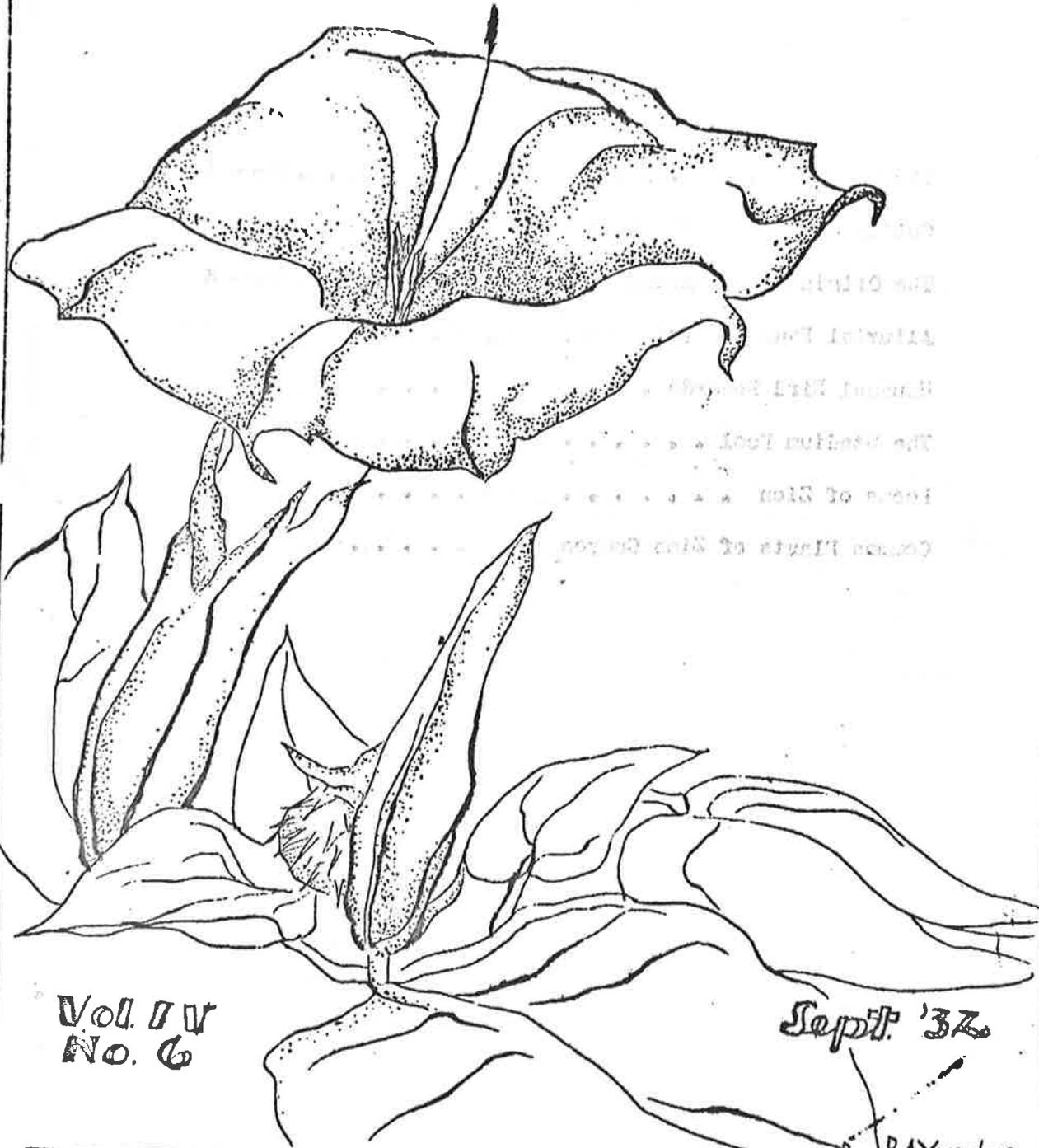


Zuom and Bryce Nature Notes



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U. S. DEPARTMENT OF THE INTERIOR
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ZION AND BRYCE CANYON NATIONAL PARKS, UTAH

Vol. 4
Zion-Bryce Nature Notes

No. 6
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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

P. P. Patraw, Superintendent

John Gray, Park Naturalist

THE DATURA
Mrs. P. P. Patraw

Large, waxy-white flowers, conspicuous on cool early mornings of mid-summer, bloom profusely in the bottom of Zion Canyon. The flower is so characteristic of Zion Canyon that locally it is called "Zion Lily", and it has recently been chosen as the emblem flower of the national park.

The shape of the flower somewhat resembles the Easter Lily. It is sometimes called "Sacred Datura" or more commonly merely "Datura". The scientific name is *Datura meteloides*, a close relative of the eastern Thorn Apple, Jimson or Jamestown Weed (*Datura stramonium*) which is noted for its poisonous seeds and narcotic leaves.

Datura is a member of the potato or nightshade family (*Solanaceae*). The nocturnal habit of *Datura* resembles that of the morning glory, also a member of the same family. Like the morning glories, too, an individual flower blooms but one night; the following day the flower droops and by the third day the corolla has fallen to the ground. The torn calyx persists until the fleshy seed pot, a prickly bur, begins to develop.

After the tightly rolled, green corolla breaks through the calyx it grows rapidly, about 2½ centimeters a day. Usually by the third or fourth night it extends from 9 to 11 centimeters above the calyx, turns white and opens. It does not open until late in the evening, usually not until eleven o'clock or after midnight. It is visited by insects, including a small green leaf-beetle, ants and bees, which effect pollination. Long pollen sacs break the night the flower opens. Pollen is abundant but by morning the anthers are bare. The flower folds up when the sun's rays become hot, about ten o'clock in the morning near the mouth of Zion Canyon and not until noon or early afternoon in the canyon Narrows. In cool, shady places the flowers do not close until late afternoon.

The *Datura* plant grows rapidly and blooms prolifically. A medium sized plant often bears from four to eight flowers, about fifteen to twenty buds of different ages and about twenty-five seed pods in varying stages of development at one time. The seed pods, from $1\frac{1}{2}$ to 2 inches in diameter, are filled with flat, light-brown seeds. There is a fairly high percentage of fertility among the seeds and the seedlings are vigorous.

Datura meteloides ranges from Colorado and western Texas westward to California and Mexico. It inhabits hot, dry, sandy places in canyons, washes, waste places and along road and trail sides, generally avoiding rocky hillsides where soil is shallow. The root extends perpendicularly into the ground. Lateral roots usually begin to appear about three to five inches below the surface of the ground so that the plant obtains most of its moisture from the subsoil. For this reason it is often found not far from stream beds.

The mealy bug, a scaly insect, often attacks the roots. Leaves of many plants are eaten by leaf beetles, common enemies of the potato family.

Datura has been a useful medicinal plant for a long period of time. Piute Indians are said to have used it in poultices. The Hopi Indians consider it dangerous and make no use of it. Children have been poisoned by eating the seeds. Leaves of *Datura stramonium* (for which *Datura meteloides* may be substituted) are dried and used in cigarettes for relief of asthma. It is sold by Park-Davis as "Stramonium". Dr. McIntyre of Hurricane, Utah, uses it extensively as a remedy for bronchial asthma. The active principal of atropine used by oculists may be obtained from *Datura*. It is used as a heart stimulant and also for skin diseases to reduce irritating perspiration.

COTTON GROWING IN UTAH'S DIXIE H.L.Roid, Ranger-Naturalist

The Valley of the Rio Virgin below Zion National Park has been known for many years as "Utah's Dixie". The name was affectionately applied by the early settlers who, under the direction of Brigham Young, entered the valley for the purpose of raising cotton.

The first cotton was grown during the summer of 1855 by a small group of missionaries who had been sent into the region during the winter of 1854-55 in an effort to keep the Indians from attacking the gold-seekers enroute to California over the Old Spanish Trail. In an effort to teach the Indians to produce their own supplies instead of stealing them from the White men, this little group of missionaries, aided by the Red-men, constructed a canal and undertook to teach the Indian the art of irrigation.

Almost by chance a small quantity of cotton seed was obtained from a Mrs. Anderson of Parowan, Utah, a former resident of the southern states. This seed was planted and the crop husbanded with care. Sufficient lint was secured to produce some thirty-five yards of cloth, spun by hand by the wives of the missionaries.

The raising of this cotton and the production of the cloth was fully reported to Brigham Young at Salt Lake City and a small sample of the cloth left at his office. Soon this bit of cloth became the object of considerable comment. Men of experience in the production of cotton fabrics were thenusiastic

Slowly the sea bottom, now our southwestern states, was lifted from the oceans depth and the waters receded, leaving a limy ooze which solidified to form the Kaibab Limestone and in this were embedded shells of sea animals of the Permian Period. This limestone forms the rim of the Grand Canyon, often 700 to 900 feet thick and extending for miles, forming the foundation upon which the sediments more than two miles thick rest that extend from Zion to Cedar Breaks. In the Dixie Country 20 miles below Zion we find the Kaibab Limestone exposed by the Virgin River and the Hurricane Fault.

As the land rose above sea level a great plain was formed which lasted for a few million years. In time this subsided as deliberately and slowly as it had risen and again became the bottom of the sea. Deposits of sand and mud accumulated and it is thought much of the land was covered with shallow marshes and salt bogs. Shallow seas and salt meadows permitted bays or evaporation pans to form, in which gypsum was precipitated in the water and the Moenkopi beds just below Zion were laid down.

Again an upward movement raised the land from this swampy sea and a vast low plain about the size of Utah was created. Over this plain streams distributed their sediments of sand and gravel which were formerly deposited in the sea, but now spread out over the lowland. Later this layer of sand, gravel and mud hardened to form a conglomerate layer (Shinarump - 100 feet in the west to 25 feet at Grand Canyon). Today this layer caps the mesas in many places and may be seen below the entrance of the park, and extends under the cliffs of Zion.

During the long period of grading of this plain, plants and even large pine trees had developed extensively. Many trees were uprooted and washed on to this gravelly plain where they lie embedded in the upper levels. The petrified trees above Rockville and on other mesas can be found in varying degrees of perfection. These, the weapons of Shinarump, the Wolf God, can be found there today partly exposed as they were millions of years ago. With the deposition of these layers closes what is known as the Triassic Period.

Over the petrified trees and layer of now hardened conglomerate there were formed beautiful colored shales, clays and sandstones. These are believed to be deposited in shallow lakes or low-lying plains. This is the layer we see at Springdale, just below the entrance to the park and in this has been found fossil fish, bones of vertebrates, reptilian tracks and much of silicified wood of the petrified forest (Chinle layer).

The next event of importance was the formation of lofty mountains to the west and south in Nevada, Arizona and neighboring California regions. These were high and robbed the east-travelling winds of their moisture and a vast desert developed east of the mountains. As the mountains were high, the moisture accumulating there washed vast supplies of sediment into the arid basin to the east. There the Jurassic winds lifted the sand from the stream banks and heaped it into huge sand dunes. An American Sahara was thus formed with sands to a depth of about 3,000 feet. Later these sands hardened into rock in huge stratified and curious cross-bedded layers visible now in the walls of Zion. For in this vast desert of Jurassic Times was formed the red and white cliffs of Navajo Sandstone that forms the walls of Zion Canyon and out of which is carved the Rainbow Natural Bridge.

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147.

Again this area was submerged and the sea covered the sands. The sea gathered a silty ooze which hardened to a peculiar buff colored limestone and covered the sunken sands now seen on the top of the canyon walls. In this was embedded the bones of molluscs and other sea animals (Carmel Limestone).

Finally, however, the land rose again and a vast swampy plain was formed and the Morrison Time arrived when the heavy, curious creatures lived and perished in the muds of the swamp. These monsters were the dinosaurs.

Again the sea came in over the land, but this time from the Gulf of Mexico. There were formed sandstones in which beds of oyster shells and sea monsters were deposited. After this the sea receded and a vast swampy plain remained. Vegetation became very dense and coal deposits were formed. Then followed a long interval of time in which Cretaceous sands and shales were laid down. At the end of this period the land rose and with it the Rocky Mountains arose and never since that time has the plateau country been submerged.

Over the marine deposits bedded rocks were formed in many places but they were all of non-marine origin and consist of sediments laid down by streams or lakes. Among more recent of these are the Eocene rocks which form the Pink Cliffs from which Bryce Canyon and Cedar Breaks have been carved.

The strata that make up the plateau country drop in steps or cliffs from the top of the series in Utah to the desert plains below. The place to get the lay of the land is from the edge of the Kaibab Plateau which forms the north rim of Grand Canyon. In the foreground lie the "Prismatic Plains", part of the Southern Plateaus. Beyond, in a low band, are the gorgeous Vermillion Cliffs. Overtopping these are the White Cliffs which together with the Vermillion Cliffs form the terraced plateaus. High above all are the Pink Cliffs, in the high plateaus where we find Bryce and Cedar Breaks.

These plateaus have been broken by earth movements. The forces that caused the land to rise were applied unevenly and great faults, cracks or slips appeared. The most famous of these is the Hurricane Fault. Fault lines developed and individual plateaus were cut out. Volcanic eruptions followed and streams of molten lava were spread over certain areas to form many curious and devious designs. Zion lies in what is known as the Margagunt Plateau, bounded on the west by the Hurricane Fault and on the east by the Sevier Fault. Bryce Canyon lies on the east edge of the Paunsagunt Plateau.

Zion Canyon is the result of the work of the Mukuntuwoap River which has cut its way deep into the cliffs of sandstone. It has been aided by other agents such as wind, rain, heat and cold, plant and animal life and by the forces of gravity. The sandstone has been undermined and has fallen out, in some cases in huge blocks leaving curious and fantastic arches, bridges and spires, in other cases it has eroded to form delicately sculptured pinnacles, buttresses and faces.

This is a country of movement; a movement that is slowly, diligently, ceaselessly changing, cutting and tearing down and returning its water-loosened sands by way of the river again to the sea. Southern California is largely composed of Arizona and Utah sands swept there by the Colorado River, aided by its tributaries.

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ALLUVIAL FANS AND TALUS CONES
Gordon Y. Croft, Ranger-Naturalist

Alluvial cones are so called because they are half-circular and relatively steep sloped. They are composed of angular material or talus that has broken off from the high cliffs above and accumulated at the base of the slopes, usually at the mouth of small valleys. The cones of Zion Canyon are unique in that they are not deposited by water but are the result of frost action and other general agencies of weathering. The material is mostly fine sand from the cliffs above that has slid down and come to rest at the base of the slope, thus covering them in many places knee deep with sand and gravel.

Recently the heavy rains produced streams which have cut down through the large fan on West Temple, forming a small gully. At the mouth of the gully where the diminishing volume and velocity of water left the high gradient of the cone to enter the valley below, the stream has dropped its load of sand and gravel, thus producing a beautiful alluvial fan of white sand.

Alluvial fans are seldom produced from talus cones, except in arid regions, but the conditions in Zion Canyon are such as to form this natural phenomena.

UNUSUAL BIRD RECORDS
A. M. Woodbury, Ranger-Naturalist

In the course of collection of specimens for the Zion Museum some unusual bird records have been obtained. Some of them are new records for the Park and one or two are believed to be new records for the state of Utah. Some of the birds have known ranges extending up from the southward and it is not unexpected that they might occur here.

Mexican Crossbill (*Loxia curvirostra stricklandi*)

This highly colored bird was found among the yellow pine trees up on the east rim of the canyon, doubtless attracted there by a good crop of pine cones from which it obtains a large per cent of its food.

Western Blue Grosbeak (*Guiraca caerulea lazula*)

This is a common bird in the lower part of Zion Canyon. It is found mostly among the thickets of willows and trees lining the ditch and river banks and around the alfalfa fields where insects are abundant. It has been observed in Zion, Springdale and Rockville.

Phainopepla (*Phainopepla nitens*)

The phainopepla has been observed nesting and rearing young in Rockville and at Anderson's Ranch. It has similar habits to the flycatchers, perching on top of tree or bush and darting out after passing insects, catching them in the air. The male with his shining blue-black coat, white spot on each forewing and his erect pointed crest is a striking figure. The female is of duller hue, mostly brownish black, and the young tend to resemble the female.

THE STADIUM POOL
A. M. Woodbury, Ranger-Naturalist

In the September 1930 issue of Nature Notes (Vol. II, No. 3) the story of the Stadium Pool along the Narrows Trail was told. The pool had been scoured clean by a waterfall from the hanging canyon above, in August, 1926. Since that time certain kinds of plants, particularly algae, watercross and cattails, had been growing in the pool and certain kinds of animals, such as tadpoles of the tree frog, a water bug, a water stridor, and the whirligig beetle, were at home there.

In July, 1932, another waterfall following a heavy rain poured from the hanging canyon scouring the pool completely clear again of plant and animal life, leaving a clean sandy floor under the pool which is kept full of clear water from the springs that seep out there. By August the green alga (Spirogyra) had begun to grow again and small tadpoles had reappeared.

POEMS ON ZION
By Annie B. Griebenow
Sierra Madre, Cal.

Lady Mountain

Lady Mountain,
Wrapped in misty shadows
That sweep in wraith-like lines
Around her form,
With dignity and grace
Serenely stands
And calmly waits
The centuries to pass.

While we,
Poor human atoms at her feet,
Rush madly to and fro,
Thinking
That we are masters of our fates.

A.B.G.

Devotions

On Sacrificial Mountain's altar
Purple lights are glowing,
From Datura's sacred cup
Perfumed incense rising.
Thru great Organ's mighty loft
Soft wind music stealing,
In the stone Cathedral spires
Choirs of birds are chanting.
Up the rugged mountain-side
Trees lead in procession,
On the banks of Rio Virgin
Wild grapes kneel, confessing.
Silently the Great White Throne
Benediction offers.

A.B.G.

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ZION CANYON

We walked together
My Soul and I
Where the canyon walls enfold;
So glad to be free
From time and strife,
To soar on wings of the mind.

So long had we been apart,
My shadowy Soul and I,
We were rushing through life
Not knowing
We had missed so much that was fine.

We climbed the rugged mountain
Above the haunts of man,
And found a healing solitude
And strength to face life again.
A.B.G.



COMMON PLANTS OF ZION CANYON
John Gray

The Indian Paint Brush
(Castilleja sp.) (Family Scrophulariaceae-
Figwort Family)

Many names have been applied to this plant, such as the Indian Paint-Brush, Painter's Brush, Squaw Feather and Painted Cup. The leaves are alternate, sessile and those subtending the flowers are partly or wholly brightly colored. The flowers are in terminal spikes.

Indian Paintbrush

Three species have been listed from Zion National Park: (1) C. linariaefolia Benth, is the state flower of Wyoming. It has a greenish yellow corolla tinged with scarlet; the plant is glabrous to villous. (2) C. flava S. Wats, has a narrow inflorescence and the bracts are yellow or yellowish in color. (3) C. linoides A. Gray, has a yellow corolla with red or reddish bracts.

The Indian Paint-Brush is found along the trails in Zion and in places along the banks of the Mukuntuwoap River and Oak Creek.



Sunflower

Younglove

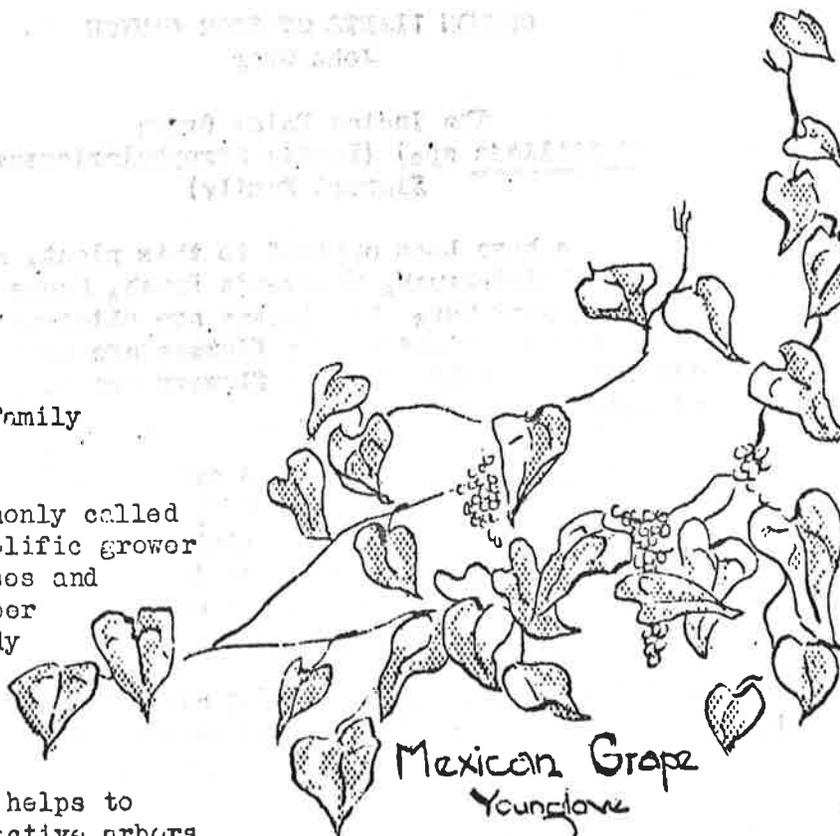
THE SUNFLOWER
 (Helianthus L. sp.) (Family Astoraceo-Aster Family)

Sunflowers cover the valley floor in late August and offer a brilliance of color to the erstwhile green vegetation. In spite of long dry spells, the plants grow prolifically and bloom in abundance.

Two species have been listed from Zion Canyon: (1) Helianthus petiolaris Nutt, is found in the artemisia belt. It is a common species found from Saskatchewan to Missouri and westward to California and British Columbia. (2) Helianthus annuus L., is common to the artemisia, pinon and yellow pine belts of Utah and Nevada. It is the state flower of Kansas.

THE CANYON GRAPE
 (Vitis arizonica Engelm) (Family Vitaceae - Grape Family)

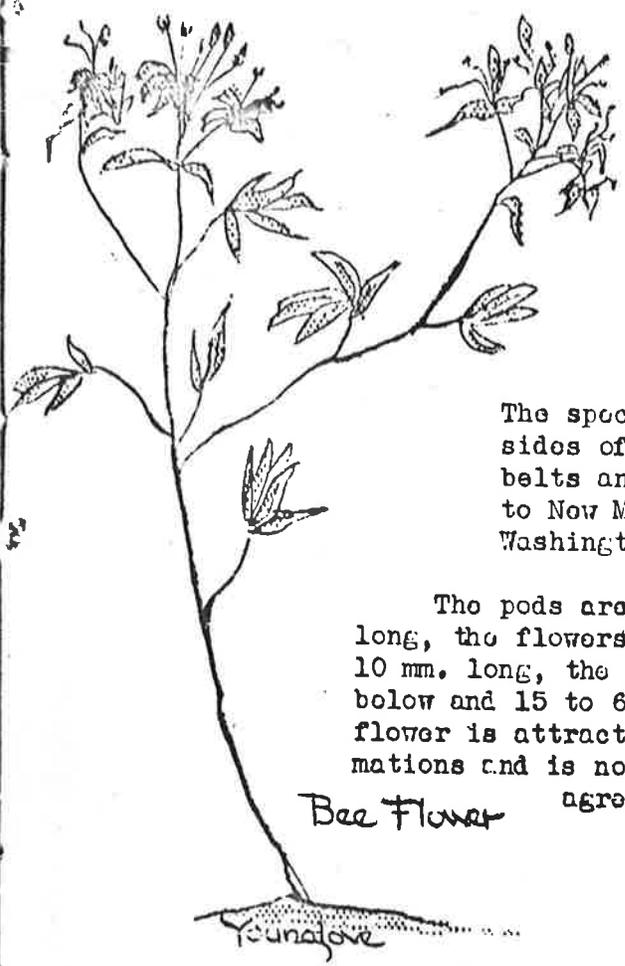
The Canyon Grape (commonly called the Mexican Grape) is a prolific grower along the flats, watercourses and more protected areas of upper Zion Canyon. It forms woody vines, climbing and trailing by tendrils over the many deciduous trees and shrubs that abound in these areas. It helps to form some of the most attractive arbors and plant clusters in the canyon.



Mexican Grape

Younglove

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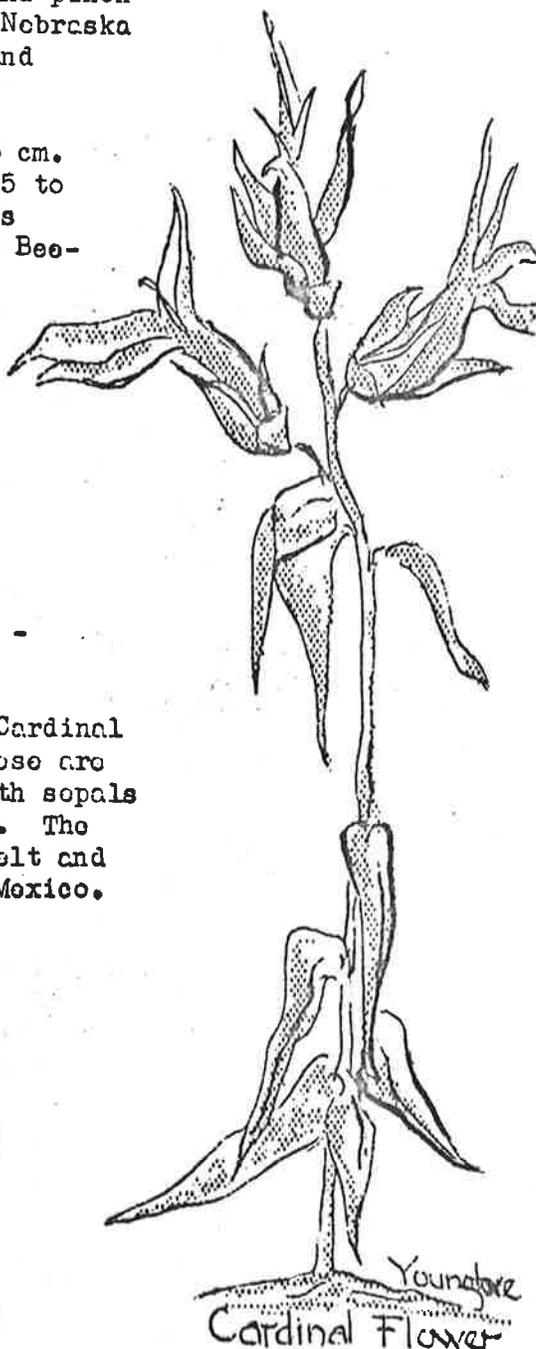
THE YELLOW BEE-FLOWER
 (Cleome lutea Hook) (Family Cappari-
 daceae - Capper Family)

The Yellow Bee-flower is the most common and persistent blooming annual found in Zion Canyon. It is also known as the "Indian Pink" or "Stink Flower" and is found especially along the river bottoms and adjacent banks.

The species is limited to the plains and mountain sides of the artemisia and pinon belts and is found from Nebraska to New Mexico, Arizona and Washington.

The pods are linear 2 to 3.5 cm. long, the flowers are yellow and 5 to 10 mm. long, the plant is glabrous below and 15 to 60 cm. high. The Bee-flower is attractive in mass formations and is noted for its disagreeable odor.

Bee Flower



THE CARDINAL FLOWER or Splendid Lobelia
 (Lobelia splendens Willd.) (Family Lobeliaceae -
 Lobelia Family)

In middle August the splendid offsets of the Cardinal Flower appear along the Narrows Trail in Zion. These are perennial plants with stems 3 to 5 cm. high and with sepals about 8 mm. long. The corolla is crimson in color. The species is common to wet ground in the artemisia belt and is found from Texas to California and in northern Mexico.

Cardinal Flower