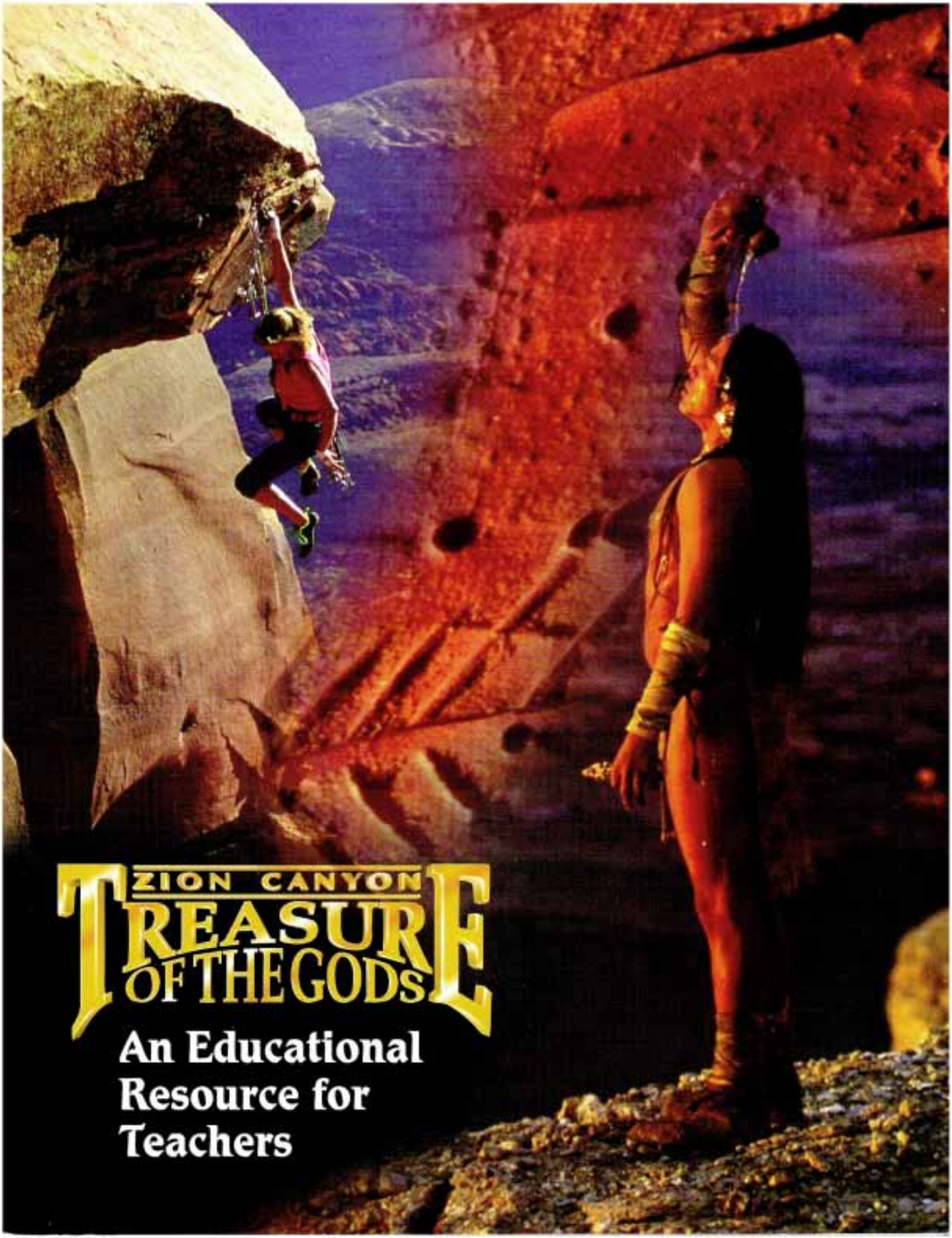
ZION CANYON
TREASURE
OF THE GODS
An Educational
Resource for
Teachers

The giant screen film *Zion Canyon - Treasure of the Gods* is suitable for all ages. While many portions of this guide relate directly to the film, certain information relates to Zion Canyon and the American Southwest in general. Discussions and activities in this guide will fit into subject areas where the geological, cultural, and historical elements of Zion Canyon and the Southwest are the classroom focus. Although a valuable resource of its own, this educational guide will be most useful when accompanying the film.

Zion National Park was set aside for -- and is best known for -- its magnificent natural and scenic features. With the establishment of Zion Canyon as a National Park, many clues to our cultural heritage have been preserved. From these clues, we can learn more about past human activities and their effects on the land and other life. This resource guide has been prepared to this end. To facilitate the teacher's use of materials in this guide, it has been divided into two sections: 1) Ideas for Study & Discussion, 2) Student Activities. Study materials in section one are cross-referenced to activities in section two.

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Activity 9 is adapted from *Sharing Nature With Children*, by Joseph Cornell, Dawn Publications.

Film Highlights

Many of the millions who visit Zion National Park every year have come half way around the world to see this wonder of the Southwest. The film *Zion Canyon - Treasure of the Gods* penetrates time and brings the Canyon's incredible history to life.

Zion Canyon - Treasure of the Gods, a large-format film produced by O. Douglas Memmott and Academy Award winning director Kieth Merrill, offers audiences an unparalleled opportunity to explore the hidden beauties, the history, the legends of Zion Canyon and the mystic Southwest.

American Indian leaders have praised the film for its awe-inspiring beauty, its respect for their culture, and its uplifting message. According to the *Lexicon, Museum & Science Center Newsletter*, "The film has been crafted to educate audiences about the cultures which flourished long ago in Zion Canyon and the scenic beauty which still exists today." The film is both an educational and entertaining introduction to the great Southwest and one of the most spectacular National Parks in America.

Zion Canyon - Treasure of the Gods makes the most of its large-screen format, allowing audiences to explore the hidden recesses and dizzying heights of one of the most beautiful canyons in the world. The film stretches across time and seasons, portraying the hidden depths, the history, the grandeur of Zion National Park

Kieth Merrill, who has produced and directed six other IMAX films, says that *Treasure of the Gods* is the most logistically difficult film he has ever made and he believes it is the most spectacular. "As many of our shots reveal, the beauty and drama of Zion Canyon is unequalled. We carted cameras and equipment into places only half a dozen climbers and canyoneers have ever been."

Zion Canyon - Treasure of the Gods reveals science, history and legend while focusing on the mystical beauty of Zion Canyon. Beginning with the Anasazi, the movie chronicles an ancient treasure as circumstances see it changing hands through the Paiutes, Spanish conquistadors, an Indian uprising, and modern explorers. The treasure finally finds a resting place in a narrow canyon, guarded by the spirit of Sinewava, ancient god of the canyon. The film allows the audience to explore the secret recesses of Zion's slot canyons, experience the terror of a flash flood, and hang with climbers from towers of stone 2,000 feet high.

In the "rock climbing" scene in *Zion Canyon - Treasure of the Gods*, world class climber Nancy Feagin had to perform her nail biting fall 16 times! Besides the technical aspects of the filming, the director wanted to show the terror of falling without Nancy screaming. She performed this amazing stunt at Dead Horse Point, Utah, where she was climbing at a height of 2,000 feet above the ground.

SEE ACTIVITY 1
FOR THE LOVE OF GRAVITY (8-12)

ZION NATIONAL PARK

Zion National Park is one of the most beautiful and popular year-round tourist attractions in the United States. The Park is located in the Southwest corner of Utah, approximately forty miles east of St. George, Utah and 160 miles northeast of Las Vegas, Nevada. Inside the Park is a Visitor's Center and a 121-room lodge, as well as numerous camping areas and RV sites. Over 3,000,000 visitors a year come to stand in wonder and disbelief as they look across the amazing vistas and ponder the creation of Zion's towers of stone.

The road into Zion National Park follows the winding Virgin River, which emerges from towering monoliths of multi-colored stone nearly 3,000 feet high. The monoliths rival those of Yosemite National Park in size and grandeur, except the rock at Zion is red and gold rather than gray granite. The Zion cliffs and canyon have the beauty, color, and splendor of the Grand Canyon, but visitors enter Zion from the bottom of the canyon, along the Virgin River, rather than overlooking the canyon from the top. Besides the perspective of seeing the Grand Canyon from the bottom up, Zion boasts a network of deep slot canyons with walls often no more than 10 feet apart and as deep as 1,500 feet.

The film, *Zion Canyon - Treasure of the Gods*, has made these strange and beautiful natural phenomena accessible to visitors who would otherwise never be able to view them. In some cases the film crew went into canyons previously seen by no more than half a dozen fearless canyoneers. The film also traces the dramatic history of the canyon, from the ancient Anasazi to the pioneer settlers and the perilous exploits of present day rock climbers. In the late 1800s and early 1900s, Zion became known through the work of artists, photographers, and writers. Turvey Denose, the old photographer in the film, is a fictional character, composited to represent the artistic temperament so obsessed with the geological wonders and scenic beauties of the area. The best word to describe the beauty and drama of the canyon and the motion picture is "awesome."

ELEVATION AND CLIMATE

Elevations in Zion range from 3,666 feet to 8,740 feet. The climate varies dramatically with the elevation and the season. From May to October, temperatures range from 70 degrees to 105 degrees Fahrenheit in the day and from 45 degrees to 75 degrees Fahrenheit at night. Afternoon thunder-storms are common from mid-July through mid-September.

"Great White Throne" - A sheer stone wall towering 2,447 feet above the valley floor.

Zion National Park covers over 147,000 acres of land (229 square miles) and includes a desert swamp, a petrified forest, springs and waterfalls, and the always unpredictable appearance of wildlife.

***Physa zionis*, the Zion snail, is a tiny aquatic snail unique to Zion Canyon. The snail clings to vertical wet rock surfaces at springs and seeps.**

The North Fork of the Virgin River, which created the Canyon, still follows its original pattern. Present bends and curves represent the original meanderings of the stream when it started downcutting millions of years ago.

Winters are fairly mild, with average temperatures in the 20s and 30s at night and in the 40s and 50s during the day. Winter precipitation often comes as rain in the canyon and snow on the plateaus. Annual precipitation averages between 15 and 25 inches.

Who Named What?

Names given to the Zion monoliths and wind-whipped structures indicate both the awe and reverence of those early settlers who dwelt within the shadows of the canyon. No one knows for sure who named what, though an early settler named Isaac Behunin is credited with first calling the canyon "Zion." Behunin built his house close to the Great White Throne, the most famous and photographed monument in the canyon, its sheer stone walls rising 2,447 feet above the canyon floor. One evening, gazing across the canyon from his front porch, Behunin was so moved by its grandeur that he recalled a passage in the Bible that mentions a place called Zion (Isaiah 2:2-3), found "in the top of the mountains," where " the Lord's house shall be established." Behunin felt that he had discovered such a place, and from then on, he called it Zion.

John Wesley Powell, already renowned for his exploration of the Grand Canyon, ventured north in 1872 to survey the Parunuweap ("water that roars") Canyon and Little Zion Canyon. He renamed the area Mukuntuweap ("straight canyon"). On July 31, 1909, at the recommendation of Stephen T. Mather, the first director of the National Park Service, President Taft signed a proclamation creating "Mukuntuweap National Monument." In 1919 the name was changed to Zion National Monument, and later that year Congress renamed the area Zion National Park.

Park officials can be credited with some of the names for individual features of the park. Others, including a visiting Methodist minister, scientists, topographers, and local residents, have been credited with originating some of the names. Regardless of who may be credited with naming a given formation, one simply needs to listen to a few of the names to understand the effect of this great canyon on the imaginations of all who entered it:

- Great White Throne
- West Temple
- Towers of the Virgin
- Alter of Sacrifice
- The Sentinel
- The Watchman
- Court of Patriarchs
- Mt. Moroni
- Emerald Pools
- Temple of Sinawava
- Weeping Rock
- Cathedral Mountain
- Angel's Landing
- Kolob Arch
- The Subway
- The Narrows

Each of these formations, almost all of which can be seen in the movie *Zion Canyon - Treasure of the Gods*, inspires the onlooker with reverence and awe.

See Activity 2
Zion Talks Back (8-12)

See Activity 3
Naming the Land (13-18)

EARLY HUMAN HISTORY

The Anasazi (Basketmaker Culture) inhabited Zion many centuries before the known discovery of America.

THE PALEOINDIANS

No one knows for certain when the first inhabitants came to North America, but most scholars agree that bands of people were well established throughout the Americas and in the Southwestern United States as early as 11,000 years ago. These early people, known as the Paleoindians, were nomadic or seminomadic hunters and gatherers. In the beginning, they hunted large animals called megafauna (woolly mammoths, camels, elk, etc.) – some of which are extinct today due to dramatic climate changes.

Small Clay Figurine

As the megafauna became extinct, the people developed what is known as the "Desert Archaic Lifeway." These Archaic people developed a sophisticated knowledge of the land and its resources, and turned to hunting smaller game and gathering wild plant foods. Little has been discovered of their mental or spiritual life, but their material culture was very basic. The Archaic Lifeway enabled the people to live rather comfortably in a harsh environment for several thousand years. These people were probably the first visitors to Zion Canyon and eventually evolved into the Anasazi/Pueblo culture (the Basket Makers) as their lifestyle became more sedentary and their means of subsistence changed from primarily hunting to growing and storing corps.

ANASAZI

NAVAJO FOR "ENEMY ANCESTORS" OR HI-SAT-SI-NOM MEANING "THE ANCIENT ONES"

About 2,000 years ago on the Colorado Plateau, from Zion Canyon to the Four Corners region (where the borders of Utah, Arizona, New Mexico, and Colorado meet), the Archaic Lifeway began to change and develop dramatically, giving rise to the Anasazi culture. Evidence indicates that this culture was comprised of many different "tribes" who, though they may have spoken different languages, otherwise followed a common lifeway -- one that gradually became very different from that of the Archaic peoples.

Though the early Anasazi continued to rely heavily on wild foods, later generations in the Zion Canyon region began to experiment with agriculture, eventually growing large, irrigated crops of corn (or maize), squash and, eventually, beans (the

Early Anasazi Pit House

ion National Park was originally named Mukuntuweap (Paiute for "straight canyon") National Monument.

Sacred Triad). This agricultural life allowed them to abandon their migratory ways and stay at home to tend their crops and build more permanent housing. Over the years, their architecture became increasingly complex, from small villages of circular, one-room "pit houses" to large communities of above-ground, multi-storied, stone and masonry complexes. These include many of the highly defensible "cliff dwellings" known throughout the Four Corners region today.

The area that is now Zion National Park is on the extreme West-Northwestern fringes of the Anasazi territory. While there is no specific evidence of the great kivas (underground religious structures), or large-scale agriculture of the central Four Corners region, there are nevertheless many living structures, food storage cists and granaries, rock art and other materials (tools, pottery, basketry, clothing) that have been found in and around Zion Canyon, as evidence of their time there.

The Anasazi inhabited Zion from about A.D. 500 to A.D. 1200, and mysteriously vanished from the entire Four Corners region by a century later. Many theories exist as to their fate, but it is most likely a combination of environmental and social factors that influenced their move out of the area. Archeological findings suggest that as a more sophisticated architecture developed, an increasing number of trees were used for building and fuel, thereby destroying the watersheds so vital for crops, game, and forage food. This, together with overpopulation, the consequent overharvest of wild game and plant resources, and perhaps competition from or aggression by neighbors, could all have contributed to their disappearance. It is generally accepted that the Anasazi dispersed southward to the mountainous areas of what is now central Arizona and New Mexico. Today they are considered part of the ancestral heritage of the Hopi, Zuni, Acoma, and other Pueblo cultures of the upper Rio Grande.

Southern Paiutes

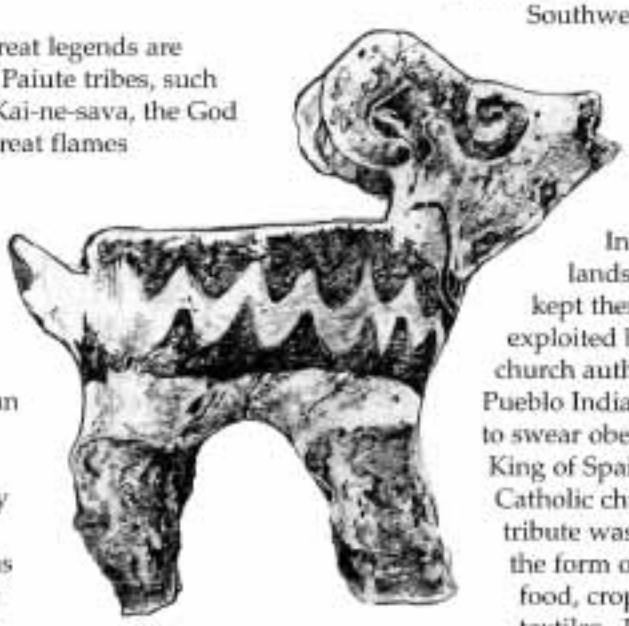
About the same time the Anasazi people disappeared, the Southern Paiutes moved into the area. Before the arrival of Europeans in the West, there were an estimated 18,000 Paiutes living in their aboriginal homeland. The Paiutes belong to the Shoshonean language group, which relates them to the Shoshone and Ute cultures. The name Ute is Navajo for "upper," because the Ute people where the "upper people" or "hill dwellers." The name Paiute, sometimes spelled "Piute," means "water Utes."

The Paiutes once inhabited a vast territory in the West, which stretched from the Colorado River in northern Arizona as far as southern California, encompassing the Arizona Strip and southern Utah, southern Nevada,

Corrugated earthenware jars & black on white geometric designs characterize the artistry of Anasazi potters.

and much of southern California. Part of this area is referred to as the Great Basin. Their homeland has been described as desolate and inhospitable, but the Paiutes were at home there, with the environment dictating the Paiute lifestyle and population.

Many of Zion's great legends are derived from the Paiute tribes, such as the pranks of Kai-ne-sava, the God of Fire, who set great flames (lightening) atop West Temple, and the mischief of Wai-no-pits, the Evil One, who invaded the Indian camps with sickness and disease. So deeply ingrained were these superstitions and the fears that grew out of them that the Paiutes were of little value as guides to the early white explorers. Zion Canyon frightened them.



Pueblo Indians used clay incense burners, like this one in the shape of a ram, for ceremonial purposes.

The Paiutes' traditional way of life was a seminomadic one in which wild plants provided the principal sources of food. The Paiutes also to a lesser extent hunted wild animals -- deer, antelope, elk, bighorn sheep, rabbits -- and grew a few modest crops of corn, squash, and amaranth. The Paiutes are famous for their fine basketry, for the hunting nets they used to trap rabbits and other small animals, and for the robes they wove from the pelts of those animals.

The Paiute group most associated with Zion Canyon and the vicinity is the Kaibab band, whose descendants dwell in the area today.

Spanish Conquistadors

The search for Cibola, a mythical province containing seven cities of silver and gold, brought the Spanish conquistadors to the Southwest. A series of explorations, begun in 1539 by Fray Marcos de Niza, failed to locate anything more spectacular than villages of mud and stone inhabited by people rich in ceremonialism but poor in material possessions.

Formal colonization of the Southwest was begun in 1598 under the leadership of Don Juan de Onate. The Spaniards did not expel the Indians from their lands. Instead, they kept them enslaved to be exploited by civil and church authorities. The Pueblo Indians were required to swear obedience to the King of Spain and the Catholic church. Further tribute was demanded in the form of forced labor, food, crops, buckskin, and textiles. In return, each Pueblo received a Spanish name, religious instruction, and promise of military protection from marauding tribes. Of far greater importance to the Indians than such religious instruction was the acquisition of iron tools, fruit trees, new domestic plants, cattle, horses, and sheep.

Life under Spanish authority became increasingly oppressive through taxation, forced labor, and suppression of native religion, which resulted in the Pueblo Revolt of 1680. The tribes united in an unprecedented effort to drive out the Spanish invaders. The revolt was carefully planned; its chief strategist was a native leader from San Juan Pueblo, identified in documents as Popé. The plan, transmitted to all the Pueblos, was simple. Each tribe would keep a calendar of knotted cord (the Ceremony of the Knot). On a specific day, when the last knot was untied, every village would kill all the friars and settlers. However, two Pueblo messengers, carrying final details of the plan, were captured, and the rebellion had to be put into operation one day prematurely. On August 10, 1680, the revolt took place. Twenty-one missionaries and approximately 380

Throughout Zion Canyon, rocks colored in white and pastels of orange and red have been eroded into hundreds of fantastic shapes etched through time with odd patterns of cracks and grooves.

"O, Great Spirit...let the rays of sun strike my skin and make me clean. Lead me to the center of the sacred hoop, the place of our beginning..."

settlers were killed. Mission records, Spanish houses, government buildings, and haciendas were burned, and the remaining Spaniards were forced to abandon the Pueblo provinces and retreat into Mexico. The uprising was a success; the Spaniards retreated to El Paso and for the next twelve years the Indians once again ruled their villages.

The scene in *Zion Canyon - Treasure of the Gods* of the Pueblo Uprising, when the last knot is untied and the Indian steps from the cave holding the cord above his head, represents that triumphant moment when the Pueblos overthrew their captives.

Kivas

The Pueblo Anasazi kiva owes its concept and design to the earlier Basket Maker Anasazi pit house. Kivas were large round underground buildings used for religious ceremonies. Kiva literally means "underworld." Kivas were, and still are, considered very sacred. They were the community and ceremonial centers of the Anasazi. Men would retire to them to smoke, weave, or discuss pressing community issues. Dances in celebration of planting harvesting, and the coming of the gods were also held there. In modern pueblos, the most sacred ceremonies are held in kivas. Anasazi kivas usually included a bench where people could sit, and a particular hole in the floor known as the sipapu. In many Pueblo "origin stories," the sipapu is the hole through which the people emerged from the subterranean third world into the fourth and final world, which according to the Pueblos, is the world in which we now live.

Anasazi Stone Kiva

The film crew of *Zion Canyon - Treasure of the Gods* was the first motion picture crew that has ever been allowed to film an actual ceremonial scene inside a kiva. The scene is shown at the beginning of the film. The Acuna Tribe from New Mexico played the roles of the Anasazi in the kiva scene. They also advised the director, Kieth Merrill, on the design and decor of the kiva and the ceremony in order to make the film authentic.

Nephi Johnson

The first white man to see the splendor of Zion Canyon was probably a young Mormon missionary by the name of Nephi Johnson. In 1858, Johnson was ordered by Brigham Young, President of the Church of Jesus Christ of Latter-Day Saints (Mormons), who had settled Utah, to explore the upper Virgin River. Johnson persuaded a Paiute to guide him over the rugged escarpment of the Hurricane Cliffs and up the river. But when they arrived at Oak Creek, the guide refused to go any further, warning that Wai-no-pits lurked somewhere in the dark shadows of the narrow canyon called "loogoon" (I-u-goon), which meant "like an arrow quiver" or "you come out the way you go in."

See Activity 4
Make a Basket (8-12)

See Activity 5
Hi-Sat-Si-Nom -

LEGENDS & MYTH

Native people knew of this great canyon for thousands of years. It was part of their life and their legends. The Paiutes called it "Mu-ku-n-to-weap," a wondrous place, place of strange events, place of mystery and superstition. They called it the abode of the supernatural and approached with apprehension.

Mu-ku-n-to-weap, also called I-u-goon, is the realm of Wai-no-pits, the sinister spirit who lurks in gloomy shadows. He can take the form of animals, to taunt and destroy.

Zion Canyon - Treasure of the Gods, portrays an Indian Runner, the chosen, anointed to manhood by the tribal Shaman. For the first time ever, a motion picture crew is allowed to take a camera into the sanctity of an ancient kiva, place of sacred ritual. The old medicine man blesses the youth, gives him the sacred corn, along with the medallion of water and life, of eternal existence.

The Runner is led by Sinewava, ancient god of the Canyon, in the form of a hawk, to a sacred cave. Here the treasures and relics of ancestors are preserved. The past and present converge as the anointed Runner meets the ancient priest and leaves his mark upon the wall of the cave, a single sacred handprint – symbolizing brotherhood – among thousands of images resounding in stone...a chosen keeper of the history of the ancients.

Beyond, the single cry of a hawk touches within us some primal nerve. We know little about the people of the rock, the mysterious Anasazi of the Southwest. In a sudden moment they abandoned their homes...dissolved into the whispering secret of this mystic land.

Kachina costumes and dolls

SUPERSTITIONS

Kachina: (ka-chi-na) A supernatural being who is impersonated by a man wearing a mask. Kachina costumes are used when performing ceremonies in kivas. To the Hopi, Kachinas are a vital part of their way of life. They are used in observing religious seasons and major ceremonies. During these ceremonies, some Kachinas give gifts to children. Generally, these gifts are used to teach Hopi children the beliefs of the Hopi. Hopi children believe in Kachinas the same way other children believe in Santa Claus.

Three Paiute Gods: Kinesava (kai-ne-sava), the masked ghost figure in *Zion Canyon - Treasure of the Gods*, a mischievous god who plays tricks on those who enter the canyon. **Sinewava** (sin-e-wava), a great and kind god. **Wainopits** (wai-no-pits) sometimes called Nopits (nu-pits), an evil god or the "destroying" devil spirit who kept the Parrusits (those who lived in the immediate vicinity of Zion) out of the canyon after sundown. The early Anasazi, however, must not have known about Wainopits, since they built small granaries far up the canyon. They also built trails up the canyon wall near Weeping Rock.

See Activity 6
Make a Kachina Doll (8-12)

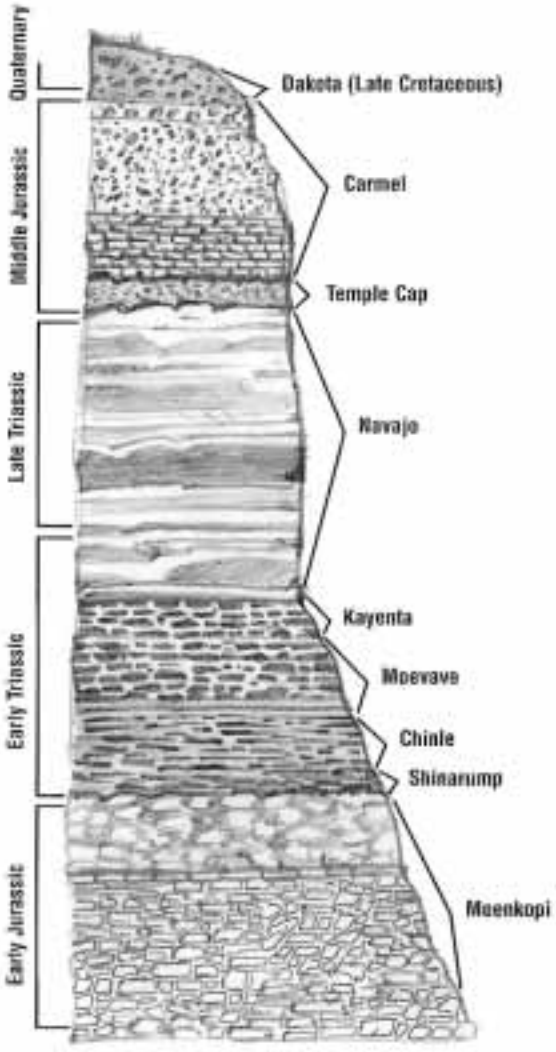
See Activity 7
Legends and Myth (13-18)

Enter Zion Canyon and you have entered the mystery, the majesty...the wonder of earth. Wind whispers. Stone speaks. What forces carved these monuments of nature? From every quarter one feels a supreme design. But is it reality or dream? The unfathomable rises to the surface of our minds and goes beyond understanding to speak to us in a more meaningful way. We cannot hold the wisdom of this Canyon, except in our hearts. But we can hear it in the stone, voices in the wind....

GEOLOGY

"Amidst the treasured temples of Zion, time does not exist, and for a fleeting instant we may feel that we are in touch with eternity."

To the geologist, Zion Canyon is "an unrivaled erosional sculpture on the surface of the Markagunt Plateau, etched by natural forces in layers of Mesozoic sedimentary rocks." (The Sculpturing of Zion, p. 6.) To the ancients, Zion was the abode of Wai-no-pits and Shin-na'wav, the Wolf god, a place of mystery, a place of dread. They said the earth was created by the Great Spirit "when the sky was shattered by light"...theirs was a tale of power and struggle between the forces of good and evil. The white man called it a myth and told a new story of creation...of cataclysmic forces through sedimentation, uplift, and erosion. In the end, perhaps the stories are the same.



Composite Stratigraphic Column of Zion National Park

SEDIMENTATION

The history of Zion is told in its rocks, and began before the appearance of the first dinosaurs, about 250 million years ago. In an orderly succession, the layers of rock were formed one above the other. Geologists call these layers of sedimentary rocks "formations." Each formation reveals the secrets of its time, telling a tale all in itself about the climate, the geography, and the plants and animals that lived then.

The geologic story of the Zion National Park area begins with sedimentation and ends with uplift and erosion. The oldest formation exposed in the area is the Permian Kaibab limestone, which happens to be the youngest formation along the rim of the Grand Canyon. Thus, where the Grand Canyon story ends, the geologic history exposed at Zion begins.

Environmental conditions which created these formations ranged from oceans to coastal flood plains to river flood plains and channels. The scene changed to lakes, swamps, and desert dunes for great lengths of time. Volcanoes deposited ash. Sediments washed down from adjacent highlands. Sedimentary deposits, however, were not continuous. There are numerous breaks, called unconformities, in the stratigraphic sequence due to deposition followed by erosion.

Including the 250 million year old Permian **Kaibab** limestone formations (which are evident only in two small areas in the northwest corner of the park, along the escarpment of the Hurricane Fault), Zion Canyon is made up of at least nine distinct rock layers:

Moenkopi (220 million years old) - The Triassic Moenkopi formation is approximately 1,800 feet thick, consisting of sandstones, shales, limestones, and gypsum, deposited in the sea and on coastal and river flood plains.

Chinle / Petrified Forest Member (200 million years old) - Unconformably overlying the Moenkopi is the Chinle formation, which is composed of the lower Shinarump Conglomerate member and the upper Petrified Forest member. The Shinarump averages about 100 feet thick, consisting of coarse sand and pebbles of hard quartz rocks transported by rivers from eroded highlands. About 350 feet thick, the Petrified Forest member is composed of shales, gypsum, and volcanic ash deposited by rivers and in lakes. This is the bright, multi-colored "rock" of Petrified Forest National Park and the Painted Desert in Arizona. Much petrified wood is found in the Chinle.

Moenave (190 million years old) - Unconformably overlying the Chinle formation is the red Moenave formation, which is divided into two members. The lower member, or Dinosaur Canyon sandstone, is 140 to 375 feet thick in the Park and is a river and lake deposit containing fossil fish. The uppermember, or Springdale sandstone, is a river deposit 75 to 150 feet thick.

Kayenta (180 million years old) - Overlying the Moenave is the red Kayenta formation, consisting of 200 to 600 feet of river sandstones and shales. Dinosaur footprints preserved within the Kayenta formation have been found up the Left Fork of North Creek in Zion National Park.

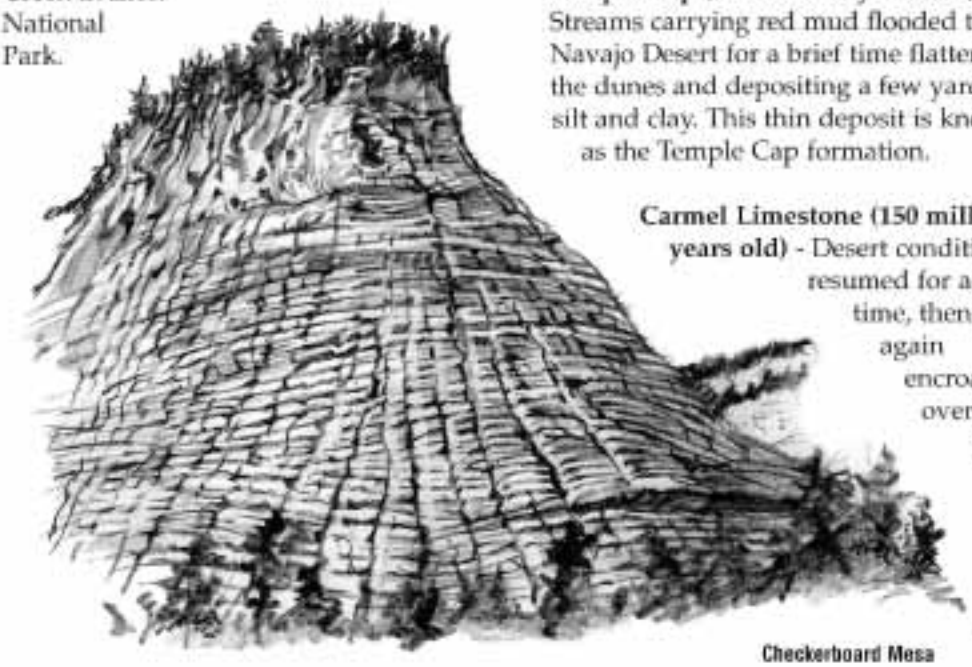
Navajo Sandstone (170 million years old) - The next formation in the stratigraphic sequence, or Navajo Sandstone, forms the spectacular cliffs within Zion. This geographically widespread formation, which reaches its maximum thickness of 2,200 feet in the Park, consists almost entirely of desert dunes. Ancient dunes truncated one another, resulting in "cross-bedding" and the fantastic patterns on the sandstone surfaces, as seen in the opening aerial sequence of *Zion Canyon - Treasure of the Gods*, above Checkerboard Mesa.

Cementing Materials

Approximately 98% of the Navajo Sandstone formation consists of quartz grains blown from the highlands to the west in what is now central Nevada. Cementing materials are calcium carbonate and iron oxide, which give the red color to the lower part of the formations (the upper part, as now exposed, is white from lack of iron oxide, which was either never deposited or has been leached out). The Great White Throne is one of the most famous and spectacular evidences of such a formation. Deposition of the sand occurred during the Jurassic period and lasted for perhaps 10 million years.

Temple Cap (160 million years old) - Streams carrying red mud flooded the Navajo Desert for a brief time flattening the dunes and depositing a few yards of silt and clay. This thin deposit is known as the Temple Cap formation.

Carmel Limestone (150 million years old) - Desert conditions resumed for a short time, then seas again encroached over the land



Checkerboard Mesa

The vertical lines of a formation like Checkerboard Mesa have been formed by water erosion of shallow cracks made in the rock during heating and cooling of the surface. The horizontal lines indicate bedding plains of ancient wind blown sands laid down under desert conditions, similar to the Sahara Desert of today.

It has taken millions of years to form the rocks of Zion National Park. Water is the single most important factor in determining the shape and beauty of the park, and is still at work sculpting the canyons, mesas, and cliffs we see today.

and 200 to 300 feet of Carmel limestone was laid down. This was followed by the deposition of 2,800 feet of more post-Carmel Mesozoic formations, consisting of dunes sands, river deposits, swamp accumulations, and marine beds through the remainder of the Jurassic and Late Cretaceous periods.

Eocene Wasatch and Dakota (50 to 90 million years old) - Much of the Eocene Wasatch formations (except for a small exposure of Dakota formation on Horse Ranch Mountain) have been eroded off the area within Zion, but can still be seen in the formations of Zion's neighbors at Cedar Breaks and Bryce Canyon. Some of these formations developed about the time Dinosaurs were becoming extinct.

Uplift and Erosion

About 13 million years ago, uplift of the entire Colorado Plateau began. Accompanying the uplift was profound erosion. River gradients increased and greater downcutting and widening resulted. Gradually the younger formations were eroded away, giving the spectacular series of step-like cliffs and terraces and plateaus that are encountered northward into Utah from the Grand Canyon.

Faults - Offsetting the cliffs and terraces are large normal faults with thousands of feet of vertical displacement that have broken the Colorado Plateau into separate blocks. These faults are the Grand Wash Fault on the west followed progressively eastward by the Hurricane Fault, then the Sevier Fault, then the Paunsagunt Fault, and finally, a fold instead of a fault, the East Kaibab monocline. Zion National Park lies within the block bounded by the Hurricane and Sevier faults, and has been cut into the White and Vermilion Cliffs along the southern edge of the Kolob Terrace at 7,000 to 9,000 feet.

Virgin River - Erosion of Zion Canyon has been accomplished principally by the Virgin River, which begins on the rim of the Markagunt Plateau at an elevation of 9,000 feet and flows southwestward for a distance of 200 miles to where it enters Lake Mead, at an elevation of less than 1,000 feet, giving the river an average gradient of 40 feet per mile. In some places through Zion Canyon, the gradient is twice as steep. After heavy summer thunderstorms or winter rains, the Virgin River (which sometimes looks more like a creek), becomes a raging torrent, cutting down through the soft Navajo Sandstone with its tools of harder rock picked up from above. Uplift, which permitted the downcutting, did not take place at a regular rate. During periods when no uplift was taking place, the Virgin River ceased to cut downwards and instead cut sidewards, allowing tributaries to enter the main stream at grade.

Water, Shale, and Sandstone - Widening of Zion Canyon has been influenced primarily by the presence of soft shale beds, especially at the top of the Kayenta formation below the Navajo Sandstone. Groundwater percolates through the sandstone until it reaches the impervious shale and then flows out laterally to form a line of springs. It also washes the shale away and undermines the overlying sandstone which then caves in. Surface runoff after heavy rains also washes the shale away and undermines the overlying rock. The Narrows of the Virgin River end at the Temple of Sinawava where the contact between the Navajo and Kayenta formations are exposed and are washed away, and the canyon is widened. White streaks of various salts and travertine deposits (light-colored porous calcite)

Slabs of rock are eventually pried loose by the process of fracturing.

mark the spring lines. Red and black streaks paint the canyon walls from above where rain water has washed down iron oxide and organic matter. Desert varnish composed of iron oxides and manganese dioxide is common on fracture planes.

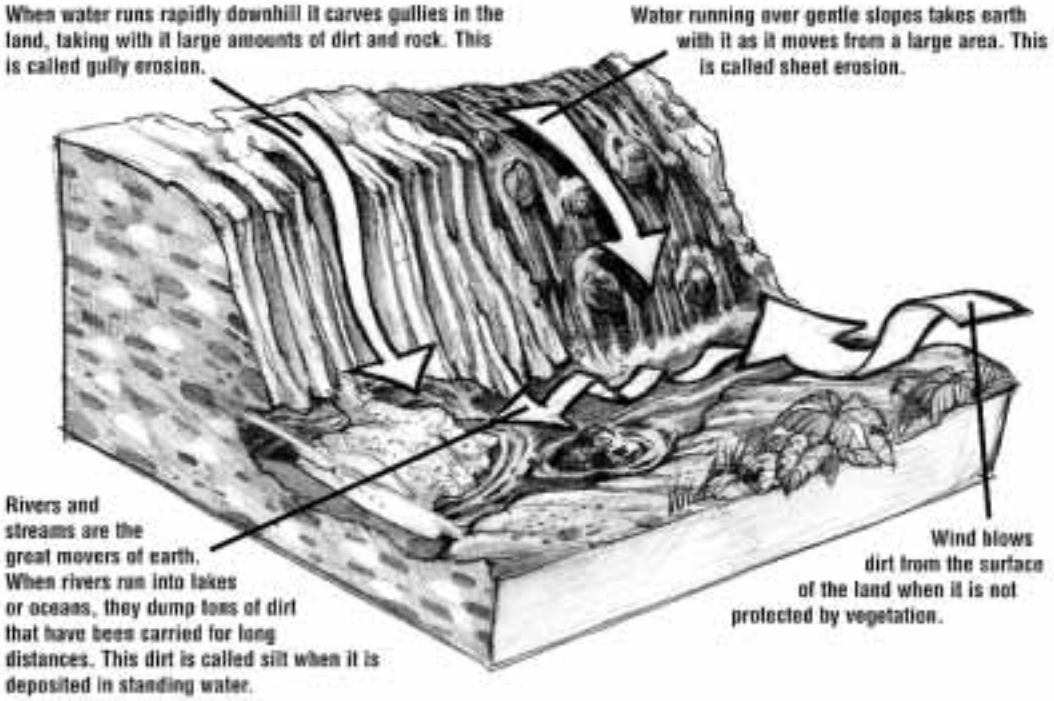
Fracturing - Fractures are enlarged by the wedging action of growing roots, daily and yearly thermal expansion and contraction in combination with the settling of sand and small pieces of rock in the fracture, and freezing and thawing during winter. Eventually, slabs of rock are pried loose by these processes.

Arches - Arches are formed primarily by rockfall on steep bedrock exposures. Rock, constantly under tensional stresses set up by the pull of gravity, create arch formations. Arches may be freestanding, where one may walk beneath them from one side to the other, or "blind," where they are formed in bas-relief on a cliff face. Rock falls and slides are quite common in Zion Canyon. On August 1, 1968, 5,000 tons of rock fell at the end of the Narrows Trail. In 1958 over 60,000 tons of rock fell over one of the windows of the Zion-Mount Carmel Tunnel. Thousands of years ago, a big slide occurred near the Court of the Patriarchs and formed a lake 50 feet deep and perhaps three miles in length by damming the Virgin River. From time to time, movement still occurs along this slide. As recently as the spring of 1995, a huge rock slide which again dammed the Virgin River.

Slot Canyons - There are hundreds of "slot canyons" or geologic "fissures" throughout Zion National Park. In the film, *Zion Canyon - Treasure of the Gods*, the old photographer and his Indian guide descend hundreds of feet into a narrow abyss to access the remote areas of Zion. Slot canyons are often 1,500 feet deep with distances of less than ten feet from wall to wall. The canyon in the motion picture has been entered by fewer than two dozen men, including the film crew, since ancient times.

Fossils - Fossils are the remains or imprint of a plant or animal preserved from prehistoric times by natural methods and found mainly in sedimentary rock, asphalt, and coal. Fossilization of skeletal structures or other hard parts is most common. Conditions for fossilization include quick

Erosion & Weathering



A network of slot canyons, more than 1,500 feet deep and in some places less than 10 feet wide, weave their formations throughout the Park.

The Virgin River discharges over 500 tons of sediment per day.

The Narrows of Zion Canyon are deeper than most skyscrapers are tall, and not much wider than a sidewalk in some places.

burial in an originally moist sediment or other material that prevents both weathering and decay. Shells and bones embedded in hardened sediment can be dissolved by water, leaving a natural mold. Sometimes these molds are filled with mineral deposits, forming natural casts.

Fossils are found throughout the various formational layers that make up the geology of Zion. Sometimes completely intact, but more often fragmented, fossils of "starfish," vertebrates (Metoposaurus), and fish (Semionotus kanabensis) are fairly common throughout Zion. Fossil footprints of dinosaurs have been found in the Kayenta Formation in the Left Fork of North Creek in Zion. Fossils can reveal much about the lives and feeding habits of ancient animals.

Flash Floods

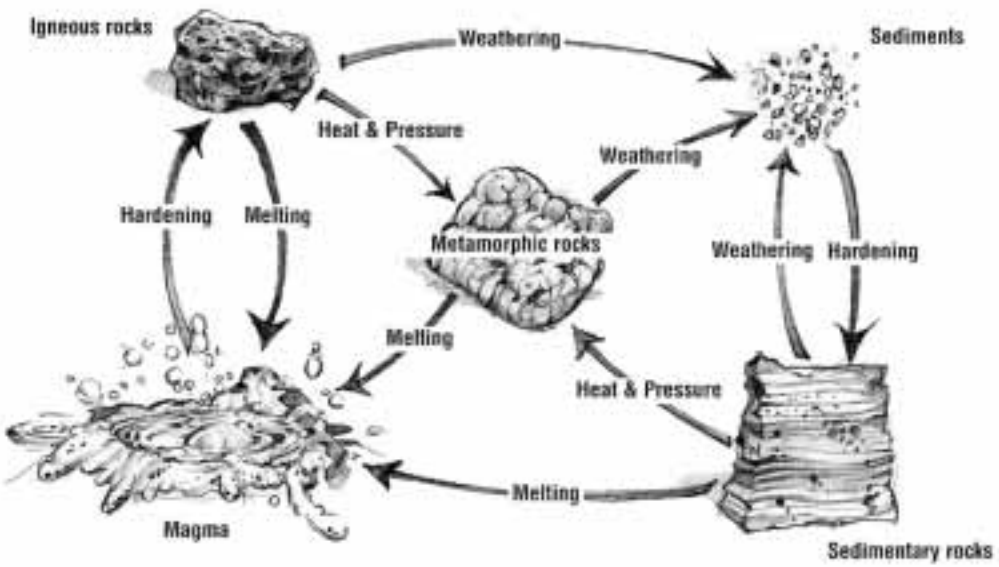
Flash flooding has become the thunder storm-related event producing the most fatalities throughout the United States annually. A given storm's chances to produce a flash flood are, of course, affected by such factors as earlier precipitation and the conditions of the basin into which the rain falls. While the public has no difficulty becoming concerned about a threat of extraordinary weather events, such as tornadoes and hurricanes, flash floods are all the more devastating because rainfall in and of itself is both common and benign, and in the vast majority of circumstances considered non-threatening. In a narrow canyon, such as Zion, the rainfall may occur miles away, and the concentrated run-off in the tributary canyons may be unanticipated and all the more dangerous.

Flash floods arise from high to extremely high rainfall rates, whereas river floods are associated with long duration weather events. The infamous floods of 1993 in the mid-Western United States clearly arose because of the persistence of rainfall over many weeks, but it was the concentrated high rainfall rates in specific areas that brought about the flash floods which caused most of the flood-related deaths of that year.

Flash floods throughout Zion Canyon and the surrounding area are common. A brief thunderburst can dump sufficient water into the narrow slot canyons to cause immediate devastation to anything caught in the water's path. Water in a canyon 40 feet wide can become 20 feet deep in minutes. The scene in *Zion Canyon - Treasure of the Gods*, in which the old photographer is caught in a flash flood, is typical of the dangers. Every few years a number of campers or hikers drown when they are caught unawares by sudden waters crashing through the canyons.

See Activity 8
Make a Fossil (8-12)

Rock Cycle



Zion Flora & Fauna

Zion is home to a wide variety of plant and animal life. Besides the great community of plants common to the Southwest, there are at least 68 species of mammals, 36 species of reptiles, 7 species of amphibians, and 271 species of birds.

Zion Flora

In Zion, where towering cliffs cast long shadows on one side of the canyon, plants that should be as much as 3,000 feet above their across-canyon neighbors are found growing at the same elevation, less than 100 yards away. A variety of flowers dot the canyon floor, their appearance stimulated by Zion's alternating wet and dry seasons. Indian paintbrush, chorispora, and the sand buttercup flourish in March and April. May brings the orchid, violet, columbine, and sego lily. During the drier July and August, day-blooming plants are replaced by night species, such as white evening primrose and the sacred datura.

A variety of trees can be found along the rivers and streams, including the cottonwood, box elder, and velvet ash. Seeping springs on the sheer cliff walls allow "hanging gardens" of ferns, grasses, and wildflowers to further dazzle the eye.

The most noticeable plant community below 5,000 feet is composed of the pinion pine and juniper tree, two evergreen species that grow together in an association known throughout the West as the "pygmy forest." It dominates the talus slopes and sandy benches below the vertical cliffs of Zion. Any good horticulturist will be able to identify manzanita, cliffrose, and various types of cacti. Also found in patches throughout the canyon is gamble oak, scrub live oak, and bigtooth maple. Between 5,500 to 7,500 feet, the terraces and plateaus are dressed by ponderosa pine, Rocky Mountain juniper, and sagebrush.

Prickly Pear Cactus

Sacred Datura "Zion Lily"

Utah Juniper

Live Oak

Zion Canyon is home to at least 271 species of birds, 68 species of mammals, 36 species of reptiles, and 7 species of amphibians.

The roadrunner, a member of the cuckoo family, is considered a clown by some, but it is deadly serious when t flails a rattlesnake to death and swallows it whole.

Zion Fauna

Some of the animals that are frequently seen in Zion include the badger, pocket gopher, white footed mouse, wood rat, mule deer, coyote, weasel, porcupine, and bobcat. The shy, rarely seen mountain lion, or cougar, lives not only in the higher mountains but is found throughout Zion National Park's 3,666 to 8,740-foot elevations. A few elk inhabit the Kolob Plateau to the north, and the desert bighorn sheep is occasionally seen at higher elevations. Although the raccoon was once prolific in the area, it disappeared in the 1920s, but its relative, the ringtail cat, may be found raiding a hiker's camp looking for food.

A variety of reptiles and amphibians, most of them nonvenomous, can be found throughout the area. These include the large vegetarian chuckwalla lizard, the western skink, banded gecko, the horned and short-horned lizards, and the white-banded common and Mountain king snakes. The western rattlesnake is a venomous snake found at all elevations up to 8,000 feet.

Of the recorded 271 bird species throughout Zion National Park, about 60 are permanent residents. Many species of birds breed in the area, including the golden eagle, the peregrine falcon, and three species of hummingbirds. Song birds include the wren, the robin, the black-throated sparrow, the road runner (a member of the cuckoo family), and the lazuli bunting. The raven and scrub jay are perhaps the noisiest birds in the park.

See Activity 9
The Web of Life (8-12)

Mule Deer

Western Rattlesnake

Chuckwalla Lizard

Mountain Lion

Jackrabbit

Roadrunner

Rock Art

Petroglyphs and Pictographs

Ancient inscriptions in the park may be called "petroglyphs" or "pictographs" interchangeably. But the first term has come to identify that which is incised or carved (usually with a stone), while the latter refers to painted figures (made from charcoal and earth pigments mixed with grease, gum, or water). Some pictographs still have bright red or green pigments, which may be as much as 1,500 years old. No one has yet found the key to translating the Anasazi petroglyphs found in and around Zion Canyon, although the attempt to interpret the symbolic import of many of the inscriptions has been made by more than one scholar.

While it is difficult to tell whether the inscriptions convey religious or secular messages, they certainly convey ancient man's urge to record in a timeless shout, "I am!" thereby reserving his place in the known community of man.

Most of the prehistoric rock art of Utah is the product of three major cultures: the Archaic culture, the Anasazi, and the Fremont. These three cultures are not always distinct and clear-cut; there is overlapping and at times confusion regarding their characteristics, origin, fates, chronologies, and geographic areas. Much is yet to be learned.

There are many patterns of rock art that repeat themselves in one form or another. These include horizontal and vertical lines, wavy and zigzag lines, circles and spirals, crosshatching, grids, abstract figures of people and animals, blanket or pottery patterns, plants, triangles, hand prints, bird tracks, reverse Swastika or cross-like images, Chevrons, shields, and rainbows. Many scholars see images symbolizing the circle of life, fertility, hunting, landmarks, the struggle between good and evil, simple messages, poetry, birth and death, noteworthy journeys, battles, and a variety of celebrations.

By choosing a patch of the dark, mineral stain called "desert varnish" for a canvas, the artist was able to accomplish two objectives: contrast and permanence. Many petroglyphs and pictographs depict bighorn sheep, wolves, and other predators, which the Anasazi probably hunted or feared.

Some Rock Art Patterns

See Activity 10
Tools of Thinking (8-12, 13-18)

Kolob Arch, with a span of 310 feet, is the largest free-standing arch in the world.

STUDENT ACTIVITIES

ACTIVITY 1
FOR THE LOVE OF GRAVITY
(8-12)

DISCUSSION

In the "rock climbing" scene in *Zion Canyon - Treasure of the Gods*, world class climber Nancy Feagin, had to perform her nail biting fall 16 times! Besides the technical aspects of the filming, the director wanted to show the terror of falling without Nancy screaming. She performed this amazing stunt at Dead Horse Point, Utah, where she was climbing at a height of 2,000 feet above the ground.

Have students imagine the training Nancy relied on to accomplish her rock climbing feat. Have them imagine the energy she used. Athletic performance, in general, spans an enormous range of activities, almost every one of which attempts in one way or another to defy the law of gravity. The runner runs, the climber climbs, the leaper leaps, the lifter lifts, always against the pull of the earth. From a young child taking a first step to an Olympic athlete breaking a world's record, the body is in a never ending contest against the earth's gravitational pull, forever expending energy to outperform itself or others.

The 2,000 foot climb takes Nancy many hours before she reaches the top, always struggling against the longing of earth's gravity to have her back. When, finally, she has almost attained her goal, her rope slips and gravity reminds her of the power of the natural forces she is up against.

For Students: What is gravity? Would Nancy be able to fall from the cliff without it? Gravity (or gravitation) is the attractive FORCE existing between any two particles of matter. Because this force acts throughout the universe, it is often called universal gravitation. Isaac Newton (considered by some to be the greatest scientist who ever lived) was the first to recognize that the force holding an objec to the earth is the same as the force holding the moon and planets in their orbits. You might say that, like the sun fc its planets, the earth has a great attractio for Nancy. Certainly, she would not be able to fall from the cliff, except for the earth's gravitational pull. How fast does she fall? Well, nobody measured her rate of fall with a radar gun, but you can be sure that she fell exactly at the same rate mouse would have fallen. Believe it or not, according to the law of gravity, the measure of the force of gravitation on a given body on earth is the WEIGHT of that body. That means that gravity make: everything fall at the same speed!

ACTIVITY

To demonstrate the gravitational princip of objects falling at the same rate, have a student stand on a chair, with a baseball in one hand and a nickel in the other. Tel him to hold his arms away from his body at the same distance from the floor and open his hands at the same time. Which do students think will hit the floor first, the ball or the nickel? They will probably think the ball, since it is heavier, but they will be wrong. Both the ball and the nickel fall at the same speed, so they should reach the floor at about the same time. Have different students try the sam experiment with a number of objects of either the same or different weights.

ACTIVITY 2
ZION TALKS BACK
(8-12)

DISCUSSION

Close-walled canyons, such as Zion, allow visitors to experiment with the peculiar phenomenon of echoes. Like lightwaves, sound waves travel in a straight line, and when they hit an object

are reflected or absorbed. When sound waves strike an object, they may make it vibrate and send the sound off in all directions. An echo is the reflection of a sound wave back to its source in sufficient strength and with a sufficient time lag (at least 0.1 seconds) to be separately distinguished by the human ear. Tell students that when sound waves bounce off hard surfaces sufficiently close together, the waves may come back so clearly that the sound is almost unchanged. Carpets, furniture, and people absorb sounds and interfere with the movement and reflection of sound waves. In order to produce a good echo, the environment must be ideal for reflecting sound waves.

Activity

Allow students to experiment with echoes by first identifying the best environments for reflecting sound waves. Good places to make an echo might be a handball court, a long hall or room that has no windows, standing on a cliff surrounded by large, mountainous rocks (as in Zion), or shouting over a quiet mountain lake.

ACTIVITY 3
NAMING THE LAND
(13-18)

Discussion

See information and ideas incorporated in the section "Zion National Park."

Activity

Ask students to write a personal essay about a geographical or scenic area that has impressed them deeply. Tell them to describe the area and how they felt about it. If they had been an early explorer to the area, seeing it for the first time, alone, how would they have felt? What would they name the area? Why?

ACTIVITY 4
MAKE A BASKET
(8-12)

Discussion

Have students imagine what it was like living in one of the Anasazi tribes of Zion, as cliff dwellers. They would be called on to gather wild food and experiment with agricultural means to grow the "Sacred Triad" (crops of corn -- or maize -- squash, and beans). Some of them would have to learn to make fine stone tools, others might learn to weave baskets, or if skillful enough, design and paint pottery. A male, of age, could participate in the sacred ceremonies held inside a kiva. Perhaps he would dance and sing with the other men or pound out rhythms on the stretched animal hides of drums.

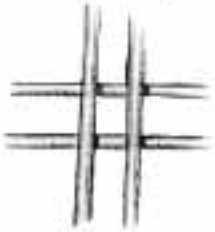
Activity

To a lesser or greater extent, almost all Native American tribes have developed the art of basket making. Like other Indians, the Anasazi used the basket for the practical purposes of storing food and carrying water. Baskets were made by both men and women in a variety of sizes, depending on the basket's purpose. Basketmaking began with the women searching for materials. They gathered the inner bark of willow and cedar trees, together with young shoots from bushes, fern stems, tree roots, and grasses. Twining and coiling were the two basic methods used to make baskets. Twining was used to make fish traps and seed beaters as well as baskets for storage and transporting heavy materials. The more difficult method of coiling basket materials created a firm, watertight basket. Since the Anasazi had no kettles or pots in which to boil water, cooking baskets also had to be watertight. Water was boiled in a cooking basket by dropping fire-heated rocks into the waterfilled basket. Food was then placed in the boiling water and slowly cooked.

Make a basket according to these simple directions: Obtain basket weaving supplies from a local crafts store, or have the students look in the surrounding area for long, pliable twigs. To make them

more flexible, the twigs should be stripped of their bark and soaked overnight. Craft store materials may also need to be soaked. Additional items, such as beads, shells, or feathers, may be obtained to further adorn the baskets. Have students follow the seven-step diagram below to twine their own personal bowls (6 to 8 inches in diameter):

Step 1: Take four twigs and place them in a cross. These are your "spokes."



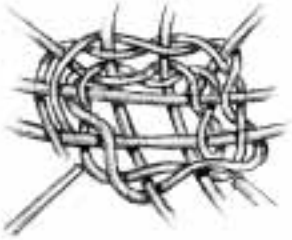
Step 2: Take another twig (your "weaver") and bend it in half around the first spoke as illustrated.

Step 3: Give the weaver a half twist and wrap it around the second spoke. Continue weaving around the other spokes, as shown in the illustration. When you have used up your first weaver, pick up two new strands and twine them as a continuation of your first weaver by pushing the ends of the new strands into the twining.

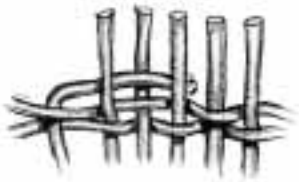
Step 4: When the new strands are secure, take the opposite end of each one (your "weavers" now) and give it a half-twist around the spokes as you did before.

Continue adding weavers as necessary. Notice that you are creating a spiral sha around the spokes.

Step 5: Begin to add more spokes, initially to each of the four corners, and continue twining.



Step 6: When you think your bowl is large enough, bend the loose ends of the spokes inside the bowl.



Step 7: Take a length of string and wrap one end around one of the bent spokes several times. Take the rest of the string and wrap it around the additional bent spokes, one at a time. Leave enough string to tie a knot around the last spoke The bowl now has a rim. If desired, you can now decorate your bowl with beads, shells, and feathers.

Finished basket:

ACTIVITY 5
HI-SAT-SI-NOM
"THE ANCIENT ONES"
(13-18)

Discussion

Discuss the three specific Indian cultures associated with Zion from earliest times to the present (Paleoindians, Anasazi, Paiute). Discuss the defining traits of each culture. Are modern people substantially different from their ancestors? As depicted in the film *Zion Canyon - Treasure of the Gods*, discuss how people have changed or how, and in what ways, they have stayed the same.

Activity

Per the above discussion, have students write a short story, perhaps with illustrations, about what life might have been like in Zion during the time of the Anasazi.

ACTIVITY 6
MAKE A KACHINA DOLL
(8-12)

Discussion

Kachinas (Kah-CHEE-Nahz) are supernatural beings who are impersonated by men wearing masks. Kachina costumes are used when performing ceremonies in kivas, as in the film's opening scenes inside the kiva. To the Pueblo Hopi, Kachinas are a vital part of their way of life. They are used in observing religious seasons and major ceremonies. During these ceremonies, some Kachinas give gifts to children. Generally, these gifts are used to teach Hopi children the beliefs of the Hopi. Hopi children believe in Kachinas the same way other children believe in Santa Claus.

Activity

Real Kachina dolls were made from the roots of the cottonwood tree. They were carved with feet and detailed masks and costumes. But your students can make a spirit figure from almost anything. It can have a mask or not. Students can decorate their figure with feathers, beads, paper cutouts, leaves, ribbons, or anything that expresses their feelings.

For the body, start with an empty paper towel tube, a one-quart milk carton, a wooden dowel, or a tied bundle of dried grasses. Make hair and facial features using cotton puffs, twine, buttons, shells, or fancy pasta shapes. Make slits in the body and poke plastic straws or feathers into the slits, or wrap the body with layers of colored yarn. Tie small objects to the yarn, or hold them in place while wrapping several layers of yarn over the objects. Secure the yarn with white glue.

ACTIVITY 7
LEGENDS AND MYTH
(13-18)

Discussion

Both legends and myths are traditional stories occurring in a timeless past and involving supernatural elements. Products of prerational cultures, myths express and explain such serious concerns as the creation of the universe and of humanity, the evolution of society, and the cycle of agricultural fertility. Myths are differentiated from folktales (e.g., Cinderella and tales from The Arabian Nights) by being more serious, less entertaining, more supernatural, and less rational and logical. Legends and sagas, by contrast with myths, are historical or quasi-historical in nature.

Ask students with what myths or legends they are familiar? Discuss the elements most myths and legends have in common.

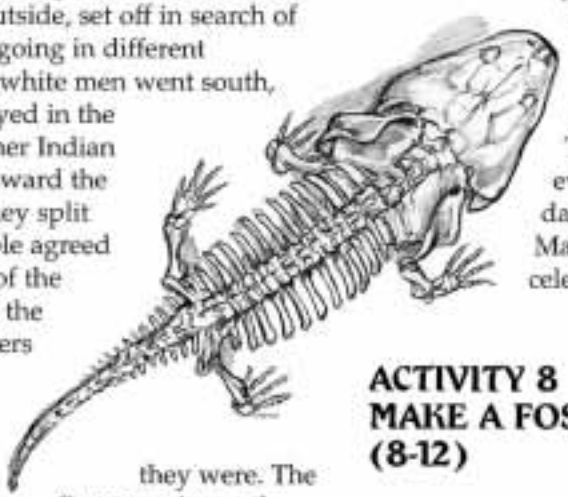
Activity

Following are two Pueblo myths, each of which, in their own way, emphasizes water and the growth of plants, which were the dominant concerns of desert farmers. Ask students to read or listen to the following Pueblo Indian myths. Discuss the meaning and symbols in each of the myths. Have students then write

their own myths (500 words) and, if they desire, illustrate them.

Mocking Bird's Song

According to a Hopi myth, the inhabitants of the earth once lived in a beautiful underground world. Families worked and played together happily. But as the people grew wealthy and self-satisfied, they also grew greedy. In punishment, the living waters rose around them and flooded their underworld paradise. Spider Woman came to their rescue, and in the form of a man led them up a reed, across a pinion pine tree, and over a giant sunflower that reached above the flood. As people climbed safely to the outside world, Mocking Bird alighted in a high branch and assigned each individual to a tribe. But before all of the people could be assigned, Mocking Bird grew tired and fell asleep. The unfortunate people remaining behind had no place to go and tumbled back through the hole into the underworld, now a place of the dead. Those on the outside, set off in search of the sunrise, all going in different directions. The white men went south, the Pueblos stayed in the middle, and other Indian nations went toward the north. Before they split up, all the people agreed that when one of the groups came to the sunrise, the others would stop searching and stay where they were. The first to arrive at the sunrise were the whites, who had created horses to help them. Upon the discovery by the whites, a great shower of stars informed the others, and both the Pueblo people and other Indians settled where they are now.



The Corn Maidens

A Zuni myth tells about ten beautiful Corn Maidens who accompanied the tribe's forefathers when they came up from the underworld. The Corn Maidens were invisible to ordinary eyes, and travelled with the tribe for four years, unseen and unknown. When the tribe arrived at the Place of fog ("Shipololo"), a band of witches discovered the Maidens and gave them seeds of different kinds of maize and squash which transformed them into human shape. The Zuni travelled on, but the Corn Maidens lingered in a magical dance-bower, walled with cedar and fringed with spruce, dancing with their bright stalks of corn with white plume-like leaves, and bathing in the dew. A party of deer-hunters discovered the Corn Maidens and took them before the Zuni to dance, but as they danced, the people all fell asleep. In the meantime, the little flute-playing god named "Payatamu," who places blooms on flowers, had come to watch. He was charmed by the dancing girls and fell deeply in love with Yellow Corn Maiden, the loveliest of the ten. The Corn Maidens read his thoughts and in fear kept dancing until he too had fallen asleep; they then fled away to the Mist and Cloud Spring. A great famine plagued the Zuni tribe, who prayed desperately for the Corn Maidens' return, until finally they were persuaded to come back and dance again. The famine ended and ever since the beauty and dancing of the Corn Maidens have been celebrated in Zuni ritual.

ACTIVITY 8
MAKE A FOSSIL
(8-12)

Discussion

Based on the material in the section on Geology, discuss how nature works to make a fossil, and how fossils are found in almost every layer of the earth.

Activity

Have students make their own fossils by using shells, leaves, or flowers to create an imprint. Fossils can be almost anything as long as they were originally part of a plant or an animal. Materials

needed: A shallow box or pan, modeling clay, shells, leaves, or flowers, plaster of paris, water, a knife or a stick, shortening.

Step 1 - Fill the box or pan with clay and smooth out the surface.
Step 2 - Press in the objects to imprint (shells, leaves, flowers, your own handprint) then remove them.
Step 3 - Mix about 3 cups of plaster of paris into two cups of water. Stir until you have a thick sort of soup. Pour a thin layer of this mixture over the clay and let it set until hard.
Step 4 - Carefully remove the box and the clay. You will find a "fossil" imprint in the hard plaster. This is a negative imprint, something like the negative of a photograph.
Step 5 - To make a positive imprint of your fossil, replace the plaster of paris back into the box or pan. Mix up another batch of plaster of paris with water. With the shortening, grease the top of your negative imprint, and pour on a second layer of plaster. Let it set until hard.
Step 6 - Separate the two pieces of plaster, and you will see a positive imprint of your fossil.
Step 7 - You can make any number of fossil imprints this way. After you have imprinted the fossils you want, you may then paint them, and arrange them artistically.

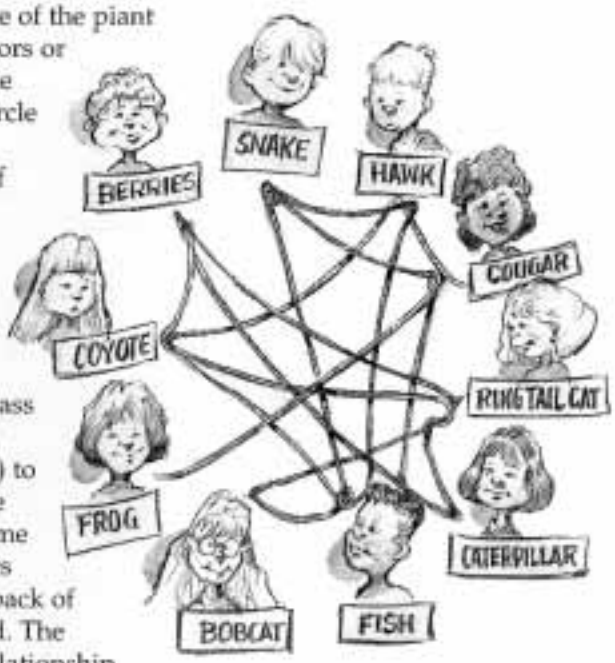
ACTIVITY 9
THE WEB OF LIFE
(8-12)

Discussion

If you think about it, the goal of every plant or animal is to stay alive. Nevertheless, Mother Nature is harsh, and in order to survive, one living thing must eat another while it works to protect itself against being eaten. This is sometimes called the "food chain" or "survival of the fittest." Other factors besides worrying about being eaten may also affect the cycle of survival in the wilderness. Man's presence, for instance, sometimes has an impact on nature. Everything, from roads, cars and buildings to recreation and litter, may affect various types of plantlife and wildlife. Dramatic changes in the habitat of even one plant or animal also affects other plants or animals in the "food chain" cycle. This is the delicate balance of nature, and man must be sensitive to it in order to coexist in the most satisfactory manner.

Activity

This activity demonstrates how various types of plants and animals found in Zion National Park, or more generally in the American Southwest, are interconnected and dependent on one another. Provide each student an index card. Instruct them to write the name of a plant or animal indigenous to the American Southwest on the card. On the back of the card, have them list one or two predators for the species they have chosen and, if appropriate, one or two prey. Tell them to pin or tape the cards to their shirts and blouses with the name of the piant or animal (not predators or prey) visible. Have the students stand in a circle and give the end of a ball of string to one of them. This is the beginning of the food chain. Ask the student holding the string what plant or animal he is and tell him to carefully pass the ball of string (still holding on to his end) to another student in the circle who has the name of one of the predators or prey listed on the back of the first student's card. The string indicates the relationship between the two animals (or plant and animal), demonstrating that one relies on the other for food. Continue the activity among the students in the circle, passing the ball of string back and forth, each student holding onto a part of the string as he receives it. Eventually, students may end up holding onto several pieces of string, depending on which animal or plant they represent. As the ball of string moves from one student to another, each will see a "web" develop. When each student is holding a part of the web and all of the cards have been used, you may stop the activity and discuss the



relationships dependent on the web (while the students continue to hold onto their section of the string). Ask what would happen if one of the strings were cut. Then take a scissors and snip one of the strings. Students will see that the web begins to collapse. When one of the plants or animals is removed, what happens to the food demands of the rest of the web? Discuss the dependency of one animal or plant upon another.

ACTIVITY 10
TOOLS OF THINKING
(8-12, 13-18)

Discussion

What is the process of communication? How is language developed? Before language, the world was filled with images, and those images forced early man to new levels of consciousness through the process of interpretation or, that is, through the process of drawing inferences about the images he saw. Two basic tools of thinking are used in drawing inferences about the images we see – analysis and synthesis. Analysis is the process of breaking something into its parts. For instance, you first see the total image of a tree before breaking it into its various parts to look at it more closely: trunk, branches, leaves, roots, bark, etc. Synthesis is the process of recombining those parts into a new whole. After you see the tree, then analyze it by looking at its individual parts, you can then reassemble those parts and infer that, while some trees are alike, all trees are not the same. Leaves, bark, and branches may differ from tree to tree. The process of analysis and synthesis takes the observer from the general to the specific and back to the general which, as a result of the process, has become more specific. In another sense, once the observer begins to make inferences about trees, he begins the process of moving from the concrete to the abstract which is the stuff of thought and the means by which we are able to understand more completely the world about us. Eventually, the concrete image of a tree is etched as an abstract symbol upon a rock. Or an alphabet, to represent (symbolize) sounds, is developed, and one day, centuries hence, because we have learned to abstractly conceptualize the concrete, we find ourselves shooting manned rockets to the moon.

How, then, you might ask, did the Anasazi see the world around him? Why was he compelled to inscribe that world on the surface of a rock? What did those inscriptions communicate to his contemporaries and what do they communicate today?

Activity (8-12)

Ask students to develop a "picture language" by drawing figures (abstract animals, designs, symbols) on a piece of paper or on a rock. Their drawings must provide information, tell a story, or convey a message. Have students exchange drawings for interpretation and explain the "picture language" they have been given to interpret. At the end of the exercise, discuss what has been communicated in the form of this "rock art." There are many reasons ancient man painted pictures on rocks, and this exercise should help students gain insights into some of those reasons.

Activity (13-18)

Assign students to write a poem about the earth, the sun, or the moon. Tell them that the poem must be 15 to 25 lines long and employ at least six symbols. After they have written their poems, have them write a 500 word explication of the meaning of their poem and their use of symbolic language. How did their use of symbols help communicate the idea or the message behind the poem?