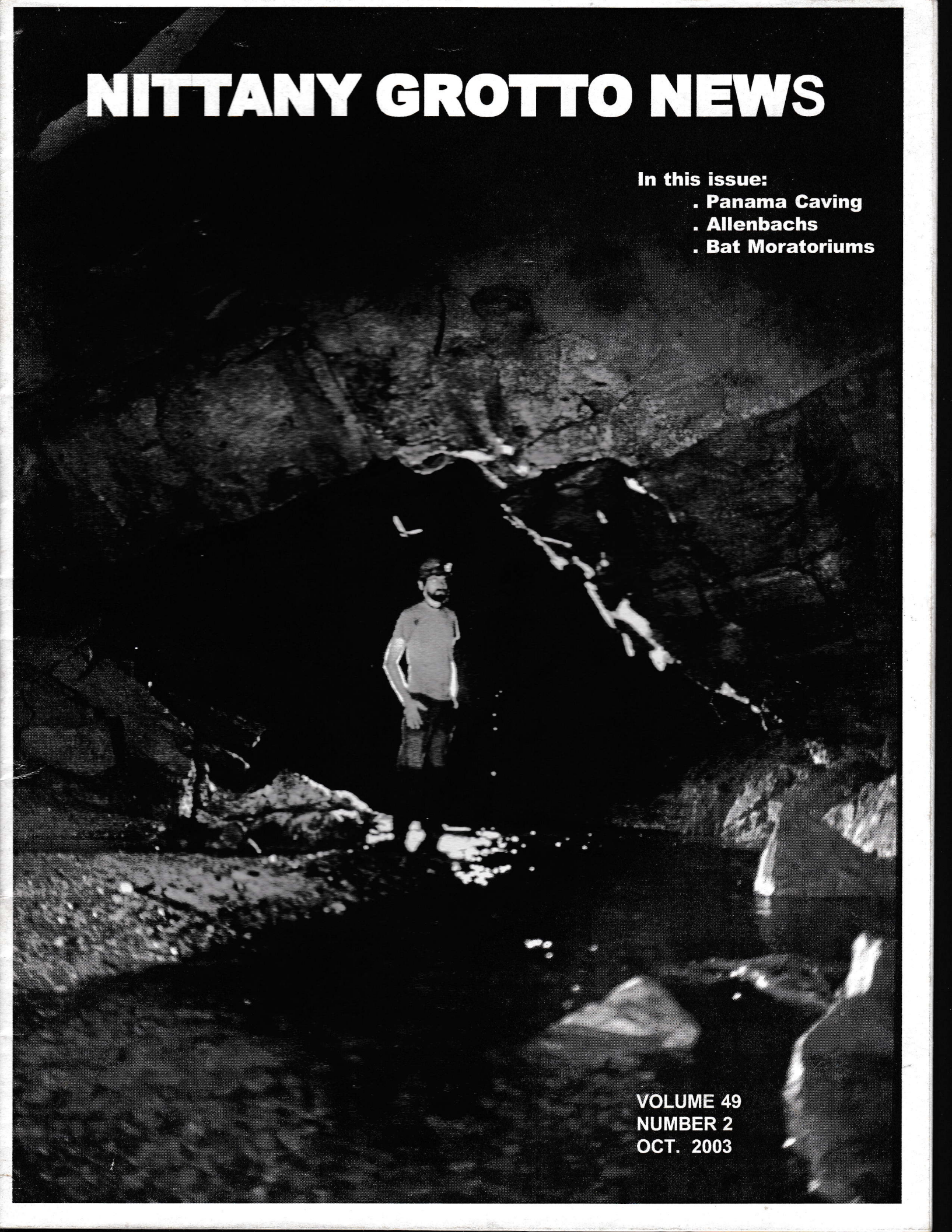


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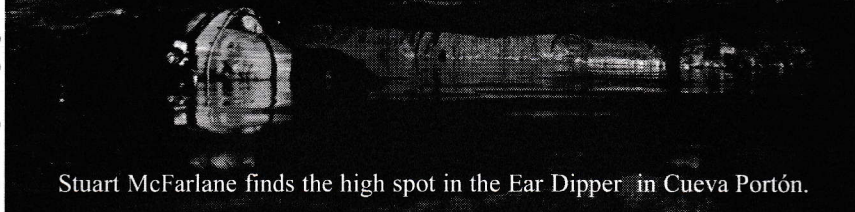
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INITIAL INVESTIGATIONS INTO THE CAVES OF THE CHIRIQUÍ PROVINCE, PANAMA



Stuart McFarlane finds the high spot in the Ear Dipper in Cueva Portón.

Keith Christenson, Jorge Luis Pino,
and Donald McFarlane

Expedition dates:
July 21 - July 28, 2001

Abstract:

An international team of four speleologists located and investigated eight caves during July of 2001, in the province of Chiriquí, Panama. Cueva en el Cerro Punta was shown to be the highest known cave in Panama at 2174 meters elevation above mean sea level, although only 43 meters long. Cueva de Portón becomes the second longest surveyed cave in Panama at 707 meters, and appears to be threatened by a quarry. With nothing to compare against, Hueco de los Duendes becomes the deepest cave in Panama at 22 meters. Bats were encountered in five caves, although none of the caves explored possessed extraordinary numbers of bats or species richness. Species encountered included *Carollia perspicillata*, *Desmodus rotundus*, *Phyllostomus hastatus*, and *Peropteryx* sp.

INTRODUCTION

There is little information available on the caves of Panama. Additionally, although in many ways the bats of Panama are well-described, the aspect of cave use by bats is poorly documented. As far as could be determined, there has never been a modern cave map published from a Panama cave, and only a limited number of publications addressing the topic of caves exist (Peck 1971, Reeves 2000 and Christenson 2001). However, the country does possess several karst regions, and Wenzel and Tipton (1966) document that there are caves in several geographical zones, many of them with at least some bats.

Several problems exist with the current data on the cave bats of Panama. First, the single study that provides information on cave and bat distribution (Wenzel and Tipton, 1966) does so in the form of a book on the ectoparasites of the bats of Panama. Although the researchers visited many caves to collect samples from bats, no effort was made to map the caves, describe ecological factors about the bats or estimate populations. This is not stated as a fault, merely that it was not part of their work.

Knowing that a bat exists in a particular cave is solid natural history research for the study of bats. However, it leaves a knowledge void on the speleological side of the research. Questions remain unanswered about the geographical distribution of important caves, physical characteristics of subsurface habitat, and the need for conservation of some caves.

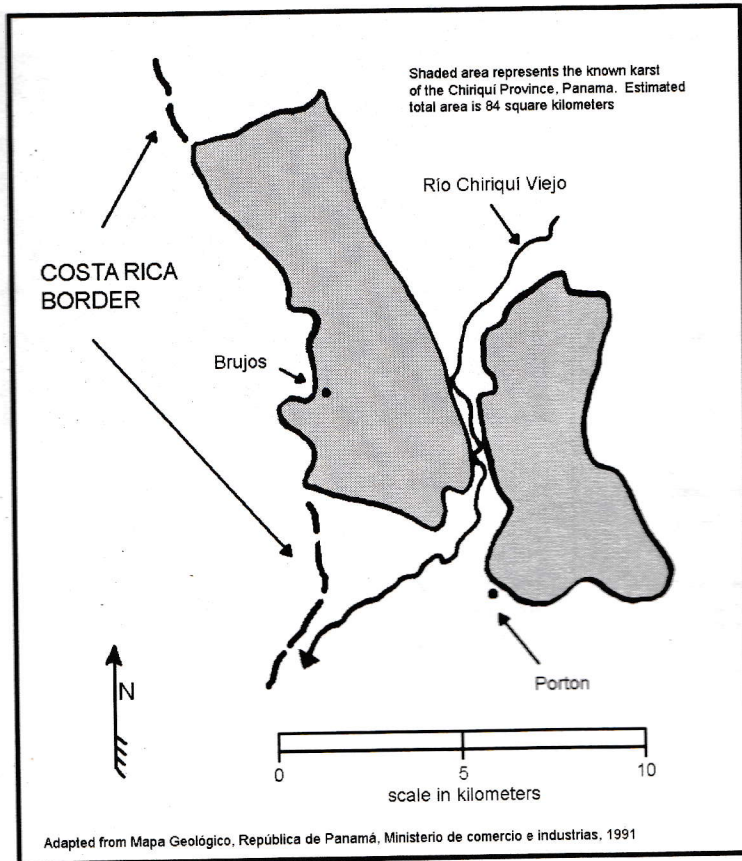
As with most cave studies, our work in the Chiriquí Province of Panama was multidisciplinary, and the first concern was geographical. This was a two-part process, where the first step was to locate a cave entrance (again a two-step process, first to find a cave entrance, and then to take a GPS reading), and the second step was to run a survey line through the cave to make an accurate map of the underground passages.

The second area of study was to determine which bat species were using the cave as a day roost, and third, the cave fauna was observed to determine if a further study is warranted. This included making observations on all of the cave's biology, as well as collecting an invertebrate sample from interior deposits of bat guano. Lastly, the site was assessed for additional resources, such as archeological or paleontological interest, tourist potential, safety hazards, etc.

Although this multidisciplinary approach may seem cumbersome and time consuming, it is remarkably straightforward in a cave. The bats are generally confined to the cave during the day, the habitat is finite and measurable (other than the obvious problem of passages too small for humans to enter), guanophiles are easy to collect, and unless the cave is overly large, archeological, biological and paleontological items of interest can often be found with limited effort.

SITE DESCRIPTION

Although individual cave descriptions are given below, a few additional notes on the geography and geology of the sites are given here. All of the caves are located in the Chiriquí province of the Republic of Panama, and are generally located north and/or west of the city of David.



Cueva de el Cerro Punta is a tectonic cave created by the separation and slipping of a large vertical block. The basal rock is volcanic, and the cave is located in the geographical feature known as Cerro Punta. Cueva Eliseo is an erosional cave at a ninety-degree bend in the Río Mula, and is formed in an andesitic conglomerate.

Cueva de Portón is a solutional limestone cave near the town of Portón. The cave contains an active stream passage for most of its course. It appears to be primarily of phreatic origin, with some joints visible and occasional fault or strike oriented passages.

The caves of Canoas Arriba are solutional caves, located on the limestone ridge above the town. The limestone is banded with sandy strata, and most caves end at rock and sand constrictions. Although all the caves discovered were small, it remains likely that the ridge has a larger cave running underneath it.

METHODS

Caves were located by asking local individuals if there were caves in the area, and if so, where they were. This worked remarkably well, and guides were hired to lead us to the caves. The geographical location of the cave's entrance was recorded with a Magellen 315 GPS handheld unit.

Six of the eight caves discovered were surveyed, and two were simply sketched with distances estimated and a compass used

for directional control. Each survey consisted of pulling a Keson fiberglass tape between survey stations, and recording azimuth and inclination with a compass and clinometer (both instruments were by Suunto). Surveys were compiled using the software SMAPS, and cave maps were drafted freehand, with computer lettering. The maps were then scanned and digitally enhanced.

Although most bat surveys were done visually, bats were captured using a hand net and a mist net in Cueva de Portón. The hand net consisted of a cotton cloth bag, and the mist net was a Japanese-made, 6-meter long, 70-denier net designed for catching birds. All estimates of population sizes were done visually.

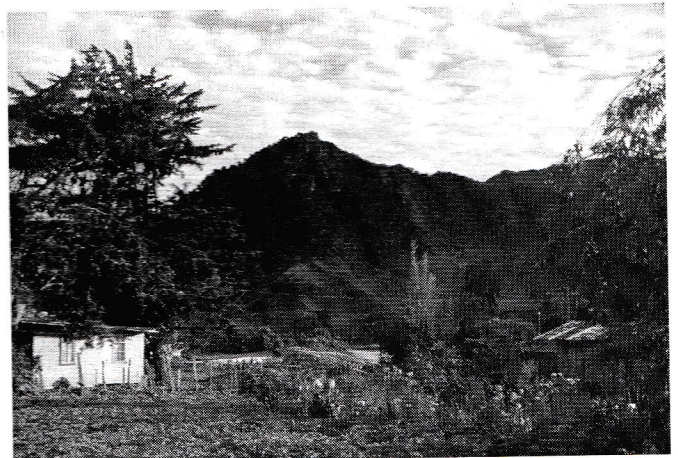
Guanophiles were collected and preserved in 70% ethyl alcohol. Additional cave fauna was noted as encountered, and not collected.

PARTICIPANT LIST

- Keith Christenson – Biospeleologist, cartographer and photographer
- Donald McFarlane – Paleontologist and bat ecologist
- Jorge Luis Pino – Bat biologist and logistical coordinator
- Stuart McFarlane – Student in cave ecosystems

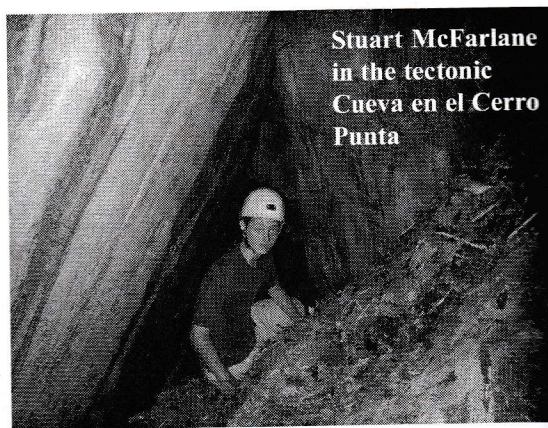
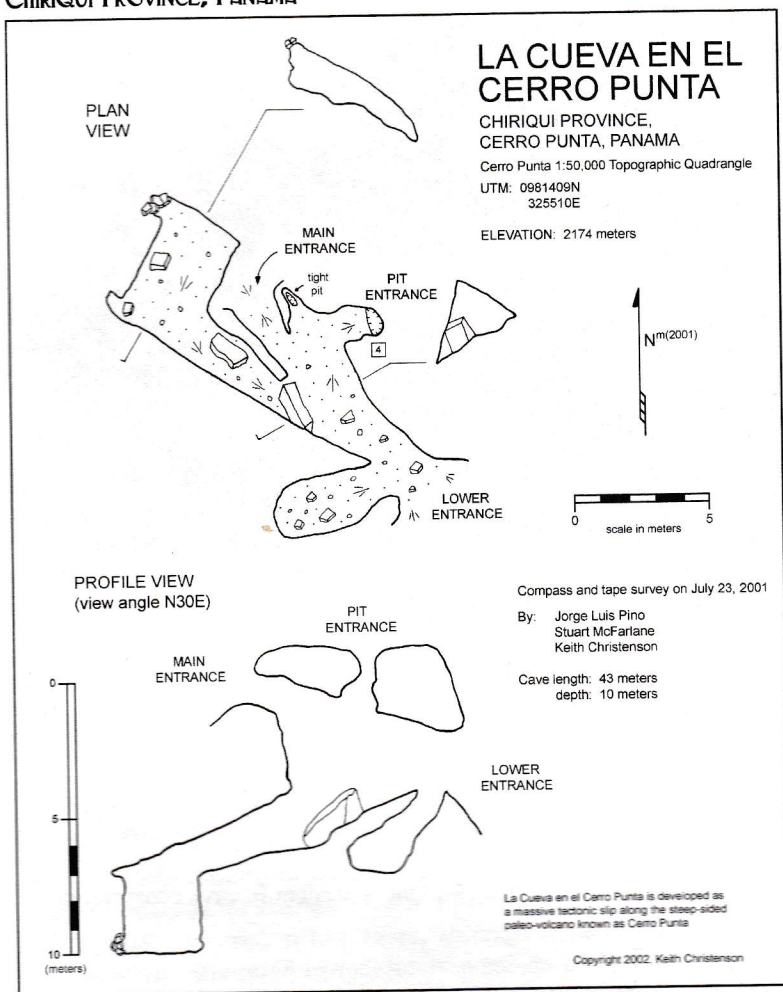
RESULTS

Although eight caves were discovered on this expedition, three had been previously visited by humans. Cueva en el Cerro Punta appeared to be heavily visited, as it is directly on the trail to the top of Cerro Punta. Cueva Eliseo is occasionally visited to try and kill the vampire bats within, and Cueva de Portón seems to be an occasional location for adventure-seeking Panamanians, as recorded by signatures in the mud in the cave.



El Cerro Punta as viewed from the town of Cerro Punta

CHIRIQUI PROVINCE, PANAMA



La Cueva en el Cerro Punta

Length: 43 meters
 Depth: 10 meters
 Elevation: 2174 meters
 UTM Location: 0981409N 325510E
 Bat species: None encountered
 Invertebrate fauna: Large trogliphilic spiders observed but not collected
 Archeology: None apparent
 Paleontology: None apparent

Notes: There are "through trip" by hikers climbing the peak, thus technically giving it some tourist value.

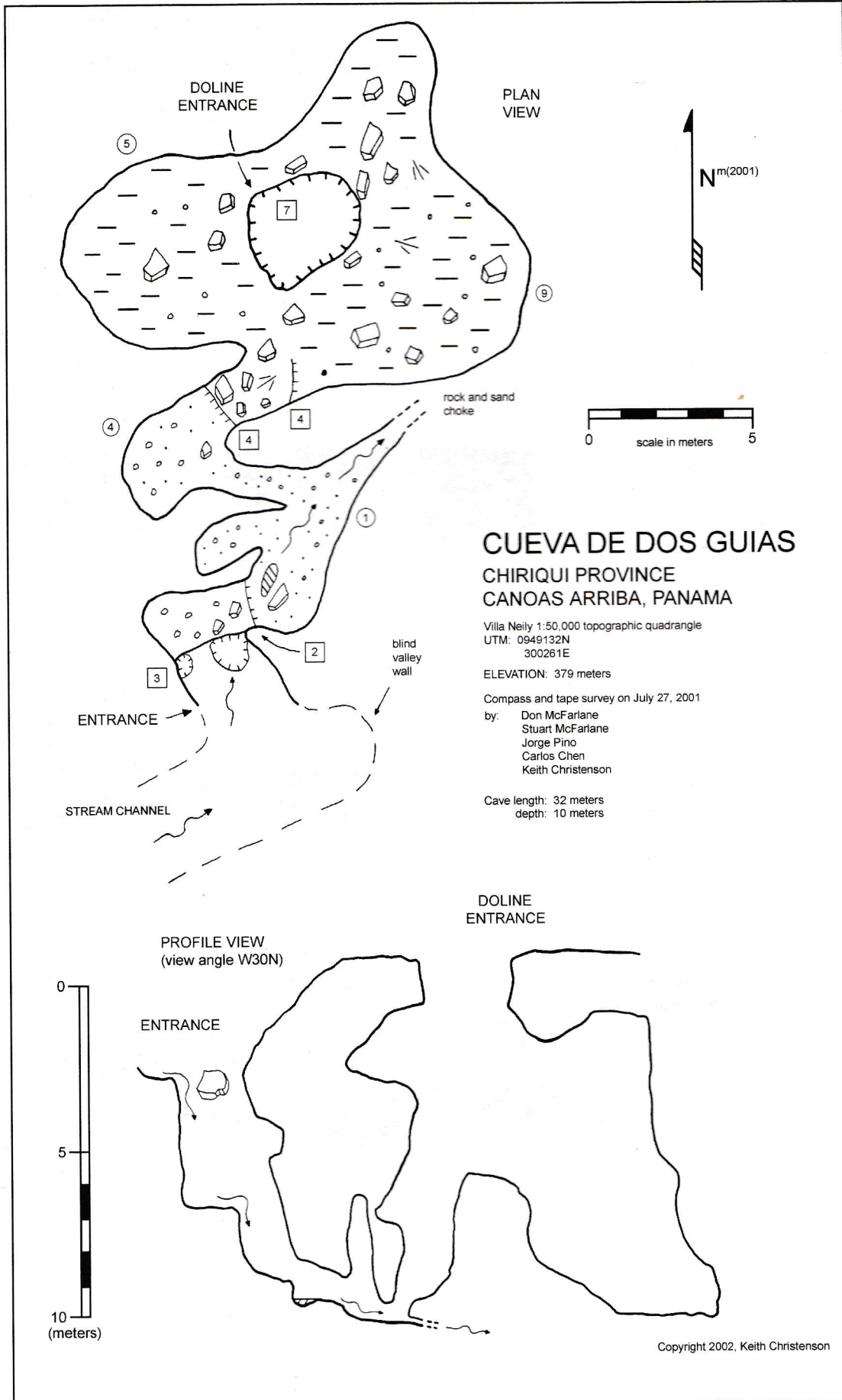
The results, as presented here by cave, are as follows:

La Cueva Eliseo

Length: 8 meters
 Depth: 3 meters
 Elevation: 381 meters
 UTM Location: 0947106N 321100E
 Bat species: *Desmodus rotundus* - visually estimated at 90 individuals
 Invertebrate fauna: Cave has a large invertebrate fauna, but was not sampled or studied due to the proximity of the colony to the entrance, introducing an unusually large number of accidentals to such a list.
 Archeology: None apparent
 Paleontology: None apparent

Notes: The owner of the cave has in the past tried to kill the bats. It is likely that he will again make some effort to kill or remove the colony. It is doubtful that such actions at this cave will affect any other species of bats, or endanger any invertebrate fauna.

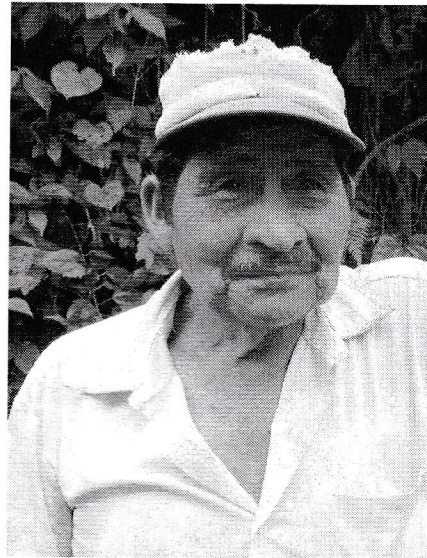




CHIRIQUI PROVINCE, PANAMA

Cueva de Dos Guías

Length:	32 meters
Depth:	10 meters
Elevation:	379 meters
UTM Location:	0949132N 300261E
Bat species:	<i>Carollia perspicillata</i> – Colony roughly estimated to number around 50 bats. Identified visually at two meters, as none were captured. <i>Desmodus rotundus</i> – Colony of an estimated 20 bats. <i>Peropteryx</i> sp – Five individuals observed roosting.
Invertebrate fauna:	Not inspected
Archeology:	None apparent
Paleontology:	None apparent



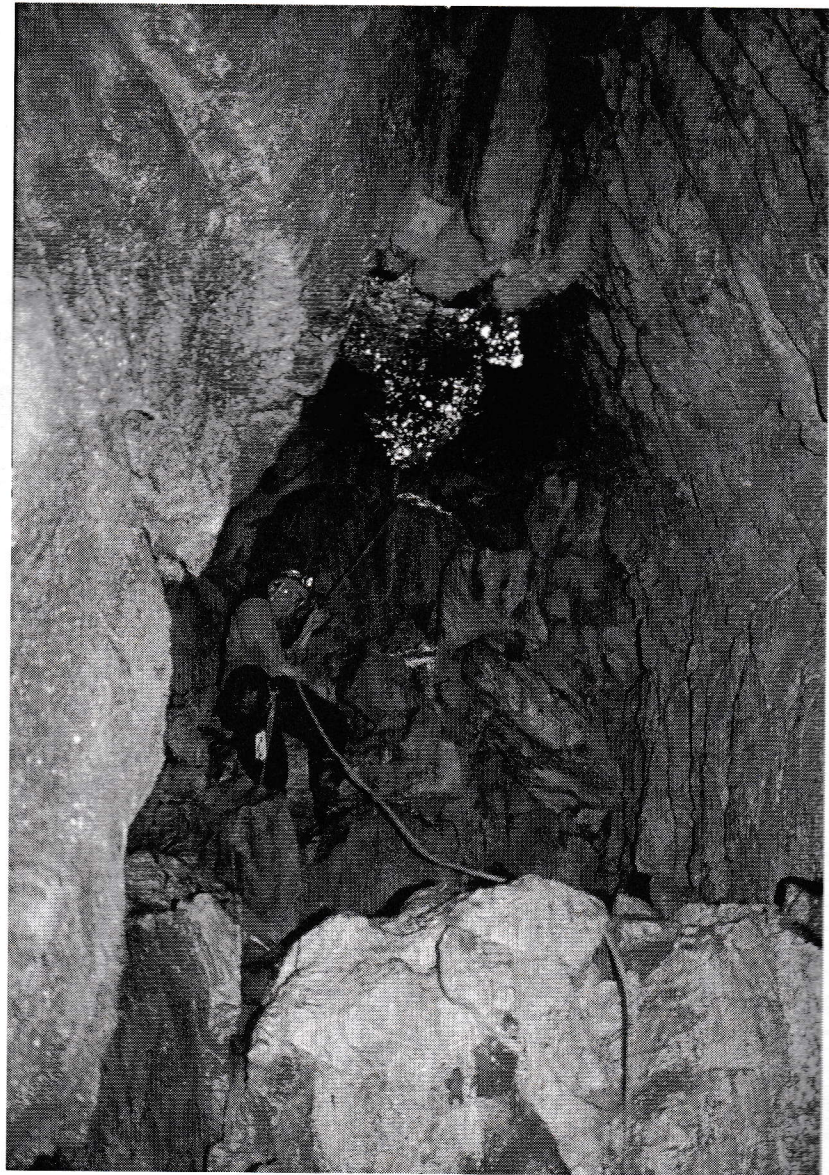
One of the gentlemen who showed us Cueva de los dos Guías.

Hueco de los Duendes

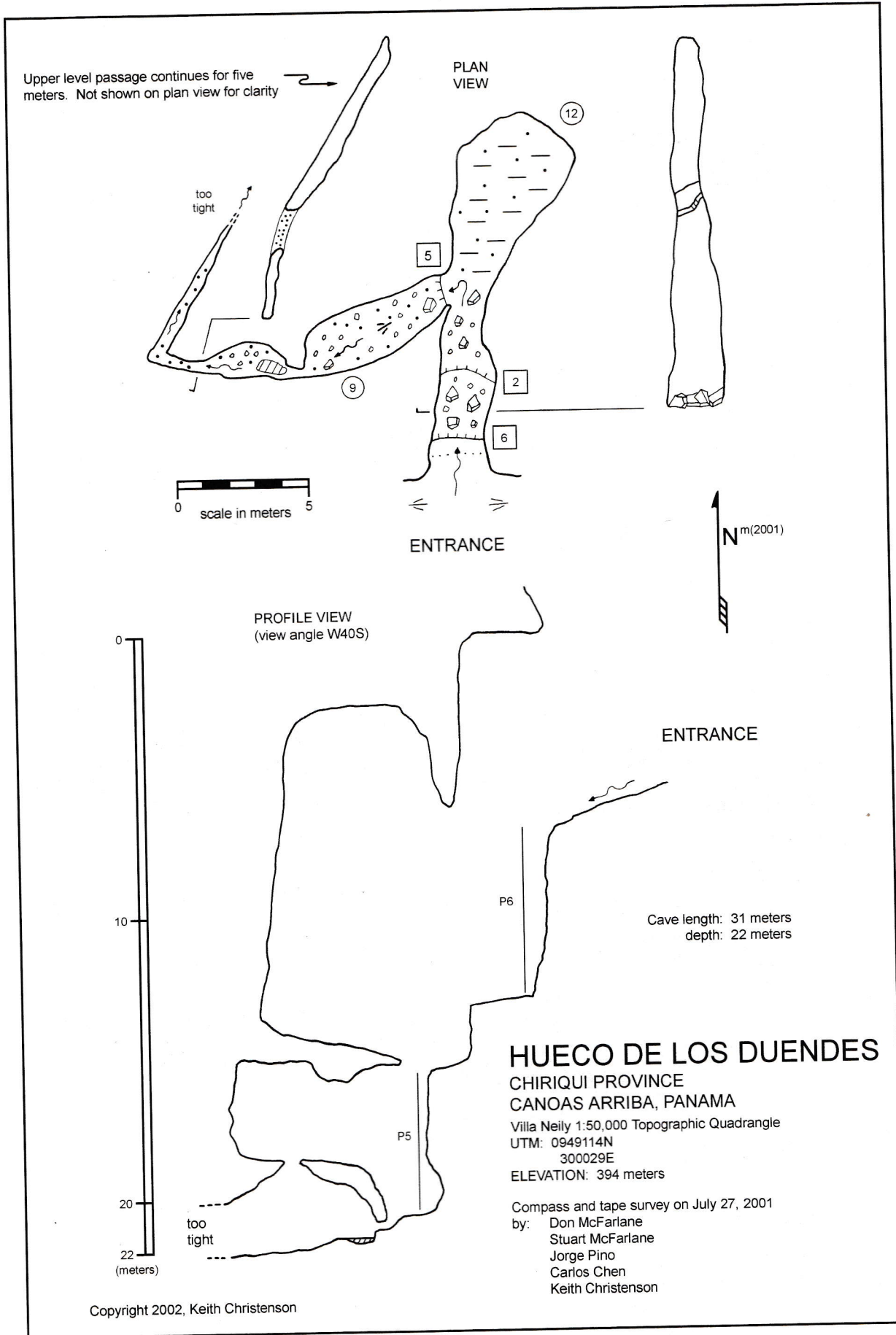
Length:	31 meters
Depth:	22 meters
Elevation:	394 meters
UTM Location:	0949114N 300029E
Bat species:	Unidentified colony of an estimated 10 Emballonurid bats were roosting in a high, narrow fissure in the wall above the entrance.

Invertebrate fauna:	Not inspected
Archeology:	None apparent
Paleontology:	None apparent

Notes: Although this cave is widely known by the local populace, most have never even walked down to see the entrance, as there are widely reported and believed stories of duendes (goblins) in the cave. Although it is possible to enter the cave without a rope, it is much safer to rappel into the cave. The second pitch is even more difficult without a rope.



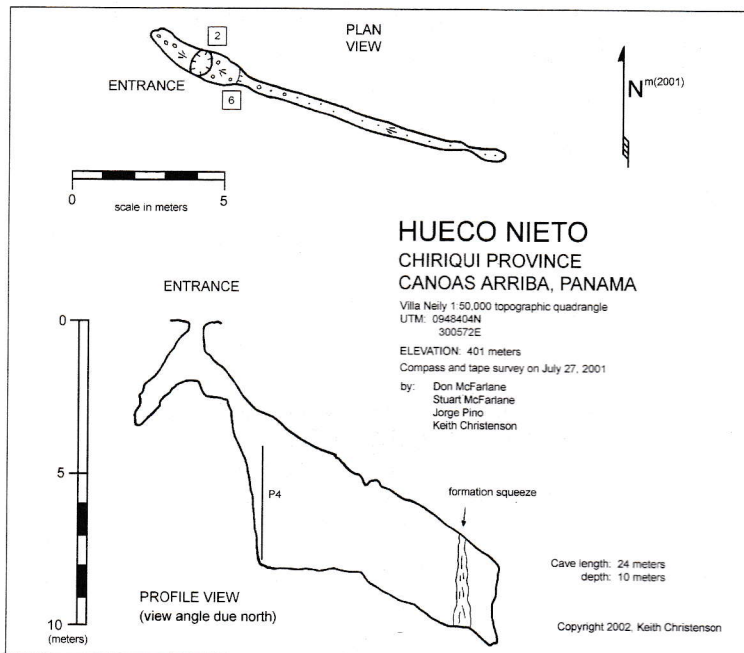
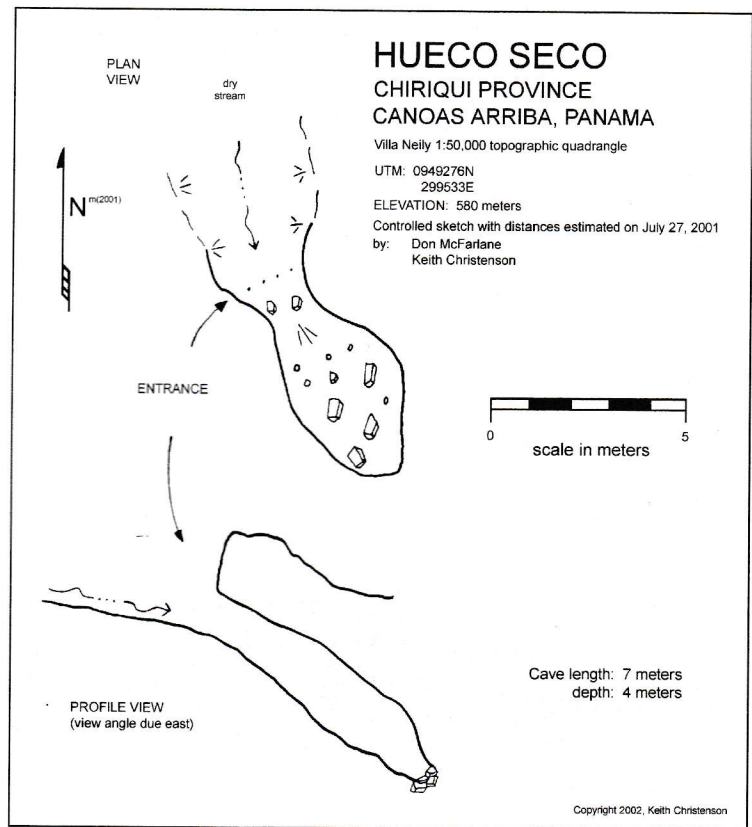
Jorge Pino rappels the entrance pit of Hueco de los Duendes.



Hueco Seco

Length: 7 meters
 Depth: 4 meters
 Elevation: 580 meters
 UTM Location: 0949276N 299533E
 Bat species: None encountered
 Invertebrate fauna: Not inspected
 Archeology: None apparent
 Paleontology: None apparent

Notes: Cave is included here "For Record Only", because it was shown to us. Hydrologically it acts as a high-water sink point.



Hueco Nieto

Length: 24 meters
 Depth: 10 meters
 Elevation: 401 meters
 UTM Location: 0948404N 300572E
 Bat species: None encountered
 Invertebrate fauna: Not inspected
 Archeology: None apparent
 Paleontology: None apparent

Notes: Squeeze at the top of the four-meter pitch is very tight.

Cueva de Portón

Length: 707 meters
 Depth: 16 meters
 Elevation: 292 meters
 UTM Location: 0947470N 305742E
 Bat species: *Carollia perspicillata* – visual estimate of population was 100+ bats. Seven individuals (6 male, 1 female) were captured in a mist net erected in the cave. The female was in a post reproductive lactating state.
Desmodus rotundus – visual estimate of population was 30 bats.
 Two individuals (Adult lactating female with pup on teat) were captured in a hand net.
Phyllostomus hastatus – a colony of about 20 large bats, apparently organized into a harem, was observed in a high ceiling bell, but no examples were captured.

Invertebrate fauna:

One collection sample was taken from a guano pile in the cave. It included examples of Collembola, Isopoda, Acari and misc. larval forms. Addition invertebrates observed in the cave included: Amblypygi, Coleoptera, gastropoda, Diptera, Lepidoptera (Tinead moths) and Orthoptera.

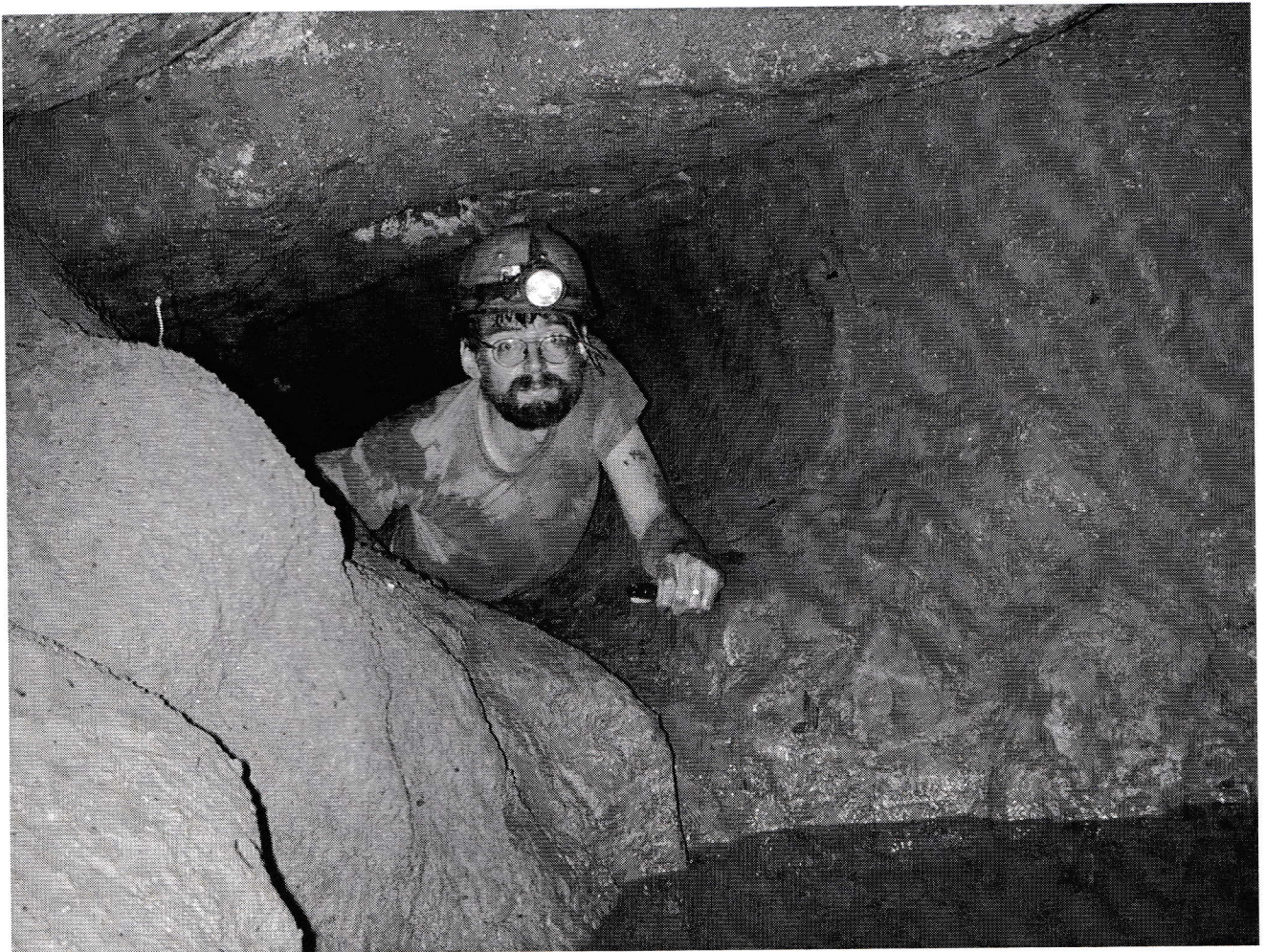
Archeology:

None apparent

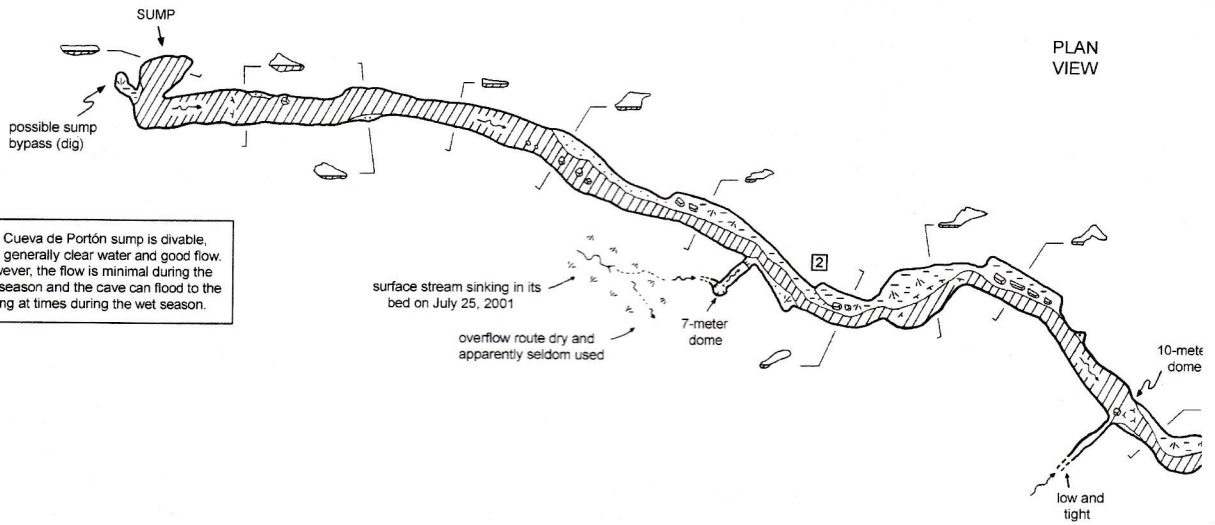
Paleontology:

None apparent

Notes: The stream in the cave was not studied, although it was noted to contain at least three species of fish, including catfish. Also, this cave may be directly threatened by a nearby limestone quarry, and a thorough biological study would be an appropriate recommendation. It is obvious from the few names written in the mud of the cave, that people visit it on occasion. However, the cave clearly floods to the ceiling beyond The Ear Dipper (see map), and travel beyond this point other than in the dry season could lead to a tragic accident. As of September 2002, this is the second longest surveyed cave in Panama.



Don McFarlane coming out of a grim lead in Cueva Portón



The Cueva de Portón sump is dividable, with generally clear water and good flow. However, the flow is minimal during the dry season and the cave can flood to the ceiling at times during the wet season.

CUEVA DE PORTÓN

CHIRIQUÍ PROVINCE

PORTÓN, PANAMÁ

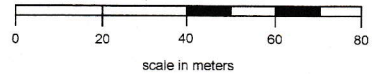
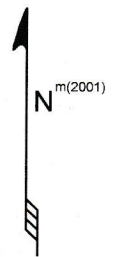
Valle Neily 1:50,000 topographic quadrangle

UTM 0947470N
305742E

ELEVATION 292 meters

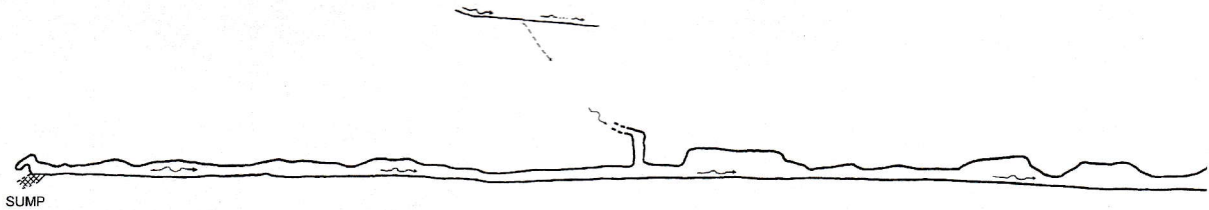
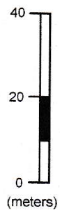
Compass and tape survey on July 24 and 25, 2001
by Don McFarlane
Stuart McFarlane
Jorge Luis Pino
Keith Christenson

Cave length 707 meters
depth 16 meters

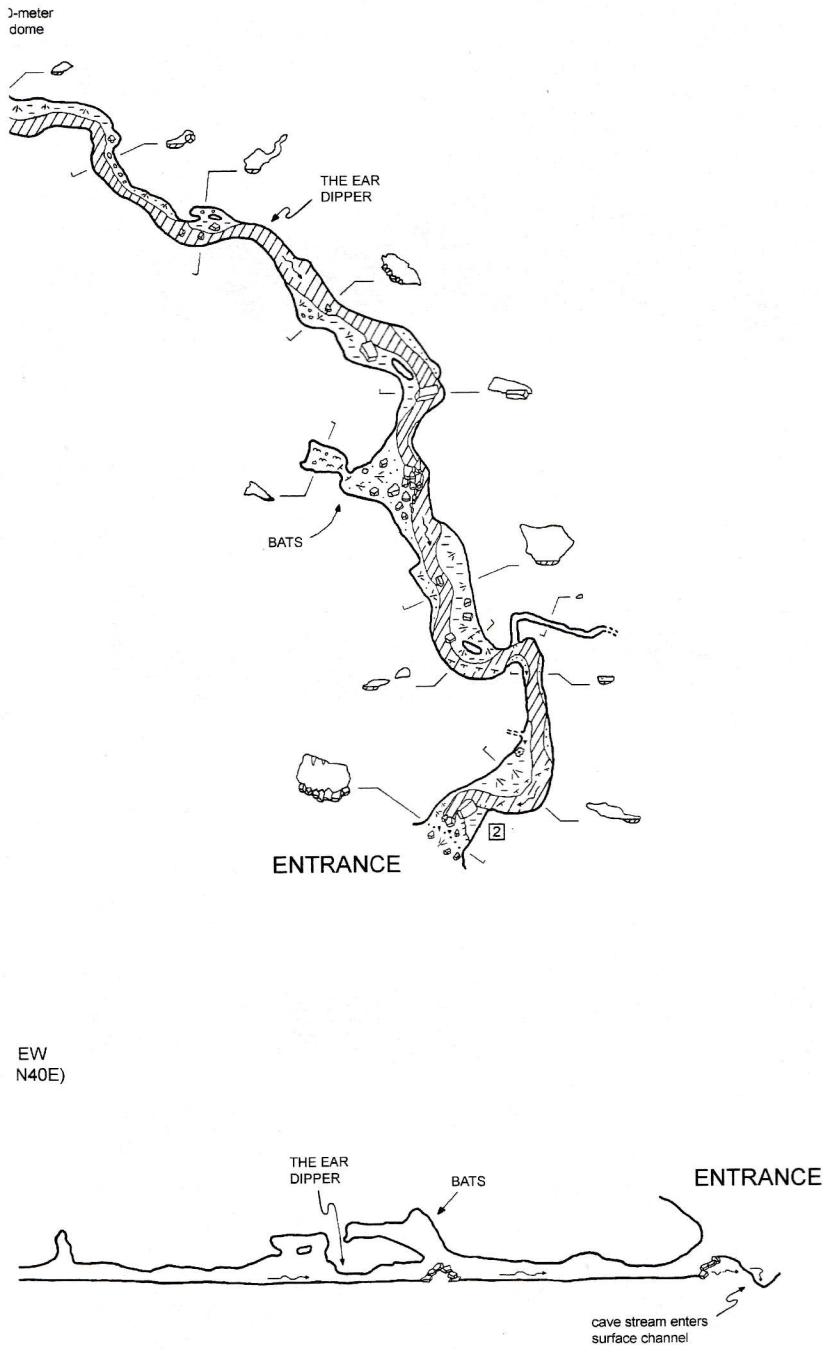


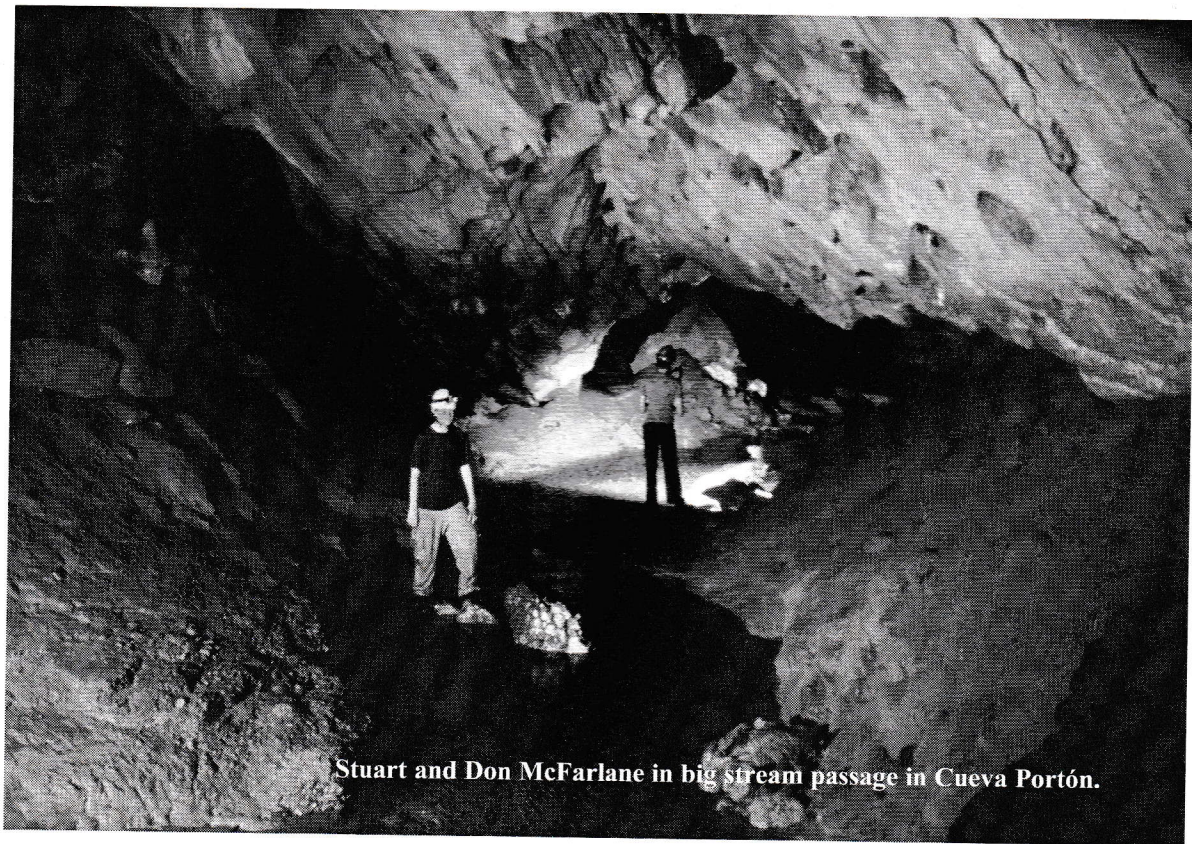
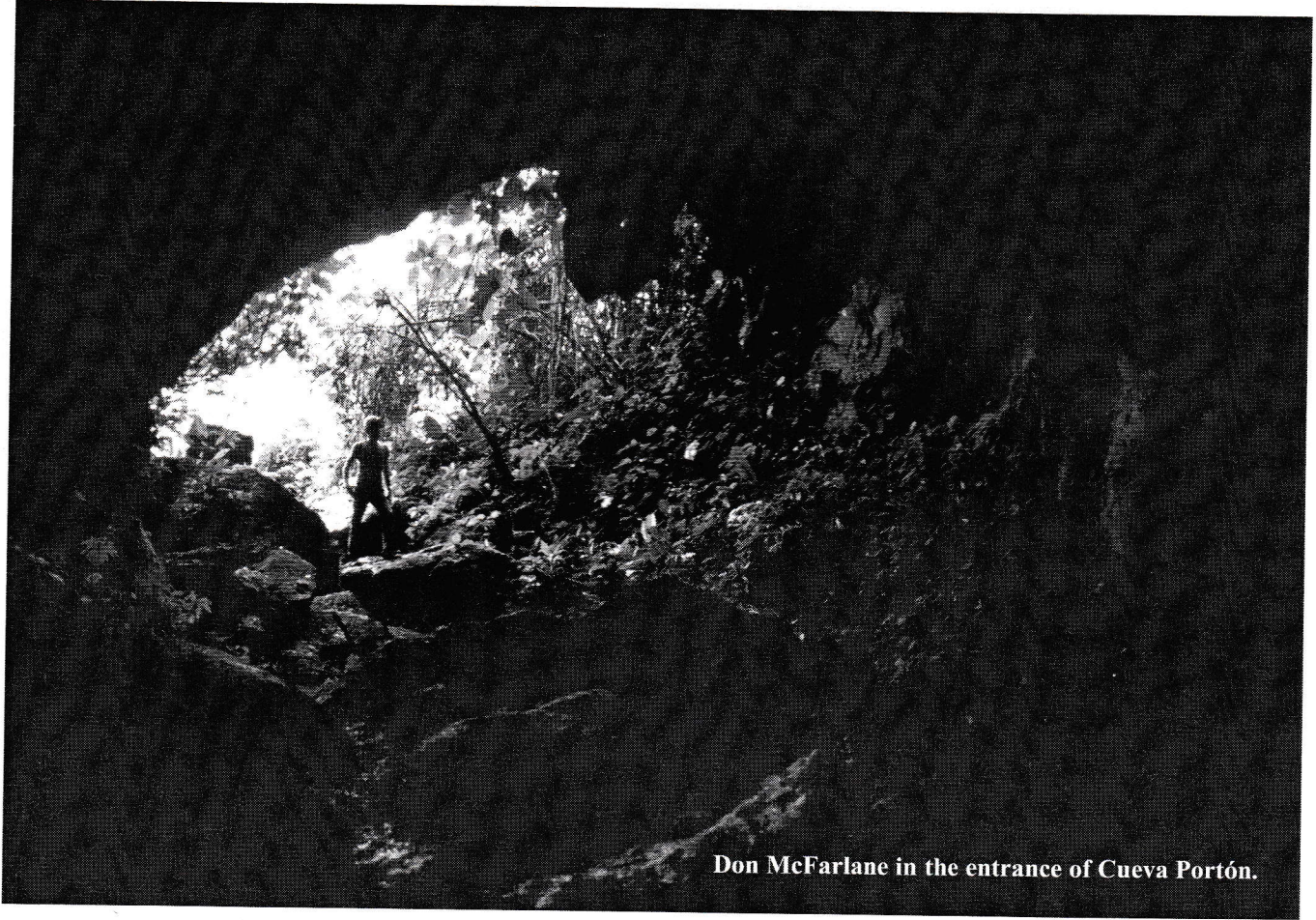
surface stream was sinking in its bed on July 25, 2001, and entering the cave at the top of the 7-meter dome.

PROFILE VIEW
(view angle N40E)



© 2001, Keith Christenson







**Vegetation covered formations at the entrance to
Cueva Portón**

Hueco Candenelo

Length:	19 meters
Depth:	12 meters
Elevation:	580 meters
UTM Location:	0949233N 299552E
Bat species:	A single, unidentified bat was seen flying.
Invertebrate fauna:	Not inspected
Archeology:	None apparent
Paleontology:	None apparent

Notes: Entrance requires a rope.



Don McFarlane and the make-do étrier used to enter Cueva Candenelo

CHIRIQUI PROVINCE, PANAMA

DISCUSSION

Other than Cueva de Portón, most of the caves discovered on this expedition are trivial. However, several topics need to be addressed here. As always, even trivial caves, when discovered in close proximity, may represent interesting karst systems, and more work may need to be done to fully understand them.

The foremost concern from the results of our work is that Cueva de Portón may be in imminent danger of a quarry. Our cave survey and surface work indicates that the cave's interior passages are quite close to the quarry. We did not locate the quarry wall during our study, but we estimate that it is about 100 meters from intersecting the cave.

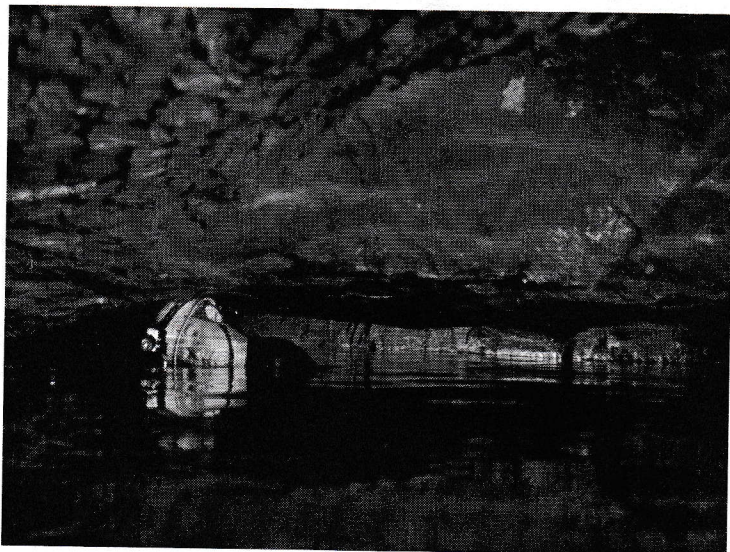
The point of reference for this conclusion is that we took a GPS reading at the entrance of the cave, and at an above-ground point where a surface stream was sinking in its bed. The surface stream's sink corresponded with a small waterfall entering the cave, and this location is close to the quarry face.

The results of the quarry intersecting the cave would be twofold. First, the stream in the cave would possibly be diverted out of its natural channel, and flow out of the quarry wall. This would have an indeterminable impact on the twilight zone

species that currently live in the entrance of the cave. Secondly, it would change the airflow pattern in the cave, possibly impacting interior species such as the bats.

Many quarries intersect, and often destroy caves. This is an unavoidable aspect of the need for limestone. For the most part, this is mitigated by the environmental plans of the quarries, and little interest is given to the caves intersected other than by geologists who wish to see the cave before it is destroyed. However, in the case of Cueva de Portón, the cave that may be intersected is of known biological interest and of some importance as the second longest known cave in Panama. We are not suggesting that the quarry at Portón is environmentally unsound, but suggest that the cave be considered in the environmental impact statement for the project, if this has not been done. Our data are available upon request.

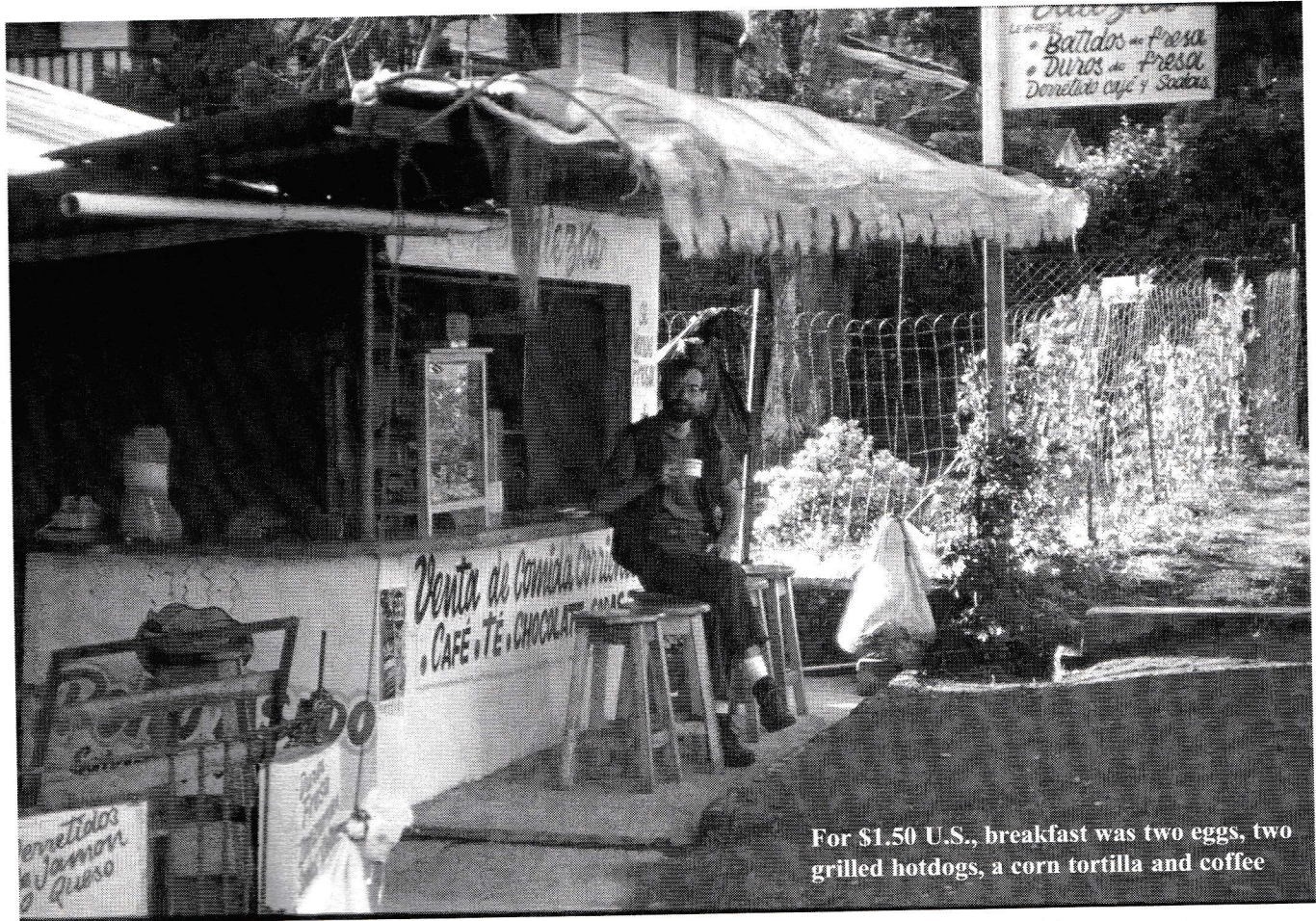
We were able to show that the limestone region above Canoas Arriba contains numerous small caves and sinkholes. Although we did not discover a large cave underlying this area, it is easy to suggest that one exists. More effort needs to be put forth in this area to understand the local hydrology and to determine the environmental impacts of mineral resource extraction in the area. At the time of this study, only small quarries were observed on the ridge, but future operations could heavily impact an as yet unknown underground habitat and its fauna.



Jorge Pino in a low section near the entrance of Cueva Portón.



Don McFarlane explains that a green vine snake's poisonous rear fangs are mostly harmless



For \$1.50 U.S., breakfast was two eggs, two grilled hotdogs, a corn tortilla and coffee

SUMMARY

Eight caves were studied in the Chiriquí province of Panama. The second longest, the deepest, and the highest elevation caves of Panama were established on this expedition, an accomplishment unlikely to occur again in Panama. It is expected that at least the longest and deepest known caves will continue to change, as an increase in the study of caves in Panama locates and surveys more caves.

No large bat colonies were located in the caves, although Cueva de Portón had at least three species roosting in the cave, and an estimated total of 150+ bats using the cave as a day roost. Cueva de Dos Guías also had three species of bats, although the total population was estimated to be just 75 bats.

Invertebrate samples were collected from Cueva de Portón. Of the samples collected, only the Collembola will be forwarded to a specialist for further study, with the few additional specimens to be submitted to the appropriate Panamanian authority.

No caves were located which contained archeological or paleontological sites. However, Cueva de Portón has at least some tourist value. Although it remains unsafe to enter beyond the first "ear dipper" for most of the year, it can be entered during the dry season by people adventurous enough to

want to get wet, muddy and crawl through passages. However, the generally difficult nature of the cave, and the few months of the year that it is safe to enter, prohibits any profitable tourism potential.

Lastly, the active limestone quarry near the Cueva de Portón entrance seems to be mining directly toward the cave. Additional studies should be undertaken related to this, as it appears that the quarry could impact the cave environment and its ecosystem within the foreseeable future.

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