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This bulletin is issued ^{quarterly} ~~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

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Notice

Certain back numbers of Zion-Bryce Nature Notes have become exhausted because of extra demands for them. This office will send a franked, addressed envelope to any reader who is willing to donate from his files any of the following numbers:

Vol. I, Nos. 1 and 2
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The last one, Vol. VI, No. 2, is especially needed.

THE REPTILES OF ZION AND BRYCE CANYON NATIONAL PARKS

By C. C. Presnall

Reptiles constitute the most evident form of vertebrate life in Zion National Park, this being chiefly due to the fact that the area of the greatest human concentration (Zion Canyon) offers an ideal reptilean environment, being part of the Colorado River Sonoran Zone area in which are found approximately half of the reptilean forms of the western United States. Bryce Canyon National Park, on the other hand, is relatively barren of reptiles, for although portions of it are also within the Colorado drainage, it is so high and dry as to offer few favorable habitats for them. Of the twenty-five forms listed here from the Zion region, only six have been found in Bryce in limited numbers, as follows: sagebrush swift, short-horned horned toad, desert whiptail lizard, Great Basin gopher snake, wandering garter snake, and Great Basin rattlesnake.

Considered in relation to their environment, the reptiles inhabiting the canyons of Zion Park are an important and interesting group. They are usually successful in their adaptations to the semi-desert conditions, and are more active during hot weather than any other vertebrate group. This, incidentally, is one reason why they are more noticeable than other animals. Also they are an effective check against an over-population of insects, and the larger snakes aid in rodent control. Taken as a whole, reptiles are very beneficial to mankind and do not deserve the all too common destruction carried on because of ignorance and fear of a few poisonous species.

In this region there are but two dangerously poisonous reptiles: the Great Basin rattlesnake, and the gila monster. The latter is not known to occur within the park boundaries, and the former has never bitten anyone in these parks. Even if it should, there are nine chances in ten that the victim would survive, if proper first aid were given; and if no treatment whatever were given, the chances of survival are still about six in ten (estimate of the American Medical Association).

In the following list of reptiles now known to occur in Zion and Bryce there are included two species (gila monster and lyre snake) which have not yet been definitely recorded in Zion, but which have been taken so close to the south boundary as to indicate that they will be seen in the park sooner or later. The list has been prepared with a minimum of annotations. For detailed descriptions, food habits, etc., reference should be had to the papers in the appended bibliography, all of which are in the Zion museum library.

- Banded Gecko, Coleonyx variegatus. Confined to the lower and hotter portions of Zion Park, where it is occasionally found under stones or in crevices. It appears to be nocturnal and insectivorous, and has the unique habit of emitting a low squeaking sound when disturbed.
- Western Collared Lizard, Crotaphytus collaris baileyi. Lives on open rocky slopes in warmer portions of Zion Park, usually below 4,000 feet, but is somewhat uncommon. It feeds on insects and other lizards, and is very pugnacious when caught.
- Leopard Lizard, Crotaphytus wislizeni. Apparently an uncommon species; a few were seen and one collected on clay slopes and flats of the Coalpits Wash region in 1935.
- Chuckwalla, Sauromalus obesus. A large vegetarian species living among rocks in Lower Sonoran portions of Zion Park.
- Rocky Mountain Tree Uta, Uta levis. A small lizard occasionally found among ledges and cliffs in higher portions of Zion Park. This is apparently the western limit of its range.
- Brown-shouldered Uta, Uta stansburiana stansburiana. This very small lizard is widely distributed in the Upper and Lower Sonoran Zones, usually among vegetation rather than rocks. It has not yet been found in Bryce, but may perhaps occur in the lowest parts of that park.
- Stejneger's Blue-bellied Lizard, Sceloporus elongatus. Very common in Zion Park, usually below 5,000 feet; commonly found on rocks and trees.
- Sagebrush Swift, Sceloporus graciosus graciosus. As common as elongatus and even more widespread, occurring from the lowest elevations up at least to 8,300 feet (near Bryce Point), but it is most common above 5,000 feet. It is usually found on the ground or in brush.
- Desert Scaly Lizard, Sceloporus magister. A large, spiny, brilliantly colored lizard, found commonly at low elevations; usually in trees, yucca, or cacti.
- Short-horned Horned Toad, Phrynosoma douglassii ornatissimum. A comparatively brightly colored lizard usually found at higher elevations (up to 9,000 feet in Bryce), but occasionally down into the Lower Sonoran Zone.
- Desert Horned Toad, Phrynosoma platyrhinos. Found in Zion Park below 6,500 feet.
- Gila Monster, Heloderma suspectum. This, the only poisonous lizard in North America, has not yet been taken in Zion Park. It has been frequently reported here, but all reports that were investigated proved to be chuckwallas or banded geckos.

Sonoran Whiptail Lizard, Cnemidophorus gularis. Fairly common in Zion Park, below 6,000 feet. The whiptail lizards are ground dwellers capable of great speed for short distances.

Desert Whiptail Lizard, Cnemidophorus tessellatus tessellatus. Approximately the same distribution as gularis, but usually in more open, sunny areas. A few have been collected in the lowest portions of Bryce Park.

Western Skink, Emmeces skiltonianus. Found in moist situations, as Emerald Pools and cool canyons along the West Rim Trail. Chiefly a Transition and Upper Sonoran Zone species, and the most widely distributed lizard in the West. Not yet recorded in Bryce, but might be expected around springs and meadows. It has two color phases: young are striped, with a bright blue tail; very old ones are olive green with reddish heads.

Sonoran Ring-necked Snake, Diadophis regalis regalis. Thus far recorded only in Zion Canyon between elevations of 4,000 and 4,500 feet, usually found under leaves or other litter. In view of its secretive habits it is probably not nearly so rare as our few records would indicate.

Red Racer, Coluber flagellum frenatum. Fairly common in the lowest portions of Zion Park. It feeds chiefly upon lizards, and occasionally small rodents and birds eggs.

Western Striped Racer, Coluber taeniatus taeniatus. Fairly common throughout Zion Park, and very common in the canyons. Food habits are similar to the red racer.

Great Basin Gopher Snake, Pituophis catenifer deserticola. The largest and most common snake in Zion Park, but rare in Bryce, where there is but one record on the rim. Its markings somewhat resemble those of a rattlesnake, a resemblance that becomes startling when it "bluffs" by striking, and sometimes even by vibrating its tail against dry leaves. It lives principally on rodents, and is one of the most beneficial of all snakes.

Boyle's King Snake, Lampropeltis getulus boylii. Fairly common in lower portions of Zion Park, usually below 4,000 feet. It feeds chiefly on rodents and reptiles, killing them by constriction, and suffering no apparent ill effects from the bites of rattlesnakes.

Arizona King Snake, Lampropeltis pyromelana. One of the most beautiful snakes in this region, marked with narrow rings of white, black, and red. It is uncommon in the higher portions of Zion Park among the yellow pines, and has not been recorded lower than 6,500 feet.

Spotted Night Snake, Hypsiglena ochrorhynchus. Only two known specimens of this very small snake have been taken in Zion Canyon: one by A.M. Woodbury on the Narrows Trail, and one by T. C. Parker as it was crossing the highway near Red Arch Mountain on June 14, 1934, at 8:50 A.M.

Wandering Garter Snake, Thamnophis ordinoides vagrans. Commonly seen around streams and moist places throughout Zion Park and the lower portions of Bryce Park. Feeds chiefly on frogs, tadpoles, minnows, and small lizards.

Lyre Snake, Trimorphodon lyrophanes. This small, very secretive, nocturnal snake has been collected at Springdale by C. M. Bogert, and may eventually be found in Lower Sonoran areas within Zion Park. A specimen captured one-third of a mile south of the south entrance was so pugnacious and struck so viciously that the school children who had captured it allowed it to escape. It is slightly poisonous, but could probably cause no harm to a human being.

Great Basin Rattlesnake, Crotalus confluentus lutosus. The only dangerously poisonous snake in this region, where it is fairly common up to elevations of 7,500 feet. (Relatively uncommon in Bryce, however, where it occurs only below the rim.) There are no records of persons being bitten by it in either Zion or Bryce.

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RATTLESNAKES

By W. S. Long

The rattlesnake is one of the numerous genera of pit vipers, or thick-bodied poisonous reptiles occurring in both the old and new worlds. It is related to the true vipers of the old world, being distinguished from them by the presence of a deep pit, of uncertain significance, in the head between the eye and nostril.

The name comes from the horny "rattler" on the end of the tail. When the tail is vibrated rapidly, a buzzing sound is produced, and the device is used to warn other animals away, or to protect the snake itself from being stepped upon. Two genera of these snakes occur in the United States, but only one, Crotalus, is found in Zion and Bryce Canyon Parks.

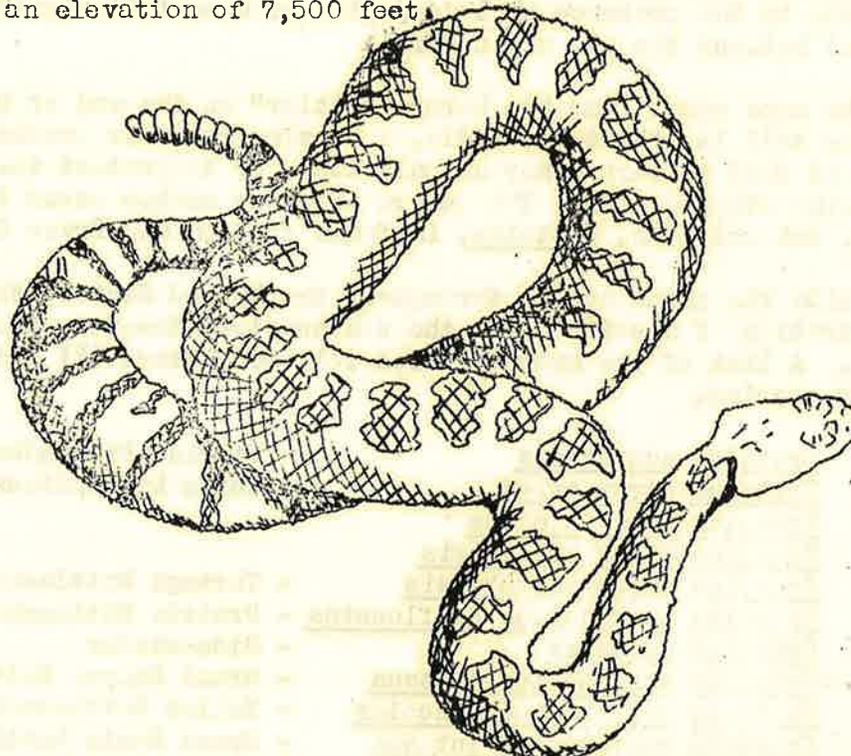
While the genus occurs throughout the United States, the greatest concentration of species is in the southwestern deserts, where it is very common. A list of the known species follows. Stars (*) indicate southwestern species.

<u>Crotalus</u> <u>adamanteus</u>	- Florida Diamondback	
<u>Crotalus</u> <u>atrox</u> <u>atrox</u>	- Texas Diamondback	
<u>Crotalus</u> <u>atrox</u> <u>elegans</u>		*
<u>Crotalus</u> <u>atrox</u> <u>lucasensis</u>		*
<u>Crotalus</u> <u>atrox</u> <u>tortuensis</u>	- Tortuga Rattlesnake	
<u>Crotalus</u> <u>confluentus</u> <u>confluentus</u>	- Prairie Rattlesnake	
<u>Crotalus</u> <u>cerastes</u>	- Side-winder	*
<u>Crotalus</u> <u>confluentus</u> <u>abyssus</u>	- Grand Canyon Rattlesnake	*
<u>Crotalus</u> <u>confluentus</u> <u>concolor</u>	- Yellow Rattlesnake	*
<u>Crotalus</u> <u>confluentus</u> <u>lutosus</u>	- Great Basin Rattlesnake	*
<u>Crotalus</u> <u>confluentus</u> <u>oreganus</u>	- Oregon Rattlesnake	*
<u>Crotalus</u> <u>onyx</u>		*
<u>Crotalus</u> <u>exsus</u>		*
<u>Crotalus</u> <u>horridus</u>	- Timber Rattlesnake	*
<u>Crotalus</u> <u>lepidus</u>	- Green Rattlesnake	*
<u>Crotalus</u> <u>mitchelli</u>	- White Rattlesnake	*
<u>Crotalus</u> <u>molossus</u>	- Black-tailed Rattlesnake	*
<u>Crotalus</u> <u>nigris</u>	- Tiger Rattlesnake	*
<u>Crotalus</u> <u>triseriatus</u>		*
<u>Crotalus</u> <u>willardi</u>		*

The rattlesnakes are closely related to the Copperhead (Agkistrodon mokasen) of the eastern states, and the Cottonmouth Moccasin (Agkistrodon piscivorus) of the southern states. Both of these snakes are pit vipers.

The only other dangerous poisonous snake in the United States is the coral snake of the southern states, which is not related to the pit vipers, but belongs to the family Elapidae or Cobras, the nearest relatives being in southeastern Asia.

Only one form of the rattlesnake (Crotalus confluentus lutosus) is known to occur in Zion and Bryce Canyon National Parks. In Zion it is quite common in the canyons and to a lesser extent on the plateaus above the rim. A few have been seen or killed at Bryce. Most of these were found under the rim, at the lower elevations; but one has been taken on the rim at an elevation of 7,500 feet.



It is popularly supposed that the rattlesnake sheds its skin once each year, and gains a new rattle each time, so that the age of the snake can be told by the number of rattles. The truth is that the snake may shed two or three times in one year or only once in two or three years; this depends upon the amount of food eaten, and consequent growth. Furthermore, some of the rattles frequently are broken off, so that it is impossible to tell the age of the reptile by the number of rattles.

The food consists of small mammals, such as rabbits, gophers, ground squirrels, mice, etc. The prey is swallowed whole, as is the case with all snakes. The lower jaws are so constructed that they may be spread wide apart to allow the snake to swallow prey larger around than itself.

The poison is for the procuring of food, primarily, and defense is a secondary matter. Muscles surrounding the poison sacs enable the snake to inject any amount of poison it wishes and thus not waste a large amount on small prey. The poison must be injected into the blood; it is harmless if taken into the digestive system.

The chances of being bitten by rattlesnakes are quite small. Of the several hundred thousand tourists who have visited Zion National Park, and walked over the miles of trails, not one has been bitten by a snake. Unless stepped upon the snake will always rattle vigorously and crawl away as quickly as possible.

The venom of the rattlesnake is very deadly, and haematotoxic in action. That is, it operates mostly on the blood system, and only to a slight extent on the nervous system. According to Woodbury, rattlesnake venom reacts in four different ways:

(1) Destruction of blood corpuscles; (2) Breaking down of the walls of the capillaries to allow hemorrhage; (3) Agglutination of the blood cells; (4) Paralysis of the respiratory nerve centers.

The most obvious effect of a bite is swelling and discoloration of the affected parts.

Anyone bitten by a snake should immediately apply a tourniquet above the bite, i. e., between the bite and the heart. The tourniquet should be released slightly every ten or twenty minutes to prevent mortification and to allow slow absorption of the poison. Then cut the wound across two or three times with a razor or sharp knife to cause profuse bleeding, and suck the wound to remove the poison. Consult a doctor as soon as possible, but always be sure to apply first aid as outlined above.

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THE GILA MONSTER, AND ITS VENOM

By C. C. Presnall

The Gila Monster (Heloderma suspectum) has not yet been recorded in Zion National Park, but because it is found very near by, and is the subject of many questions, a few notes concerning it are given here.

It is the only poisonous lizard in the United States (another species, H. horridum, lives in Mexico), and is easily distinguished by its beaded scales, its striking color pattern of irregularly broken transverse bands of orange and black, and its large size (adults vary from twelve to twenty inches in length). Records show that its range extends from northern Sonora, Mexico, through all the Lower Sonoran areas of Arizona into southeastern Nevada and southwestern Utah. Its principal range in the last two states is in the Virgin River valley, up at least as far as Hurricane, Utah. It is nowhere common, and usually lives among rocks where it is not apt to be encountered by human beings. This, combined with its phlegmatic disposition and peculiar poison apparatus, renders it a source of little danger to humans.



Newspaper accounts of persons bitten or even killed by gila monsters are fairly common in the southwest, but we have been unable to learn of a single death that can be unquestionably ascribed to the venom of Heloderma. Yet the creature is well supplied with a powerful neurotoxic poison which, in experiments upon dogs and other small animals, has been shown to affect the nerve centers in much the same way as the venom of cobras and coral snakes, and to cause death through failure of the respiratory system. Heloderma venom apparently has but slight hematoxic action, thus differing markedly from that of rattlesnakes.

The explanation of several reports of bitten persons without any authentic reports of death is chiefly that the monster cannot inject the poison, but must bite and retain its hold long enough for the poison to run slowly down the grooved teeth. The fact that the poison is secreted only in glands in the lower jaw renders poisoning still more unlikely unless the creature turns its head upside down (which the Mexican species is reported to do instinctively).

There are many curious legends about the poisonous qualities of the gila monster, the most common one being that the poison is caused by a unique construction of the digestive tract compelling ejection of fecal matter through the mouth. This is pure nonsense, although it is quite true that decayed particles of food lodged in the teeth might cause an infection of the wound inflicted by a monster. The same could be said of a pet dog or cat. The plain facts are that a gila monster secretes a strong neurotoxic poison in glands located in the lower jaw, and that this poison, mixed with the saliva, may run into a wound inflicted by an irritated monster which is permitted to retain its grip for some time. Although the results of such a bite are uncertainly known, it is probable that it would cause death to a child and more or less serious consequences to a large and healthy man.

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