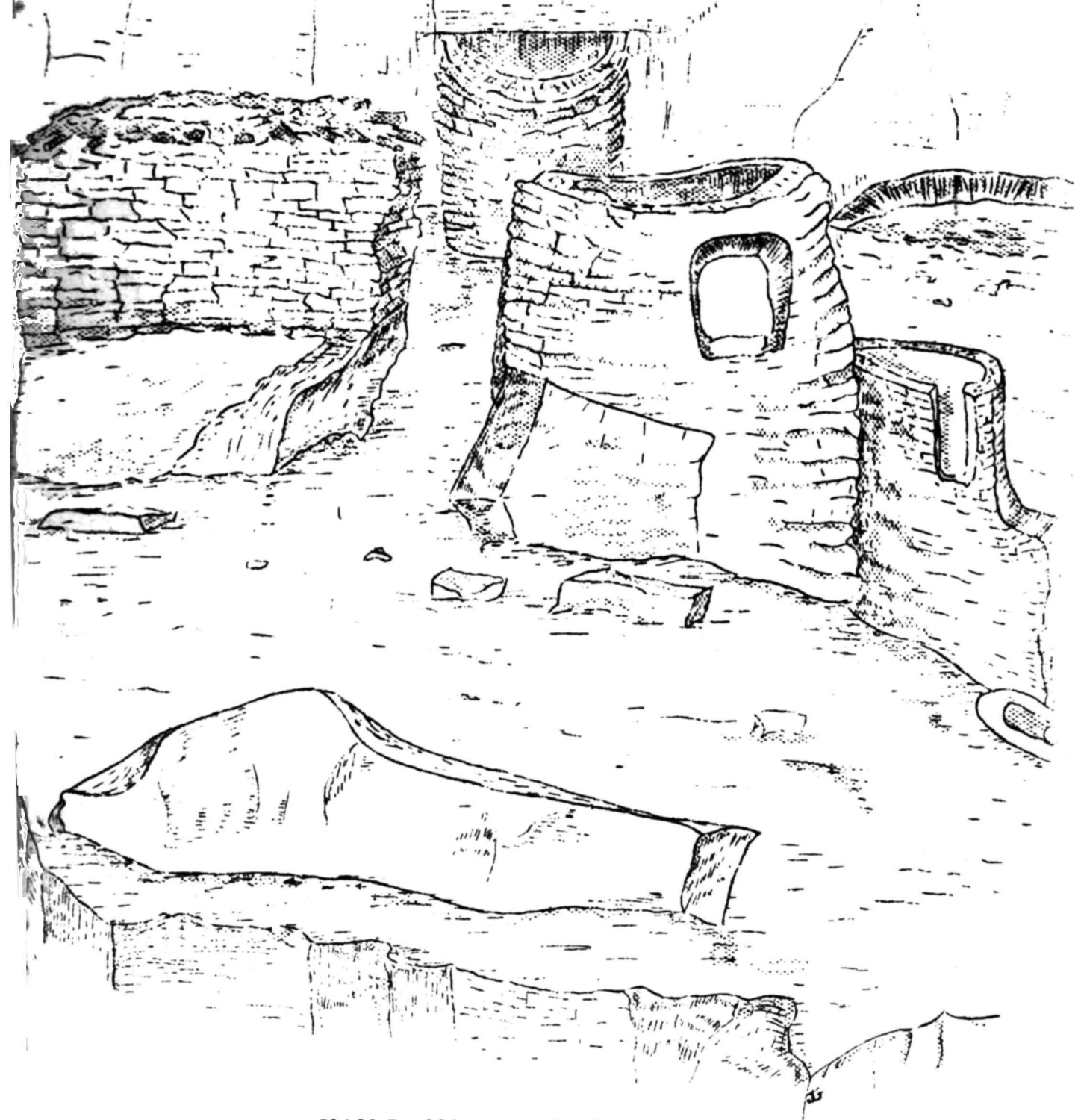


ZION-BRYCE.

NATURE ~ NOTES.

Vol. IV
No. 2



Cliff Dwellings on the Parunuweap

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This Bulletin is issued monthly for the purpose of giving information to those interested in the natural history and scientific features of Zion and Bryce Canyon National Parks. Additional copies of these bulletins may be obtained free of charge by those who can make use of them by addressing the Superintendent, Zion National Park, Utah. PUBLICATIONS USING THESE NOTES SHOULD GIVE CREDIT TO ZION-BRYCE NATURE NOTES.

F. P. Patraw, Superintendent

John Gray, Park Naturalist

CLIFF DWELLINGS ON THE PARUNUWEAP
B. W. Rozelle

At the break of dawn on a bright Sunday morning we started on our trip up the Parunuweap Canyon and river of the same name, the south fork of the Rio Virgin. Our destination was the ruins of the cliff dwellings, long since abandoned and only seen by a few of the park employees. Fred, our guide, had formerly helped on a partial survey of the canyon, so with his aid and with trust in our four mountain horses and one mule, we set out. The mule was slightly balky and caused us a little trouble and delay at the junction of the rivers, but finally, with difficulties partly smoothed, we proceeded on our way.

Leaving the highway a little north of Hockville, we crossed the muddy, rock-strewn stream and started to climb up over the lower mesas. Our path rose as we passed along the beautiful banks of eroded shale, mud rock and sand lying as buttresses along the foot of the mesa. These seemed to blend imperceptibly with the huge ledges of dull red ~~Block~~ sandstone farther up which in turn fade into the higher towering cliffs of red and white sandstone.

After several miles of uphill climbing and many crossings of the river we came to a rocky knoll overlooking the entrance to our canyon. To the right of us extended another equally interesting ravine traversed by a smaller creek, the Shoenburg. In a flat below us nestled a little farm and several cultivated fields. Our standing ground was rocky, rough and irregular and reminded one of some hillside farm in New York or Vermont. On the crest of the benchland stood the frame of a large dwelling of native stone construction built of carefully cut sandstone taken from the cliffs some few yards away. No finer house could be found than this typical early pioneer architecture with its massive walls, divided compartments and large community room. Once a prosperous home and the center of a large farm, this old ruin now stands with a few rock walls and a curious log granary as the only monument to the fortitude of an early Mormon pioneer who attempted



subdue and conquer the arid wilderness and the ravages of an angry river. The fields, now back to nature, are mute evidence of the results of the years of toil, for the river has taken its toll, and erosion has removed much of the farm land and is cutting back the cliff, and will in time undermine this fine old structure.

Leaving this ruin and the little farm away to our right, we entered the Parunuweap Canyon. The entrance closes in quickly and we were crossing a few open flats covered with cottonwood and oak. Innumerable nets of tent caterpillars have settled on the cottonwoods and soon will remove most of the young leaves, but the trees are sturdy and seem to resist the ravages of these pests, as they increased in size as we proceeded up the river. Many are several feet in diameter.

Our talus slopes gave way to rocky ledges of dull red sandstone and the overlying cliffs began to assume spectacular and weird shapes. Unnamed crags rose on either side to a height often of 2,200 feet. On either side the precipitous cliffs and walls are of the same general coloring and formation as those in the main canyon of Zion. The outcropping of the ledges and buttes, however, are more prominent.

At a point about $8\frac{1}{2}$ miles up the canyon our guide called us to a halt and explained that the dwellings were on our left, at the base of the upper cliffs. We dismounted and began the trek up the steep slope. Not until we were actually at the ruins, some 600 feet above and a half mile away from the river, could we perceive any signs of ancient existence.

The mud and stone ruins are perched on a ledge, commanding a sweeping panorama of the river, but hidden to view from below. The dwellings are circular in construction, with the stones cemented into place by a mixture of mud and straw. Three of them are intact and in a good state of preservation; the willows used as supports for the roof are dry and brittle but still serve their original design. One small structure surmounts a rock and consists of a single chamber, bunt in a half-circle and lying close to the cliff. A larger one consists of three chambers. To the left and rear of these is a cave with many pieces of broken pottery, charcoal and burned willow sticks. The pottery pieces were made from fine grade mud and were burned black with no colorations. On the wall are several pictographs.

The ancient inhabitants obtained their water from a small spring 30 feet below and to the left of the ruins. Their common food, maize or Indian corn, was much in evidence in the ruins. It was probably quite inferior to that which we know today. The cobs which we unearthed from the debris were very small and irregular, but the number of them showed that they formed a large portion of the cliff dwellers' diet.



Sego Lily,
Utah State
Flower.

ROCKS OF AGES
Chief Ranger D. J. Jolley

The Great West Temple stands alone
near the entrance to the park,
Its massive sandstone brilliance
enthalls you until dark.

The great old Altar of Sacrifice by the
Streaked Wall so grand,
Is Sentinel to the Patriarchs or guard
in Dixie land.

Mt. Zion boasts of beauty and great magnificence
While the Castle Dome in summertime throws off
incandescence.

The Spearhead and Cathedral, both mystic and
sublime,

Will stand by Mt. Majestic until the end of time.

Beautiful Angel's Landing, a ship on the Virgin sand,

Decked out in futtocks of color unequalled in any land.

In the Temple of Sinawava the Indian legends say,

The Redskin dropped his sacrifice from the canyon rim each day.

The Great Stone Sphinx serenely waits for better times to come,

As he sits in his massive red stone chair in utter dismal glum.

A trail leads to the Narrows where the wanderlust must stop,

He can see the Mountain of Mystery, but cannot reach its top.

Returning down the canyon road we look out to the left,

Where flowers in profusion grow in valley, dell and cleft.

Observation Point is next, with cliff-dwellings underneath,

And the Weeping Rock mourns sadly on, decked out in floral wreath.

The story of the next great rock I'd tell if I were able,

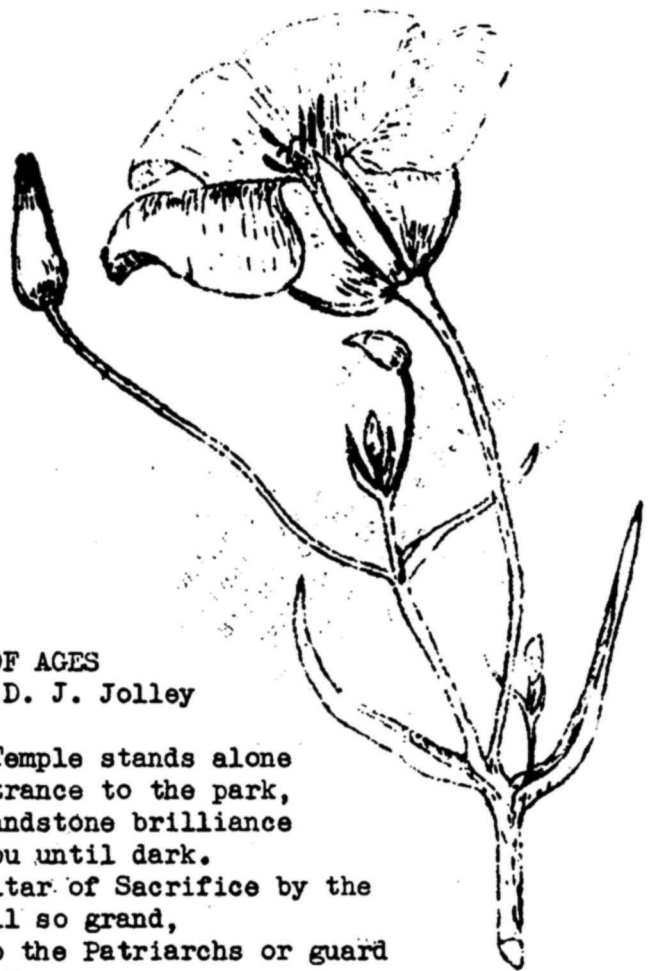
How men and freight rode up and down its sheer wall on a cable.

The Great White Throne and Red Arch and the Mountain of the Sun,

Dressed up in regal glory each year in oil are done.

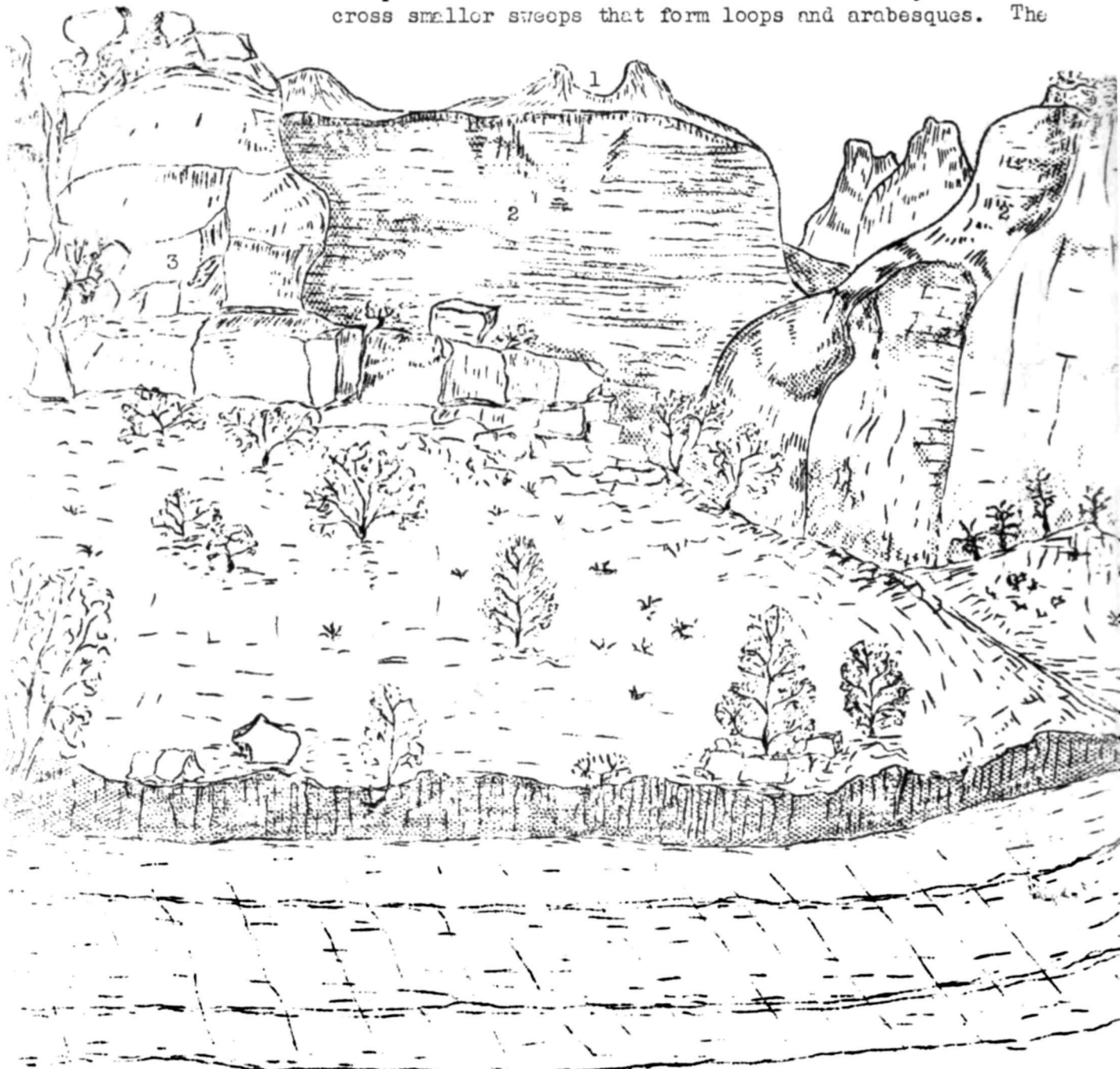
The Watchman and East Temple, Bridge Mountain and Deer Trap

Are mountains that are unsurpassed upon the Zion map.



CHARACTERISTIC EROSION IN JURASSIC SANDSTONE

In Zion Canyon the vortical cliffs of vermillion sandstone are surmounted by huge caps and pinnacles of white to yellow sandstone. Both constitute what is known geologically as Navajo sandstone. Within these cliffs horizontal surfaces, slopes and vortical walls, cross-bedding is visible to a remarkable degree. Cross-bedded laminae of "frozen" sand often appears as huge inclined arcs which gradually decrease as they merge into underlying layers. Huge sweeps of sand extend from 200 to 300 feet to join or cross smaller sweeps that form loops and arabesques. The



Jurassic Sandstone south of the Sentinel - Zion

1. Navajo sandstone - White Cliffs.
2. Navajo sandstone - Vermilion Cliff.
3. Block-like sandstone below Navajo (probably upper Chinle.)

prevailing design, best visible in Majestic Mountain and on Zion Carmel Hill, is composed of curves tangent to curves.

Just below the Navajo Cliffs is a ledge of horizontal layers of deep bedded dull-red sandstone characterized by regular block-like fractures (called by some the upper Chinle; there is some question as to whether this is upper Chinle or Wingate). It represents ledges of sand that were deposited under shallow water, supposedly during the early Jurassic Period. Wind, water and variations in daily temperature have caused the exposed surfaces to fracture and erode. Fracturing is both vertical and horizontal and the blocks formed are square or rectangular to slightly irregular and moderate in size compared with the huge blocks that split off from the surmounting Navajo. The final appearance is like that of man-made masonry.

Navajo sandstone is characteristic wind-blown sand that was formed over a vast plain or desert in an early geologic period (Jurassic). Wind-swept deserts of shifting sand dunes 2000 to 3000 feet deep extended from southwestern Colorado to southern Nevada. Gradually this vast area sank, through the downward movements of the earth's crust, until they, like other deposits below them, became engulfed by the incoming waters of one of the epicontinental seas that at intervals previously had engulfed this great inland region. Limestone and other cementing substances were washed over the surface of sand and slowly with the aid of pressure and long eons of time, these shifting desert sand dunes were solidified to hard white and vermilion sand rock.

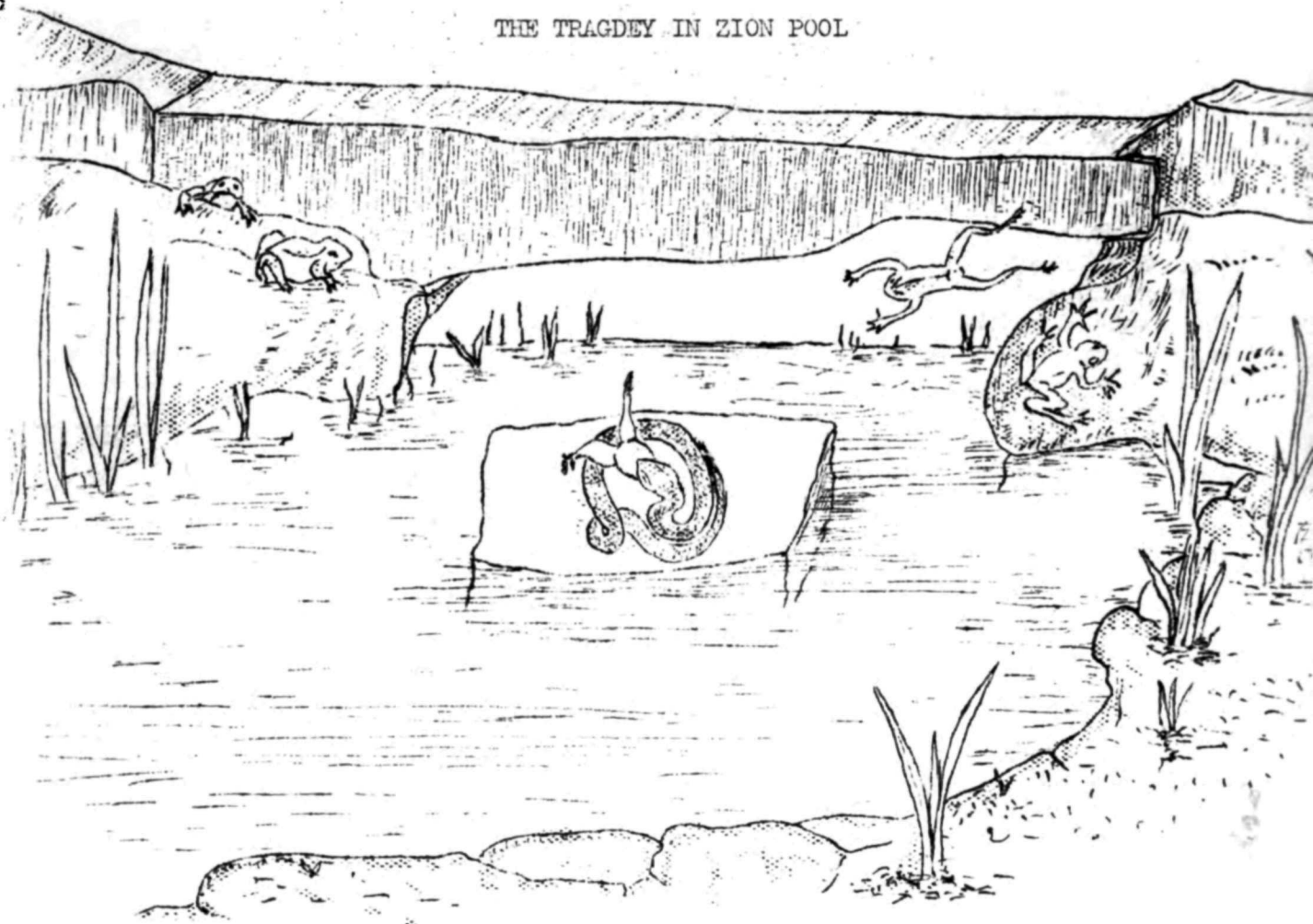
Navajo sandstone is a typical cliff maker. The vermilion rock has a tendency to split in long vertical or curvilinear fractures parallel to the surface of the cliff and parallel to the cross-bedding laminae. An erosion slab is produced with curved faces leaving a sheer wall of slightly curved surface behind. Smaller, thin pieces scale off from the cliffs and canyon walls. These are especially evident in the region of weeping rocks where water seepage has aided temperature changes in producing this type of fracture.

In contrast to the vertical fractures of the vermilion layer of Navajo sandstone, the surmounting crests of the white cliffs appear as smooth, slick surfaces eroded to hard peaks and pinnacles. Weathering has produced surface cracks in places, but fractures, ledges and bridges are not characteristic. The surfaces are more often curved than vertical, the pinnacles precipitous and the area unscalable. The caps of white are often cone shaped. They lie over the vermilion cliffs and are often surmounted with a small ledge of red, producing a fantastic effect when viewed from a distance. The Guardian Angels in the West Canyon are of this structure and remind one of huge dishes of ice cream.

The colors of the white and vermilion cliffs are chiefly due to the presence of varying amounts and kinds of cementing substances. The white cliffs have only calcite (CaCO_3) cement, except where iron oxides from overlying red ledges have washed over the surface. The vermilion sandstone varies from yellow, buff and tan to red tones and is due to the degree of concentration of iron compounds (iron oxides). In general the cement is limo, (CaCO_3) and dolomite ($\text{CaCO}_3 \cdot \text{MgCO}_3$) with varying degrees of iron, magnesium, copper and other substances cementing an aggregate of white crystal-clear quartz grains.

Erosion factors are many in Zion but the outstanding effects on the upper strata of sandstone are three-fold: In the (upper Chinle) ledge below the Navajo a block-like fracturing appears; in the vermilion cliff a perpendicular parallel splitting that leaves vertical cliffs and arches; in the white a slow surface erosion to form smooth cones, curved surfaces and pinnacles with an absence of noticeable fractures.

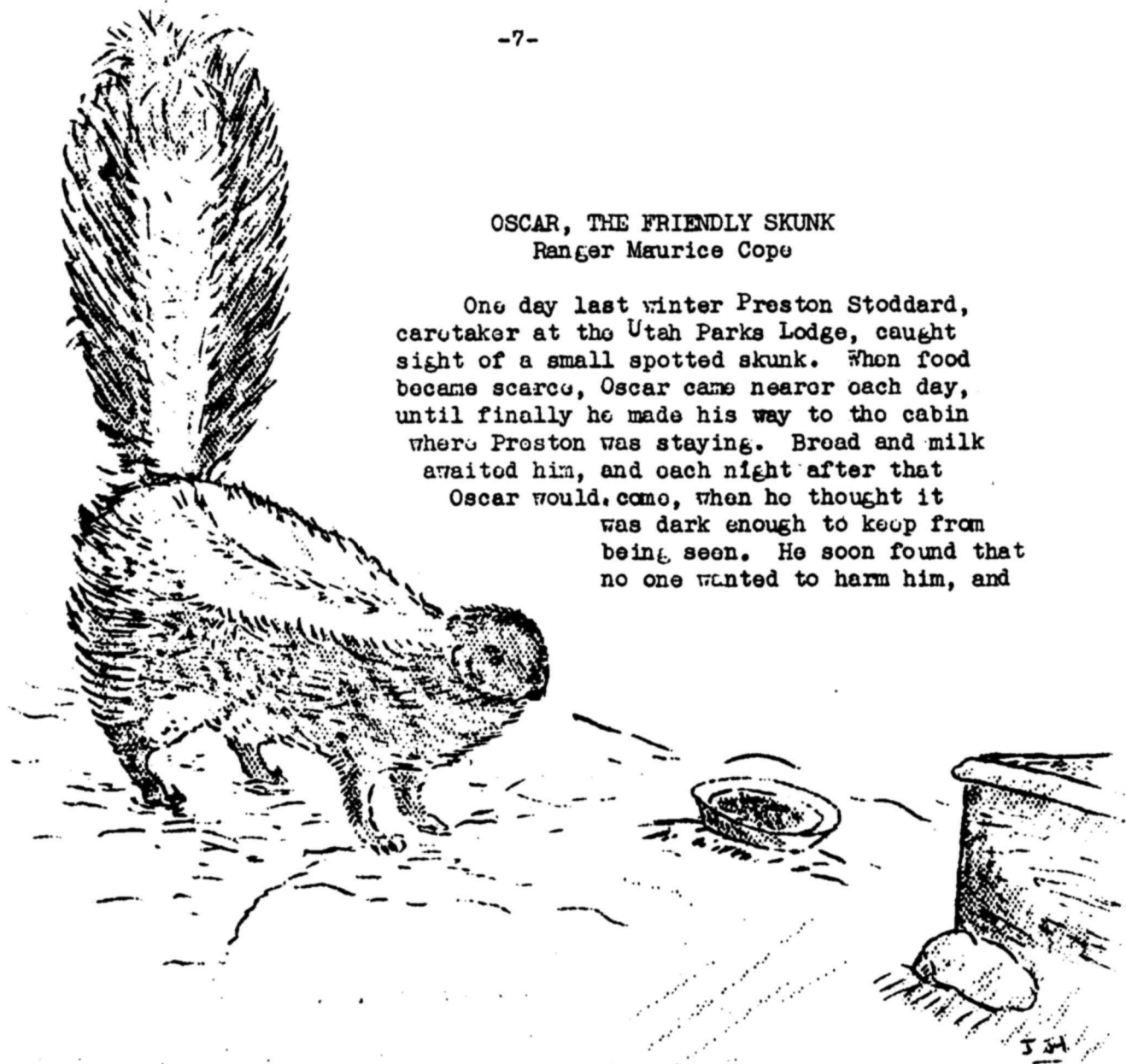
THE TRAGEDY IN ZION POOL



On a bright, warm day in early April Superintendent Patraw and Assistant Superintendent Parker were inspecting the Narrows trail. At the pool in Zion Stadium, one of the most scenic spots on the trail, they noticed a water snake coiled on a piece of wood that had floated down stream. Suddenly one of the many tree toads perched on the rocks appeared disturbed by the noise and leaped out over the water. Like a flash the snake had observed the movement and Mr. Tree Toad was caught in mid-air, and the snake settled back on its raft and began to swallow his victim. Head first, the frog slowly disappeared as the snake worked its jaws forward. Finally the hind feet were engulfed and Mr. Toad had passed to the place from whence no good toad returns. A slight bulge in the body of the snake was the only indication of the tragedy as the villain lay coiled peacefully in the sunshine.

OSCAR, THE FRIENDLY SKUNK
Ranger Maurice Cope

One day last winter Preston Stoddard, caretaker at the Utah Parks Lodge, caught sight of a small spotted skunk. When food became scarce, Oscar came nearer each day, until finally he made his way to the cabin where Preston was staying. Bread and milk awaited him, and each night after that Oscar would come, when he thought it was dark enough to keep from being seen. He soon found that no one wanted to harm him, and



quickly he became a real pet. It was not uncommon for Preston to pick Oscar up in his arms, and Oscar began to think that was part of the daily program. Now the snow is gone and Oscar can find plenty of food without coming for his break and milk, and he has disappeared.

EARLY SETTLERS PLANTINGS - "THE TREE OF HEAVEN" IN ZION
Ranger Harold Russell

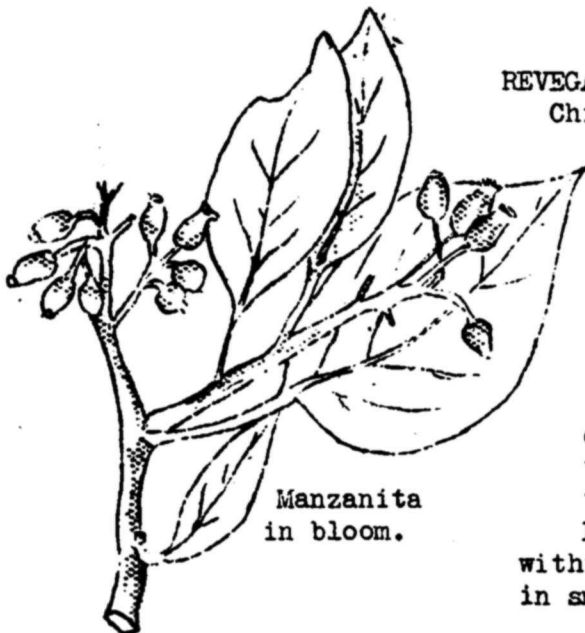
This particular species Ailanthus glandulosa (Simarubaceae Ailanthus family) is found for some distance along the roadside at the southern entrance to the park. Its foliage is beautiful and the tree is rather graceful. The saplings are very brittle, but when a tree reaches maturity of fifteen to twenty years the trunks which are free of knots from eight to ten feet above the ground might be considered one of the hard woods. From best information obtainable the tree was introduced into this region by an early pioneer who settled near the southern entrance in the town of Springdale. He prob-

ably knew of its worth as a hard wood before introducing it here, for it was used by him in the manufacture of chairs, wagon tongues, plow beams, hoe and shovel handles, and various other needed implements.

The word Ailanthus is said to mean "Tree of Heaven". The tree is a native of China. Its seed was sent to England from China in 1751 by Jesuit missionaries who believed it could be acclimated and the leaves used for the food of a certain silk worm. The experiment failed, but the trees proved to be so stately, graceful and ornamental that they were much valued for their own sake. They were planted extensively in parks and pleasure grounds.

Subsequently they were introduced into the United States and planted near Philadelphia. At first the trees were very popular, but their popularity soon waned because of the disagreeable odor of the blossoms. Therefore the tree was generally cut down. Lately, however, the tree has been slowly coming back into favor, and pistillate plants can now be readily obtained. When once the root system is firmly embedded it can withstand long periods of drought.

The family includes some eight or nine species, three of which grow in the United States. In some localities it grows wild and has no known enemies. The tree is able to endure smoke and dust better than most trees, and because of this endurance it will thrive in manufacturing towns where few other plants exist.



Manzanita
in bloom.

REVEGETATION ON THE RIMS OF ZION
Chief Ranger D. J. Jolley

The east rim of Zion is a plateau 6,200 feet in elevation, cut up with a series of canyons which change to chasms or gorges as they near the main canyon.

For many years this area was almost devoid of vegetation. Sheep and cattle have grazed in this area since 1860. Herds increased in number annually until 1915 when the Government first took steps to protect the area and included it in Zion National Park. Thereafter sheep were not allowed within the limits of the park, and cattle only in small herds and under permit.

At the time protection of the natural features of Zion was started there were no flowers, very little grass, and the small shrubbery was so closely eaten by sheep that only a tassel of leaves at the tip of the bushes remained. Consequently the country had come to look like a desert, with only a few of the shrubs remaining that stock would not eat, and a scattering forest of yellow pine trees and Gambel Oaks. Since the stock has been

kept away, the grasses and plant life have grown up thicker each season until now some sections are almost impenetrable.

While repairing the telephone line over the east rim in April, I saw many beautiful flowers along the trail. Spring beauties were blooming in profusion up to 6,200 feet elevation. Manzanita, sweet williams, wild sweet peas, princess feather (*stanleyii*) and many others were numerous at 5,000 to 5,500 feet. To me, however, the most beautiful of all was a Douglas Fir on Observation Point in full bloom.

There is no doubt but that the east and west rims of Zion Park will equal, or perhaps exceed, the valley in plant life when they are properly seeded and will be gardens of flowers and shrubs within the near future.

ANTHONY W. IVINS AND THE INDIANS OF ZION
Asst. Supt. T. C. Parker

At the time of Powell's historic trip in the late 60's, Anthony W. Ivins, now in the high presidency of the Mormon Church, was scout for the church in this country. He worked among the various Indian tribes and especially with the Santa Clara Indians at St. George. This work carried him along the Virgin River to the Grand Canyon, so that he knew the Indians personally. They were always friendly and believed in him.

Between the first and second trips down the Colorado River, Powell came through this region and met Ivins and the Indians. Ivins showed him the way through the country and helped establish caches along the Colorado River. Knowledge of the country and his long standing friendliness with the Indians made this possible.

The Indians were a poor class of people driven out of the better lands by the Navajo and other stronger tribes. They had few possessions and lived on pinyon nuts, prairie dogs and rodents. Although of great help to Powell and Ivins, these same Indians were not friendly to Father Escalante on his trip through their region in 1876. He could not find the way through the country from the region where Cedar City now stands to the Virgin and Grand Canyon. The Indians led him purposely out of the way, so that it took all summer to get through. The Indians had a fear of Zion, because of the roughness of the country, and believed it to be a spirit land. They did not live in these canyons, but sought and cached food here in the daytime. Many of the earlier prehistoric dwellings were used by them for these storage purposes.