Cascade Caver

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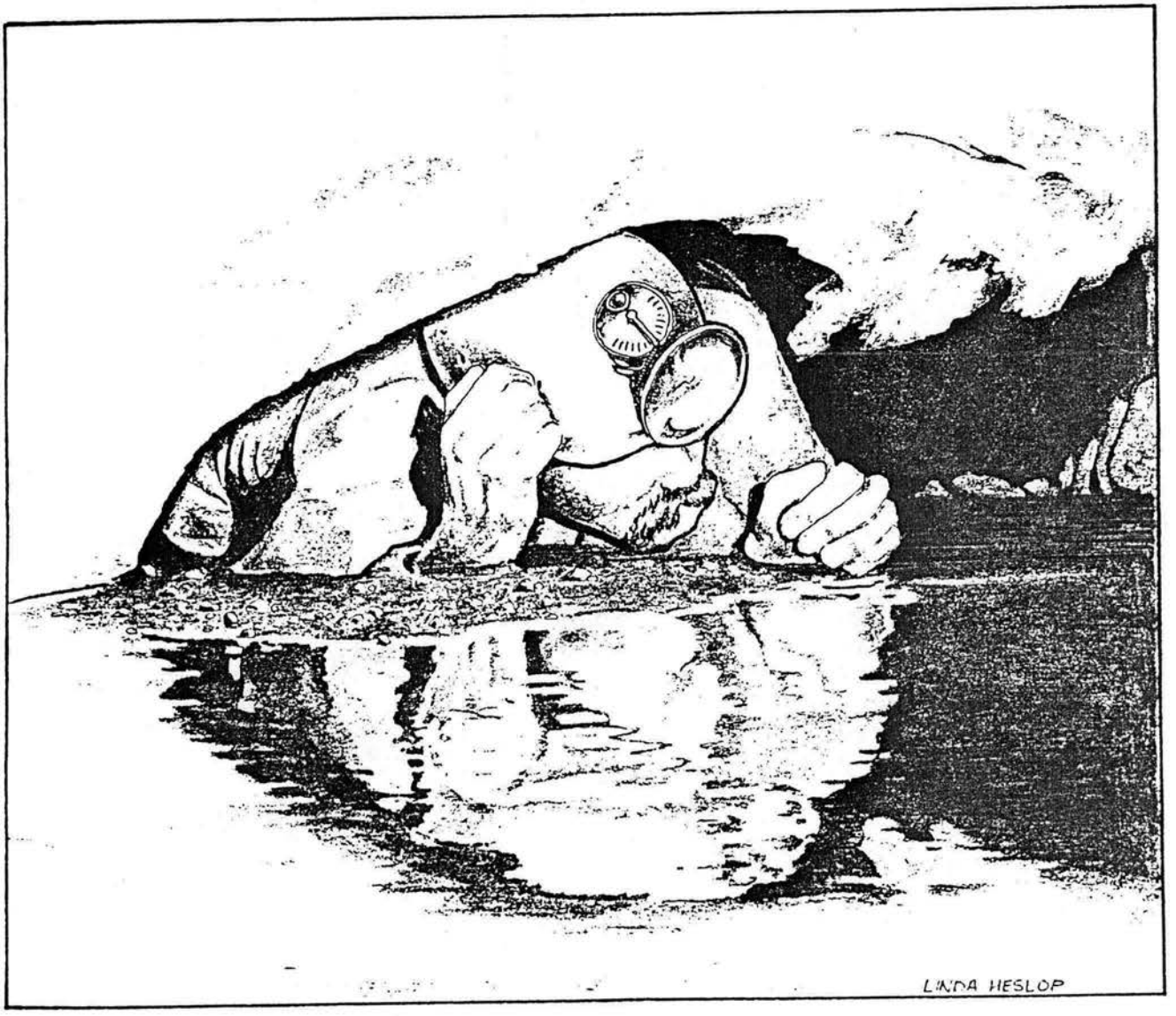

CASCADE CAVER

The *Cascade Caver* is published 10 times a year by the Cascade Grotto, a member of the National Speleological Society. All correspondence should be sent to: The Cascade Grotto, P.O. Box 75663, Seattle, WA 98125-0663.

Meetings: 7:00 pm on the third Friday of each month at the University of Washington, Room 6, in the basement of Johnson Hall.

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Dues: Membership in the Cascade Grotto including subscription to the *Cascade Caver* is $7.50 per year. Dues for additional family members is $1.50. Subscription to the *Cascade Caver* only is $7.50 per year. Please note the date on your mailing label that indicates when your dues expire.

Dropped:	Peter Carter (5/88)	Diane Coburn (6/88)	Ed Crawford (6/88)	Mary Crawford (6/88)
	Dede Brown	Jan Roberts (6/88)		
Overdue:	Rob Stitt	Sue Brenner	Chris Burdge	Richard James
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Due now:	John Day	Adriyah Hanum	Rob Harrison	Robert Jared
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Due in Dec:	John Clardy	Jerry Frahm	Dr. W.R. Halliday	Steve Sprague
	Ben Tompkins			
Due in Jan:	Alan Coakley	Tina Coakley	Dan McFeeley	

Cover: This month's cover was drawn by Linda Heslop. This is of Jim Jacek in Yuck Duck which is in Cold Rock to Go Cave on Vancouver Island.

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Grotto Notes

Upcoming Events

Current trip list, planned and proposed. Anyone with other trip ideas is welcome to contact Jim Harp, grotto trip coordinator.

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January 1989

20	**Grotto Meeting.** Announcement of new officers.

October Meeting

At last month's Grotto meeting a Trip Report Contest for the Caver was approved. Mark Sherman requested that instead of limiting the contest to just trip reports, it should include all original articles. This could include trip reports, technical articles or just general information. This was approved.

Chuck Crandell volunteered to host the Christmas party at his house this year. It will be held on Dec. 10th. Ben Tompkins and Mark Sherman will send letters to the Oregon Grotto and to VICEG inviting them. Bob Brown volunteered to buy the meat for the dinner.

Mark Wilson discussed the results of the recent survey he conducted about peoples opinion of the Grotto. The results broke down to:

1) There needs to be a separate business meeting. Conducting all the business at the general meeting can be very boring and has a tendency to drive prospective members away.
2) We need to recruit new members.
3) The programs need to be more varied. Instead of having slide shows or a video every month we need to have educational programs. This could include things like First Aid or cave photography for example. After a short discussion it was voted to hold separate business meetings which would be called by the Chairman. The time and location along with the agenda would be published before-hand in the Caver.

Mark Wilson reminded people that nominations for next year's officers would be held at next month's meeting.

This month's program was an NSS slide show on Western Oklahoma Gypsum Caves, subtitled "Gypped Again in OK".

November Meeting

The first item discussed was the upcoming Christmas party.

Nominations for next year's officers were held. The ballots will be mailed out with the November *Cascade Caver* and must be returned to Ben Tompkins by Dec. 31.

Rob Lewis and Larry McTigue when down to Mount St. Helens and found the new parking lot at the Ape Cave Visitor Center done as was the pathway to the cave. They also found that the exit crawl in Gremlin cave was plugged with mud so through trips are no longer possible without some digging.

Jeff Forbes, who finally is back from Mexico, was up on Vancouver Island helping dig open some new caves.

There will be a Trip Planning meeting held in January, time and location to be determined later.

This month's program was another NSS slide show, entitled Caves of Upper Austria.

December Meeting

There is no December Meeting.

See you at the Christmas Party!

Election of officers

The following people have been nominated for the three elected grotto offices:

Chairman:	Mark Wilson	Ben Tompkins
V. Chairman:	Chuck Crandell	Rob Lewis
Sec/Treas:	Ben Tompkins	Mark Wilson

A ballot has been enclosed with this issue for all of you who are current grotto members. Please return these ballots by December 31 to Ben Tompkins either in person at December business meeting or the grotto Christmas party, or else mail to Ben Tompkins, 18002-First Avenue N.W., Seattle, WA 98177.

December Business Meeting

Our first separate grotto business meeting will be held on Monday, December 5, 7:00 pm, at Mark Wilson's house. Call Mark at 285-5724 for directions. Agenda:

1. Formalize the process of separate business meetings.
2. Fund the Cascade Caver.

Christmas Party

The grotto Christmas party is being held Saturday, December 10, at Chuck Crandell's house. We will provide a roast and salad, grotto members please bring your favorite dessert or another entree.

VICEG and the Oregon Grotto have been invited and various grotto members will be glad to host out-of-towners for the night.

See the party insert to this issue for more details.

1,600 "C" Cells in the palm of your hand
Ben Tompkins

Rechargeable batteries are valuable assets to electric caving. Wonderful, that is, until needing a recharge far from an electrical outlet or automobile. You then need to carry a bunch of charged batteries or else bring along a generator, solar panel, windmill, treadmill or other such monstrosity to recharge your batteries.

Now there is a new battery called LandWatt(R) from Alupower, Inc., Bernardsville, NJ, that uses aluminum-air chemistry to pack a lot of energy in a portable package. An article in *Design News*, 11-7-88, describes the battery as being 12 X 8 X 8 inches and providing 6V at 2.5 Amps. It contains more than 4 kW of potential energy, the equivalent of 5 hp or more than 1600 "C" size batteries.

The nice thing about this battery is that the electrolyte is "user friendly", it's saltwater. For really portable operations where water is available you only need to pack in the battery (5 lbs) and some salt.

The article tells of a British caving expedition that took 24 LandWatt units to a region in northern Spain called the Picos de Europa. They not only mapped to a depth of 1139 meters but were also filmed by a British network crew and the aluminum battery packs powered the film lights as well as recharging their personal head lamp batteries.

Mount St. Helens Caves
Larry McTigue

On October 28 Rob Lewis and I went to dig in the terminal crawlway in Ape Cave. We dug for several hours but only got about 100 feet or so. Debris has filled the crawlway to within 6 inches of the ceiling making it difficult to dig. A few years ago I saw a constriction at the end of the crawl and a continuation of the main tube beyond. We wanted to get to the end of the crawlway so we could use a hammer and chisel to break the lava constriction.

The forest Service has dug up the old road and parking lot at Ape Cave and moved it about 500 feet south where they have made a new parking lot with a gate on it and added a visitor center and two rest room buildings. There is a 500-foot asphalt walkway leading north to the cave entrance. The facilities are almost finished and should be ready for next summer's tourists.

We went to Lake Cave the next day and found the lake completely dry. Rob found a grylloblattid crawling on the passage wall near the "lake". He also noted a faint water line several feet up the wall that was composed of small sand particles and continued for about 50 feet. Rod Crawford suggests that flooding may occur in years of heavy snowfall if meltwater from a sudden warming trend coincides with heavy rainfall.

We also stopped at the stream passage which enters on the east wall about a third of the way back to the entrance. I'd never been in it before and was surprised to find soft sandy floors so that we didn't need knee pads to do the crawlways. This passage contains tree casts whose charcoal remains have been radio-carbon dated to 2,250 years ago.

Our next stop was Gremlin Cave. We entered the upper entrance and explored the main passages as far as we could. In places we noticed silica stalactites which were quite small but nicely reflected the light of our headlights against the dark background of the lava.

At the Hub Room we found the passages to the northwest to be filled within a few inches of the ceiling and we never made it to the Formation Room. At that point we called it a day and headed home.

Underground Elephants
By Ian Redmond

[This article is taken from the Dec/Jan 1983 issue of Animal Kingdom.]

The Crunching was clearly audible. Ten yards away in total darkness, massive molars were grinding rock. With a dim pen torch I cautiously cast a stream of light over the jumbled boulders. Fifteen elephants, standing side by side like cows in a byre, were munching on lumps of rock; overhead, fruit bats flapped off into the night from the fossil branches of their roost.

The setting for this unlikely scene was a cave beneath the forested slopes of an African volcano - my home for a total of five months during the first study of elephants underground.

Elephants are not renowned for burrowing, but there is one place on Earth where they penetrate the darkest recesses of complex caverns. That place is Mount Elgon, on the Kenya-Uganda border.

Elgon is one of the many volcanos that punctuate the 3,000-mile-long Afro-Arabian rift system. Stretching from Mozambique to Syria, this series of rifts was formed by movements within the earth's mantle, causing the crust to rupture. Between long parallel faults, equally long chunks of bedrock sank, leaving flat valley bottoms between steep escarpments. In some places lava leaked through the cracks in the crust, creating the solitary volcanic peaks we see today. Some are still active but most lie dormant - sleeping giants with only geothermal springs and steam vents to remind us of their turbulent past.

At 14,178 feet, Mount Elgon is not the highest of East Africa's solitary mountains; it is dwarfed by Kilimanjaro (19,340 ft.) and by Kenya (17,058 ft.). It is, however, the biggest in terms of bulk; the basal diameter - some 50 miles across - has led to speculation that this eroded shallow cone might once have had the highest summit in Africa.

During its formation 10 million to seven million years ago, in the late Miocene, Elgon was behaving much like Mount Saint Helens, in Washington, today. Sudden violent eruptions were interposed with long quiescent periods when forest grew on the slopes. Explosions would flatten the trees for miles around and a rain of pyroclastic material - volcanic bombs, ash, and debris - would be thrown out by the force of the blast.

Most of Elgon is made up of agglomerate produced in this way; only one percent was formed by lava flows. Once on the surface the lava cooled quickly, forming hard, fine-grained basalt layers which, when re-exposed millions of years later, formed a protective cap over the softer material beneath it. Unprotected pyroclastics have been eroded away so the downhill edge of this basalt umbrella usually forms the lip of a cliff. It is into these cliffs that the majority of Elgon's caves extend, the roof supported by the harder lava cap.

Unlike the spectacular lava tubes beneath other Kenyan volcanos, the caves were not formed in molten rock, but in the softer, underlying layer of mineral-rich agglomerate. Deep within the caverns the petrified trunks of Miocene trees can be seen radiating from the mountain in the direction of the blast that felled them.

Calcite and zeolite crystals have replaced the wood fibers, and in places the claws of roosting bats have exposed the petrified roots and branches so that, 10 million years after their death, the trees again support life. Fossilized hollow stems and logs are lined with needles of natrolite, looking like glassy crystalline fur. Around the cave mouth these tubes in the rock are used as ready-made nest holes by swifts and swallows. Chicks are reared in soft nests of pale green old-man's beard lichen in crystal-lined seclusion well beyond the reach of predators.

But the caves are not used just as roost and nest sites. The force that drives elephants underground is their hunger for salt.

All animals need a balanced intake of mineral salts, and if there is a deficit they will go to great lengths to correct it. In mountainous areas of high rainfall, soluble salts are leached from the soil; vegetation growing in that soil therefore contains low levels of such salts. Herbivores that feed on these plants must find an alternative source, usually a mineral-rich outcrop, which becomes a salt lick.

It is not by accident that in montane rain forests, lodges such as the Ark in Kenya's Aberdare National Park, are built beside natural licks. Visitors there can watch concentrations of shy forest animals: Herbivores are drawn by the salt and carnivores by the herbivores. The predators show no interest in licking rock - their food comes already salted.

At Mount Elgon the soft agglomerate, shielded by its lava umbrella from the leaching effects of rain, contains more than 100 times the sodium salts found in forest plants. The rock is not salty to our palate because it is not sodium chloride (common salt) but sodium sulfate. Known to pharmacists as Glauber's salt after Johann Rudolf Glauber, the seventeenth century German chemist who first prepared it - sodium sulfate is dispensed by doctors as a mild laxative, but the copious quantity of dung carpeting the cave floor

dispels the notion that visiting elephants are constipated! Not only elephants are lured by the vital sodium ions; buffalos, antelopes, even black-and-white colobus monkeys also make their way into the bowels of the earth.

Kitum Cave, the focal point of my research, is typical of the many caves hidden in the forested folds of Mount Elgon's fertile flanks. Situated at the head of a small valley at an altitude of 7,900 feet, it is regularly visited by elephants and other herbivores. The cave mouth, shaped like an irregular letter box, is 45 yards wide and mostly blocked by fallen rock and a waterfall cascading over the cliff. Inside, the cavern widens to more than 100 yards and extends more or less horizontally into the mountain for 175 yards.

Much of the floor consists of mounds of fallen roof over which the elephants must clamber to reach the salt-mining bays. The worked walls are covered with a crazy mosaic of tuskings - smooth grooves carved in the rock by living ivory chisels.

For my base of operations I selected a large rock shaped like a ship's prow, jutting from the north wall just inside the entrance chamber, behind this I placed my bed - a mattress borrowed from Elgon Lodge.

To the left of my campsite the waterfall splatters onto the mossy jumble of rocks that blocks most of the cave mouth. Forty-five yards ahead the south wall overhangs the narrow path by which all large animals enter and leave. Below the observation rock some of the water splashes and gurgles through the boulders and down the valley; the rest flows back into the cave, creating a large muddy area pocked with elephantine footprints.

Apart from occasional trips down to Kitale market for supplies, my policy was simply to live in the cave and monitor all traffic.

In general, the elephants were remarkably tolerant and once they had accepted the presence of harmless human company, they paid me little heed as long as I kept a low profile.

They usually arrived at dusk, feeding leisurely before disappearing, single file, into the black maw of Kitum main cave. The cows kept matronly trunks on their young to prevent their straying near a crevasse that previously had claimed the lives of two calves and several antelopes. Once in the back chamber they would relax, spread out, splosh in the pools, and mine the rock, staying up to six hours or more, apparently at ease in the stygian blackness.

At that time of night a torch shone onto the domed roof above them would reveal a moving squealing galaxy of reflective red eyes: the roost of Rousette's bats preparing for another night's foraging in fruit trees.

Unlike most other species of fruit bats, which navigate by sight, Rousette's bats have evolved a primitive tongue-clicking sonar system for night flying not a patch on an insectivorous bat's system but sufficient to get around the cave. During the late-evening fly-past, one could just discern the tut-tut-tut of their sonar and occasionally feel the waft of a two-foot wingspan.

So as not to miss an elephant visit, I would sleep tied to a length of black cotton thread stretched over the entrance path at elephant head height. I devised this simple alarm to overcome the problem of missing their often silent approach whilst I was either asleep or just waiting in the dark next to a noisy waterfall. But the thread did not go unnoticed.

The dermal layers of an elephant's forehead may be up to an inch or more thick but they are very sensitive. Photographs later proved what I had begun to suspect: The leading elephants sometimes felt carefully along the thread to where it was tied to the wall, then neatly snapped it off as I slumbered on. Usually I heard them once in the cave but missed recording their time of arrival.

One evening an old solitary bull I called One-Tusk Willy touched the thread and let out a roar of frustration. Hours later he returned and repeated the performance but in the morning the thread was still unbroken. Perhaps he had somewhere experienced the new solar-powered electric fencing that discourages elephants with long memories from following traditional routes through rich farmland.

Following the elephants and observing things never seen by human eyes were the high points of my study, but success did not come early. In 1981 Caroline and I lived in Kitum for six weeks, but for the first three and a half weeks no elephants turned up.

It was the end of the rainy season - cold and damp - and our spirits sank almost as low as the gray clouds that added daily to the waterfall and drips in the cave. During the fourth week the rain decreased and a few sunny days dried the forest (and our kit) a little. On our twenty-fifth night, at 8:20 p.m., the cotton tugged twice and broke: Our observations began.

After shooting half a roll of infrared film with invisible red flashes, we were ecstatic to find that the elephants continued into the cave. (Our joy might have been tempered somewhat had we known that the humidity had already destroyed that roll.

For the first time, I followed the elephants into the back chamber, keeping to the route least accessible

to blindly wandering pachyderms. A bat circled above me, clicking, and I could hear heavy breathing and the clunk of tusk on rock, but I still couldn't see an elephant. The huge boulders I had mapped began to look alarmingly like elephant bottoms and flanks; determined to see a real underground elephant, I moved to the pillar that supported the cave roof and waited. There, in the light of my pen torch, it happened. An elephant head slowly appeared round the pillar. It was a young bull. As if in slow motion he glided past within 10 yards, then up onto the mound, where he paused for several minutes before heading out to the forest.

That image remains indelibly imprinted on my mind. It was only then that I realized just how helpless the elephants are when negotiating such an obstacle course in darkness. With trunks outstretched like built-in white canes, the beasts carefully place each foot before lifting the next; groups move in single file like circus elephants, the one in front feeling the way and rest following nose-to-tail behind. It is literally a case of the blind leading the blind, yet they seem quite familiar with the layout of the cave and relaxed even in my presence.

One time a young bull, unfettered by family ties, allowed me to approach within several yards of where he was mining before spreading his ears at me in annoyance. His mining technique was straightforward: place tusk on irregularity on wall and heave; try to catch loosened rock before it falls in mud.

Loosening lumps is obligatory for an elephant because it cannot lick or bite the rock as most other animals do. With tusks and trunk there is just too much tackle obstructing the mouth. As with every other food item, rock must be placed in the mouth with the prehensile trunk tip, ground by the molars, and swallowed.

The results of this mining are clearly visible on the walls and lower ceilings of worked chambers. Five or six tons of pachyderm pushing on the point of a tusk produces a stripe of polished rock - a tusking - which remains for many years. In old caves, now blocked by rockfalls or surrounded by agriculture outside the park, tuskings provide mute testimony to the efforts of earlier elephants.

But the miners pay a price for their ration of salt. Although tusks (modified incisors) grow throughout life, most adult elephants on Elgon have worn theirs down to short rounded stumps, some barely protruding beyond the bases of their trunks. Most affected are the cows, as they need more salt when pregnant and lactating. In these extreme circumstances, tusk growth cannot keep up with wear.

The elephants do, however, seem to enjoy the caves (one female was even caught by a flash photo taking a dust bath) otherwise why would they stay so long underground?

Elephants spend about 80 percent of each 24 hours feeding, so five or six hours in a cave makes a large gap in the daily cycle. Tape recordings of their activity in the dark revealed that they are not mining all that time. After a while there is just silence, broken by occasional resounding flatulence. Apparently they like to sleep underground after their dose of salts. At this altitude night temperatures outside can drop to below 46 ^{o}F; but the cave interior remains a constant 57 degrees F with 85 to 90 percent humidity. With salt rock and pools of water to boot, it is not surprising the elephants should choose to relax in troglodyte comfort.

Ever since Scottish explorer Joseph Thomson visited Elgon, in 1883, the origin of these remarkable caves has been a subject of speculation. Conventional theories of cave formation, such as splashing waves, underground rivers, and gas bubbles trapped by lava, fail to account for their characteristics.

Some theories have even suggested that they are man-made, as the El Kony (the mispronunciation of which gave the mountain its European name) tribe, sometimes called the Elgon Masai, formerly inhabited the larger caves along with their cattle. They mined basketfuls of rock for their stock (and still do in one or two caves outside the park boundary) but the idea that primitive tools could have created such impressive caverns has been scoffed at. Pastoral man probably moved into ready-made caves. There is, however, an alternative if rather unorthodox explanation of their origin.

Long before man began keeping cattle, elephants and their proboscidean progenitors roamed these forests. If we reflect upon the effect of generations of elephants, each in need of a regular peck of salt, the origin of the caves becomes apparent.

Examination of 15 different-sized caves revealed the stages in evolution and decay of an elephant cave. Most exposures of mineral-rich agglomerate on Elgon show signs of tusking, but only where they have been softened by waterfalls does erosion by tusk have an appreciable effect. Initially this causes shallow caves and overhangs similar to those reported in India, Sumatra, and Tanzania's Ngorongoro Crater. Such overhangs collapse periodically, giving the long-term effect of a receding cliff. But on Elgon the cliff is capped by a layer of lava, enabling the cave to extend

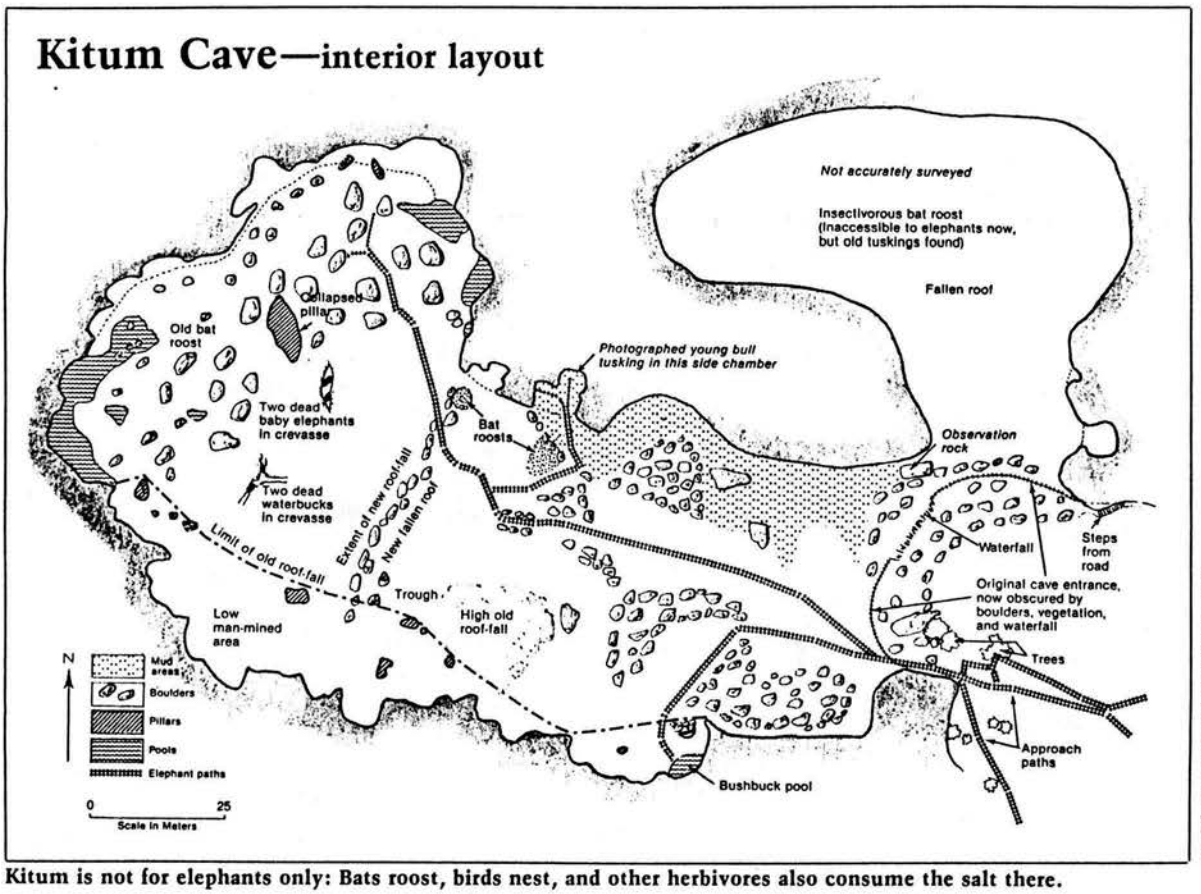
deeper and deeper as each generation of elephants continues the work.

These caves are huge, some people protest. How can elephants possibly remove so much rock? The answer: Slowly. Forty-five percent of the elephant droppings examined during this study contained rock fragments, some as large as two inches across.

The volume of Kitum Cave is on the order of 1.3 million gallons. If, for the sake of conservative argument, we suppose that elephants excavations averaged just one quart per week, it would have taken only 100,000 years for them to dig Kitum. And that is without the help of other animals and pastoral man. Given that Elgon has not erupted for several million years and that elephants have been around for about two million years (to say nothing of their tusked ancestors), the theory of elephant speleogenesis is entirely plausible. The caves of Mount Elgon are the world's only elephant salt mines.

As with most research, each new and fascinating fact raises more and better-phrased questions. My "satiable curiosity" is not yet sated so we plan to do further work. Funds permitting, we hope to radio-track elephant groups to discover where they obtain their salt when not visiting Kitum. Does their need for salt vary according to season? Do different herds use different caves or whichever is nearest? Can we quantify the amount of rock eaten per visit to accurately calculate the annual rate of excavation?

Regardless of whether the mysteries are solved, the wonder of elephants feeling their way deep underground will live on in the mind of anyone lucky enough to see them.



Kitum is not for elephants only: Bats roost, birds nest, and other herbivores also consume the salt there.

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1987-1988

The Cascade Caver is published in 1-year volumes which start in January. Pages are numbered consecutively through all issues in a volume regardless of issue number. References in this index are given by volume and page, ignoring issue numbers. For example, 25p10 refers to volume 25, page 10.

Don't Forget to V O T E!