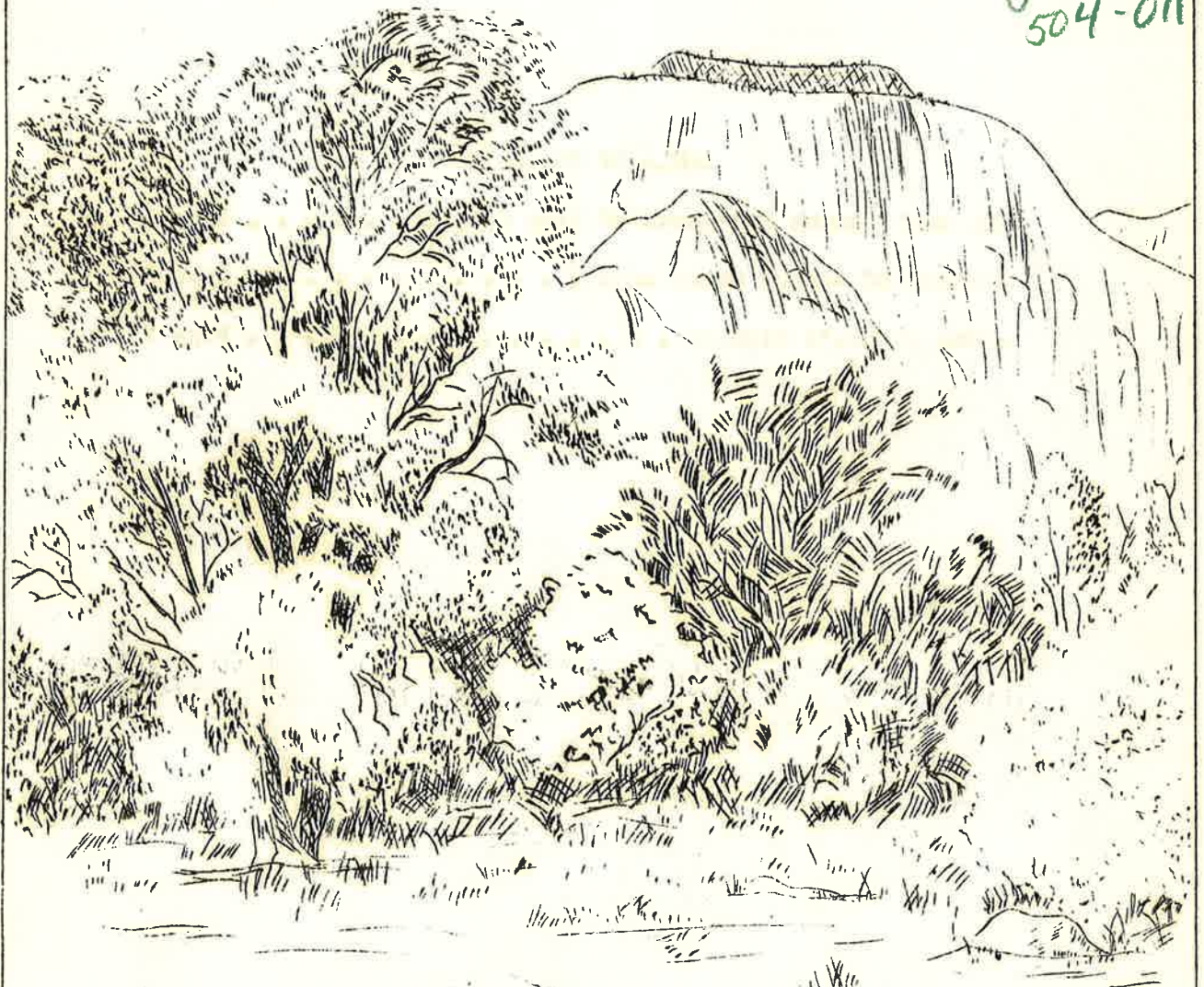


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Zion and Bryce Nature Notes

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VOL. 5

No. 4

Nov.-Dec., 1936

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U. S. DEPARTMENT OF THE INTERIOR
Office of National Parks, Buildings & Reservations
Zion and Bryce Canyon National Parks, Utah

Vol. 5
Zion-Bryce Nature Notes

No. 6
Nov.-Dec., 1933.

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.

P. P. Patraw, Superintendent

C. C. Presnall, Park Naturalist

THE COMMON HARDWOODS OF ZION CANYON

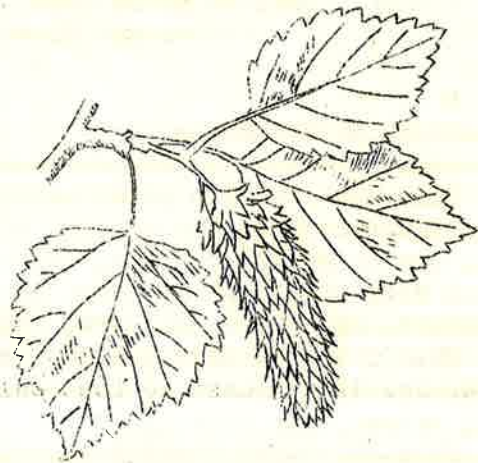
By C. C. Presnall, Park Naturalist

The deciduous trees which compose the forest cover of Zion Canyon may be divided into three classes based on the extent to which they attract the attention of the casual observer; the first and most noticeable division includes the cottonwoods and willows, discussed in the preceding issue of Nature Notes; the second division includes trees of secondary importance numerically but which are usually noticed because of their comparatively large size, such as Birch, Oak, Maple, Boxelder, and Ash; the last group includes all species which are least noticeable because scarce or inconspicuous. Obviously there is no scientific basis for such a classification, but it follows the natural approach of the average person when commencing a study of trees.

In this article we will consider the second group containing five species: Red Birch, Desert Ash, Boxelder, Bigtooth Maple, and Rocky Mountain White Oak. The species are arranged according to their apparent preference for water, those requiring the most soil moisture being placed first.

Red Birch (Betula fontinalis Sarg.), sometimes called Water or Mountain Birch, has the most localized distribution of any deciduous tree in Zion Canyon, being confined to areas that are both moist and cool. Streams and springs in protected side canyons are commonly bordered with this tree, and in only a few places does it extend down these tributaries to the level canyon floor, as for example at Birch Creek, Weeping Rock, the Grotto, and along the intermittent stream issuing from Refrigerator Canyon. It almost invariably grows

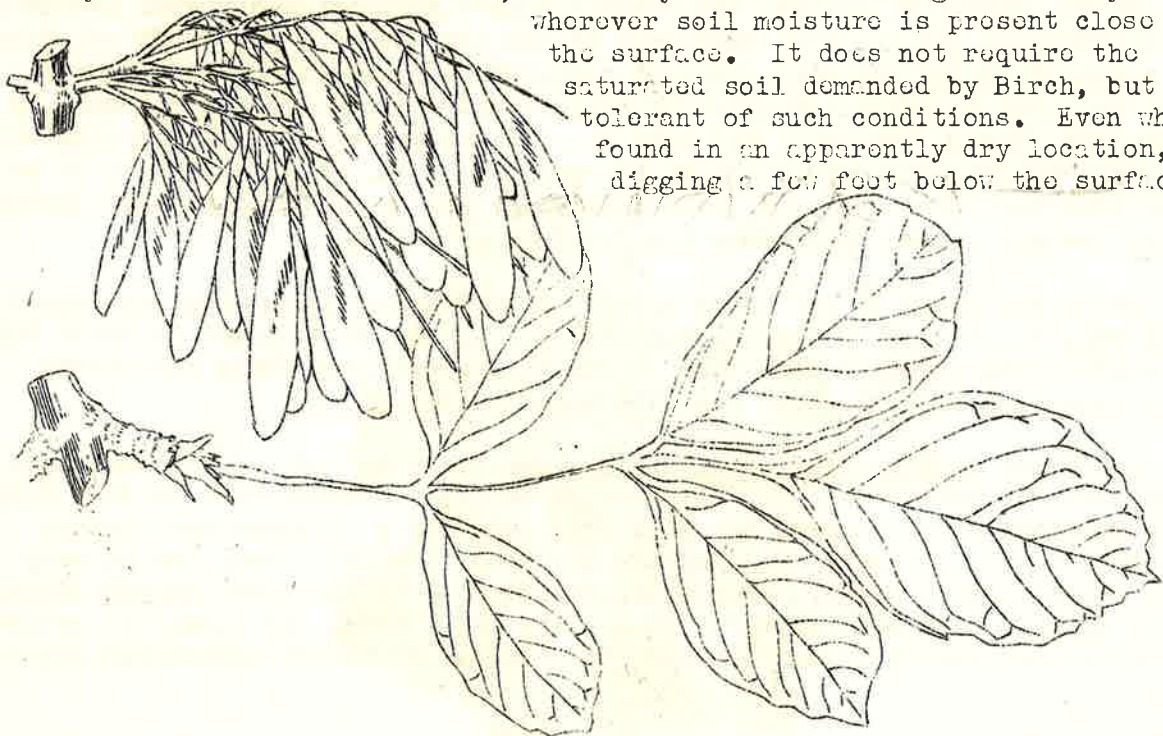
in soil that is constantly wet, and would probably form dense thickets in many parts of the entire canyon if the mean temperature were a little lower. This preference for cool climate might lead one to suspect that it indicates Transition Zone "islands" wherever it occurs in Zion Canyon, which is chiefly Upper Sonoran. Such is often the case, but although the metropolis of this species is in the Transition Zone it cannot be regarded as a true indicator, since it extends into both Canadian and Upper Sonoran habitats.



In spite of its relative scarcity in the Canyon it always attracts the attention of hikers because of its smooth, old-copper colored bark and its slender, graceful form. In most cases it forms dense clumps of tall brush, but where conditions are favorable it becomes a fair sized tree, occasionally exceeding a foot in diameter. The largest I have measured was 14 inches.

As a factor in controlling erosion the Red Birch is very important, growing as it does on hillside seeps or along streams usually having a rather steep gradient. Even after the tree dies it often retards erosion by damming up small gullies with its fallen trunk. In many cases I have observed extensive fills of sand deposited behind log jams composed principally of Birch.

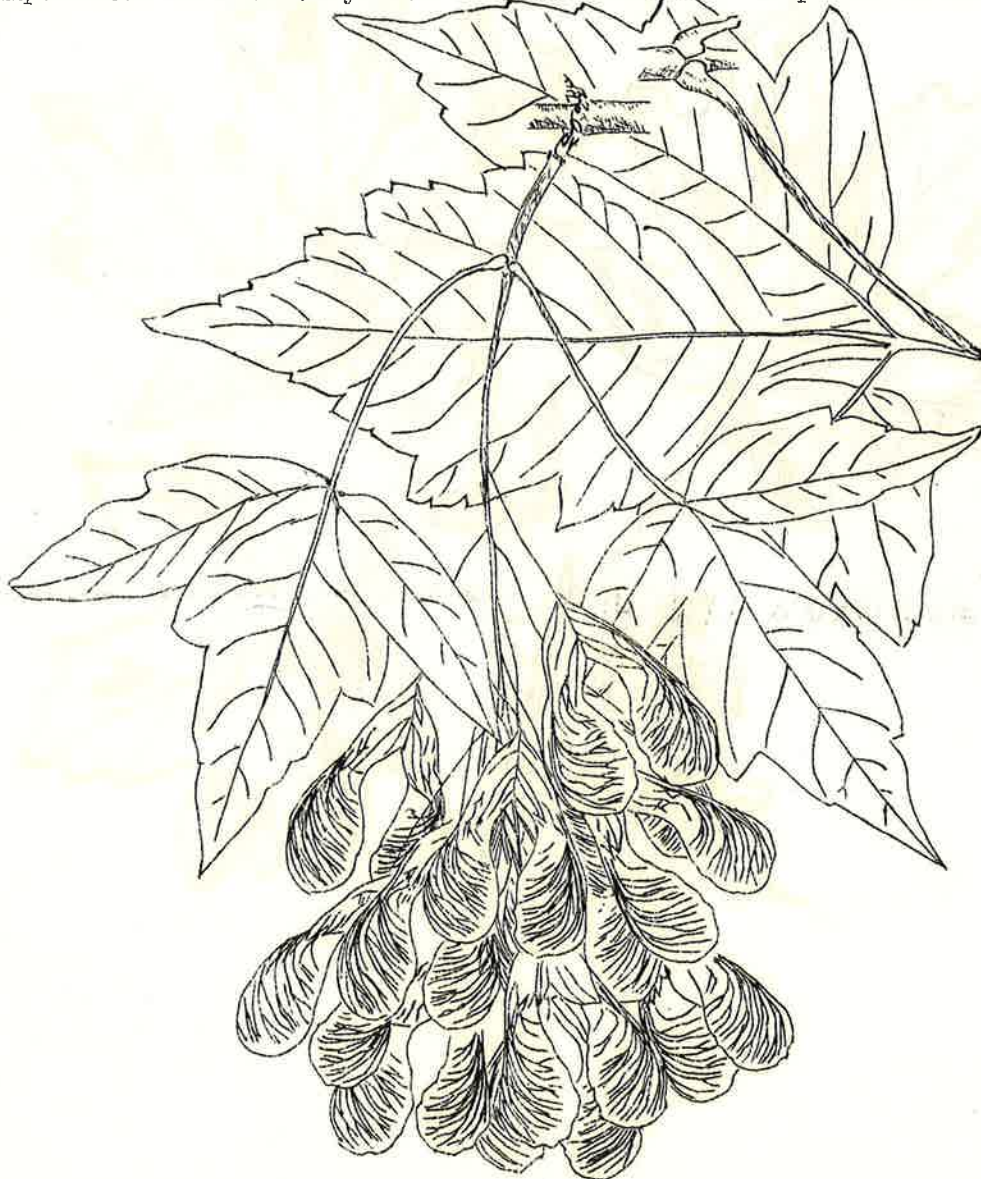
Desert Ash (Fraxinus velutina coriacea Rehder), often designated by the clumsy name of Leather-leaf Ash, is widely scattered through Zion Canyon wherever soil moisture is present close to the surface. It does not require the saturated soil demanded by Birch, but is tolerant of such conditions. Even when found in an apparently dry location, digging a few feet below the surface



will always reveal abundant moisture. This species is nowhere abundant in the Canyon, and never forms dense pure stands, as some other species of ash often do in the humid belt of the Pacific Coast. It has apparently adapted itself to the limited water supply of the semi-arid Great Basin country; one especially noticeable adaptation being the habit of bearing immense quantities of seeds. However, reproduction in Zion does not seem to be very good; whether due to low germination percentage or to some other unfavorable factors I have not yet determined.

Desert Ash is one of the most pleasing shade trees, with its clean trunk, heavy foliage, and large size, being second only to the Cottonwood in this respect. One tree near the public campground measures 2 feet 4 inches in diameter and is at least 60 feet tall.

Boxelder (Acer Negundo interius Sargent) is too well known to need lengthy discussion. A quick growing short-lived tree, it is nevertheless of considerable importance in Zion Canyon as a shade tree. It requires about the same



conditions of soil and climate as does the Desert Ash, but is sometimes found in dryer locations. It seems to require a constant supply of subsoil moisture, but often grows where such moisture is too far below the surface for the Ash. It shares with the Ash an ability to withstand hot dry summer weather, which should make the two species very valuable in this region where it not for the fact that both are often badly defoliated by the attacks of various leaf-eating insects. In Zion Canyon such attacks have been combated more or less successfully with various sprays, so that the Box Elder is aided in maintaining its position as the best shade tree in the Canyon. The old Wylie Camp owes much of its attractiveness to the immense Boxelders which shade the entire area, making it one of the most comfortable spots in the Canyon.

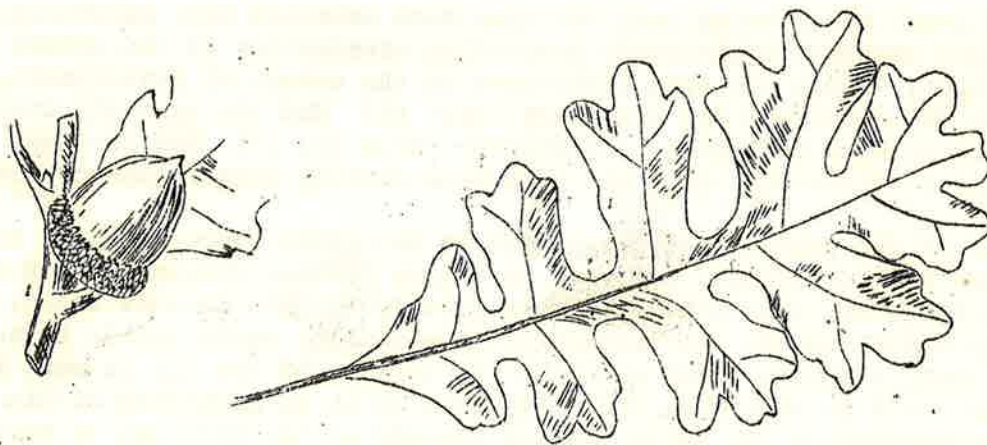
The Bigtooth Maple (Acer grandidentatum Nuttall) has somewhat the same preference for cool slopes and tributary canyons as is displayed by the Red Birch, but it always grows in much dryer situations. Almost every



spring or seep that waters a clump of Birch will be found to have a circle of Bigtooth Maple growing around it on higher well drained ground. The contrast between the shiny copper colored Birch bark, and the light chalky gray bark of the young Maples is very pleasing, especially after the leaves have fallen. The Maple is still more attractive just before the leaves fall, when it stands out prominently with blazing colors, - reds, purples, and yellows. Even in summer its small sharply-cut leaves make it one of the most pleasing trees in Zion. Like the Birch, it does not often occur on the level canyon floor, but it is quite common near the Temple of Sinawava and along Birch Creek. It never attains large size, and is known to most observers as a bush.

Rocky Mountain White Oak (Quercus utahensis Rydberg), formerly designated as Quercus gambeli, is by far the most drought resistant of the commoner deciduous trees in Zion. Being also tolerant of wide climatic variations it has been able to establish itself over a large portion of the Park, particularly on the eastern plateaus, where it forms dense pure stands of small trees seldom over 20 feet high. On the bottom of the Canyon it attains larger size, often over a foot in diameter, and in at least one case a diameter of slightly over two feet has been recorded. Many of these larger trees have broad, spreading crowns with numerous large branches starting near the ground.

The Oak is a very valuable source of food for a host of creatures, - deer, squirrels, mice, jays, nuthatches, woodpeckers, and a great many other species. It is probable that more species of insects feed on oaks than on any other tree, but they seldom do serious damage



(Note: This is the third of a series of articles on Zion Canyon trees; three more will appear early next year.

The illustrations in the above articles are by Ruby Presnall, three being adaptations from "Trees of the Pacific Slope" by Sudworth. Mrs. Presnall has done all the illustrating and lettering for Nature Notes since last July.)

A STUDY OF GOPHER SNAKE EGGS

By A. M. Woodbury, Ranger-Naturalist

A large female gopher snake, $5\frac{1}{2}$ feet in length, deposited 13 eggs early on the morning of July 16, 1933, at the Museum in Zion National Park. The eggs had a flexible membranous shell which became somewhat hardened and leathery upon exposure to the air. They were somewhat moist and sticky and wherever they touched one another they stuck together, upon drying, as though they were glued.

Under normal conditions, a snake of this kind usually digs a hole in the sand, lays the eggs together in a more or less regular pile, so that they are all glued together, covers them up with moist sand and then abandons them. This snake, however, being confined in a cage had to deposit her eggs on the floor of the cage. As soon as discovered, she was transferred with her eggs to a sand box where she finished laying the rest of the thirteen by eleven o'clock A.M.

Six hours after being laid the eggs were examined more carefully. The shells were somewhat translucent permitting examination of the embryo by a strong light. There was some difference in the amount of development, which suggested two questions for consideration: (1) Had the eggs all been fertilized at once and grown at different rates or; (2) Had the eggs been fertilized at different times and some been growing longer than others?

Most of the embryos had progressed to the point where a foetal circulation had been developed, but some were much further developed than others. The area opaca and area pellucida were plainly visible in most cases, and the large blood vessels and network of capillaries could easily be seen in most of them, covering about one half the surface of the egg in most cases. So far as could be observed, there appeared to be no mechanism within the egg corresponding to the white twisted strands of the bird egg to hold the embryo in position in the upper part of the egg. The embryo appeared to be fixed in position. If the egg was turned over, the embryo turned with it instead of floating to the top as in the case of the bird egg.

On the third day, the eggs were examined again, and showed further development. The dark spot of the embryo had enlarged in size slightly and the area of the foetal circulation seemed also to have increased. In one case, it appeared to cover one half the surface of the egg. Efforts to incubate the eggs beyond this stage were unsuccessful.

ALONG NATURE'S HIGHWAY

On Nov. 6, while crossing a meadow at the base of the Great Organ, I chanced upon the nest of a Harvest Mouse (Reithrodontomys m. megalotis). The nest was a ball of vegetable down (from the seeds of rabbit brush and cottonwood) about the size of a tennis ball, and more than filled the old deer track which the mouse had chosen for a building site. Inside were four pink mice, a little larger than red Mexican beans, that had not yet opened their eyes. C.C.P.

Rock slides, or falls, are common and spectacular occurrences in Zion Canyon, spectacular because of the huge clouds of red dust that accompany them. The rock usually falls many hundreds of feet, and is so friable that most of it is pulverized to dust by the impact. The effect is much the same as that of an avalanche plunging over a vertical cliff and billowing out in great clouds at the bottom. Early in December we had an opportunity to watch closely the cloud effect of a rock fall from the east face of West Temple. The rock mass was not especially large, perhaps 25 cubic yards, and it did not fall over 300 feet, but the resultant cloud was so large and dense as to completely hide the base of the mountain for nearly an hour, and it had not completely dispersed at the end of two hours. C.C.P.

A "park-minded" porcupine has been assisting in the removal of exotic fruit trees from Zion Park. Ten peach trees in an old orchard on Oak Creek have, within the last two months, fallen victims to the porcupine's appetite for bark, but native species in the same locality have not been touched. C.C.P.

