



ZION - BRYCE

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ZION-BRYCE NATURE NOTES

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This series of bulletins is issued from time to time during the summer for the information of those interested in the educational opportunities, the natural history, the scientific features, or the scenic beauties of the region. Publications using these notes should give credit to ZION-BRYCE NATURE NOTES AND AUTHOR.

Thomas J. Allen Jr.,
Superintendent.

Angus M. Woodbury,
Park Naturalist.

OUR EDUCATIONAL PROGRAM.

By J. W. Thornton, Ranger Naturalist

Zion-Bryce Nature Notes begins another year with this issue. Dr. A. M. Woodbury again leads the educational forces, aided by Ranger Naturalists J. W. Thornton, Kenneth E. Weight, S. D. Durrant and H. L. Reid. This gives us an increase of three naturalists for short periods over last year. This enlarged personnel, coupled with the constructive support of our new Superintendent, Thos. J. Allen Jr., promises much for our educational program. All the educational work will be carried on with enthusiasm and friendly interest. New fields of activity are to be opened and developed. New trips will be taken. The museum work will be extended. New collections will be made. New trails will be signed and plants marked. At least four lectures daily will be given at different places in the canyon on some interesting phase of its natural history.

Nature Notes will reflect many things in and about the parks that lovers of nature will like to read.

Zion and Bryce are beginning the greatest tourist year in their history. The checking to date already shown an increase of about 25 per cent over last year.

Zion-Bryce Nature Notes will, we hope, accurately portray in a better way than ever before a little of what nature has done to make these parks so wonderful.

WATER OUZEL FEEDS SELF AND YOUNG
By Ben H. Thompson, Wild Life Survey
May 26, 1931

A small stream runs down the canyon of the Three Patriarchs and joins the Virgin River in Zion Canyon. The stream bed is cobbled with water-worn boulders and ledges.

Rain was falling. Out in the stream a young water ouzel bobbed on a rock, its short wings spread and fluttering, and its stubby tail tipped up as it begged and called. Close by, a mature ouzel darted and shuttled back and forth in the water, catching insects. Its dull slate coat seemed dry as the water slid off each time. The adult was feeding ~~itself~~ itself, but every few minutes it flew to the young and thrust something into its open bill. Each time the little bird went into a frenzy of demonstrative begging. Again and again the old bird came back with something snatched from the stream, and the young bird kept up its squeaky clamor. When the adult foraged too far up stream, the young one flew stoggily after, and lit and dipped on a stone near by. Occasionally the little one picked at something in the water, then begged and fluttered again.

Neither bird showed fear when we were within ten feet of it.

The parent water ouzel was an adroit teacher; it shared only a small portion of what it caught, which was just enough to keep the young bird hungry. Whether this was due to intention, instinct or necessity would be interesting to know.

COUGAR KITTENS IN CAPTIVITY
By Donal J. Jolley, Chief Ranger

On April 18 the Willis Brothers and Arthur Perry, hunters for the Biological Survey on predatory animal control, killed two cougars in the park and three outside the park on the east side. They brought in a pair of cougar kittens alive and left them with us for about a month. They proved to be expensive and much trouble, as we had no place to keep them other than a small cage we made after we got them. They grew so fast that it was necessary to enlarge the cage every two weeks to make room enough for them. For the first few days they would not eat while any human being was near. We started giving them a quart of milk each day and they soon looked forward to it, and became so gentle that they would come out to the dish and wait for the milk. We went out and killed a jack rabbit each day for the kittens for a while but they grew so fast that one rabbit was not enough. We then brought them two rabbits per day and before we sent them out we were giving them five each day, and they still wanted more. We found that it was not practicable to keep cougars in such quarters. We did not weigh these animals at any time, but they looked twice as large at four months of age as they did at three months.

EROSION OF BRYCE CANYON

By Kenneth E. Weight, Ranger-Naturalist

The first impression of many people as they walk onto the rim of Bryce Canyon is that erosion of the canyon is very rapid. Before much of an examination of the canyon was made one very enthusiastic tourist made the remark, "Why didn't the Union Pacific build their lodge back farther? It will only take a few years until they will have to move the building, because of the receding canyon wall." After walking along the rim for a short distance the individual's attention was called to a large Rocky Mountain Yellow Pine, *Pinus ponderosa brachyptera*, that was growing on the edge of the rim. This tree was struggling to maintain its balance. Many of the roots on the canyon side were exposed and dead. How long they had been exposed was a real problem. Comparison of this tree with a stump near by of about the same diameter showed it to be about ninety years old. For exact age a boring should have been made. This age determination was made by counting the annual rings on the large end of the tree that had been cut previously.

It is the natural thing for plants to send their roots downward and outward in the soil upon germination and growth of the seedling. The large pine tree on the rim with the now exposed roots certainly, in its earlier life, was so situated that its roots were in the ground. It sent its roots downward and outward in order to support and anchor the rapidly growing stem and branches.

Allowing twenty or thirty years for the side roots to have made their outward growth in the soil to the point where they now stand exposed, it leaves some sixty years for the bank to weather and erode up to the present state. A measurement of the exposed portion of several roots showed most of them to be six or seven feet long. The assumption is that it has taken fifty or sixty years to wear away the bank under the tree a distance of six feet. If this be true, the rate of recession of the rim is about one inch a year. Other trees on the rim were observed in the same way with similar conclusions. Trees on the side rim of the canyon no doubt are in a safer location, because the bank does not wear away as fast on the sides as it does at the head.

If the conclusions drawn are anything near true, then we can assure our good friend of the road that the De luxe cabin of the Bryce Canyon Lodge nearest the rim need not be disturbed for at least 37,669 years in the future.

ASH TREE CATERPILLARS AGAIN
By Donal J. Jolley, Chief Ranger.

During the past several years caterpillars living on the Leather-leaf Ash Trees in Zion National Park have become so numerous that they have become a menace to the scenery and to campers in the park. They feed principally on the leaves of the trees. Beginning in March or in early April, the trees are sometimes completely stripped of leaves within two or three weeks. This season they were first noticed in great numbers on March 26. A tourist at the public auto camp reported that the caterpillars were about to run him off the auto camp. I went up immediately and investigated conditions. I found that they were crawling over the ground by thousands; they were all over his tent, automobile, table, and the ground was covered with them. The Superintendent returned with me in the afternoon and soon realized the serious condition there. He immediately wired the Park Naturalist, Dr. A. M. Woodbury, who was then in Berkeley, California, and received by return wire instructions to spray with arsenate of lead. I drove into Cedar City and made arrangements with the State Inspector, Mr. John Blazzard, who volunteered to loan us the state spraying machine and his own services in order that we might save our trees. We put the spraying machine on a truck, using eight pounds of arsenate of lead to each two hundred and fifty gallons of water, and sprayed every tree we could reach with a fifty-foot hose. We started March 28 and completed the job April 6. The spray proved very successful, as within a few days we could hardly find enough caterpillars for specimens which Dr. Woodbury wanted for study. We did, however, collect a few and kept them in a glass jar with the lid perforated. Unthoughtfully we left the jar by a window during one whole day where the sun could beat upon them, and that night we discovered that they had all melted. We collected a few more and kept them in a screen cage, but they escaped through a crack by a small door. Later Dr. Woodbury and I (on May 25) collected a few specimens in a telephone box in the Temple of Sinawava, which so far we have successfully kept. The Park Naturalist expects to learn something more about the history of this specimen this year, with a possible hope of finding a better method of getting rid of the caterpillars before they kill the trees. They live principally on the leaves of the ash trees, and feed on the other trees only when this food is gone. They attack the Boxelder trees next, but only when the ash trees are completely defoliated.

They come out first on the leaves high up in the trees and are not noticeable for some time after they have been working. A light wind will blow them to the ground, as they they do not seem to be able to cling to the tree when it is moving much. A stiff wind will blow nearly every worm to the ground.

THE DESERT TOAD IN SEEPAGE POOLS

Animals that live in the desert have adverse conditions of heat and drouth to combat. They must either be able to resist such hostile conditions, or avoid them. Some animals, such as certain reptiles, are armoured with scales which tend to prevent evaporation and helps them to combat drouth. Certain other forms, such as the Desert Toad, *Bufo punctatus*, avoid the desert hostile extremes. Such a toad has no armor of scales to protect its delicate skin, and if it were exposed to the extreme conditions which lizards as the Western Ring-neck, *Crotaphytus collaris baileyi*, or the Desert Scaly Lizard, *Sceloporus magister*, can endure, it would soon perish by drying out of the skin.

Most of the toads and frogs of Zion live in close proximity to streams or ponds that are permanent, but the Desert Toad may live in the dry arid regions in the neighborhood of seeps, springs, or even rain-water pools which may be only of temporary character. I found a specimen of this toad in the petrified forest among the junipers and pinons during the early part of July a few years ago at a time when the extremes of heat and drouth were most critical. It was carefully ensconced beneath a large flat rock so heavy that I had difficulty in lifting it, and beneath which the soil was cool and moist. The nearest living water was some two or three miles distant. It was, however, close to a wash where intermittent streams of early spring and late summer left standing pools which must have been the source of the tadpole development.

It seems certain that the life history of this toad must be adjusted to fit these conditions. While the adult toads must return to water to lay the eggs, and the eggs must develop through the tadpole-stage in water, yet the adults at other times are able to survive the desert climate by hiding in cool shady places during the day when temperature and moisture conditions are extreme, and doing their foraging for food at night when such conditions are more favorable.

On May 29 of this year, in coming past the Coal Pits Wash Corral, near the petrified forest in the southwest corner of the park, I heard the Desert Toad singing in a ravine near by. Upon investigation I found several pairs of these toads in copulation in seepage pools left muddy by floods following a heavy rainstorm of May 26. The water was of such temperature that it felt warm to the hand. Eggs in various stages of development were scattered about the floor of the pools which were only a few inches deep. Some of the embryos were so well developed that they were plainly visible as small tadpoles.

In every case observed, the male, which was much smaller than the female, grasped the female around the body just behind the front legs. The length of the male was such that the end of the body was even with that of the female in such way that end of the sperm duct was in close proximity to that of the female oviduct. Although the operation was not witnessed, it is believed that the sperm was sprayed over the eggs as they were deposited by the female.

On June 12 Ranger Russell obtained specimens of tadpoles from the same pools, in various stages of development, ranging up to more than one-half inch in length, and the beginning of the external development of the hind limbs was apparent. It would appear that the life cycle of this toad is adjusted to fit the larval stage into a short period when water is available from seepage or from pools after rains.

In the mud around the pools tracks of two mammals were seen, one a rodent, probably a wood rat, the other a carnivore, probably a ring-tailed cat. The tracks of both were suggestive of the idea that they might have been seeking food in the pools and the only food available would be the toads or their eggs.

DEER IN ZION

By S. D. Durrant, Ranger-Naturalist

The deer, which, as we regard them plunging recklessly over brush and rocks, seem to be the perfect picture of agility and surefootedness, sometimes meet with peril and accident. Such was explained in the "Deer Slide" of the Zion-Bryce Nature Notes Vol. 1, No. 1.

Again we have another case brought to our attention. On June 26, 1931, another deer, which undoubtedly had slipped and fallen from the ledges, was dispatched by the rangers. This unfortunate animal had broken its back and was badly bruised and mangled.

Such, however, may not be so rare an occurrence in the future, because the deer are becoming more numerous in the park. I counted nine bucks and six does on a short two-mile ride upstream from the museum. They were in splendid condition and were feeding in the sweet clover.

They are one of the most interesting of animals and furnish a great deal of interest to visitors. The people sitting in front of the Lodge in the evening often see the deer disporting themselves in the vicinity of the swimming pool. Deer on the Narrows Trail are also a source of constant joy to the people. Their cries of awe and astonishment warm the heart of the true lover of the outdoors.

OUR MUSEUM TABLE

By J. W. Thornton, Ranger-Naturalist

If rocks could speak, those on our museum table would tell volumes. As it is, to all who are attempting to interpret the past by reading the records that time has rock-bound, much is written through these stone annals; dead centuries speak, inorganic matter gives evidence of a time when organic matter existed in many life forms; time becomes an immense thing, an incomprehensible thing.

Millions of years are consumed in the forming of a rock. Its particles have been wind driven, water washed, heated, fused or cemented. It has been on the surface and deep under the earth's crust covered by thousands of feet of material. It has come in contact with life forms somewhere in its varied course and now sits on the corner of the table, a convincing witness of many forces, changes, and long periods of time.

Look at that section of petrified wood showing bark, branches, trunks, knots and rings of a tree. It is all rock which once was wood. Here is a piece of the oldest wood known. Part of it is rock but part of it still is wood. The same piece shows rock on one side and wood on the other. Here the wood ceases and the rock begins. It is a solid piece of matter, part organic, part inorganic.

Streams have brought these trees in and buried them in the Shinarump, a sand and gravel formation. As the vegetable matter decomposed, the mineral matter took its place cell by cell, preserving the tree form in solid rock. Thousands of years of erosive action finally exposed it and now, collected by some naturalist, it occupies a place on our museum table with millions of years of time and of natural history tied up in its making.

THE GREAT WHITE THRONE CLIMBED
By J. W. Thornton, Ranger Naturalist

The Great White Throne has been climbed. No longer can that impregnable fortress of solid rock cast its summit into the blue undesecrated. That seat of Indian superstition whose dizzy heights have challenged all comers has felt the foot of conquering man. At noon on June the thirtieth the signal smokes of victory mounted skyward from its summit and the form of Don Orcutt was seen silhouetted against the sky as he shouted to the watchers below.

Four years before another fearless climber had reached the top, but the old mountain hurled him down to its south base, where he was picked up thirty-six hours later by the rangers. But Don Orcutt of Los Angeles was not to be treated thus. The mountain wall pulled at him and nearly had him in its clutches as he slid to almost certain death at the beginning of his downward climb, but by flattening out against the surface and digging bare hands and feet into the uneven surface of the cliff he stopped the death slide and slowly but safely made his way to the valley below. He was occupied with the climb from six o'clock a.m. until five o'clock p.m.

The Great White Throne is the most spectacular of all the peaks in the canyon. It rises from the floor a perpendicular wall twenty-five hundred feet in height. On three sides its wall is vertical, but on the south the perpendicularity gives way to a wall not quite so steep, yet offering many perilous obstacles to the one who would mount to the top along its surface.