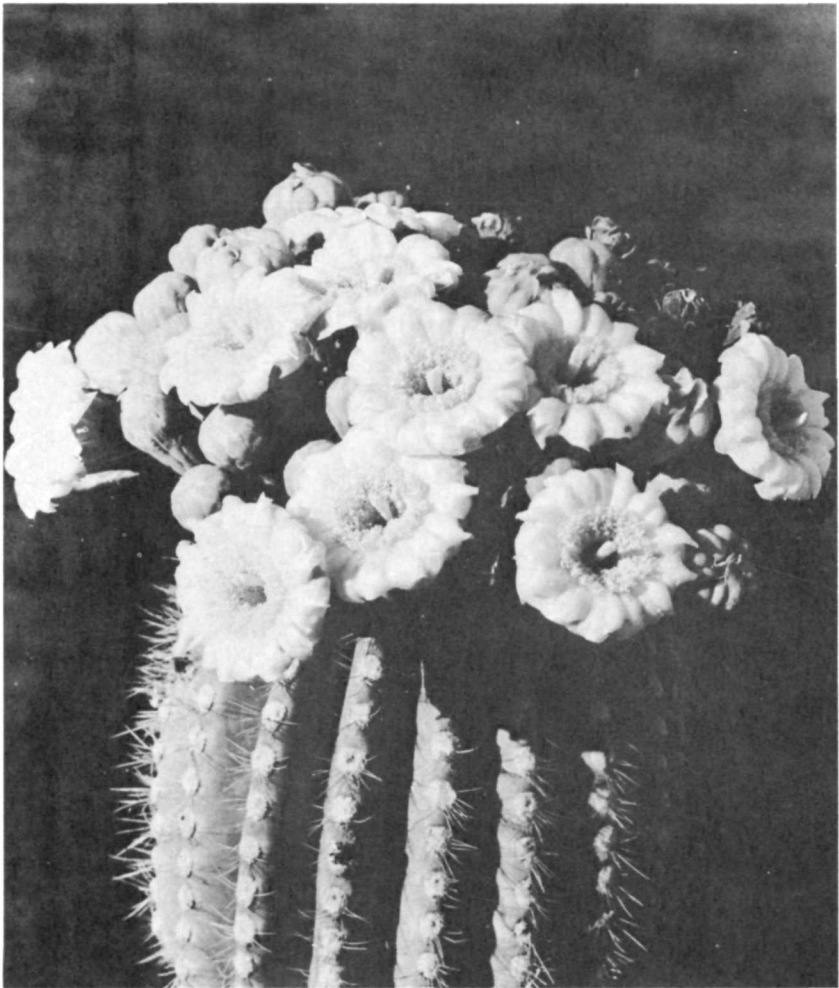
5. SAGUARO (sah-WAH-ro). These cactuses grow to a height of 50 feet or more, and are said to reach an age of 150 to 200 years. Large specimens will weigh several tons after a heavy rain. The root system, being quite shallow and widespread, is well adapted for rapid absorption of ground surface moisture. The trunk contains a pulpy material surrounded by a cylindrical structure of wooden ribs, and covered by a pleated skin. The pleats allow great expansion as the pulp swells during periods of considerable moisture and contracts during dry periods.

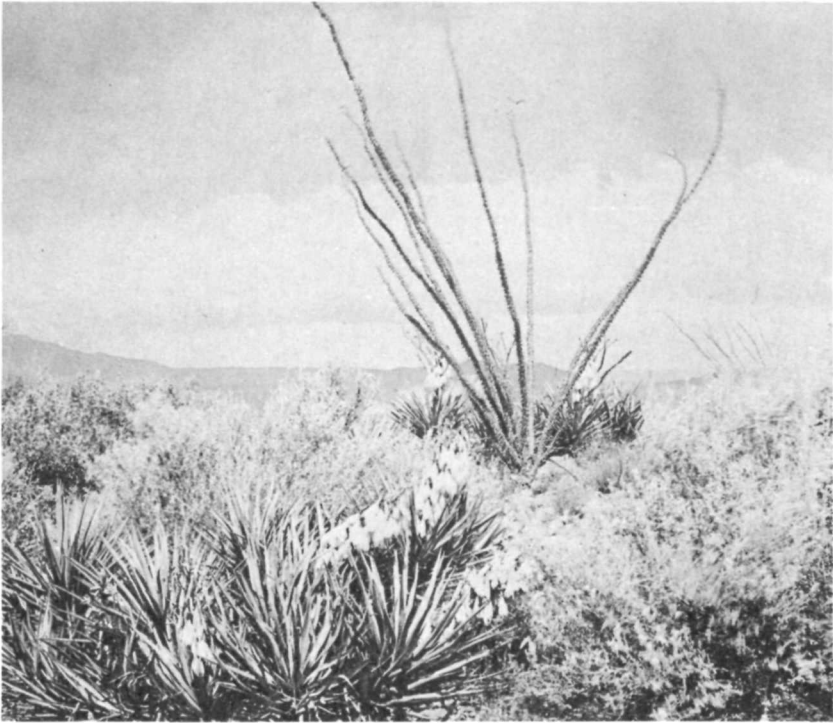
The waxy, white flower (the state flower of Arizona) blooms on top of the plant in May or June. The red meat of the fruit, maturing in June and July, is sometimes mis-

taken for a flower. The fruit is edible and is still harvested by Indians.

It is sometimes difficult for newcomers to the Southwest to distinguish a young saguaro from a mature barrel-cactus. The easiest way is to look at the spines. The saguaro has straight white spines which are almost invisible at a distance. Barrel-cactus, on the other hand, has long, red, hooked spines which appear as a thick mesh over the plant when seen from a distance.

Saguaro blossoms — Arizona's state flower





Yucca in bloom, and ocotillo

6. OCOTILLO (o-ko-TEE-yo). This thorny desert member of the candlewood family is called by many different names, including "coach whip" and "flaming sword." Visitors to the Southwest are often surprised to learn that many desert plants in addition to cactuses are armed with sharp spines or thorns. This plant puts out new leaves after every sufficient rainfall, except during winter. It usually blooms in April, producing bright, flame-red flowers at the tips of the branches.

7. PLANT EROSION. The small, green and orange-brown plants found clinging to the north side of this boulder are lichens, the "professional pioneers" of plant erosion. They represent a symbiotic combination of a fungus and an alga living together, to the mutual benefit of each.



Typical lichen growth on rock

The alga provides food-stuffs for both, manufactured by photosynthesis from water and soil salts provided by the fungus.

Lichens produce a weak acid which slowly eats away at the rock until some soil is formed. Then the mosses, a higher type of life, replace them. Moss is found in dark, fuzzy patches on

this boulder. As more soil is formed, the mosses are replaced in turn by grasses and annual flowers, shrubs, and trees. These larger and more complicated plants effect further breakdown of rocks by means of penetrating root systems, assisted by water and by freezing and thawing. This plant erosion is well illustrated on this boulder.

8. "CAVES." The recesses in the face of the skyline butte across the canyon are natural hollows. They are shallow, with steeply sloping bottoms, and there is little evidence that they were ever used by the Indians.

9. SAGUARO RIBS. The tough, wooden ribs of this large, dead saguaro are exposed. The Indians made considerable use of these items, using them for digging sticks, as reaching tools, and for other purposes. Saguaro ribs were also used in construction of the ceilings in the Lower Ruins.

10. CALIFORNIA JOJOBA (ho-HO-ba). This important browse plant is also called "coffeeberry" and "goat nut." The nuts are edible, and were used by Indians and early settlers. They contain an oil which is said to have some medicinal value.

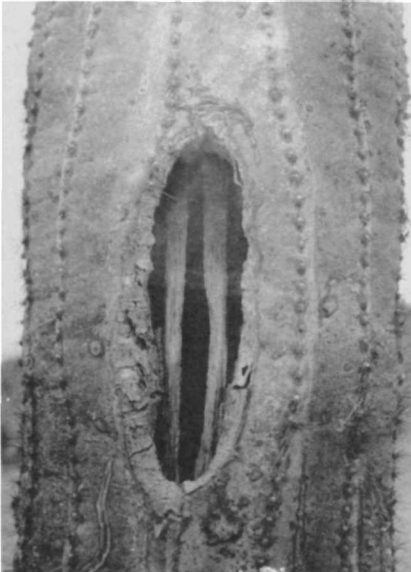
11. TEDDY BEAR CHOLLA (CHOY-ya). This cactus, one of many cholla species, is sometimes called "jumping cactus," because it will often stick to a victim after only the slightest contact. The joints break off easily, and the numerous spines penetrate deeply and are hard to remove. The plant reproduces both from seeds and from fallen joints. Woodrats protect their nests by surrounding them with these jointed sections. Some birds build nests in the living plant.



Teddy bear cholla

12. CEMENTED ROCK. This rock broke away from the cliff, as did the calcite-coated one at Stake No. 3. Here is a

Saguaro ribs as seen in old wound



superb example of how solid rock can be shattered by the combination of great pressures from weight and earth movements. The calcite cement holding these broken pieces together makes a pattern much like a jig-saw puzzle, since in many places the original position of each fragment with relation to its neighboring fragments may be seen.

In addition to the calcite you saw at Stake No. 3, you find here the white to yellow forms of the same

basic mineral, calcium carbonate. In desert country like this, where this chemical makes crusts within or on top of soil or rock, it is usually called *caliche* (kah-LEE-chee).

13. FORMATION OF THE CAVE. Important to creation of this natural cave were the faulted, shattered, and broken bands of sandstone, overlying thin layers of "mudstone" or soft rock which would absorb water and under favorable conditions be dissolved and removed. This is the only section of cliff in this vicinity in which such "mudstone" is exposed. Some of it is to be seen just below the cave front.

As moisture seeped down through the rock from above, through cracks and weak places, and as rain water ran down the cliff face, erosion of the slope at the base eventually weakened and removed some of the soft "mudstone" deposits, thus removing support from under some of the sandstone layer. As a result, a large block broke out and slid

Erosion slowly continues eating away the cliff face, and the talus slope under the Lower Ruins.



forward, followed later by several others. Some of these blocks are still visible on the slope below, and so is a large section of tumbled cliff, farther up the arroyo.

Removal of these large blocks of stone left a cave which continued subject to erosion from variations in temperatures and moisture, resulting in exfoliation, or sloughing off. The cave would naturally have appealed to humans as a shelter. It is not certain how long ago people first occupied it, but from the fact that the present clay walls appear to be built against smoke-blackened rock surfaces, it is quite possible that the builders of the Lower Ruins weren't necessarily the first Indians to live here.

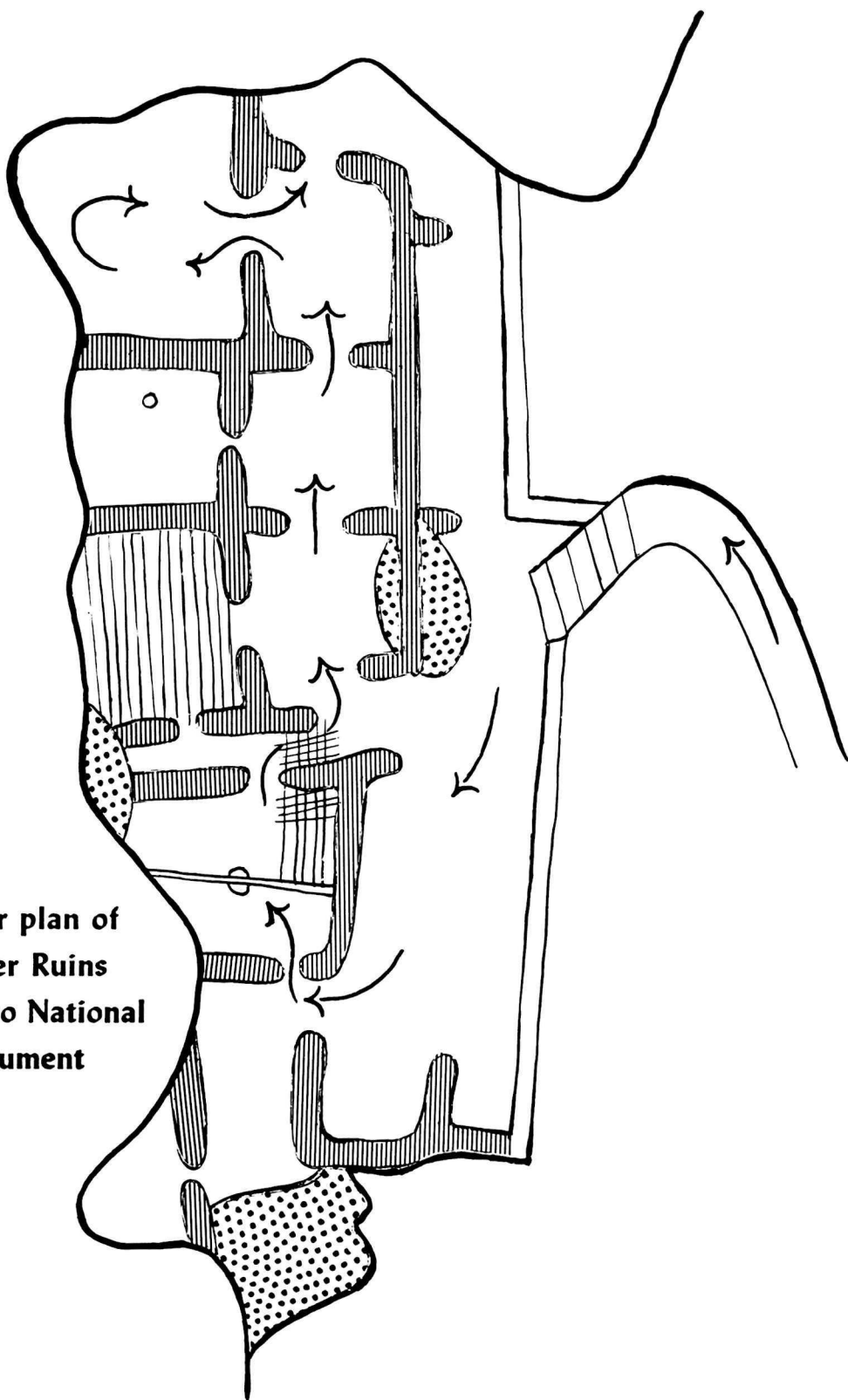
14. LIMONITE. Geologists use the word *limonite* to cover the several hydrous oxides of iron produced by oxidation during weathering. Here it is revealed by rocks tinted in varying shades from dark brown to pale yellow-orange. The reddish colors, also iron oxide, are called *hematite*. Some limonite-colored rocks were probably ground up by the Indians to obtain paint pigments.

15. INDIAN ENTRANCE. Above you is a V-shaped notch, which probably served as a point against which an entry ladder rested. When the Indians wanted to lock the door, they simply drew up the ladder.

LOWER RUIN

From some unknown date before A. D. 900, and for at least 500 years afterward, people living in this area developed and expanded what archeologists call Salado (sah-LA-do) culture. Salado (Spanish for "salty") refers to the Salt River of this region. No one is yet certain which historic Indians are descendents of these prehistoric ones, so for the present, the name Salado is used to mean both the people and their culture.

At one time many Indians lived near and in the valley now covered by Theodore Roosevelt Lake. There are



**Floor plan of
Lower Ruins
Tonto National
Monument**

remains of irrigation ditches and several towns, some of several acres extent. The people lived a sedentary life (that is, in permanent homes), making various objects from materials at hand, some of which have been preserved to tell their story. It appears that sometime around A. D. 1300 living conditions worsened, conflicts occurred, and some of the Indians apparently moved to more protected sites for building homes, such as on ridges and in caves.

Before you are the remains of some houses built by the Salado people. The cave has protected most of the architectural features from the effects of wind and water. It is possible, therefore, to see much of this dwelling nearly as it looked when the Salado left it. As with any abandoned home, the rooms no longer contain the many material objects which were part of the owners' ways of life. Some objects recovered from these dwellings are now on display in the Visitor Center.

Even at a glance you can see that the walls are of crude masonry. Though the construction involved considerable work, most of the building materials were close at hand.

Interior view, looking to northwest from south end of Lower Ruins



Rocks, clay, and water were the items used in the walls. Some blocks of stone could have been picked up from the fallen debris on the cave floor, others might have been quarried from the cave walls, the remainder could have been secured from the talus slope in front and below. Clay was (and is) abundant at the base of the cliff, where one or more springs may have been.

16. FRONT ROW OF ROOMS. Rising above the stake are remains of a row of rooms, two stories high at this end, which once closed in the front of the cave. Three beams indicate the location of the first floor ceiling, and two beam holes several feet higher indicate the second floor ceiling. Notice that the walls continue upward beyond the second floor roof. These parapets served as protection for an open-air work area, which was much better lighted and ventilated than the dwelling's interior. Such roof workspace is commonly found in both ancient and modern pueblos.

There is an observation hole in the second floor wall, facing toward the entry ladder mentioned at Stake No. 15. This feature reminds one that this was a fortified home, built during troubled times. Just who these villagers may have feared is not known, however they may well have been former friends and neighbors.

17. STORAGE ROOM. You are now standing in the original entryway of the dwelling, near the top of the ladder mentioned at Stake No. 15. In front of you is a small room with a curved, unroofed wall. It appears very cramped for living quarters and may well have served for storage of corn, beans, and squash grown by the Salado.

The entrance is what archeologists call a half or semi-"T" doorway, easy to cover in storerooms. The small size is not an indication of a small people, but in dwellings and workrooms was a protection from drafts, besides making them easier to defend. Many such entryways were used in this cliff house, but some have since been destroyed.

Behind you is a doorway in the wall which was blocked up by the Indians in favor of another entrance. Doors were

built at the time the wall was raised, by insertion of wooden lintels, of which there are two types in use in this building. The first is of several poles set in the wall and across the doorway, and the second is made with a hand-hewn plank. The plank type was stronger, but required much more time and work to prepare.

18. PARTIAL ROOF.

In the corner of this room is part of the original roof. Such a roof was supported by a main crossbeam, resting at or near center on a post which stood in a hole dug in the floor. The main beam was crossed by a number of smaller ones, which in turn were covered by a mat of sa-



Notice part of original roof over the room on right side

guaro ribs. A thick layer of clay over the mat provided a fireproof floor for the room above. If a second story roof was built, the construction was similar.

You may not be impressed by the size of this and other rooms, but they are larger than many found in other prehistoric ruins of the Southwest. There often seems a definite relation between size of a room and length of available roofing timbers. Here you see a big room, containing long juniper beams of a size which does not grow within many miles of here today. Yet junipers of considerable dimensions must have grown nearby when these rooms were roofed, otherwise the builders would have provided narrow ceiling spans for shorter timbers.

A few scattered one-seed junipers, some dead and some alive, are still visible from these ruins. They are poor examples of the species which provided this fine timber before

you, and may reflect onset of a drier and warmer climate.

Other species of trees, including Arizona sycamore, Arizona walnut, and pinyon, were used by the Salado in house building. Of these, only the pinyon is not found growing here today.

19. HALLWAY. Hallways are not common in Southwestern Indian dwellings. The one in which you are standing seems to be an accidental feature, resulting from two different periods of construction.

Please look through the doorway near the stake to see the next interest point.

Don't be a litterbug! Use the trash can at the parking area.

20. DARK ROOM. Since the ceiling in this room is still nearly intact, it is easy to visualize how dark the lower rooms were. Such rooms were probably used only for sleeping, and some storage. The stone-lined hatchway in the corner of the ceiling allowed the family to go to the room above by means of a ladder, and let smoke escape through higher levels. The stone lining was the Salado answer to human erosion, for a clay lining would have worn away.

21. BABY BURIAL. During excavation of the floors this very young, probably premature, baby skeleton was found here. Degree of bone development reveals the approximate age. The burial was partially covered with a cotton cloth. Only a few children were buried in the dwellings, and very few adult burials have been recovered in this vicinity.

Please do not climb on walls.

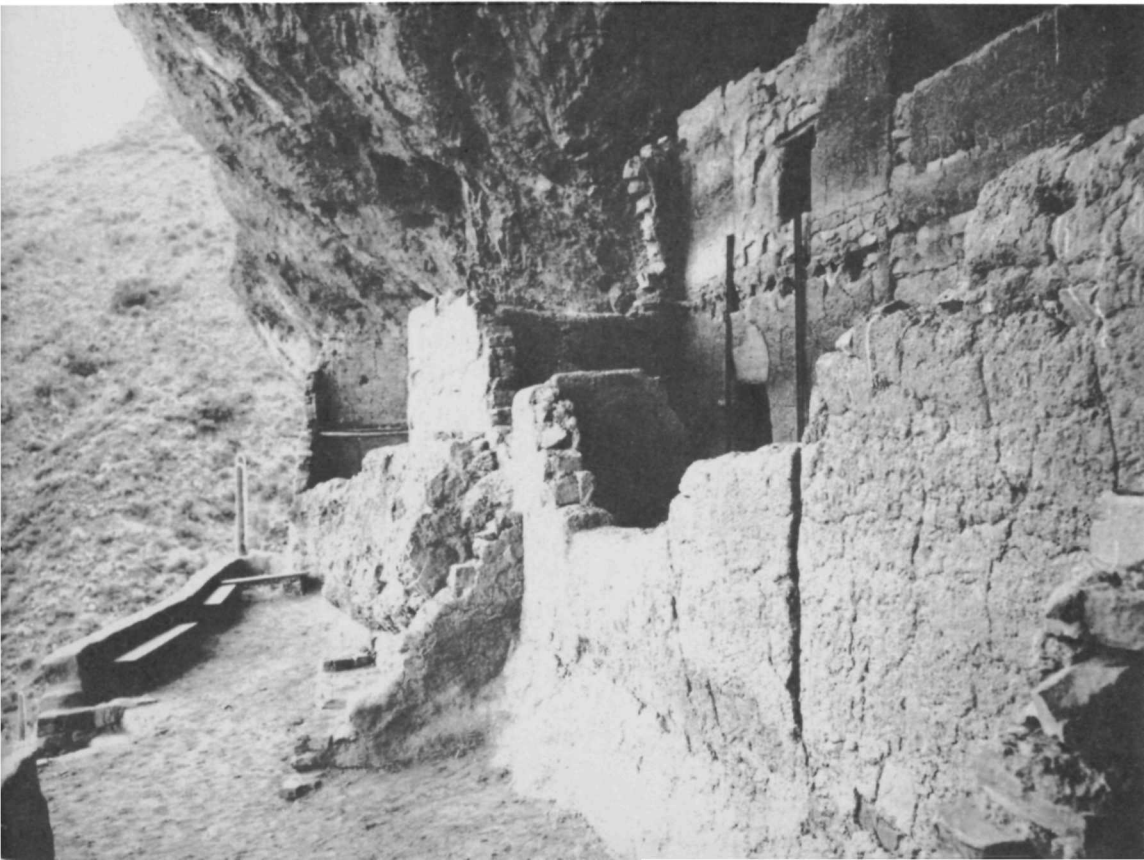
22. STONE MEAL GRINDER. This metate (meh-TAH-tay) was worn to its present depth in grinding of corn, mesquite (mes-KEET) beans, and probably other foods. The stone used for grinding is called a mano (MAH-no), meaning "hand" in Spanish.

The best way to see the room back of this one is to go on into the next room and around into the large open room to your left in the cave rear.

23. LARGE OPEN ROOM. This room did not support a man-made roof like the others. Since it had better light and ventilation than most other interior rooms, it may have been used as a workroom and kitchen. It would also have been a good meeting room, though no definite evidence of ceremonial use has been found. There is a different sort of grinder, called a mortar, cut into the bench-like formation in the rear.

Please look over the low wall, into the next room, for Stake No. 24.

24. ORIGINAL FLOOR. The floor of this room is made with clay which was carried in and packed down by the Indians. Notice the round firepit or fireplace, near the
Interior view, looking to south from north end of Lower Ruins



center of the floor, in which the Salado had their small cooking and heating fires. Probably many rooms formerly had such firepits, but the floors of the others have all been dug up so completely that this is the only original floor with a firepit left in the Pueblo. To protect what remains of this prehistoric floor, we ask that no one enter this room, as it may be seen quite well without entering.

25. WATER. Many of our visitors ask, "Where did the Indians get their water?" There are a number of indications, such as these limey potholes, that seepage through the rock formation in which the cave is situated was one of the water sources used by the Salado. There were probably seeps and springs in the canyon below the ruins as well. The present day water supply for Tonto National Monument lies up Cholla Canyon a short distance above the Visitor Center.

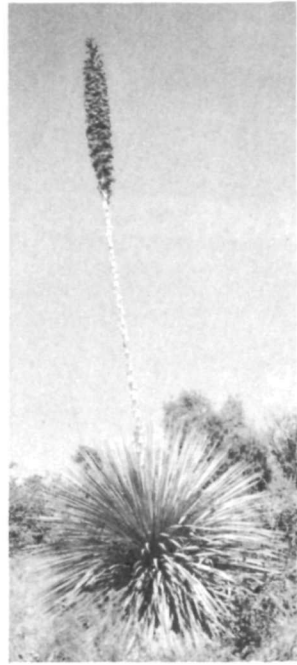
*Let No One Say
And Say It To Your Shame!
That All Was Cleanliness Here
Until You Came.*

WHAT HAPPENED TO THE INDIANS?

The Salado lived in this fortified home for an undetermined number of years and then abandoned it. Unsettled conditions appear to have continued for so long that it was no longer possible for them to carry on their accustomed way of life. Many archeologists think that the Salado moved from the Roosevelt Basin, and some are busy trying to trace their movements, but a great deal of excavation and study remains to be done. It is possible that not all the Salado left the area. Some of them may have continued to live in the region as semi-nomadic gatherers. People who depend on gathering wild plant foods for their principal means

of existence do not have time to build permanent houses and to make the many objects and utensils which characterize sedentary farmers. It is more difficult, therefore, for archeologists to find trace of them. In any case, although we don't know what happened to the people, the Salado culture in its highly developed form at least, disappeared from the Roosevelt Basin at some date probably subsequent to A. D. 1400.

This completes your visit to the Tonto Lower Ruins. You may wish to return directly to the parking lot by the main trail. If you wish to see a number of interesting plants, not found on this slope, take the turn-off at the sign "Cactus Patch."



Wheeler sotol

CACTUS PATCH TRAIL

1. **WHEELER SOTOL.** This plant served the Indians as a source of fiber which they used in manufacture of coarse ropes, mats, and sandals. Its young flower stalks, roasted, are edible, and a potent beverage may be made from the roasted heart. The sotol has forward curved spines along its leaf edges, and is easily distinguished from yucca and agave by its lack of a spine at the leaf tip.

2. **ENGELMANN PRICKLYPEAR.** Most of the numerous pricklypear cactus species have an edible fruit, and in all probability the fruit of this kind was eaten by the Indians here. The flat pads of some species are still eaten by some groups of Indians.

You will notice that a saguaro is growing in the midst of the pricklypear. Young saguaros need protection from the heat of the sun until such time as they develop a skin

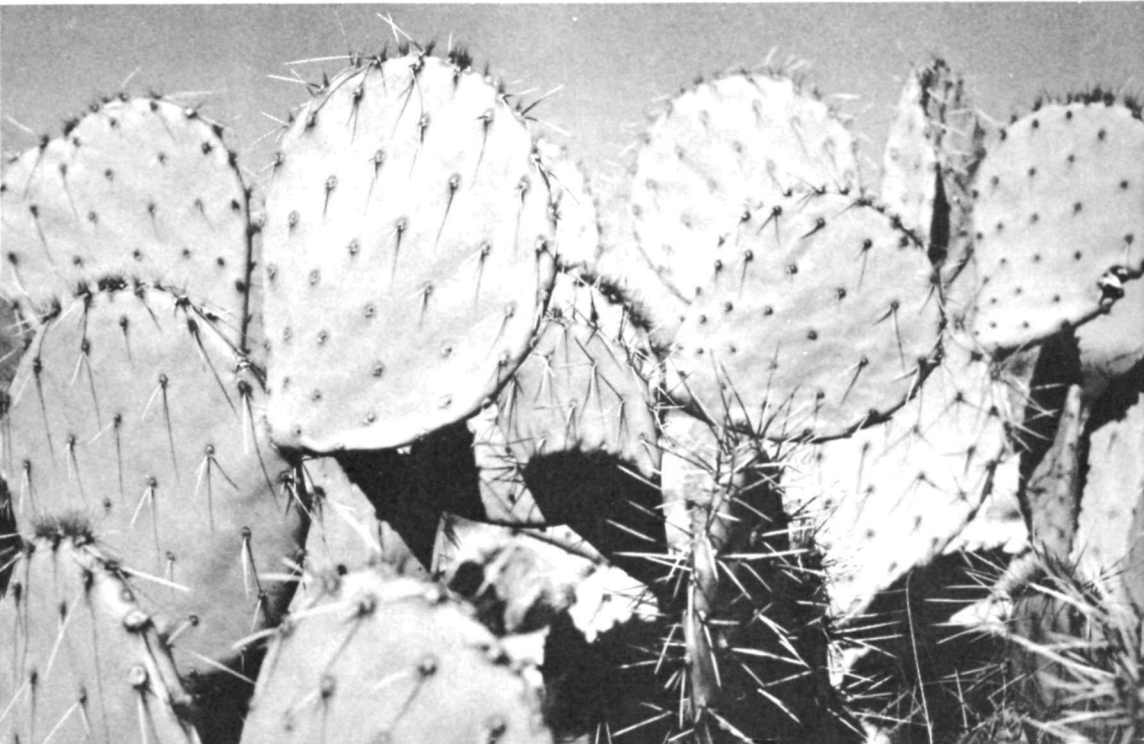
tough enough to protect themselves. Therefore, they begin life hidden by other larger plants.

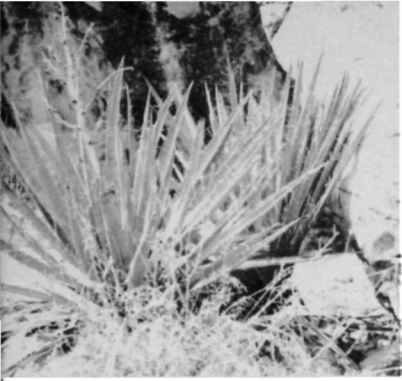
3. DATIL YUCCA. *Yucca* served the Indians in many ways. The leaf fibers provided strong thread for use in bowstrings, mats, rope, and sandals. Buds, flowers, and stalks were eaten raw or boiled. The large, pulpy fruits could be eaten raw or roasted, dried for winter use, or ground into meal. The roots can be used as a soap or laxative, as they contain saponin. Leaf margins of this species eventually separate into fine, white fibers.

4. FLATTOP ERIOGONUM, "BUCKWHEAT." Not a sage or sagebrush. Much of the year this plant remains in a dry and dormant state, and considerable rainfall is required before it will produce its pinkish flowers in abundance.

5. TESAJO, "CHRISTMAS CACTUS." Tiny fruits, tomato red when ripe during late November and December give this little cholla its name.

Engelmann pricklypear





Datil yucca



Sonora jumping cholla [flower and fruits

6. SONORA JUMPING CHOLLA, CHAIN-FRUIT CHOLLA." Not to be confused with the smaller and spicier teddy bear cholla, also often called "jumping cactus," this cholla derives its name from the chains of fruit hanging from it. New flowers and fruit appear on still-attached fruit of the previous year, thus forming a chain of fruit.

7. ECHINOCEREUS, "HEDGEHOG CACTUS." These "pickle-shaped" cactuses produce a thin-fleshed, juicy, edible fruit which, in some species, tastes much like a strawberry, hence the name "strawberry cactus" for some kinds. The

Fendler echinocereus





Palmer agave

fruit probably furnished the Salado Indians with a seasonal diet variation.

8. PALMER AGAVE, "CENTURY PLANT." Agaves (ah-GAH-vez) were a good source of fiber for the Indians, and by removing the spines at the leaf ends, with the attached fibers, they had their needles already threaded. The roasted base of the plant could be eaten or made into a drink. The food and drink are both known as "mescal," and this name has been applied by some people to the plant as well. Most of our agaves are distinguished by broad spine-edged leaves which terminate in a long spine at the tip.

9. BUCKHORN CHOLLA, "CANE CHOLLA." This cholla bears yellow flowers in this locality, but the same species alters to red or variegated flower colors elsewhere. Present day Pima Indians use the flower buds for food. The food product is prepared by a steaming process.

10. MESQUITE (mes-KEET). When cultivated crops failed during periods of drought, mesquite beans were undoubtedly an important part of the Salado diet. Pinole, a meal made from the pods, when prepared in the form of cakes was a staple Indian food. Fermented pinole was a favorite intoxicating drink with some groups. The gum which exudes from the bark could be used to make candy, to mend pottery, and as a black dye. The inner bark furnished material for basketry and coarse fabrics, as well as for medicine.

If you have any questions "Ask a Ranger."

To insure the preservation of this area for your pleasure and inspiration thoughtful visitors have refrained from picking flowers, molesting wildlife, and collecting specimens of any kind. Those who come after you will appreciate *your* consideration.

TECHNICAL NAMES OF PLANTS LISTED IN THIS LEAFLET

Agave, Palmer	<i>Agave palmeri</i>
Barrel-cactus, Southwest	<i>Ferocactus wislizenii</i>
Cholla, buckhorn	<i>Opuntia acanthocarpa</i>
Cholla, Sonora jumping	<i>Opuntia fulgida</i>
Cholla, teddy bear	<i>Opuntia bigelovii</i>
Echinocereus, Fendler	<i>Echinocereus fendleri</i>
Eriogonum, flattop	<i>Eriogonum fasciculatum</i>
Joboba, California	<i>Simmondsia chinensis</i>
Juniper, one-seed	<i>Juniperus monosperma</i>
Mesquite	<i>Prosopis juliflora</i>
"Mistletoe"	<i>Phoradendron californicum</i>
Ocotillo	<i>Fouquieria splendens</i>
Paloverde, yellow	<i>Cercidium microphyllum</i>
Pinyon	<i>Pinus edulis</i>
Pricklypear, Engelman	<i>Opuntia engelmannii</i>
Saguaro	<i>Cereus giganteus</i>
Sotol, Wheeler	<i>Dasyliirion wheeleri</i>
Sycamore, Arizona	<i>Platanus wrightii</i>
Tesajo	<i>Opuntia leptocaulis</i>
Walnut, Arizona	<i>Juglans major</i>
Yucca, datil	<i>Yucca baccata</i>

WHAT IS MISSION 66?

MISSION 66 is a 10-year development program, now in progress, to enable the National Park Service to help you to enjoy and to understand the Parks and Monuments, and at the same time, to preserve their scenic and scientific values for your children and for future generations.

CONSERVATION — YOU CAN HELP.

If you are interested in the work of the National Park Service and in the cause of conservation in general, you can give active expression of this interest, and lend support by alining yourself with one of the numerous conservation organizations which act as spokesmen for those who wish our scenic heritage to be kept unimpaired for the enjoyment of future generations.

Names and addresses of conservation organizations may be obtained from the ranger.

This booklet is published in cooperation with the National Park Service
by the

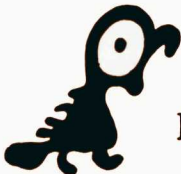
SOUTHWESTERN MONUMENTS ASSOCIATION

*which is a non-profit distributing organization pledged to aid in the
preservation and interpretation of Southwestern features
of outstanding national interest.*

The Association lists for sale many interesting and excellent publications for adults and children and hundreds of color slides on Southwestern subjects. These make fine gifts for birthdays, parties, and special occasions, and many prove to be of value to children in their school work and hobbies.

May we recommend, for example, the following items which give additional information on the Southwest?

- ***45. **FLOWERS OF THE SOUTHWEST DESERTS.** Dodge and Janish. More than 140 of the most interesting and common desert plants beautifully drawn in 100 plates, with descriptive text. 112 pp., color cover, paper. **\$1.00**
- ***60. **FLOWERS OF THE SOUTHWEST MESA.** Patraw and Janish. Companion volume to the Desert flowers booklet, but covering the plants of the plateau country of the Southwest. 112 pp., color cover, paper. **\$1.00**
- ***61. **FLOWERS OF THE SOUTHWEST MOUNTAINS.** Arnberger and Janish. Descriptions and illustrations of plants and trees of the southern Rocky Mountains and other Southwestern ranges above 7,000 feet elevation. 112pp., color cover, paper. **\$1.00**
- ***63. **POISONOUS DWELLERS OF THE DESERT.** Dodge. Invaluable handbook for any person living in the desert. Tells the facts about dangerous insects, snakes, etc., giving treatment for bites and stings and dispels myths about harmless creatures mistakenly believed poisonous. 48 pp. **\$0.60**
- ***67. **MAMMALS OF THE SOUTHWEST DESERTS** (formerly Animals of the Southwest Deserts). Olin and Cannon. Handsome illustrations, full descriptions, and life habits of the 42 most interesting and common mammals, members of the strange animal population of the lower desert country of the Southwest below the 4,500-foot elevation. 112 pp., 60 illustrations, color cover, paper. **\$1.00**
- ***68. **MAMMALS OF SOUTHWEST MOUNTAINS AND MESAS.** Olin and Bierly. Companion volume to Mammals of Southwest Deserts. Fully illustrated in exquisitely done line and scratchboard drawings, and written in Olin's masterfully lucid style. Gives descriptions, ranges, and life habits of the better known southwestern mammals of the uplands. To be published in April, 1961. Color cover, paper. **\$2.00**
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