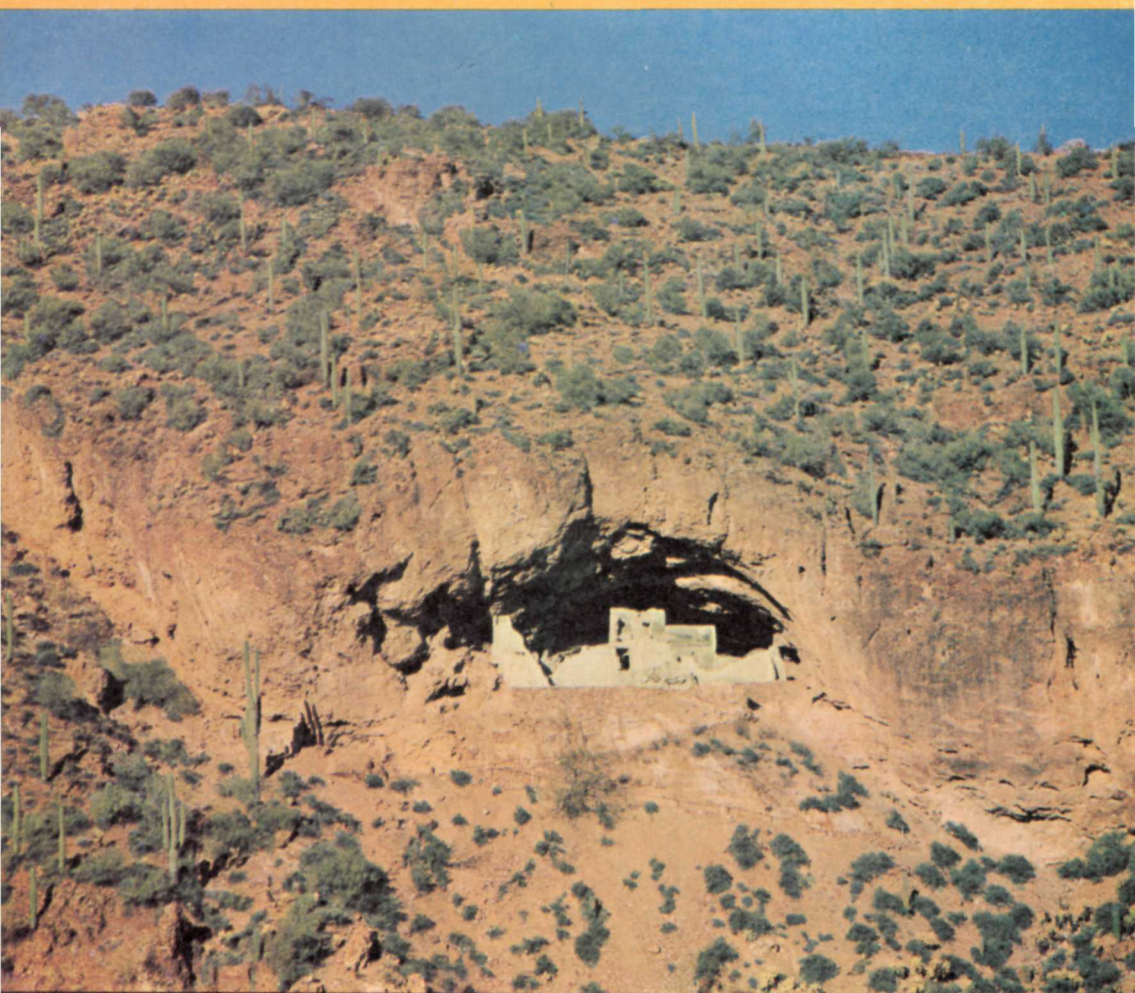


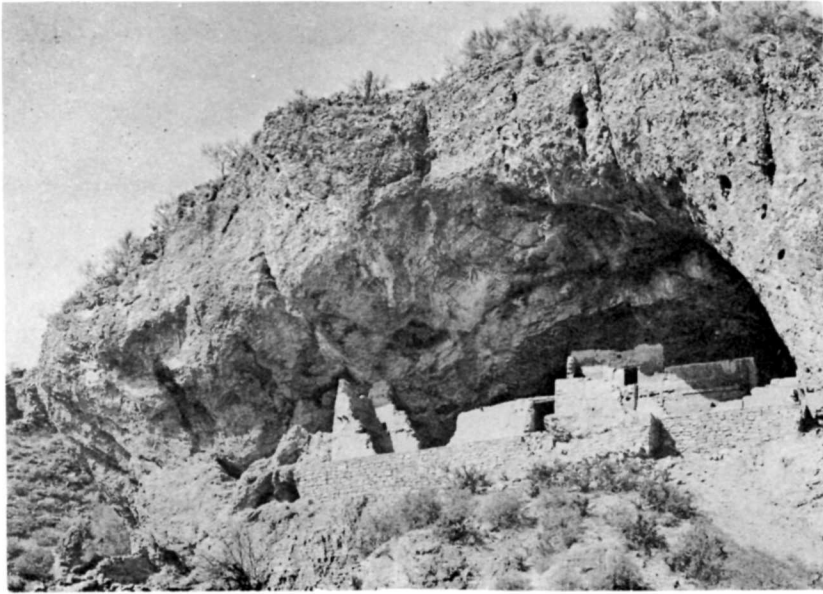
15 CENTS IF YOU TAKE THIS BOOKLET HOME

tonto trail

TO THE CLIFFDWELLINGS



TONTO NATIONAL MONUMENT
ARIZONA



Lower Ruins

Tonto National Monument is one of more than 200 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."

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.

1. 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

* For technical names of plants see last page.

Fendler echinocereus



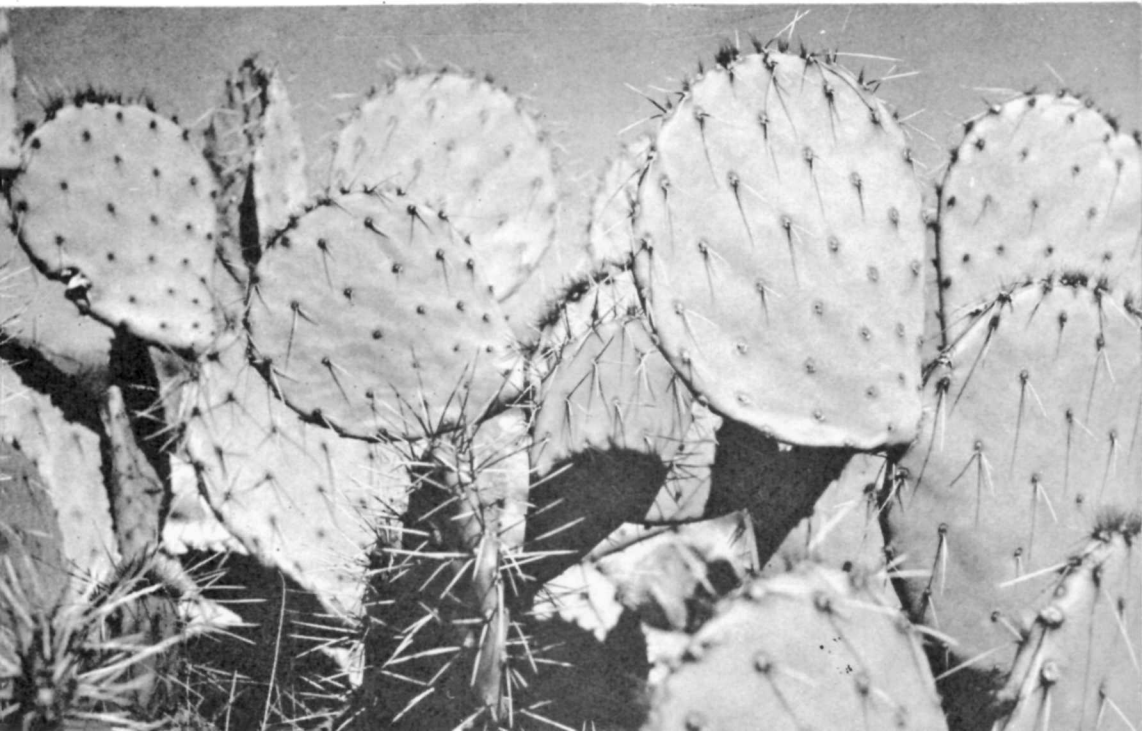
fruit probably furnished the Salado Indians with a seasonal diet variation.

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. SOUTHWEST BARRELCACTUS. 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

Engelmann pricklypear



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 barrelcactus

4. 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.

5. SONORA JUMPING CHOLLA, "CHAIN-FRUIT CHOLLA." Not to be confused with the smaller and spinier 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.

6. 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.

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

8. 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.

9. 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.

10. CALCITE-COATED BOULDER. This boulder is a piece of the cliff above you which broke away and rolled down here.

Datil yucca

Sonora jumping cholla flower and fruits



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.

11. **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.

12. **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

Wheeler sotol

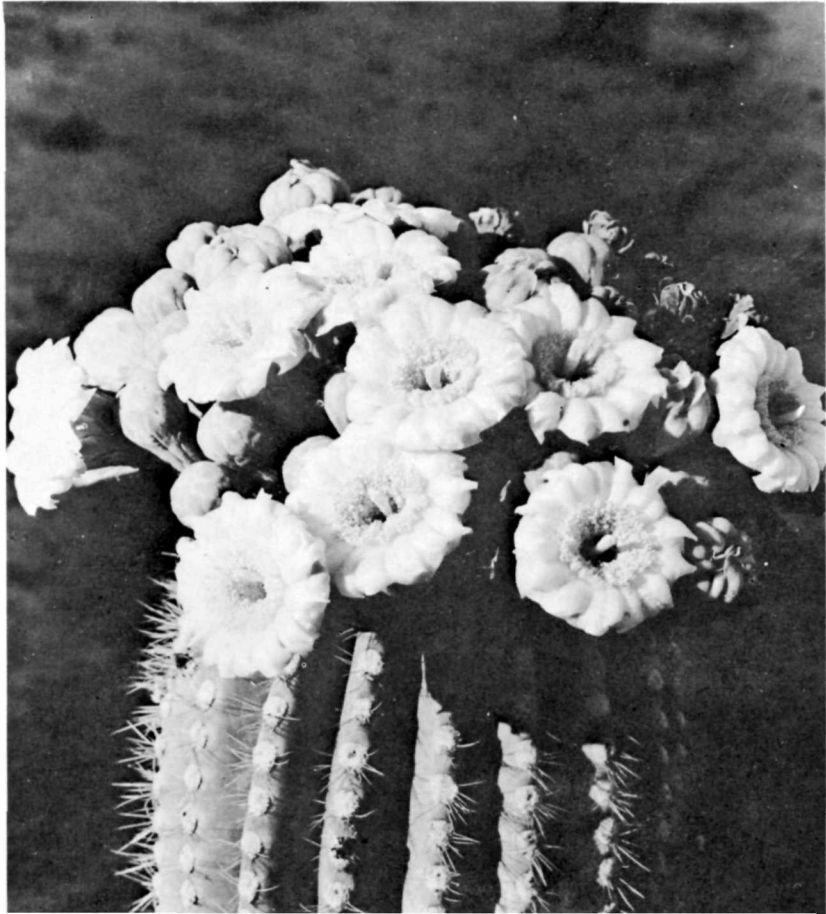


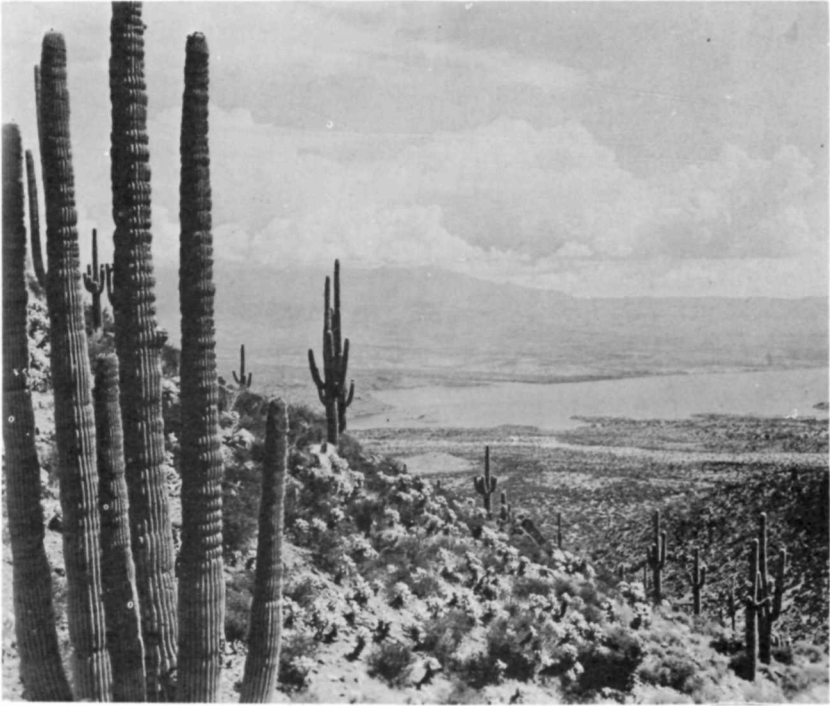
moisture. The trunk contains a pulpy material surrounded by a cylindrical structure of wooden ribs, and covered by a pleated skin. The pleats allow great expansion as the pulp swells during periods of considerable moisture and contracts during dry periods.

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 mistaken 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, hook-

Saguaro blossoms — Arizona's state flower





View of saguaros and Roosevelt Basin from trail

ed spines which appear as a thick mesh over the plant when seen from a distance.

13. 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.

14. 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



Yucca in bloom, and ocotillo

alga living together, to the mutual benefit of each.

The alga provides foodstuffs 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.

15. 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.

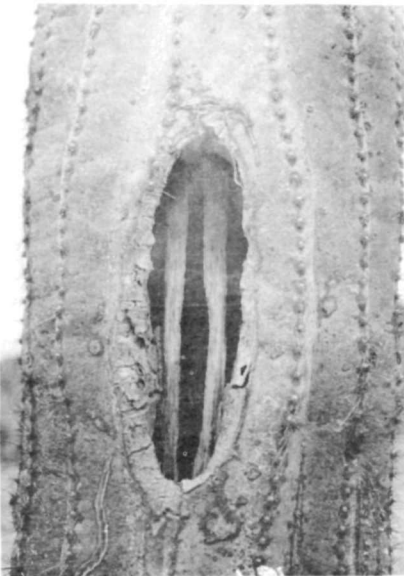
16. "CAVES." The recesses in the face of the skyline butte across the canyon are natural hollows. They are shallow, with steeply sloping bottoms, and there is little evidence that they were ever used by the Indians.



Typical lichen growth on rock

17. 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 other purposes. Saguaro ribs were also used in construction of the ceilings in the Lower Ruins.

Saguaro ribs as seen in old wound



18. 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.

19. 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

20. CEMENTED ROCK.

This rock broke away from the cliff, as did the calcite-coated one at Stake No. 10. Here is a 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. 10, 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).

21. 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 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

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



that the builders of the Lower Ruins weren't necessarily the first Indians to live here.

22. 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.

23. 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 RUINS

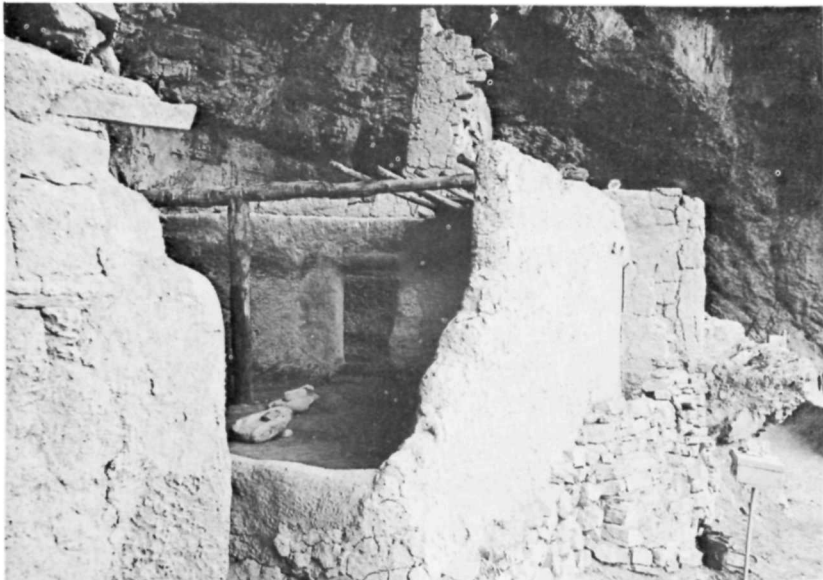
From some unknown date before A. D. 900, and for at least 500 years afterward, people living in this area developed and expanded what archeologists call Salado (sah-LA-do) culture. Salado (Spanish for "salty") refers to the Salt River of this region. No one is yet certain which historic Indians are descendants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

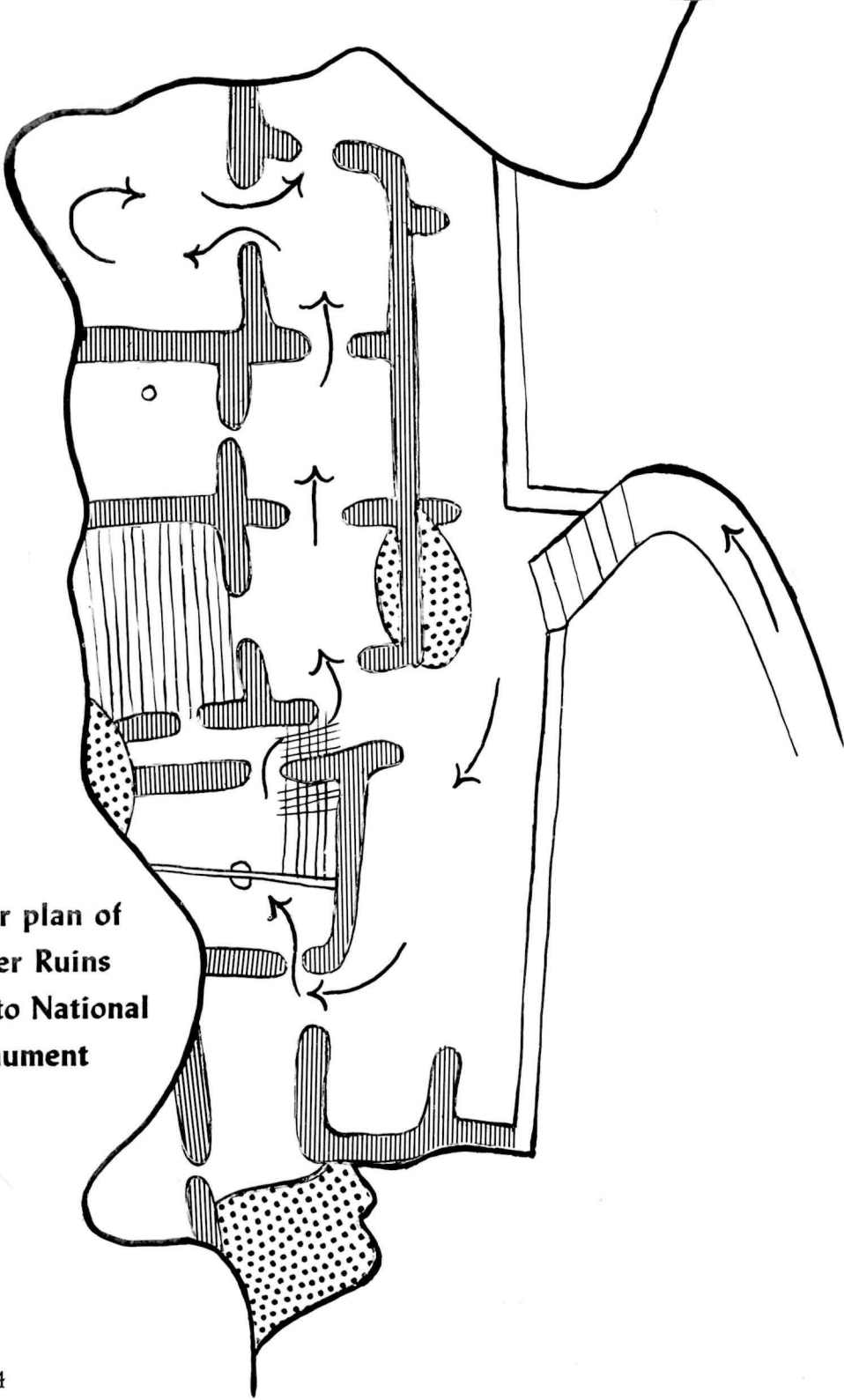
Before you are the remains of some houses built by the Salado people. The cave has protected most of the architectural features from the effects of wind and water. It is possible, therefore, to see much of this dwelling nearly as it looked when the Salado left it. As with any abandoned home, the rooms 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. 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.

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



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



24. 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. 23. 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.

25. STORAGE ROOM. You are now standing in the original entryway of the dwelling, near the top of the ladder mentioned at Stake No. 23. 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.

26. 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 saguaro ribs. A thick layer of clay over the mat provided a fire-proof floor for the room above. If a second story roof was built, construction was similar.



Notice part of original roof over the room on right side

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.

27. 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 point of interest.

28. 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.

29. 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.

30. 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.

31. 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 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



Interior view, looking to south [from north end of Lower Ruins

may be seen quite well without entering.

32. **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.

33. **WATER.** Many of our visitors ask, "Where did the Indians get their water?" There are a number of indications, such as these limy 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 ruin as well. The

present day water supply for Tonto National Monument is in Cave Canyon a short distance below the Visitor Center.

Another very frequent question is "How many people lived here?" This ruin had 19 rooms originally, and the archeologists figure 3 or 4 persons to the room. There are some rooms that were used for storage and work rooms, which lessens the number that were habitable. At the population peak probably 50 to 60 people lived here.

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 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.

TECHNICAL NAMES OF PLANTS LISTED IN THIS LEAFLET

Agave, Palmer	<i>Agave palmeri</i>
Barrelcactus, 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>
Jojoba, California	<i>Simmondsia chinensis</i>
Juniper, one-seed	<i>Juniperus monosperma</i>
Mesquite	<i>Prosopis juliflora</i>
Ocotillo	<i>Fouquieria splendens</i>
Paloverde, yellow	<i>Cercidium microphyllum</i>
Pinyon	<i>Pinus edulis</i>
Pricklypear, Engelmann	<i>Opuntia engelmannii</i>
Saguaro	<i>Cereus giganteus</i>
Sotol, Wheeler	<i>Dasylirion 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>

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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.

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Wupatki National Monument, near Flagstaff
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