

CANYONS & CAVES

A Newsletter from the Natural Resources Offices
Carlsbad Caverns National Park

Edited by Dale L. Pate

Issue No. 2

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"It is well to be reasonably watchful when a Mexican lion sings soprano along the arroyos at sundown. The burden of his song may be that young calves and fat lambs are scarce, and that he has a carnivorous desire for your acquaintance."

From "The Princess and The Puma" found in The Heart of the West, a collection of short stories written by O'Henry and published in 1904.

RESOURCE NEWS

THERE IS A GOOD REASON why the trash cans along the Main Corridor have lids that must be locked in place when sweep closes the cave for the night. There was an uncontrolled raccoon problem in the cave during the 1970's and 80's. An example of the severity of the problem was indicated by Ranger Bob Turner who stated that 300 racoons were live-trapped in the cave (mostly around the Lunch Room/Big Room area) and relocated to the surface between 1975 and 1985. When the trash cans did not have locking lids, the racoons were able to make their way down into the Lunch Room area by following the scents emanating from the trash cans and from the food trash visitors would drop along the trail. There was even an occasional bold raccoon that would attack a visitor, trying to get food that they were carrying. A Raccoon Management Plan was developed that recommended (1) emptying the trash cans more frequently (2) redesigning the containers with locking lids (3) maintaining a high standard of cleanliness in the underground lunchroom (4) educating the public in regard to why its not a good thing for visitors to have food along the trails in the cave (5) removal of problem animals from the cave and (6) leaving less lights on at night in the Lunch Room area. Thanks to these recommendations raccoons are only seen in the entrance and twilight areas of the cave today.

MEXICAN FREE-TAIL BAT COUNT ESTIMATE - Based on the estimated space the bats are occupying in their roost from the photos that Jim and Val Werker took last week in Bat Cave and a visual count that Gary Vequist made on Thursday, June 7 when the bats flew early, we now feel confident that we have at least **500,000 bats** here this spring and early summer. Since many of these bats are pregnant females, we expect that number to rise significantly by August when the baby bats will be flying. By late September and October more bats will stop here on their way south and increase the numbers even more. During this later period in 1994, Ken Geluso had estimated from the space they occupied in the roost that there were approximately 1,000,000 bats in the cave.

WATER LINES - In conjunction with the General Management Plan being prepared for the park, a replacement design plan for the entire water system is also being prepared. The water lines from Rattlesnake Spring to the Visitor Center and beyond to the water tanks are slated to be replaced pending approval and funding from Congress. The main line has sprung numerous, serious leaks in the past few years. Also planned for the project will be the removal of the 500,000 gallon water tank (the one furthest

to the west) and the associated pipeline and replace it with a smaller tank at the base of the escarpment below the Visitor Center.

RECENT SIGHTINGS and a high incidence of lion sign down Bat Cave Draw (including a fresh kill near the main entrance) indicate that a mountain lion has been hanging around the area near Carlsbad Cavern. Be careful, keep your eyes open, and maybe you'll be one of the lucky ones to spot this illusive creature.

INFILTRATION STUDY - Mark Brooke and Helen Dawson, from the Colorado School of Mines, are back in the park to continue the infiltration study. Many thanks to Mike Queen for volunteering his time to work with Mark and Helen on this study. Preliminary results show high levels of nitrates in some of the cave. In addition, high levels of aluminum and zinc are found in parking lot and maintenance yard runoff as well as showing up in several parts of the cave, especially the Big Room.

MICROBE STUDY CONTINUES - Dr. Larry Mallory has collected approximately 3000 strains of microbes out of Mammoth Cave, Lechuguilla Cave, and some caves located in Hawaii Volcanoes National Park. About 1200 of these have been collected out of Lechuguilla Cave. Preliminary tests for potential cancer-reducing agents on 1000 of the 3000 strains have had good results. From those out of Lechuguilla, sixteen of these tested have good potential for medicinal qualities. Four of the sixteen have tremendous potential. Dr. Mallory quotes, "Initial results are very promising and indicative of success to come." We will pass on more information as it becomes available.

VERTICAL TRAINING WORKSHOP - For those interested in learning the techniques necessary for visiting vertical caves (ascending/descending on rope), classes will be taught Thursday June 27, and every Thursday during the month of July (excluding July 4th). The classes will be from 6-9 pm, and are open to all experience levels. The range of topics will include Knots, Rigging, Ascending, Descending, Change-overs, Pick-offs, and Reblays. The course plan is intentionally being left open so that all levels of experience can be accommodated, and so individuals can attend any of the classes without the need to attend all or even a previous class. Persons with experience are encouraged to attend, share your knowledge with those less enlightened individuals, and possibly learn something new yourselves. Come on out and join in the fun! For more information or to find out the meeting spot (it is still under negotiation) call Harry Burgess at ext. 363.

AN ASTEROID NAMED IDA - Tom Bemis reports that features on an asteroid (in the asteroid belt between Mars and Jupiter) by the name of Ida will be named after numerous caves of the world. Of course, Lechuguilla will be included as well as Kartchner, Mammoth, Lascaux, Kazamura, and a host of other world cave names.

ANIMAL LIFE OF CARLSBAD CAVERNS BEFORE WE WERE BORN by Gary Vequist

Vernon Bailey in 1928 wrote a book on Animal Life of the Carlsbad Cavern. Dr. Bailey was a Biological Survey scientist from the old school of natural history descriptive science. His observations give a different picture of wildlife then now exists in the region today. Below are quotes from his book on the extirpated mammals.

BISON ALONG THE PECOS

"In 1540, Coronado had his first view of the Pecos River and of the Buffalo at about the same time and place ... Other early writers spoke of the abundance of Buffaloes in the Valley which apparently marked the westernmost limit in New Mexico. . . With the coming of the white men, the buffalo were rapidly destroyed or driven back, and the last of which were recorded in the valley in 1884 and 1885. Up

to 1900 their were old trails leading down from the plains and the deep cuts worn into the Pecos River banks were still conspicuous landmarks, but now these old trails have been so long used by domestic stock as to have lost much of their original character, and with them the last traces of the buffalo."

BIGHORN SHEEP, EARLY CAVERS

"The herds of Bighorns, which have long struggled for existence in the Guadalupe Mountains on both sides of the state line, are just about holding their own against predatory animals and predatory man. . . formerly they came down to Rattlesnake Canyon, and undoubtedly to Walnut and Dark Canyons even below the present level of Carlsbad Cave. I found these sheep on April 29 and 30, (1924) in Slaughter Canyon, where fresh tracks and trails were conspicuous in one of the big caves high up on the canyon side. For ages evidently this cave has been used by considerable numbers of bighorns as a refuge from storms; and the spring, or drip pool, of excellent water in the far end of the cave seems to be visited at all seasons.... The cave room, one to two hundred feet wide, by four hundred feet long and seventy-five feet high, half-lighted by a great arched opening on the west side and a small doorway on the east, affords an ideal shelter for comfort and protection..... Bear tracks are sometimes found in the cave, but the sheep would have a fair chance of escape from either bears or mountain lions, as the cave is large and open, and the sheep lie on the high slope of broken rocks, which gives them the advantage of a mountain slope for protection and escape."

PRAIRIE DOG TOWNS

"Colonies of these plump little yellowish burrowing squirrels are scattered over the Pecos Valley and on many of the more fertile mesas and mountain slopes. They are generally located on the richest and mellowest soil, where digging is easy, and where the short grass and low vegetation furnish abundant food.... Naturally they are not on the limestone ridges about the cave, but they are common along the Black River Valley only two miles to the south, where they lay a heavy tax upon some of the best forage..... They prove a serious handicap to stock raising as well as to any form of agriculture, and are generally destroyed in every way possible, mainly by means of poisoned grain scattered about their burrows."

Story to be continued next issue.

HISTOPLASMOSIS - A FUNGUS AMONG US by Harry Burgess

Histoplasmosis is one of those five syllable words that many of us may not be able to define, even though we may have been unknowingly exposed to it years ago. No, we are not talking about some secret Army experiment, but a respiratory disease that is transmitted via airborne particulates. *Histoplasma capsulatum* is a fungus that grows on soil enriched by bird or bat guano, and when this soil is disturbed the spores can be inhaled, resulting in the infection and subsequent development of histoplasmosis in the host organism.

The disease is characterized by mild flu-like symptoms (fever, ulcers, headaches, weakness), yet some of those infected experience no symptoms while others exhibit pneumonia-like symptoms that can become fatal. In many cases the infection is misdiagnosed as a cold or flu, and the person recovers nonetheless. There are tests to determine if the individual has "histo", and treatments specific to the infection, yet these tests are not commonly administered to persons exhibiting a fever and associated flu-like symptoms. Two years ago, a visiting caver who spent several days in Lechuguilla with a 103 degree temperature was diagnosed with pneumonia after exiting the cave. After returning home, he decided to ask his doctor about testing for histo...and it came back positive.

The caver mentioned above did not contract histoplasmosis in Lechuguilla, the incubation time ranges from five to fourteen days. He probably came in contact with the disease the prior week in South Texas, in a cave now known to contain the fungus. That does not mean that histo isn't present in

Lechuguilla, however. Diana Northup, a researcher from UNM, reported to the park in 1990 that she had obtained positive cultures of histo from the entrance pit of Lechuguilla. This is the same area that was mined for guano earlier this century, and there is still a large amount of guano remaining in which the spores were found. Histo has also been documented in Bat Cave at Carlsbad Cavern, as a NM state archeologist caught the disease while doing research there in 1973.

So what can we do to protect ourselves against a disease that exhibits a wide range of symptoms and is commonly misdiagnosed? Odds are that many of us are already infected, and dependent on where we have lived in the past, those odds can be even higher. According to a study done on Navy recruits from 1958-1965, the percentage of the population that has been exposed to *Histoplasma capsulatum* is as high as 80% in the Mississippi River Basin, and Eddy County's exposure rate was as high as 40% of the population. That means that roughly one out of every three of the employees here could have been infected in the past, possibly without any knowledge of the infection. That doesn't mean that we should not be concerned with our activities in caves, particularly caves where there is guano. Those persons who have already been exposed can be reinfected, and when reinfected the symptoms seem to occur sooner after exposure than in initial infections. Also, some studies show that subsequent reinfections can result in more serious symptoms, since a hypersensitivity to the histoplasmosis builds over time.

SO, WHAT DO WE DO?

1. Avoid enclosed areas where there is known to be bird or bat guano.
2. If you can't avoid these areas, try not to disturb the soils of the area since the path of transmission is airborne.
3. When in places suspected of containing histo, wear a properly-fitted HEPA certified mask designed to filter to 2 microns.
4. If you suspect that you have been exposed to *Histoplasma capsulatum* and are experiencing symptoms of illness, inform your physician of this possibility.

The information presented here was gleaned from three separate articles: [Histoplasmosis in Caves](#), by Warren C. Lewis, NSS News, vol. 32, [Histoplasmosis](#), by Michael L. Furcolow, U.S. Department of Health, Education, and Welfare, and [Histoplasma Capsulatum](#), James E Loyd, Roger M. Des Prez, and Robert A. Goodwin, Jr., Infectious Diseases, Chapter 242. For additional information, consult these publications or others found in the Park Library's vertical files under Cave Ecology/Histoplasmosis.

COWBIRD PARASITISM AT RATTLESNAKE SPRINGS by Sue Durnin

Cowbirds are a growing problem throughout much of the United States. Due to improved feed provided by livestock grazing, agriculture and irrigation, these cowbirds have been able to greatly increase their range. Cowbirds are a brood parasite. Instead of building their own nests, they lay eggs in other "host" bird's nests. Cowbird chicks then hatch earlier, fight aggressively for food, and grow much faster than the other host chicks. Most of the mother's time is spent feeding the cowbird chick at the expense of her own. The result is decreased survival rates of the host chicks. Another problem occurs when the cowbird lays her egg in the host's nest. The cowbird will remove one of the original species eggs, thus reducing the potential survival of the host species young by one. A female cowbird can lay over 40 eggs in one breeding season so even small populations of cowbirds can parasitize many nests.

Cowbird parasitism has contributed to the decline of at least ten migratory songbirds species in California and similar declines have been documented in New Mexico. Riparian areas, such as Rattlesnake Springs (RSS), are of particular concern. It is estimated that in the United States, 70-90% of the natural riparian ecosystems have been lost because of human activities. The fragmented areas that remain are depended upon by 64 endangered species and 47 that are being considered for listing (Ohmart & Anderson, 1986).

The Surface Resource Management office is presently conducting a study in the RSS area to

determine the extent of cowbird parasitism. The RSS area is home to many migratory songbirds, which make ideal hosts for cowbird. Since these songbirds migrate a great distance to their nesting area, their breeding season is short. Often the songbirds do not have time to re-nest if a cowbird egg is discovered. The Bells Vireo, which is a New Mexico state endangered species, is one of these often parasitized songbirds. After comparing lists of species common to RSS and parasitism rates, we came up with a list of 6 target species. Since mid-March we have been identifying these target species home ranges and attempting to locate their nests. So far we have found only six nests that are of our target species, and in accessible locations. We have been monitoring these nests every four days and, although many cowbirds have been seen in the RSS area, no evidence of parasitism has been found.

This study will continue for the rest of the nesting season and depending upon results may be continued yearly. If anyone is wishing to volunteer their time and help search for nests please contact Dave Roemer at the Surface Resource Management Office.

AN UPDATE ON THE FRINGED-MYOTIS BATS IN CARLSBAD CAVERN by Dale Pate

In the summer of 1995, Dr. Ken Geluso of the University of Nebraska and Dr. Troy Best of Auburn University conducted a study of the fringed myotis bats (*Myotis thysanodes*) that roost near the Lake of the Clouds in Carlsbad Cavern. This study, which was funded from Adopt-A-Bat funds, has provided us with a lot of very useful information.

On July 9 in the evening, thirteen individuals were captured by mist net as the bats left their roost on their way out of the cave to feed. Of these thirteen, ten were lactating females (meaning that they have recently given birth to a baby bat), one was a pregnant female, and two were adult males. These bats then had a small patch of hair removed between their shoulder blades and a small transmitter attached with a non-toxic adhesive. None of these bats appeared to have any difficulty flying with the attached transmitters. The adhesive allowed the radio transmitters to fall off after two to three weeks. For the next two weeks, the researchers and their students used radio receivers to track the bats movements.

It was found that the bats did not leave their maternity roost in rapid succession, but instead exited individually over a period of several hours. Average flight speed as the bats flew down Left-hand Tunnel was 18 feet/second. This means that it takes about 5 1/2 minutes once the bats have left their roost to reach the entrance to the cave. The researchers were also able to count the bats as they flew down Left-hand Tunnel. They came up with an fairly accurate count of 115 individuals. It was found that 75% of the bats exited the cave using the large, main entrance, leaving 25% to exit the smaller entrance east of the main entrance. It was also found that 50% of the bats exited the main entrance during the evening outflight of the Mexican free-tailed bats. The research team was also able to track the bats route as they left the cave. It was found that the bats flew down Left-hand Tunnel to the Lunch Room, go upward towards Iceberg Rock from the passage behind the Concessionaire structures, along the Main Corridor and then exited through one of the two entrances. This dashed the hopes of some that there was an unknown passage the bats were using to exit the cave.

The bats are thought to roost above the Lake of the Clouds because this is the warmest area in the cave. It was found that below the roost is 10.4°F warmer than at Devil's Spring and 7.2°F warmer than where the Mexican free-tail bats roost in Bat Cave.

Of special interest, it was found that when repair crews were cutting tiles in the Lunch Room, the first three females to leave the roost returned a short time later. Evidently the noise level was too great and caused them to turn back. These same females were documented leaving later in the evening after the repair work was completed. It was also found that depending on where lights were left on throughout the night, the bats evidently would change their route through the Lunch Room area and beyond traveling in the darkness as much as possible.

Based on the findings and observations of this study, the researchers recommended the following actions be taken to help protect the colony.

1. Turn off all lights by approximately 7:00 pm every night.
2. No one be allowed into the roost area immediately before and during parturition (the act of giving birth). Additionally, when the bats are present, no visits to the area be allowed except for an occasional research project. If this type trip takes place, then researchers should minimize disturbance by passing through the area quickly, not talking, and by directing headlights toward the cave floor.
3. Any repair or maintenance work in the Lunch Room be done during daylight hours or done in the seasons when the bats are not present.
4. The Park Service needs to determine when the bats arrive in the Spring and when they depart in the Fall. (This year they arrived early to mid-May).
5. The Park Service should determine each year where the bats are roosting.
6. A population count be made at least once a year.
7. The fence on the smaller entrance be moved 12 to 15 feet away from its present location. (This has already been taken care of)

All this information has been taken from a report by Drs. Geluso and Best titled "Radiotracking the Fringed Myotis (*Myotis thysanodes*) in Carlsbad Cavern, New Mexico". Because of this study and recommendations, the Lake of the Clouds area will be closed to all trips except an occasional approved research trip from May 1 to October 1 every year. This will include employee orientation and restoration trips. Additionally, no one will be allowed into the area from June 15 to July 15 every year for any purpose.

HEY, WHAT KIND OF BUGS LIVE HERE? by Rick D. Houston Jr.

In the No. 4 issue of Carlsbad Caverns Underground which headlined in January 1996 Jason Richards did a wonderful job of presenting to us the famous cave cricket, under the title "How 'Bout Those Crickets". The article talks about *Ceuthophilus carlsbadensis* and *Ceuthophilus longipes* which are two species of camel crickets found here in Carlsbad Caverns, but not the only insects. In fact there happen to be 60 other species of insects found here in our cave. I am only going to talk of some of the more common ones that you might encounter on a tour or off-trail trip.

In cave biology the fauna found there is classified in three categories. The **troglobite** or "cave dweller" is an animal that lives in caves and nowhere else, like a blind crayfish. The **troglophile** or "cave lover" is one that can complete its life cycle in or out of a cave, but prefers a cave, such as the cave cricket. Then there is the "cave visitor" or **trogloxene** which can visit a cave but must return to the surface for food, like bats or cave swallows.

In the world of entomology (the study of insects), insects tend to be classified from the primitive to more advanced orders. In this cave the most primitive insect encountered is the dipluran (Order Diplura). This interesting little insect is pure white and fairly quick. The size and structure makes it easy to identify. The body is somewhat elongated in shape with two tail-like appendages at the posterior and anterior ends of the body which is less than 5mm in length. These tiny creatures feed on organic matter such as decaying wood and leaves and, of course, bat guano. A good place to look for and avoid these fascinating insects is in and around the "sand passage", especially in matlock's pinch! Don't worry they don't bite. The genus of this bug is *Plusiocampa* while the species is undescribed at this time. This particular insect is considered to be a troglobite.

If you know where to look and you look close enough there is another interesting insect that may be seen. This bug is known as a springtail (Order Collembola). According to a species list there are six different species of springtail found in the cave. These are minute insects often 1mm or less and whitish in color. The behavior of these creatures, as far as being in the three classifications listed above, is varied depending on the species. All of the springtails feed on decaying organic detritus and that is usually where they can be found. The anatomy of these insects is quite interesting in the fact that they possess an appendage on the posterior end of the abdomen that is called the "springtail". This device is just what the

name implies, it acts like a catapult. When the animal is disturbed it springs itself into the air to avoid attack. The species *Entomobryoides purpurascens* that I have encountered is probably a troglobite because it is white and found in the Big Room.

I hope this brief introduction has spurred your interests in cave biology, stay tuned for more exciting insects in future newsletters. Until then happy hunting.

WHO'S WHO by Jason Richards

You've heard the name.... Oh yeah, she's some scientist or researcher that comes here once in a while, isn't she?

This question is asked on numerous occasions, and we who work with these people tend to take for granted that they are known by all. As you know too well this is not the case, so we decided to write a "Who's Who" column that will be featured in this newsletter. Who's Who, will be a profile of researchers that study in the park. In this issue of "Canyons and Caves" we will profile Harvey R. DuChene, a cave geologist from Englewood, Colorado.

In the future, if there is some particular researcher that you would like to learn about, please let us know.

HARVEY R. DUCHENE

Harvey DuChene, born in Royal Oak, Michigan, August 26, 1943, now resides in Englewood, Colorado. Harvey works as a petroleum geologist and is the exploration manager for Axem Resources Inc. in Denver. For over 35 years Harvey has been an active caver and a member of the National Speleological Society in which he has the honor of being a "Fellow". Harvey holds two geology degrees from the University of New Mexico, a bachelor degree of arts, and a masters degree of science. Harvey is also presently a member of the Board of Directors for the Carlsbad Caverns-Guadalupe Mountains Association. In real life, Harvey has two grown kids, a significant other in Chicago, is an accomplished musician/singer, and enjoys canoeing on some of Colorado's finest rivers.

Among Harvey's accomplishments are:

- * Research in the sediments of Lower Cave, Carlsbad Cavern.
- * The confirmation of tuyuaminitite in the New Mexico Room and Chocolate High, Carlsbad Cavern.
- * Collaboration with Carol Hill on tower coral at Lake of the Clouds, Carlsbad Cavern.
- * The geology of Ogle Cave, and helped put together the 1978 Ogle Cave Symposium.
- * Published papers, along with Kiyam Cunningham, on the sulphur in Lechuguilla Cave.
- * Harvey's proposal on the mineralogical inventory of Lechuguilla was accepted, and for the past three years Harvey and his hand picked crew of quality cavers have been doing excellent research. To date, Harvey and his crew have inventoried 3,535 stations in Lechuguilla and identified over 30 different minerals.

CALENDAR OF EVENTS

Apr. 1-June 30	Cowbird Parasitism Survey - Rattlesnake Springs
June 1-July 1	Infiltration Study Continues - Carlsbad Cavern
June 15-22	CRF/NSS Restoration Camp - Carlsbad Cavern
June 27-30	Newton's Apple Film Crew - Carlsbad Cavern
June 29-July 7	Seiser/Holcomb Survey Expedition - Carlsbad Cavern
Aug. 3-10	National Speleological Society Convention - Colorado
Aug. 26-30	Bat Photo Census - Carlsbad Cavern
Aug. 31-Sept.2	CRF Survey Expedition - Carlsbad Cavern
Sept. 14-22	Seiser/Holcomb Survey Expedition - Carlsbad Cavern

Sept. 29-Oct. 5 Lint Camp - Pat Jablonsky
 Mid October Mountain Lion Transects
 Nov. 28-Dec. 1 CRF Expedition - Carlsbad Cavern

LONG CAVES OF THE WORLD

The following is a partial list of the longest known caves in the world as of April 16, 1996 and compiled by bob Gulden. The more extensive long and deep caves of the World lists were published in the NSS News, May 1996, Part II (known as the Member's Manual).

Name	Country	Length	
1. Mammoth Cave System	USA (Kentucky)	563,270 meters	350.0 miles
2. Optimisticeskaja	Ukraine	183,000 meters	113.7 miles
3. Jewel Cave	USA (South Dakota)	170,301 meters	105.8 miles
4. Holloch	Switzerland	165,500 meters	102.8 miles
5. Lechuguilla Cave	USA (New Mexico)	143,795 meters	89.3 miles
6. Siebenhengste-hohgant Hohlensystem	Switzerland	135,000 meters	83.9 miles
7. Wind Cave	USA (South Dakota)	125,835 meters	78.2 miles
8. Fisher Ridge Cave System	USA (Kentucky)	125,529 meters	78.0 miles
9. Ozernaja	Ukraine	111,000 meters	69.0 miles
10. Gua Air jernih-Lubang Batau Padang	Malaysia	101,500 meters	63.1 miles
11. Systeme de Ojo Guarena	Spain	97,400 meters	60.5 miles
12. reseau de la Coumo d'Hyuernedo	France	94,843 meters	58.9 miles
13. Zolushka	Moldovia	85,500 meters	53.1 miles
14. Sistema Purificacion	Mexico	84,992 meters	52.8 miles
15. Hirlatzhohle	Austria	79,270 meters	49.3 miles
16. Easegill System	United Kingdom	70,500 meters	43.8 miles
17. Raucherkarhohle	Austria	70,000 meters	43.5 miles
18. Friars Hole Cave System	USA (West Virginia)	69,997 meters	43.5 miles
19. Toca de Boa Vista	Brazil	64,000 meters	39.8 miles
20. Organ Cave System	USA (West Virginia)	63,569 meters	39.5 miles
32. Carlsbad Cavern	USA (New Mexico)	49,680 meters	30.9 miles

DEEP CAVES OF THE WORLD

		Depth	
1. reseau Jean Bernard	France	1,602 meters	5,256 feet
2. Lamprechtsofen-Vogelshacht	Austria	1,537 meters	5,043 feet
3. gouffre Mirolida/Lucien Bouclier	France	1,520 meters	4,987 feet
4. Shakta Vjacheslav Pantjukhina	Georgia	1,508 meters	4,948 feet
5. Sistema Huautla	Mexico	1,475 meters	4,839 feet
6. Sistma del Trave	Spain	1,441 meters	4,728 feet
7. Boj-Bulok	CIS	1,415 meters	4,642 feet
8. (II) Laminako Aterneko Leizea	Spain	1,408 meters	4,619 feet
9. Lukina Jama-Manual II	Croatia	1,393 meters	4,570 feet

10. Sistema Cheve	Mexico	1,386 meters	4,547 feet
Lechuguilla Cave	USA (New Mexico)	477 meters	1,567 feet