PHOLEOS

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PHOLEOS

Pholeos (Greek - *cave*) is a biannual journal of the Wittenberg University Speleological Society (WUSS), an internal organization of the National Speleological Society (NSS).

Purpose
The Wittenberg University Speleological Society is a chartered internal organization of the National Speleological Society, Inc. The Grotto received its charter in May 1980 and is dedicated to the advancement of speleology, to cave conservation and preservation, and to the safety of all persons entering the spelean domain.

WUSS Web page
http://www4.wittenberg.edu/student_organizations /wuss/

Subscription rates are $10 a year for two issues of *Pholeos*. Back issues are available at $5.00 an issue.

Exchanges with other grottoes and caving groups are encouraged. Send all correspondence, subscriptions and exchanges to the grotto address.

Membership
The Wittenberg University Speleological Society is open to all persons with an interest in caving. Membership is $10 a semester or $20 a year and comes with a subscription to *Pholeos*. Life membership is $150.

Meetings
Meetings are held every Wednesday at 7:00 p.m. when Wittenberg University classes are in session. Regular meetings are in Room 319 in the Barbara Deer Kuss Science Hall (corner of Plum St. and Bill Edwards Dr. – parking available in the adjacent lot).

Submissions
Members are encouraged to submit articles, trip reports, artwork, photographs, and other material to the Editor. Submissions may be given to the Editor in person or sent to the Editor at the Grotto address. Guidelines for submitting research papers can be found on the inside back cover of this issue.

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Cover Photo

Figure 4: *Aaron Taylor and Kate Ferguson work in the belly crawl of the D survey to connect it to the main passage. Photo by K. M. Kissell. See Lake Cave Survey on Page 18.*

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EDITOR'S NOTE

Hello again my fellow cavers and spelunkers! As you can see, we WUSSes have been quite busy again this year and there seems to be no signs of slowing down. Once again, we've seen our WUSS family grow with some new members (suckers!) and we're happy to welcome them to all of our fun and games. Even better, they decided to contribute to this issue of *Pholeos*. So inside this very bright and shiny issue you will find everything from poetry to survey work, gear reviews to puzzles, and of course a collage of all our blackmail (a.k.a. photographic evidence) for posterity to enjoy.

As you've probably noticed, we decided to change the format of the journal for this issue and bring you the new, improved, all color *Pholeos*! Share it with your family, your friends or whomever you can get to sit still long enough. We hope you enjoy this extremely exciting issue, and that it makes you look fondly back on our shenanigans over the past year.

On a personal note, I would like to say a huge "Thank You" to every single person who contributed to the journal and helped get it out to the masses. Your names are crossed off of my list, so you can breathe easy. I hope you enjoy reading the following tales; I thank you for the memories and wish you many adventures both above ground and under.

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MESSAGE FROM THE PRESIDENT

Here we are again - another year has passed and another issue of *Pholeos* is here for your reading pleasure. It comes to no one's surprise that the club has been quite busy since the last issue was released. Although we do not have any international group travel to report (tear), (Dr. Hobbs did venture to Slovenia for two trips), we have kept our domestic trips numerous and enjoyable.

Over the summer Hobbs spent many weeks in West Virginia working on his biological diversity study and WUSSes joined him on every occasion possible to enjoy time underground and the free food! Another fellow WUSS, Kate Ferguson, was working on a study of plant life around cave entrances down in our home away from home, Carter Caves State Resort Park; she enjoyed company on numerous weekends. The end of summer gave way to a new school year and our focus moved immediately to attracting new members, especially suckers, ooops, I mean freshman. A handful of brave students joined the club even after hearing stories of various cold survey trips, scary accounts of incidents on rope, and OTR. The "Officer's Training Retreat" attracted a large crowd of WUSSes, complete with two OTR virgins; the club participated in the Do-Da Parade, coming in second. The group recovered in time to help lead two Cave Ecology trips and an Intro trip in the following weekends. The next few months blazed by with many survey trips, vertical practices, and clean ups to attend, including a trip into Buckner's Cave in Indiana, hosted by the Indiana University Caving Club, to help work on the survey for the 2007 NSS Convention Guidebook. As winter descended upon us, the club spent every weekend in January and February in Carter working on the database and/or surveying pits and caves in the park. Crawl-a-thon was extremely popular this year, all in all over 35 people stayed in lodging provided by the club and for the third year in a row we had a squeeze box champ sign the box, this time in blood! (See page 31.)

With summer right around the corner we are already mapping out plans for summer survey trips and hopefully a group trip to Puerto Rico for some BIG caving over Spring Break! The year has, as always, gone by in a blur; it seems like just yesterday we were scrambling to finish *Pholeos* Vol. 24. Now, just like last year, we have put the finishing touches on many articles and maps, only this year we were happily surprised to find that we have enough articles, surveys, and photos for two issues. Let the scramble begin again!

As the hectic-ness that is the end of the year approaches I am left with a plethora of memories unique to this caving club. Where else can you find a group who would be willing to sleep 20 plus people in a cabin designed for eight? Where else could you find a group who will happily share a bed with three people they just met or help teach a freshman the difference between a rack and a Jumar? While I am sure many groups and organizations are "what they consider to be" close, I still feel that WUSS is on a completely different level of closeness. We are after all a big family, a family that happily accepts new members into it, at any given time. Our family continues to grow year after year and with every new member comes the chance for the upper classmen to mold or corrupt as they see fit.

I hope as you read through this issue of *Pholeos* you come to realize the love and respect we have for all those members of our family we know, have known, or will know in the future. Remember as you skim the pages of *Pholeos*, Vol. 25 (1), that this is not merely a scientific journal but an accurate account of the growth and evolution of a close knit family of more than 550 members, a family that is forever growing and forever lasting.

Kevin Kissell, President
WUSS #0530
NSS #54578

Flora and Fungi
of Selected Vertical and Horizontal Cave Entrances
in Carter Caves State Resort Park, Carter County, Kentucky

Kate Ferguson (WUSS #0544, NSS #56925)

Abstract

A pilot survey of the plant life found in and around some cave entrances in Carter County, Kentucky, was conducted during the summer of 2006. Since caves sometimes shelter uncommon or vulnerable species due to their unique microclimates, a complete inventory of vascular plants, mosses, and mushrooms in these environments, created over several years, would ensure that any endangered species were adequately protected. Though very few surveys of cave flora have been conducted anywhere, there has never been one in Kentucky. Carter Caves State Resort Park was chosen for the study since many small-to-medium sized caves, both horizontal and vertical, are concentrated in a small geographical area.

Thirteen caves were included in the investigation, three of which had vertical entrances. A narrow transect was laid at or though the entrance of every cave inventoried. All species found along each transect were identified. Detailed notes and photographs were taken for any plants on the transect that could not be identified in the field. Once this base list was established, nearby trees and other major plants within 0.6m were added to the list.

There was a greater density of mosses found around the cave entrances, but whether this is due to a cave-created microclimate is unclear. Fifty-one genera were positively identified, none of which were listed as threatened or endangered in Kentucky. Pedicularis lanceolata *is listed for historical purposes.*

Figure 1: *Cricket on unidentified plant outside 7-70 Pit.*

Introduction

Caves, whether vertical or horizontal, can be divided into three zones: the entrance zone, the twilight zone, and the dark zone. The entrance zone includes the mouth and the area directly around it. Any distance from 0 to 10 meters or more can be part of the entrance zone, though the size of the area depends on the size of the opening, its orientation, and the length of the cave. Any part of the cave into which indirect light penetrates is considered the twilight zone. Beyond the reach of daylight is the dark zone. In vertical caves (pits), zones are not so well defined. Light might enter the pit all day, or only for a few hours, and it does not necessarily reach all areas. This, along with the higher humidity typical of caves, results in bands or patches of plant growth on the walls of the pit (Elliott & Smith, 2002). The entrance and twilight zones in both kinds of cave have the moisture and indirect sunlight necessary for vegetation and so, it is these two zones upon which the project is focused.

Since caves sometimes shelter uncommon or endangered species– such as the Texan *Dennstaedtia globulifera*, or hay-scented fern, which Veni (1994) describes, or the rare

Table 1: *Species identified.*

Group	Scientific Name	Common Name
HERBACEOUS PLANTS	*Antennaria* spp.	Pussytoes
	Arisaema triphyllum	Jack-in-the-Pulpit
	Asarum canadense	Wild Ginger
	Dioscorea villosa	Wild Yam
	Fragaria virginiana	Strawberry
	Hedyotis nigricans	Bluet
	Hepatica nobilis	Hepatica
	Maianthemum racemosum	False Soloman's Seal
	Maianthemum stellatum	Soloman's Seal
	Parthenocissus quinquefolia	Virginia Creeper
	Pedicularis lanceolata	Lousewort
	Podophyllum peltatum	Mayapple
	Sedum ternatum	Stonecrop
	Silene virginica	Firepink
	Toxicodendron radicans	Poison Ivy
	Trillium sp.	Trillium
	Urtica dioica	Stinging Nettle
	Viola sp.	Violet
TREES	*Acer*	Maple
	Fagus	Beech
	Liriodendron tulipfera	Tulip
	Quercus spp.	Oak
	Rhododendron maximum	Rhodoendron
	Tsuga canadensis	Hemlock
FERNS	*Adiantum pedatum*	Maidenhair Fern
	Asplenium rhizophyllum	Walking Fern
	Botrychium virginianum	Rattlesnake Fern
	Cystopteris bulbifera	Cystopteris bulbifera
	Dennstaedtia punctilobula	Hay Scented Fern
	Dryopteris marginalis	Marginal Wood Fern
	Polystichum acrostichoides	Christmas Fern
MOSSES	*Anomodon*	
	Atrichum	
	Fissidens	
	Hypnum	
	Polytrichum	
	Selaginella	
	Thudium	
MUSHROOMS	*Boletus* sp.	Bolete
	Cantharellus	Chanterelle
	Clavulina cristata	Common Coral Mushroom
	Fistulina hepatica	Beefsteak Mushroom
	Hydnum repandum	Common Hedgehog Mushroom
	Polyporaceae-*Trametes vericolor*	
	Tremella mesenterica	
	Tremellacae	

Hart's Tongue fern that Evans (1982) and Hall (1999) have studied- it is unfortunate that more surveys of cave vegetation are not made. Many surveys of cave fauna, rare, endangered, or otherwise have been done both for pits (Gibert et al., 1981) and for horizontal caves (Peck, 1976). Elliot & Smith (2002) have done a limited evaluation of vegetation in Missouri karst. They mention the importance of vegetation management for fauna use and clean groundwater. There has never been a study focused on the cave flora found in Kentucky, although Carter Caves and the surrounding areas have been part of a broad biological survey that includes both plants and animals (Jones, 1999). Very few studies of this type have been made anywhere, although a comparable project was done on the endangered and rare karst vegetation of the Balkan Peninsula in the late 1990's (Redzic, 1997). Carter Caves is an ideal location for a review of plant life, since there are a large number of small-to-medium sized caves, both horizontal and vertical, concentrated in a relatively small area. GPS coordinates for all the caves in the area known to WUSS have already been verified and compiled thanks in large part to Dr. Hobbs. This information would provide a solid foundation

Table 2: *Caves inventoried.*

Name of Cave	Orientation
7-70 Pit	Vertical
Boundary Pit	Vertical
Haunted Pit	Vertical
Cave 1 & 3	Horizontal
Cobble Crawl	Horizontal
Constipation	Horizontal
Fudge Ripple	Horizontal
Green Trail	Horizontal
Hole-above-Green Trail	Horizontal
Laurel	Horizontal
Rhododendron	Horizontal
Rimstone	Horizontal
Walking Fern	Horizontal

Figure 2: Pedicularis lanceolata*, or swamp lousewort. This specimen is about 15 inches across. Photo by K. Ferguson.*

Figure 3: Cystopteris bulbifera *or Immature Bladder Fern.*

Figure 5: Tremella mesenterica *before rainfall.*

Figure 4: Tremella mesenterica*, or Brain Jelly, after rainfall.*

Figure 6: Rhododendron maximum *blossom.*

for a GIS overlay of flora survey and mapping. Flora maps could be used to track fluctuations in the frequency of any plant species found in the caves at Carter. With help from the Kentucky Natural Heritage Program, any endangered species found could be protected from excessive human disturbance.

Methods and Materials

Thirteen caves were included in this investigation, three of which were vertical. A distance of 0.6m from the drip line or the edge of a pit was assumed to be the limit of a small- or medium-sized cave's entrance zone. Laurel Cave, which is a large "wild" tour cave, was assumed to have an entrance zone of 10m. The vegetation around the caves ranged from lush and nearly undisturbed to extremely trampled and sparse.

A narrow transect was laid at or though the entrance of every cave inventoried. For horizontal caves, transects were perpendicular to the entrance. All species found along that line were identified and photographed. Detailed descriptions and photographs were made of any plants that were not recognized in the field. These were first identified with Peterson series field guides and later checked by a park staff member, Channing Richardson. Along with the plants found along the transect, trees and ferns within 2m of the entrance were added to each cave's list.

Results

Only one difference was discovered between the flora found around cave entrances and the general flora of the

Figure 7: Sedum ternatum *on an outcrop.*

area: there was a greater incidence of moss around the entrances. This may be due to a cooler, wetter microclimate, as had been predicted, but the slight change in substrate around the entrances could also be the cause.

Though it was not possible to key each organism to species, fifty-one genera were identified, including species of mosses, fungi, liverworts, and herbaceous plants. No species found was especially rare or fragile within the state, however, fourteen are federally listed in nearby states and one is listed in Kentucky for historical value.

Discussion

Throughout the study, and even before it began, Dr. Hobbs and I struggled to identify the area that should be included in a study of this sort. How large an area outside each cave should be included as entrance zone? How does the size of the cave relate to the size of the entrance zone? Are the caves in Carter Caves SRP large enough to have a microclimate? We never arrived at a good answer. Considerations for the future might include temperature monitoring, slope of the entrance, direction it faces, and perhaps some sort of light-received measurements. For vertical caves, mosses and/or ferns found on the inside should also be included.

Since only thirteen out of two hundred or so caves were inventoried, several more years of documentation will be needed to create a complete picture of the non-faunal life around cave entrances at Carter Caves SRP. Visiting the sites during early spring through early summer would increase the number of wildflowers found, and autumn visits would add to the list of fungi. Lichens, which also occur around caves, could be identified as well.

Literature References and Citations

Baskauf, Carol J. 1997. Population genetic studies of plants endemic to karst, with an emphasis on the limestone glades of Tennessee. *IN,* Sasowsky, Ira D., Daniel W. Fong, and Elizabeth L. White (eds.), Karst Waters Institute Special Publication 3, Conservation and Protection of the Biota of Karst, pp. 2-4.

Elliott, William R. and Tim Smith. 2002. Plants and fungi of the Missouri karst. Unpublished 1 page article.

Evans, A. Murray. 1982. The Hart's Tongue Fern - an endangered plant in cave entrances. Proceedings of the National Cave Management Symposium, 1980:16-20.

Gibert, J., R. Laurent, J. Mathieu, and J.L. Raygrobellet. 1981. Ecological studies of openings into underground karst: the shaft wall fauna of an entrance pit, first results. Proceedings of the Eighth International Congress of Speleology, I:228-233.

Hall, Jim. 1999. History and current status of the Hart's-Tongue Fern in the South. Proceedings of the National Cave & Karst Management Symposium, 14:89-90.

Jones, Ronald L. 1999. Unpublished report on basic biological inventory of the Charles Bryant Tract, Carter Caves State Resort Park, Carter County, Kentucky. Eastern Kentucky University.

Peck, Stewart B. 1976. The effect of cave entrances on the distribution of cave inhabiting terrestrial arthropods. International Journal of Speleology. 8: 309-321.

Redzic, Sulejman. 1997. The protection of the diversity of vascular plants in the karst poljes of the Dinaric Mountains. *IN,* Sasowsky, Ira D., Daniel W. Fong, and Elizabeth L. White (eds.), Karst Waters Institute Special Publication 3, Conservation and Protection of the Biota of Karst, pp. 82-84.

Veni, George. 1994. Fern Cave. *IN,* Elliott, William R. & George Veni (eds.), The Caves and Karst of Texas, 1994 NSS Convention Guidebook, pp. 287-289.

Preliminary Description of a Small Karst System in Carter County, Kentucky

Lindsay (McCullough) Walker (WUSS #0469, NSS #48931) and Horton H. Hobbs III (WUSS #0001, NSS #12386 HM, CM, FE)

Overview

Immediately south of Smoky Valley Lake in Carter County, Kentucky is a small north-south oriented karst valley developed within Mississippian carbonate rocks. On the valley floor is an intermittent, wet-weather stream that alternately rises and sinks below the surface as it drains north, ultimately emptying into the lake. Because the north end of the valley is the site of a former homestead (revealing only a few remnants of earlier habitation – chimney, foundation), the karst features aligned along the valley are designated collectively as the **Old Homestead Karst System**.

At least eight distinct components make up this small karst system that consists of exsurgencies, sinkholes, insurgences, resurgences, karst windows, springs, and shallow subterranean conduits that periodically carry water 0.6 km northward as a tributary to Smoky Valley Lake. The farthest upvalley element is **Lazy Fern Spring Cave** [so named because of the profusion of Christmas Ferns (*Polystichum acrostichoides* – Figure 1) hanging over the entrance and adorning the shaded banks of the spring run] which consists of a low, wide entrance (3.1m wide x 0.35m high - Figure 2) that supplies water to the remainder of the system primarily only during the winter and spring months. Except during heavy precipitation events, virtually no water emerges and flows in the system throughout the summer and fall seasons. This spring cave is very low (generally 0.35m high) and, to date, has not been surveyed.

The water that flows from Lazy Fern Spring Cave travels north overland for 64m before it is joined by a small surface runoff tributary from the southwest and continues north for 42m over the limestone slab and cobble armor of the streambed (Figure 3). The stream then reaches its first insurgence at the entrance to **Upper Old Homestead Cave** (see below) (Figure 4), and is not observed again until it reappears at the **Old Homestead Karst Window** some 290m to the north. Within this small, north-south oriented karst window the stream resurges from the south via the entrance to **Middle Old Homestead Cave** (Figure 5), flows north and drops over boulders and corroded bedrock in the floor of the karst window, and intersects **Pinch-out Cave** (Figure 6) where it disappears into the constricted

Figure 1. *The Christmas Fern,* Polystichum acrostichoides, *at entrance to Lazy Fern Spring Cave.*

***Figure 2**. Katie Schneider (NSS #52155) in low entrance to Lazy Fern Spring Cave lacking effluent, January 2004.*

eastern passage. Neither of the caves associated with the karst window have been surveyed but Middle Old Homestead Cave is a half-meter high crawlway floored by the stream and Pinch-out Cave consists of a stream passage that, to the east, becomes very narrow within a few meters of the entrance; to the west the cave continues as a small, dry, breakdown-strewn crawlway (Figure 7) that periodically serves as an overflow route for waters exiting Middle Old Homestead Cave.

The sixth feature of the Old Homestead Karst System is **Lower Old Homestead Cave** (Figure 8) located 150m north of Old Homestead Karst Window. The gravel-floored stream that resurges from the low entrance to the cave flows north-northeast for a few meters and then sinks (hence a second, smaller karst window within the system). This water reappears within 10m in a series of small springs and then drops steeply down slope to join Smoky Valley Lake within 44m. See the Dye and Physicochemical Studies section below for information concerning the remaining elements of the system.

Figure 3*. Beth Hagen (WUSS #0400) standing by shaded spring run flowing over sand and cobble-covered stream channel between Lazy Fern Spring Cave and Upper Old Homestead Cave, April 2000.*

Figure 4*. Beth Hagen standing adjacent to insurgence to Upper Old Homestead Cave during moderate flood, April 2000.*

Description of Upper Old Homestead Cave

Upper Old Homestead Cave (see map) is likely the largest of the karst features included within the system although it is the only one that has been surveyed, resulting in a total horizontal distance of 61.53m (201.82 feet). The entrance (Figure 9) is an insurgence that receives the entire drainage from Lazy Fern Spring Cave and contributing tributary. Consequently, **this cave (and any feature of the system) is prone to intense flooding and should NOT be entered when threat of heavy precipitation is predicted**. The entrance is a climb-down (including an unstable, very small arch) with a dead end passage leading off to the northwest. By continuing in the main corridor, one moves down over breakdown and enters a junction

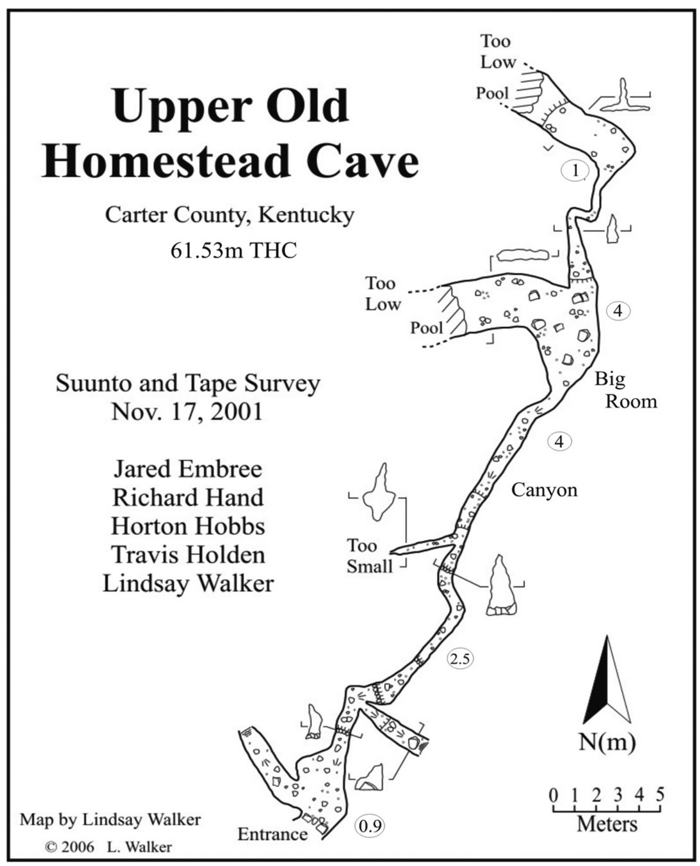


Figure 5. *Beth Hagen immediately below resurgence and entrance to Middle Old Homestead Cave, April 2000.*

Figure 6. *Katie Schneider at entrance to Pinch-out Cave in Old Homestead Karst Window lacking stream flow, January 2004.*

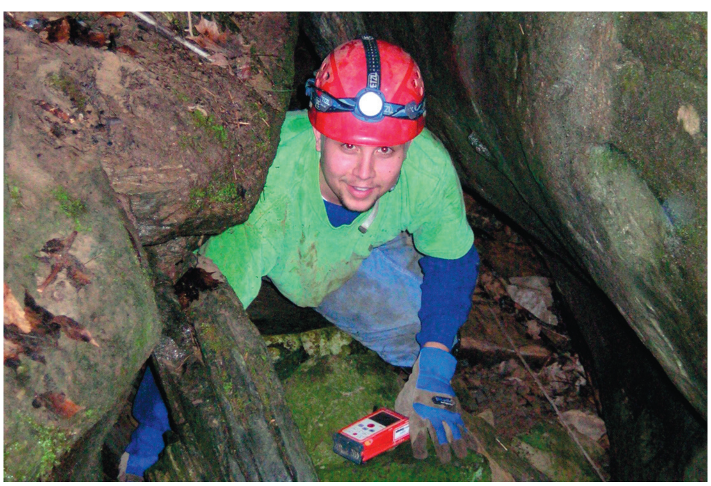


Figure 7. *Travis Holden (WUSS #0499) near entrance of western section of Pinch-out Cave (photo by Bill Stitzel).*

Figure 8. *Stacey Wharton (WUSS #0546) and Brandon Marcum above crawlway entrance to Lower Old Homestead Cave, February 2006.*

Figure 9. *Travis Holden (left) and Jared Embree (WUSS #0440) gearing up for survey trip at entrance to Upper Old Homestead Cave, 17 November 2001.*

area (Figure 10) where one passage terminates quickly to the southeast and the other continues to the remaining portions of the cave. What was a hands-and-knees crawlway now progresses as a narrow canyon characterized by a series of step-downs floored by small breakdown as the ceiling continues to be relatively horizontal, resulting in a taller but constricted passageway. In this section of the cave, numerous crickets (*Ceuthophilus* sp.) and a few individuals of the Solitary Bat [*Pipistrellis subflavus* (Cuvier) - Figure 11] and the Herald Moth [*Scoliopteryx libatrix* (Linnaeus) – Figure 12] are commonly encountered. One short, terminal lead is passed on the west (left) side of the passage (Figure 13) as the uneven canyon (Figure 14) continues to deepen as it

Figure 10*. Travis Holden (left) and Richard Hand (WUSS #0217) taking passage measurements near entrance area in Upper Old Homestead Cave.*

Figure 12*. Herald Moth* (Scoliopteryx libatrix) *in Upper Old Homestead Cave, November 2001.*

traverses to the north-northeast. Approximately 28m from the entrance the nearly 4m high constricted canyon passage opens into the largest section of the cave ("Big Room" – map, Figure 15). Here a 4+m high room, floored by small breakdown (Figure 16), leads off to the west as a low crawlway terminating in a pool with a very low ceiling, the lowest point in the cave at 6.8m below the entrance (Figure 17). The main passage continues to the north as a higher, very tight, sinuous crawlway (Figure 18). This northernmost passage leads to the terminal section of the cave that cannot be traversed due to a very low ceiling and pool (see map).

Dye and Physicochemical Studies

Historically, a variety of fluorescent dyes has been used in karst and other permeable terrains in order to determine hydraulic connections and ground-water travel times (Aley and Fletcher 1976, Smart and Laidlaw 1977, Mull et al. 1988, Aley 1999, Jones 2005). On 6 January 2007, 115g (0.25 pounds) of fluorescein dye were released into the stream insurgence of Pinch-out Cave (Back Cover). Volume of flow measured 18 hours prior to the injection was $0.0033 m^3/sec$; no precipitation occurred after the measurements were obtained. Approximately five hours after the dye was placed into the insurgence it reappeared in the second karst window at the resurgence of Lower Old Homestead Cave, as anticipated. Dye also emerged from the network of small springs

Figure 11*. Solitary Bat* (Pipistrellis subflavus) *in Upper Old Homestead Cave, November 2001.*

Figure 13*. Jared Embree (top) and Travis Holden measuring distance between stations; auxiliary flash is from short terminal corridor on west side of narrow, main canyon passage (see map).*

Figure 14. *Lindsay Walker taking notes and sketching in uneven-walled section of canyon passage.*

Figure 16. *Travis Holden taking notes and sketching while Lindsay Walker takes compass readings in "Big Room."*

immediately below the karst window and flowed into Smoky Valley Lake. Additionally and somewhat surprisingly, dye appeared in two small springs that were located approximately 91m to the east of the karst window that houses Lower Old Homestead Cave. One of the springs (Fluorescein Spring) was situated at the mouth of a ravine and approximately 7m south of the edge of the lake; this is the lowest known element of the karst system. The other spring emerged from beneath breakdown some 30m below the entrance to Boat Dock Cave, an unmapped crawlway passage at the head of the ravine (Figure 19) in which Fluorescein Spring is located.

Figure 15. *Jared Embree entering "Big Room" from canyon passage.*

Travel time between Pinch-out Cave and Fluorescein Spring was approximately five hours whereas it took slightly more than 5.5 hours for the dye to appear at the spring below Boat Dock Cave. Clearly the hydrologic system is more complex than initially anticipated and additional dye injections will be made in the near future.

During the late afternoon of 12 January 2007 physicochemical data were obtained from four sites within the karst system, using a YSI 6600 Sonde multiparameter instrument. Additionally, water samples were placed in acid-washed 1-L polypropylene Boston bottles and soluble reactive

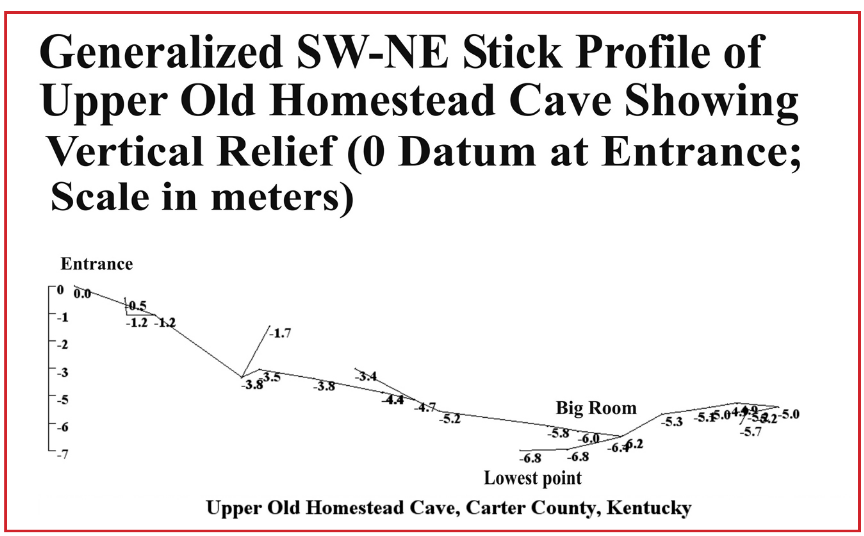


Figure 17. *Generalized NE-SW stick profile of Upper Old Homestead Cave showing vertical relief (0 datum at entrance; metric scale).*

Figure 18. *Travis Holden emerging into "Big Room" from tight crawlway leading from terminus of cave.*

Figure 19. *Matt Demeter (WUSS #0415) in entrance to Boat Dock Cave.*

Table 1. *Physicochemical data for Old Homestead Karst System. Site 1 = spring run approximately 50m below Lazy Fern Spring Cave; Site 2 = surface runoff tributary approximately 15m above its confluence with Lazy Fern Spring Cave effluent; Site 3 = Entrance to Pinch-out Cave; Site 4 = spring immediately below Lower Old Homestead Cave.*

Site	Temp °C	Sp. Cond. µS/cm	O_2 % saturat.	O_2 mg/l	pH	PO_4-P mg/l	NO_3-N mg/l	SO_4-S mg/l
1	8.62	116	93.8	10.93	7.55	0.08	0.1	20
2	8.36	176	93.1	10.90	7.76	0.11	0.2	26
3	9.96	209	101.8	11.49	7.76	0.10	0.2	17
4	10.09	237	92.9	10.47	7.58	0.05	0.2	17

phosphorous, nitrate, and sulfate concentrations were determined using a Hach DR/2400 spectrophotometer. Site locations and data are summarized in Table 1.

Of interest, the entire karst valley and most of the passages of Upper Old Homestead Cave are oriented predominantly in the direction of strike which is unusual in that the major passages of most caves that have been surveyed in Carter County are developed in the direction of dip (e.g., Bat Cave – Hobbs 1985, 1989; Coon-in-the-Crack Cave I and II – Madigan 1988; Rat Cave – Davenport 1986; Saltpetre Cave – Fazio and D'Angelo 1984, Hobbs 1985; X Cave – D'Angelo 1984). This development of passages along strike is shared with Cool James Cave (Engel 1991), the Horn Hollow Cave System (Hobbs and Pender 1985), and with the upper level section of Laurel Cave (Pfeffer et al. 1981).

In recent years, descriptions and maps of two caves south of the lake have appeared in Pholeos: Surprise Dome Pit (Hazelton 2001) and KBH Cave (Maxson et al. 2005). Work continues on the south side of Smoky Valley Lake and efforts will result in the publication of additional maps of caves associated with the Old Homestead Karst System as well as other small but interesting caves in that part of the county. Numerous WUSSes have spent many hours walking and locating many karst features and thanks are extended to them for their efforts in helping to put together pieces of the karst puzzle in this part of Carter County. We would like especially to thank members of the survey team who helped with the surface and subsurface work associated with production of the map of this cave: Jared Embree, Richard Hand, and Travis Holden. We are most appreciative of the help provided by Travis Holden and Bill Stitzel for their invaluable help with the dye study.

Literature Cited

Aley, Thomas. 1999. The Ozark Underground Laboratory's Groundwater Tracing Handbook. Ozark Underground Laboratory, Protem, Missouri, 35pp.

Aley, Tom and Mickey W. Fletcher. 1976. The water tracer's cookbook. Missouri Speleology, 16(3):1-32.

Davenport, Robert. 1986. Rat Cave. Pholeos, 6(2):7-8.

D'Angelo, Donna J. 1984. X Cave. Pholeos, 4(2):5-6.

Engel, Scott. 1991. Adams Creek Cave and the Cool James System. Pholeos, 12(1):8-15, map.

Fazio, V. and D. D'Angelo. 1984. The Saltpetre-Moon Cave System. Pholeos, 4(1):7-12.

Hazelton, Matthew. 2001. Surprise Dome Pit. Pholeos, 19(1,2):41.

Hobbs, H. H. III. 1985. A description of Bat Cave and the Saltpetre-Moon Cave system. NSS Conv. Guidebook, 25:28-34.

Hobbs, H. H. III. 1989. Bat Cave: An endownment and legacy to karst in northeastern Kentucky's "Valley of the Caves." Pholeos, 9(2):8-14, map.

Hobbs, H. H. III and Marc M. Pender. 1985. The Horn Hollow Cave System, Carter County, Kentucky. Pholeos, 5(2):17-20,22, map.

Jones, William K. 2005. Karst water tracing. *IN*, Culver, D.C. and W. B. White (eds.), Encyclopedia of Caves: Elsevier Academic Press, Burlington, MA, pp. 321-329.

Madigan, Terence J. 1988. Coon-in-the-Crack Caves I and II: THC=212.01m (I) and 127.42 (II). Pholeos, 8(2):4, 6-7.

Maxson, Michele, Kevin Kissell, Caleb Heimlich, and Rachel Horowitz. 2005. KBH Cave. Pholeos, 23(1,2):30-31.

Mull, D. S., T. D. Liebermann, J. L. Smoot, and L. H. Woosley, Jr. 1988. Application of dye-tracing techniques for determining solute-transport characteristics of ground water in karst terranes. U. S. Environmental Protection Agency, Region 4, EPA 904/6-88-001, 103pp.

Pfeffer, Nathan, Terry D. Madigan, and H. H. Hobbs III. 1981. Laurel Cave. Pholeos, 2(1):10-13.

Smart, P. L. and I. M. S. Laidlaw. 1977. An evaluation of some fluorescent dyes for water tracing. Water Resources Research, 13(1):15-33.

CAVER'S WORD SEARCH

C	J	N	T	P	Q	B	A	J	L	U	S	W	A	G	C	V	P	F	V
A	C	W	I	S	U	R	V	E	Y	G	O	M	B	O	R	M	L	B	G
V	V	R	Y	C	C	L	I	N	O	M	E	T	E	R	A	A	N	E	S
E	C	O	M	P	A	S	S	J	Q	Y	G	U	Y	L	G	S	T	L	T
R	N	R	E	K	N	U	L	E	P	S	T	A	D	G	D	T	I	L	A
W	F	L	O	W	S	T	O	N	E	U	A	A	I	S	S	A	E	Y	T
X	F	L	O	R	U	T	M	A	R	S	E	N	G	Q	R	L	Y	C	I
O	R	V	Y	E	M	J	I	A	T	H	G	B	J	E	H	A	R	R	C
R	R	G	D	D	P	H	C	Z	E	T	S	F	S	R	S	G	E	A	R
I	X	F	H	N	Q	K	B	L	A	J	D	U	U	T	Q	M	N	W	O
Q	A	D	S	A	G	Y	F	P	A	X	F	I	A	F	X	I	I	L	P
L	Q	W	Q	M	U	N	E	J	C	Y	U	L	S	B	B	T	B	C	E
X	T	Q	U	A	A	F	D	I	H	M	A	I	S	R	A	E	A	R	O
K	S	C	E	L	N	Q	L	E	C	C	N	E	N	G	T	Q	R	I	O
S	R	I	E	A	O	R	L	D	T	K	V	Q	W	G	Q	U	A	C	J
Q	A	K	Z	S	J	M	D	I	H	I	Q	A	K	M	I	N	C	K	G
K	K	U	E	J	E	P	T	O	E	D	I	B	R	A	C	S	J	E	H
P	N	T	B	T	I	E	L	C	P	D	K	P	Q	O	U	A	V	T	Q
Z	H	Z	O	T	F	E	R	I	M	S	T	O	N	E	D	A	M	R	W
Y	A	T	X	H	O	P	T	S	J	G	Q	N	C	M	I	B	G	J	H

Find the words below in the grid at the left. Words may appear vertically, horizontally, diagonally, or backward.

Answers on page 37.

bat
bellycrawl
carabiner
carbide
caver
clinometer
compass
cricket
flagging tape
flowstone
guano
headlamp
helmet
karst
pit
rack
rimstone dam
salamander
sinkhole
spelunker
squeeze box
stalactite
stalagmite
static rope
sump
survey

The Meaningfulness of Microbes

Megan Arthur

"Things can be low on the food chain, but that doesn't mean they're lowly". This profound quote, attributed to comic artist Gary Larson, can be directly applied to microorganisms, especially those residing in caves (Larson 2006). While seemingly insignificant, microorganisms make up a large cornerstone in the base of the food system within caves. In fact, "sulfurous bacteria thrive within unique ecosystems where they are often the primary producer of food and energy for that community" (Summers 1995). Thus, without microorganisms, the collapse of the entire ecology of the cave would be certain.

The importance of microorganisms within a cave owes to the fact that the interiors of caves do not receive direct sunlight, thus photosynthesizing plants are not abundant, if available at all, past the cave entrance. In the epigean world, plants serve as the basic source of energy for all living things. As Poulson (2005) so frankly states, "The observed absence [of] light in caves leads to the hypothesis of food limitation; no light means no photosynthesis." Therefore, the lack of plants in an isolated environment poses a problem – a problem that is solved by the existence of microbes (Moore and Sullivan 1997). As the sole independent energy producers in caves, "a few species of chemoautotrophic bacteria may support the survival of cave animals, especially in caves that have no natural entrance and [in those with] the absence of water infiltration from the surface" (Hüppop 2005). Many microbes are able to produce their own energy sources through the transformation of certain minerals. Thus, due to the lack of sunlight, it is evident that the only plant life in a cave past its initial entrance and twilight zone is that of species that are able to live within complete darkness. It is these species that mostly make up the microbes: bacteria and fungi. These and other microorganisms require carbon compounds for nutrition, instead of chlorophyll which relies upon the sun (Moore and Sullivan 1997). Hence the lack of sunlight within caves poses no problem to the existence of these microorganisms.

These microbes are further categorized into two distinguished groups: heterotrophs and autotrophs. Heterotrophs do not have the ability to synthesize carbon compounds and, consequently, in order to sustain life, they must also consume other organic materials that are brought into or washed into the cave via further means. Detrital material from the surface and "the populations of heterotrophic microorganisms associated with it probably constitute the major food source for many troglobitic invertebrates" (Dickson 1975). Autotrophs, on the other hand, are capable of independently producing organic substances from inorganic sources such as carbon or sulfur (Moore and Sullivan 1997). The most important of these are chemoautotrophic bacteria, or chemoautotrophs (Engel 2005). This grouping of microorganisms plays a central role in the ecological system of a cave.

Chemoautotrophs undergo a process called chemosynthesis, instead of photosynthesis. Through chemosynthesis, "reactive rock surfaces and mineral-rich groundwater provide an assortment of potential energy sources for specialized microorganisms that gain cellular energy from the chemical oxidation of inorganic compounds and convert inorganic carbon sources into organic carbon" (Engel 2005). Simply, it is through this process that microbes gain energy by means of the transfer of electrons. In addition, a number of these microbes "derive energy from the oxidation of inorganic molecules such as nitrogen, sulfur, and iron compounds, or from the oxidation of gaseous hydrogen" (Summers 1995). This process is called bacterial catabolism and it results in breakdown products and energy (Summers 1995). Thus, without any form of sunlight, these organisms are able to live in utter darkness and provide an imperative food source to the rest of the cave system.

Microorganisms are the largest form of life on the planet Earth. In addition to serving as the base of the food chain for cave systems, their activity is also vital to the progress of basic limestone caves. The respiration of these microbes produces carbon dioxide, which, in turn, generates carbonic acids that corrode limestone. This process slowly produces these massive voids (Bottrell 2004). Studies conducted on Frassassi Gorge in Italy have also "confirmed the significant role of acid produced by sulfur-oxidizing bacteria in the dissolution of concrete and limestone" in certain caves (Vlasceanu et al. 2000). A similar study in Cesspool Cave, Virginia studied acid-producing bacteria which play a role in the formation of the cave. The study found that cultures of *Thiobacillus*, a chemoautotroph, were revealed to be capable of wearing away calcium carbonate, "suggesting that the colonization and metabolic activity of these bacteria may be enhancing cave enlargement" (Engel et al. 2001). The results of these studies also place significant value on biofilms and bacterial mats within the food web within these caves

(Vlasceanu et al. 2000). Evidently, microorganisms are essential to the ecology of caves in many ways.

It is apparent that there are many different types of microbes, which all serve different, yet exceptional, purposes in a cave's natural balance. Microbiologists study five main types of microorganisms: bacteria, fungi – yeasts and molds, algae, protozoa, and viruses are all types of microorganisms, which are defined as any organism too small to be seen with the naked eye. Many times these organisms are unicellular, or single-celled (Lavoie and Northup 2004). Specifically in caves, microbes are of two types: resident and transient. Resident microbes are the native inhabitants of a cave, whereas transient microbes are mobile: introduced to caves from the surface through air currents, flowing water, and other organisms that enter caves from the hypogean environment (Lavoie et al. 1997). Thus microbes can be located in exceedingly varying spots within a cave.

Any place in a cave that can provide significant moisture is likely to be inhabited with microbes. Streams that run into the cave carry algae, as well as protozoa which are contained in the sediments along the bottom of the water, and bacteria that cling to the surface and even the proximate air. In addition to the stream itself, fungal spores often dwell along the stream's banks. These spores act as the seeds of fungi and are crucial to its reproduction (Lavoie et al. 1997). The Encyclopedia Britannica Online (Anonymous 2006) defines bacteria as the most varied and extensive of all organisms on the planet. They exist in abundance within soil deposits and, along with fungal spores, they may also be found in the film of surface water that covers limestone rock and calcite speleothems (Lavoie et al. 1997). In fact, these microbes may contribute to the formation of this cave décor! Also, "there is good, although limited, evidence that microbes are involved in the formation of iron and manganese oxides, sulfur compounds, saltpeter deposits, and even calcium carbonate" (Lavoie et al. 1997). Evidently, these countless forms of microorganisms are located throughout caves, and each is important to the ecology of caves in many different ways, including a source of energy, breakdown of organic materials, and even the production of speleothems.

Not all microorganisms offer energy support to the cave environment through chemosynthesis. Some provide a means of energy through their processes of breaking down and decomposing organic matter that is flushed into caves and serves as one of the largest food sources for the hypogean environment. Microbes "recycle organic material into microbial biomass as the first step in the food chain, or as primary producers" (Lavoie and Northup 2004). The base of the food chain in most caves begins with losses from the epigean environment. These may include leaf and wood litter, carcasses of dead animals, guano, and even urine. The amount of this material that is carried into the cave is progressively reduced with depth below the surface. The permeating water that seeps deep into caves through cracks and fissures is estimated to contain and bring in mainly minutely sized particulate and dissolved organic matter. These organic bits are consumed by the microbes, lost through leaching, and used by microorganisms as they move from the surface through the soil. Those who inhabit the soils, such as earthworms, also eat the converted materials and thus benefit from the processes of the microbes, but most organisms merely feed off of the microbes and the energy source then works its way up the food chain (Poulson 2005). Moore and Sullivan (1997:91) describe the system well in their statement that "...the decomposer bacteria are eaten by protozoans that are eaten by such aquatic cave-dwelling animals as flatworms, isopods, and amphipods, that are eaten in turn by larger animals such as crayfish, salamanders, and fish. Finally, these aquatic forms release waste material that supports the heterotrophic bacteria that helped to initiate the chain, and the cycle is complete."

Through the complex decaying of vegetation, microorganisms in the soil, as well as fungi in leaf litter, provide a source of carbon dioxide and other organic compounds. Bacteria in topsoil also release copious quantities of carbon dioxide through their metabolism, and are major producers (Gillieson 1996). The breakdown of these materials provides these energy rich carbon compounds to other organisms within the cave, as well as the ability for organic materials to travel further into the depths of the cave.

One special cave phenomenon that is related to the business of microorganisms is that of cave slime – a type of biofilm that is closely related to the plaque which forms on teeth or even the scum that forms on the inside of a fish tank (Boston 2004). In this case, the bacterial growth of microbes in a cave is so profuse that the walls begin to drip with slime. Diana Northup is a microbiologist who studies this substance. She claims that "The bacteria are making sort of a biofilm in which they exist" and this microenvironment is presented visually in a slimy form (Hart 2006). The biofilm is made up of *hydrogen sulfide* which combines with *oxygen* to produce sulfuric acid, plus the bacteria add their own acid as a waste product. Another definition defines the film as "a coating on rock or other surfaces composed of microorganisms, extracellular slime and other materials that the organisms produce, and particles (sediments, organics, or minerals) that are trapped by or precipitated within the film" (Boston 2004). Northup's research partner, Penny Boston, states, "We protect ourselves (sometimes ineffectually) against the byproducts of our *metabolism*, everything from simple waste products like feces to the toxic substances resulting from our industrial efforts. In essence, the bacteria are doing the same thing" (Hart 2006). The slime also provides an essential nutrient base to the microorganisms living within it, thus providing more support upwards throughout the rest of the food chain. The cave biofilm is extremely diverse and can take form as anything from strings, loops, thick mats, thin slippery coatings, fluff, and even moonmilk (Boston 2004). With so many intricate variations, it is no wonder that Northup describes the "vast colonies of bacteria [that] coat the walls of some Hawaiian lava tubes . . . [as] just breathtakingly gorgeous" (Hart 2006). It is evident through Northup's and Boston's work that microorganisms, though minute and sometimes overlooked, are truly a major force within caves and can have dramatic effects not only on the energy and food cycles of caves, but the visual appearances as well.

In summary, microorganisms have proven themselves to be small but mighty. One may not automatically think of bacteria and fungi as one of the most significant attributes of an ecological cave system, but it is clear that they and other microbes truly are vital to the ecosystem within a cave. Most importantly, microbes serve as a foundation upon which the food web within a cave is based. This is possible both through microbes that produce their own energy, as well as those that process organic matter that is washed into the cave from the surface environment. Every type of microbe thus either produces or serves as a food source upon which the rest of the cave system feeds, both directly and indirectly. Microbes even lend a hand in the formation of speleothems and other visual aspects of caves, as well. These findings have made it clear that microorganisms are anything but lowly, despite their placement at the bottom of the cave food web!

Literature Cited

Anonymous. 2006. Encyclopedia Britannica Online. http://www.britannica.com/eb/article-216164/

Boston, P. 2004. Biofilms. *IN*, Gunn, J. (ed.). Encyclopedia of Caves and Karst Science. Taylor & Francis Books, Inc., NY, pp. 145-146.

Bottrell, S. 2004. Microbial processes in caves. *IN*, Gunn, J. (ed.). Encyclopedia of Caves and Karst Science. Taylor & Francis Books, Inc., NY, pp. 505-509.

Dickson, G.W. 1975. A preliminary study of heterotrophic microorganisms as factors in substrate selection of troglobitic invertebrates. The NSS Bulletin. 37(4):89-93
.

Engel, A. S. 2005. Chemoautotrophy. *IN*, Culver, D. (ed.). Encyclopedia of Caves. Elsevier Academic Press, MA, pp. 90-92.

Engel, A. S., Porter, M. L., Kinkle, B. K., and Kane, T. C. 2001. Ecological assessment and geological significance of microbial communities from Cesspool Cave, Virginia. Geomicrobiology Journal, 18:259-274.

Gillieson, D. 1996. Caves: Processes, Development, Management. Blackwell Publishers Inc., MA, pp. 203-213.

Hart, S. 2006. Cave Slime. National Aeronautics and Space Administration. http://www.nasa.gov/vision/universe/solarsystem/cave_slime.html/

Hüppop, K. 2005. Adaptation to low food. *IN*, Culver, D. (ed.). Encyclopedia of Caves. Elsevier Academic Press, MA, pp. 4-5.

Larson, G. 2006. ThinkExist Gary Larson Quotes. http://en.thinkexist.com/quotation/things-can-be-low-on-the-food-chain-but-that/635024.html/

Lavoie, K. H. and Northup, D. E. 2004. Microorganisms in caves. *IN*, Gunn, J. (ed.). Encyclopedia of Caves and Karst Science. Taylor & Francis Books, Inc., NY, pp. 506-507.

Lavoie, K., L. Mallory, and D. E. Northup. 1997. Microbes in caves. NSS News. 58(3):68-69.

Moore, G.W. and N. Sullivan. 1997. Speleology: Caves and the cave environment. Cave Books, MO, pp. 79-92.

Poulson, T. L. 2005. Food sources. *IN*, Culver, D. (ed.). Encyclopedia of Caves. Elsevier Academic Press, MA, pp. 255-256.

Summers, A. 1995. Sulfur bacteria in spelean environments. NSS. 15(2):28-39.

Vlasceanu, L., Sarbu, S. M., Engel, A. S., Kinkle, B. K. 2000. Acidic cave-wall biofilms located in the Frasassi Gorge, Italy. Geomicrobiology Journal, 17:125-139.

The Wave of the Future Part 1
Surveying with a PDA

Kevin Kissell (WUSS #0530, NSS #54578)

New age surveying tools: PDA with protective case, Suunto Tandem combination compass and clinometer, Leica Disto A6 laser rangefinder, cyalume, and survey notebook. Note the survey book and PDA are mounted on a custom made clipboard for easy transportation underground. Photo by K. M. Kissell

Introduction

Auriga (ô-rī'gu) is a freeware program for PDA's (Personal Digital Assistants) running on a Palm OS operating system. The original programming was implemented by Martin Melzer to work along side his sensor box (containing an electronic compass and clinometer) which would automatically acquire cave survey data. The hardware progress ceased in 2000 but the software development was resumed in 2002 by Luc Le Blanc a native of Montréal (Québec), Canada. In 2003 a software conduit was created by Christian Chénier which allows the bidirectional transfer of data between Auriga and many desktop cave survey programs, including Compass and Visual Topo. The conduit means the user does not need to retype the data on their home PC after a survey; rather they simply link the PDA to the PC and the software imports and translates the information into the other program. Auriga is designed to be used as an in-cave smart survey notebook. During the surveying process, Auriga updates a line plot map, tracks statistics, can find and fix errors, and aid in drawing via a sketch to scale assistant. It is currently used in conjunction with a piece of grid paper (for the actual drawing) but all physical numerical data are inputted into Auriga. The program itself is highly customizable and is currently available in three languages (English, Spanish, and French).

Understanding Auriga

The Auriga program was designed to be as user friendly as humanly, make that mechanically, possible. From the first time you turn the program on you are greeted with a simple yet sometimes highly debated question, feet or meters? While this question is not groundbreaking by any means it does show that the program's writer was trying to make it as easy and streamlined as a veteran book keeper's own survey book. With your units selected the program opens up what is known as "the Main Form;" this is the screen you will always see when you start Auriga. It should be noted that there are many references to different "forms"

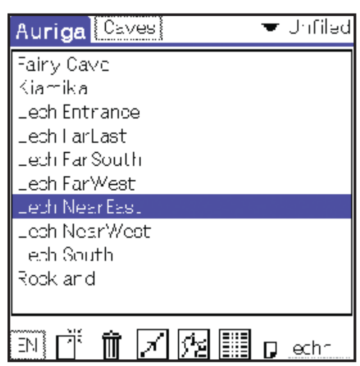


***Figure 1:** In "the Main Form" the user can start, edit, or delete a survey.*

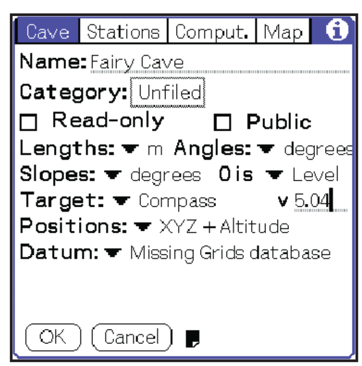


***Figure 2:** "The Cave Form" is used to control settings for a specific cave.*

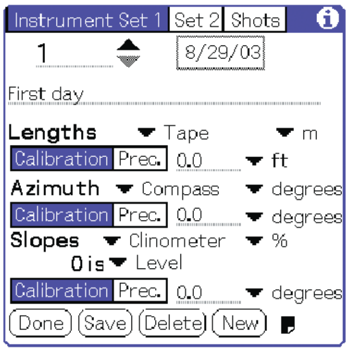


Figure 3: *Instrument adjustments can be made in "the Sessions Form."*

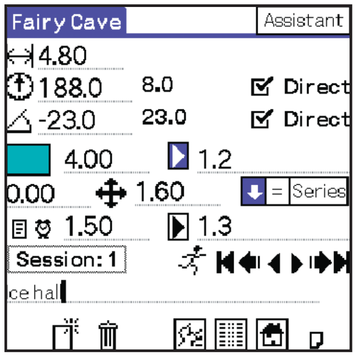


Figure 4: *"The Survey Shot Form" allows for standard input of data at and between stations.*

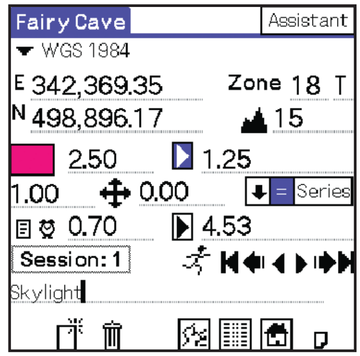


Figure 5: *Using a geographic position in "the Survey Shot Form" gives a cave a starting location and orientation.*

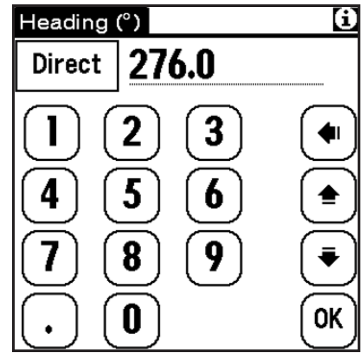


Figure 6: *The keypad self adjusts depending on what piece of information the user is entering.*

and these should be thought of simply as different pages of a book, each one contains varying information required to reach the end. From "the Main Form" (Figure 1) you can change Auriga's language, start a new or delete a survey, edit the survey data, view the map for a selected survey, view a list of all the information for each station, or add a note to a survey title. All this is accomplished by a set of icons that are along the bottom of the screen; these icons stay with you on most of the different forms (pages) and they provide the primary means of navigation while using Auriga.

When beginning a new survey one must simply tap the "new" icon to open the next form which is "the Cave Form" (Figure 2); here you begin the sometimes arduous task of controlling the numerous settings that give Auriga its user customization. Cave name, angle and slope units, datum, station name format, closure error, deviation, paper grid size, and target program (e.g. Compass, Walls, etc.) can all be set using the various tabs found on "the Cave Form." While to some this may seem a bit ridiculous, it is nice to know that the program remembers nearly all the general settings on its own; basically you can skim over these each time you start a new survey and you will very rarely have to change them after the first time. Once all your general settings are up to your specifications you can tap "OK" and another option filled form opens-this one is "the Session Form" and it is used to assign specific settings to a specific session. It is at this point that you may be asking yourself, what is a session? Simply put, sessions are settings for either a particular survey, set of instruments, team, or day of survey. There can be numerous sessions listed in the same cave, i.e. a cave that takes three days to survey will have three different sessions. "The Session Form" (Figure 3) tracks the date for each session as well as settings for the instruments used during that session. The user defines what type of instrument is used for length measurements (e.g. tape, Topofil, Disto, Rangefinder, or Toposcan) and units and number of decimals can also be defined. The Azimuth and Slope instruments (compass, clinometer, Theodolite, TNT module, Toposcan, etc.) can also be set, complete with unit and calibration settings. That means that if you know your instruments are not quite zeroed in correctly you can set it to compensate if you know how far your instruments are off. "The Session Form" comes complete with two sets of these settings, one for front shot and one for back shot. The final tab under "the Session Form" lets you decide whether or not to use, see, or store back sights, whether to use passage size on the start station or end station and even what color you want the line plot to be on the map (handy for differentiating days of survey or teams.) Upon completion, "the Session Form" offers a save feature so it can apply the settings to each shot. With saving complete you are ready to start inputting data into the program.

Get use to the next form because you will be seeing it a lot. It is known as "the Survey Shot Form" (Figure 4 and 5) and it is where you will input the start station and end station, length, azimuth, slope, left, right, up, and down for each shot. A unique feature to Auriga is the ability to create virtual shots, say at an entrance or pit and these shots can then be assigned a geographic position (UTM is the only format currently supported) and used to link two caves together-more of this will be covered below. A convenient feature of "the Survey Shot Form" is, once you start a naming sequence it figures it out and continues it. The only time this may be problematic is when connecting to another passage, i.e. where A01 connects to B01, however this is easily adjusted and the sequence starts again. Now if anyone has ever tried using a stylus to write in a centimeter square space, in gloves while your hands are shaking from

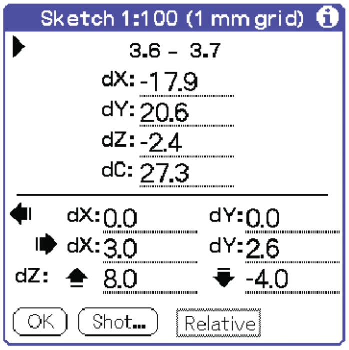


Figure 7: *With "Sketch to Scale" the user simply counts boxes to place the next point on the book drawing. Here the -17.9 means 17.9 boxes to the left and the 20.6 is that many boxes up.*

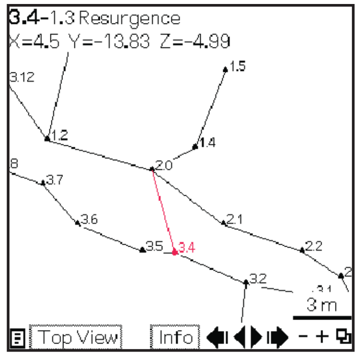


Figure 8: *Many of the same features as desktop viewing software can be found in "the Map Form," including a line plot and walls.*

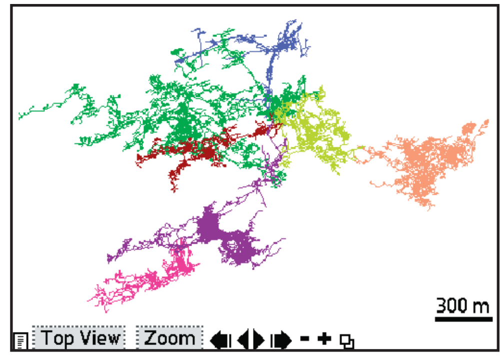


Figure 9: *Caves that have been networked can appear on the same screen, making connections all the more possible.*

the cold you may be thinking that writing all the data for each station would not be practical or even possible. However Auriga has the answer and that answer is a smart keypad (Figure 6). Now by smart I mean that the keypad, whose buttons are big enough to use with gloved fingers, reconfigures depending on what piece of data you are supposed to be inputting. With the start and end station and note you have a typical full character keyboard, length and azimuth gives you just a number pad with a decimal button, you get the same number pad with slope plus the addition of a minus button. Of course, along with the number pad you also get a button to reverse the direction of the azimuth and slope–this would be used in case a front shot is not possible for some reason. Finally with the left, right, up, and down walls you get the standard number pad as well as the decimal and a button labeled with an "X" which is used to represent a wall which in fact is a passage; this works the same way as the "P" in Compass. The keypad is very well thought out and once you enter it from "the Survey Shot Form" you can navigate through the different fields with convenient up and down arrows. Once all the necessary fields are filled a simple "OK" button takes you back to "the Survey Shot Form." With the data entered, stations can be marked to help you remember certain things when viewing the map, for example, an "E" symbolizes an entrance while an "?" is used for a lead. Also of note is the ability to search for any station by its name, this can be very useful if dealing with a large complex survey where you could have hundreds if not thousands of survey stations.

As handy as not having to flip through pages of survey data can be, the most relevant feature, at least in my humble opinion, is the inclusion of a feature called "Sketch to Scale" (Figure 7). Using the grid paper setting from way back in the beginning Auriga makes the actual drawing of the distances and angles between stations much easier. This feature basically tells you how many grid boxes to count up or down and left or right. That means you can kiss your protractor goodbye, and yes it even compensates for slope on low to high angle shots. To assist you in your sketching, Auriga also includes a constantly updating map feature, complete with grid lines that match those of your survey book. "The Map Form" (Figure 8) comes complete with zoom and pan, as well as an orientation selection, i.e. you can view a top view, an extended profile, cross-section, or any of the other four views of the map you could possibly want. Much like desktop cave viewers, you also have the option of seeing where the walls are by your choice of perpendicular lines or filled polygons; loop and closure errors also are identifiable by a dashed red line between two stations. All of these features can be extremely useful when drawing the map in the survey book. The sheer amount of data gives the drawer the ability to create an amazingly accurate map underground.

While the map feature is extremely useful it is not the only trick Auriga has up its sleeve. With the ability to network multiple caves or surveys (Figure 9) it may increase our capability to find other caves or connections between caves. Using GPS data at the entrances of various caves, Auriga can place those caves on the same grid sheet in accordance with each other and show each cave's line plot. Thus it may be possible to look at the line plots for two networked caves and decide which survey route is most likely to lead to a connection; all of this can be accomplished underground and on the fly making route choice all the more easy. Imagine if they had this type of software and ability when they were looking for connections in Mammoth! On the topic of multiple teams, say you have two teams working in the same cave but coming at it from

Kate Ferguson inputting data into Auriga. All data can be inputted by tapping on the screen; there is no need actually to write out the information. Photo by K. M. Kissell

different directions. Now if two teams want to work together they can easily and quickly share their data via infrared (IR) beaming ability built into any PDA-at any point you can beam any piece of data to another Auriga user. For example you could beam one shot, one session, or an entire map to another team to help tie into their existing survey. This means no more waiting until the end of the day to see if the two surveys connect. Sessions or shots can be beamed and linked to an existing survey by many means, including same station connections, i.e. two teams meeting at the same station and linking the two sessions that way. Also available on the map page is a line tool which can tell the user the distance and direction between two points, this is useful if two geographically linked surveys come close but do not connect, one could easily tell how much more passage (over a straight line distance) is needed to be surveyed in order to connect the two.

Practicality

I have been a PDA user for sometime now but I have to say when I heard about this program it did make me cringe. The thought of taking a small portable electronic device into the deep dark recesses of a cave, especially for a survey trip, seemed completely impractical and, dare I say, stupid! Upon doing a little research and finding out what worked and what didn't I came to the conclusion that while not impossible it would certainly take some thinking. The main concern is protection of the PDA while traveling underground; this includes keeping it dry and dust free. For the club this is handled by the purchase of an OtterBox 2600 PDA case (Figure 10). While this case can be a bit pricey it has proven to be well worth the money and shows no signs (other than mud stains) of being destroyed any time soon. Also, as any electric caver knows, all of our electronics require batteries to keep them useful; this is something a typical paper survey book does not require. This problem is also easily erected due to the large number of PDA's Auriga will run on, including the old Palm III which run off two AAA batteries. Even for those of us who own PDA's with rechargeable batteries all is not lost. Inexpensive rechargers that run off two or four AA batteries can easily be found online and are usually capable of recharging a PDA at least once if not two or three times. When a PDA's battery will last for eight hours at a time, a recharger gives you the ability to stay under for more than a day of straight surveying. Finally the last major issue is that of reliability. While not much can happen to a standard survey book, electronics are sometimes filled with glitches that could cause power loss or worse, data corruption or loss. Most current PDA's have built in flash memory, which means that even with a complete power loss, data are never lost. Auriga also supports the use of memory cards. At any time the user can save the entire survey to a secure memory card making it nearly impossible for data corruption or damage.

Figure 10: *The OtterBox 2600 is a formidable opponent for dust, dirt, water, and grime.*

Tomorrow and Beyond

Auriga is by no means a perfect program. After 35 beta versions the first non-test phase version (1.0) was just released last September and already the program has improved by leaps and bounds. Since September, Bluetooth support for the new Leica Disto A6 has been implemented and you can now transmit data straight from the laser rangefinder to the PDA with the push of a button. Gone are the days when you actually had to talk to your survey team!

Another added feature is that of a "Pit Sounder," (Figure 11) an automated program that calculates vertical distances by using a mathematical formula along with the speed and acceleration of a falling rock. This highly accurate program can take the guess work out of knowing how much rope to lower into a pit.

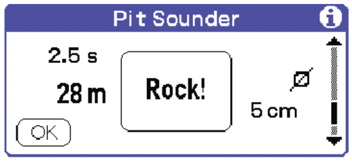


Figure 11: By telling Auriga the size of a rock, the program can accurately tell you the depth of a pit, cliff, or stairwell.

This article is by no means a complete representation of the entire Auriga program and it would take many more pages to list all the possible features and settings of this very well written and comprehensive in-cave survey program. With any luck the future incarnations of Auriga will bring with it the ability to draw the actual map right on the screen of the PDA and hopefully the ability to overlay Topo maps on top of the line plots while underground. It is no doubt that Auriga will continue to improve over time. As we approach the all-digital age, the real test will come when Auriga has to face off against the old timers and their trusty paper survey books. Only time will tell who will win the battle of the survey books.

Notes and References

For more information regarding Auriga go to: http://www.speleo.qc.ca/auriga/

Information on Otter Boxes can be found at: http://www.otterbox.com/

Already have Auriga but need some help? Please see Brandon Kowallis's website for video walkthroughs at: http://www.brandonkowallis.com/Video.htm

POETRY

a poem by lisa nichols

if you should decide to go caving
it's important to keep down the raving
for you'll scare all the bats
and they'll drop their top hats
and the guano from which there's no
saving!

Christy Taylor in Pine Hill Cave, Kentucky. Photo by Aaron Taylor.

The Crawlspace

An invisible force grabs my wrists,
Pulling me deeper into silent darkness.
I've lost all bodily control,
My limbs move by unconscious momentum;
The quest has begun.

I traverse the elongated passage,
My ribs are punctured, my breath is gone,
The serrated rock etches wounds in my skin,
But the quest has begun.

My mind is flaccid and pensive,
I conceive no conniptions, no paranoia,
I am only probing the unknown,
The quest has begun.

My body is desperate for quenched thirst,
But the soil, once glistened, is now encompassing my clothes,
My soul is elated as I reach a magical room,
The virgin passage is mine,
But the quest is not over.

Danielle Carey (WUSS #0551)

Hillside Pit

Carter Caves State Resort Park, Kentucky

Caleb Heimlich (WUSS #0539, NSS #55745)
Aaron Taylor (NSS #58227)
Christy Taylor (NSS #58226)

Figure 1*: A small pit north of Bowel Cave in the Horn Hollow Valley, Hillside pit is located close to a limestone ledge on the steep slope of the valley. Photo by Aaron Taylor.*

13 January 2007

Hillside Pit is a small pit located on the west side of Horn Hollow Valley in Carter County, Kentucky. The entrance is small, slightly larger than body size, with no appreciable surface depression surrounding it. A bench sized limestone block which protrudes from the hillside marks the north side of the entrance (Figure 1). Water enters the feature by a small subterranean stream on the west (uphill) side of the pit. The water falls to a stone and gravel drain, also along the western side of the bottom of the pit. The pit itself is approximately 7 meters deep and contains some surface soil and other organic debris. The slope of the bottom of the pit is defined by gravel and organic debris which slopes toward the drain. Several *Meta ovalis* and *Ceuthophilus* sp. were seen as well as a larger number of an unknown type of dipteran.

HILLSIDE PIT

CARTER CAVES STATE RESORT PARK
CARTER COUNTY, KENTUCKY

A Suunto and Leica Disto survey by:

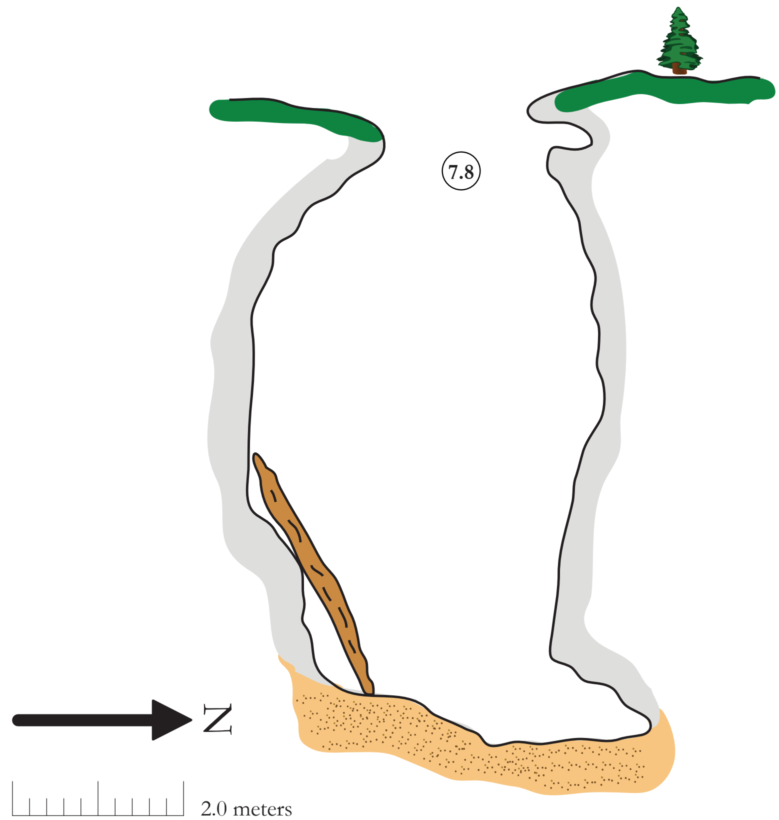
Caleb Heimlich, Aaron Taylor, & Christy Taylor

13 January 2007

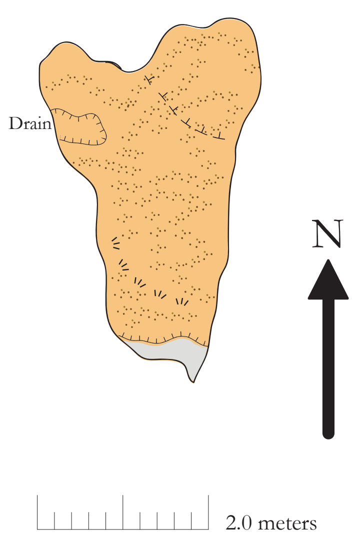
Total Vertical Extent - 7.8 meters

Cartography by Kevin Kissell
Data processing - Compass for Windows
(www.fountainware.com/compass)
Illustration software - Adobe Illustrator CS 2

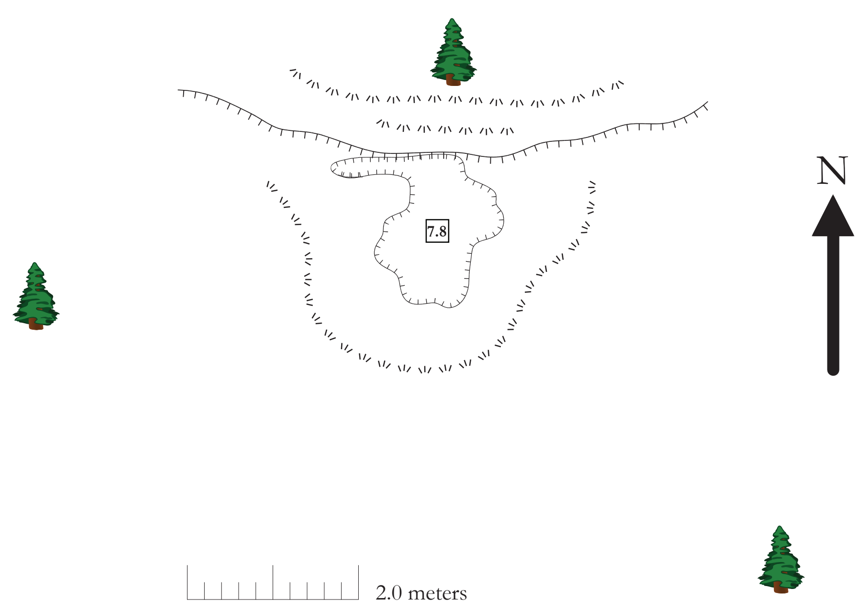
Vertical Profile



Floor



Pit Entrance



Wittenberg University Speleological Society

Lake Cave

Carter Caves State Resort Park, Kentucky

Kevin Kissell (WUSS #0530, NSS #54578)
Polly Barger (WUSS #0555)
Kate Ferguson (WUSS #0544, NSS #56925)
Linda Oxenrider (WUSS #0535)
Aaron Taylor (NSS #58227)
Christy Taylor (NSS #58226)

With the advent of new surveying technology, specifically software that provides the ability to link two surveys together via GPS points taken at the start stations, the club's ability to find connections between caves has greatly increased. To test these new abilities, survey data were collected and GPS points were taken at numerous cave entrances along the ridgeline on the northeastern side of Smokey Lake. When all the data were inputted into Auriga (see page 17 for the complete article) a possible connection was found between Sinus Cave, *Pholeos* Vol. 23 (1,2) and Lake Cave, *Pholeos* Vol. 7 (2).

Figure 1*: A large stalagmite dominates the entrance of Lake Cave; the ice is a result of a cold January morning. Photo by H. H. Hobbs*

Since the survey of Sinus Cave had just been completed and published two years earlier using the club's current, complete, and very thorough methods, the only thing that had to be done was confirm the data from Lake Cave. The original survey of Lake Cave, one of the largest caves on the northeastern side of the lake, was completed in 1986 and published in 1987. For this new project the data from the original survey were reviewed but were found to be tainted and incomplete due to the lack of inclination information, hence it was decided that a new more complete survey was needed. Therefore during one of Dr. Hobbs' traditional Cave Ecology class trips, the resurvey of Lake Cave began.

30 September 2006

A particularly beautiful Saturday afternoon found a survey team consisting of Kate Ferguson, Aaron and Christy Taylor, and Kevin Kissell leading a few Cave Eco students on the short hike to Lake Cave. Upon arriving at the entrance, the Cave Eco students began their research while the survey team divided up the jobs and practiced sighting through the instruments. The survey team set the first station a little after 12:30pm EST on a large stalagmite that dominates the high and wide overhanging entrance (Figure 1). After the entrance room the cave makes a sharp right (east) turn into a hands and knees crawlway; the floor is covered in breakdown ranging in size from a few centimeters to half a meter in width. Following the crawl is a low room, roughly seven meters wide and one meter tall, known simply as "the Junction Room;" (Figure 2) this is aptly named since there are six passages going off one

***Figure 2**: Aaron Taylor and Kate Ferguson check one of the many leads going off "the Junction Room." Photo by K. M. Kissell*

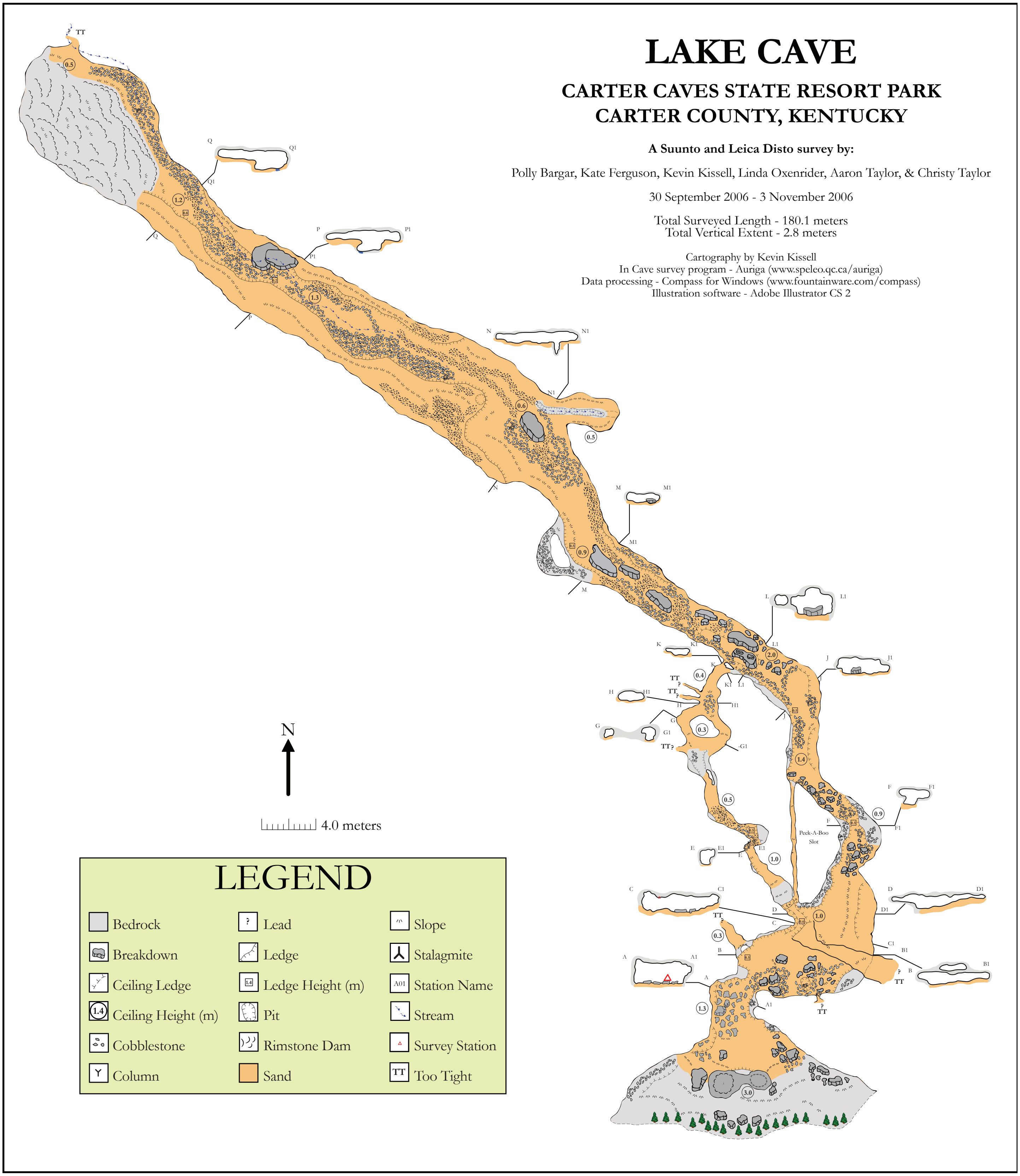
***Figure 3**: The small loop in "the Loop-Dee-Loop Crawl" is barely big enough for human travel; here boots and legs are all that can be seen. Photo by K. M. Kissell*

survey point which is located on the ceiling of this room. It was at this room that we dropped all of our unnecessary equipment and proceeded to set good solid points down each of the passages. From A02 which is the central point in "the Junction Room," the main passage, known as the A survey, continues directly ahead (east). However, a high lead, the B survey, goes back over the room in a roughly southeastern direction. The B Survey is a belly crawl with two meter wide smooth walls, and ceiling as well as a sand floor; the passage pinches seven meters from A02. The C survey consists of two shots into a high lead on the northern-most wall at the beginning of "the Junction Room;" unfortunately the crawlway becomes too tight for human travel, after only a meter or two. Other than the A survey, the passage that showed the most promise was the D survey which would come to be known as "the Loop-Dee-Loop Crawl." This passage consisted of a sand and mud floored canyon with a width of only half a meter and a height of close to a meter. The survey team set five points in the D survey before the Cave Eco students reappeared and announced that they were done with their research. With solid points set in four of the six passages leading off "the Junction Room," the survey team retired for an afternoon snack, leaving the cave only three hours after entering.

After a healthy break of three hours a partially new survey team, consisting of Polly Barger, Kate Ferguson, and Kevin Kissell, reappeared at the entrance room to Lake Cave. The team immediately set to work on lengthening the main passage, the A survey. Leaving "the Junction Room" the main passage takes an immediate left turn (north) into a body sized keyhole passage. The floor is littered with vegetal debris and beer cans, more than likely left there by a pack rat since the cave is not well traveled and fairly dry. After a few meters, the main passage eventually opens into the tallest part of the cave with a ceiling height of two meters. At this location a small canyon is noticed on the left (west) side of the passage; upon further inspection it is found that this canyon is in a direct line of sight with "the Junction Room." Due to its small size, 12 centimeters in width, it is the only connecting passage we could not physically go down, however the extreme straightness of the canyon allowed for a single 12 meter shot to connect the A survey back to the main room. Since this connection was a bit of a surprise this passage came to be known as "Peek-a-Boo-Slot." The survey team continued adding length to the survey until it was decided that a hot meal and warm sleeping bags sounded better than surveying. The total surveyed length for the day was a mere 87.87 meters; however the prospect of connecting to Sinus Cave haunted the dreams of the surveying party until they were able to return some two weeks later.

16 October 2006

While Fall Break is traditionally reserved for a nice long TAG trip, the lack of interest caused the trip to be cancelled. However a break from school can never be wasted, especially if there is an active survey just calling our names, so on another beautiful day three WUSSes arrived at Carter Caves State Resort Park for a day trip of survey work. The team consisting of Kate Ferguson, Linda Oxenrider, and Kevin Kissell had a singular goal: to finish the survey of Lake Cave, however unforeseen problems complicated the survey. After


LAKE CAVE
CARTER CAVES STATE RESORT PARK
CARTER COUNTY, KENTUCKY
A Suunto and Leica Disto survey by:
Polly Bargar, Kate Ferguson, Kevin Kissell, Linda Oxenrider, Aaron Taylor, & Christy Taylor
30 September 2006 - 3 November 2006
Total Surveyed Length - 180.1 meters
Total Vertical Extent - 2.8 meters
Cartography by Kevin Kissell
In Cave survey program - Auriga (www.speleo.qc.ca/auriga)
Data processing - Compass for Windows (www.fountainware.com/compass)
Illustration software - Adobe Illustrator CS 2
N
4.0 meters
Peek-A-Boo Slot
LEGEND
Bedrock
Breakdown
Ceiling Ledge
Ceiling Height (m)
Cobblestone
Column
Lead
Ledge
Ledge Height (m)
Pit
Rimstone Dam
Sand
Slope
Stalagmite
Station Name
Stream
Survey Station
Too Tight

many failed attempts at accuracy in the "the Loop-Dee-Loop Crawl" the survey team changed roles and moved into the main passage for some "easier" survey. Picking up where the previous team stopped the A survey continued. Climbing over a few large pieces of breakdown, the passage quickly became low again, averaging a ceiling height of 0.3 meters, in a wide sandy belly crawl. In the distance a waterfall or drain could be heard and after a few meters a canyon appeared in the floor on the right side of the main passage. Without any of the proper safety equipment the survey team ignored the canyon and continued with the A survey. Past the canyon, the floor of the main passage dropped close to a meter into the base stream level; here a shallow active stream flows underground to the canyon. The main passage terminates after a few meters in the stream; rimstone dams cover the up-sloping floor on the left side of the passage in the last room of the cave. Located on the back wall of the room is a very small body-sized hole which may continue, however it is half filled with water and the walls are covered with sharp rock protrusions. Surveying in the stream passage was a cold, mucky endeavor. With the main passage surveyed it was decided that it would be best to stop the survey and proceed to "the Junction Room" for a hot cup of tea. The team quickly moved through the main passage back to "the Junction Room" where the mostly unneeded gear was stored, including a small stove and water. It did not take the team long to realize that they had had a visitor while they had been surveying deeper in the cave. Apparently a pack rat had found the stash of gear and decided to chew through the PVC bag which contained the team's Clif Bars, tea, water, stove, and lighter. The small bag containing the stove was found a few meters away from the gear stash, stuck on a rock, unable to be dragged any farther by the little rodent. One of the Banana Nut Bread Clif Bars was missing from its wrapper, and worst of all the only lighter the team had brought was nowhere to be found. With the inability to heat the water for tea, the team left Lake Cave in poor spirits, only 60 meters of passage had been surveyed and the cave was still not finished. It would take at least one more trip to finish "the Loop-Dee-Loop Crawl" and check the canyon for a going lead.

5 November 2006

A strong, very confidant survey team, consisting of Kate Ferguson, Aaron and Christy Taylor, and Kevin Kissell, arrived at Lake Cave at 10:00am EST. The team had three very accomplishable goals for the day and it did not matter how long it was going to take, they were going to finish the survey of Lake Cave. Goal one was to finish "the Loop-Dee-Loop Crawl" and connect it to the A survey; goal two was to explore and survey the canyon in the back of the cave. The third and final goal consisted of a wetsuit-wearing-look at the body sized lead in the very back of the A survey. With a set plan, the team moved into the D survey to pick up where the previous teams had stopped. The D survey snakes back and forth for a few meters as a small belly crawl before splitting in two and reconnecting, forming a small loop (Figure 3). It should be noted that there are three or more small leads on the left side of the D survey, most were no larger than ten centimeters in diameter and none of them were blowing any sort of air. The D survey continued on snaking around (Figure 4, front cover) before eventually reconnecting with the A survey, forming another loop in the cave. With the D survey completed and connected to the A survey the team moved to the canyon to check it for a going lead. The half meter wide canyon dropped down roughly one meter (Figure 5) followed by another one meter drop. Water was actively flowing from the stream observed deeper within the cave; it cascaded down the half meter wide canyon and collected in a pool located in a small dome room. Four survey points were set as the keyhole canyon (Figure 6) progressed deeper and deeper; however the dome room was not surveyed due to a lack of possible points and the inherent danger of falling into the pool of water. The canyon passage does not extend past the dome room but water is able to leave the room by an unknown way. With the canyon pushed as far as anyone wanted, the team moved along the main passage to a convenient changing place for the final push in the back of the cave. Aaron Taylor bravely volunteered to don a wetsuit and check the possible lead

Figure 5*: Aaron Taylor happily sliding his way into the tight canyon. Photo by K. M. Kissell*

***Figure 6**: The canyon turns into a tight, body-sized, keyhole before opening into a small room. Photo by K. M. Kissell*

***Figure 7**: A chilly survey team stops for a warm cup of Aaron's famously delicious "Russian Tea" before hiking back to the lodge for dinner.*

for a going passage. After about ten minutes of squeezing and scrambling, Aaron announced he was too large to get through but the possibility of a going passage was very small. Content with the news, the survey team proceeded to "the Junction Room" for a warm drink (Figure 7) before leaving the now completed Lake Cave.

During the three survey trips required to finish Lake, the teams reported very few fauna sightings. Crickets representing *Hadenoecus cumberlandicus* and *Ceuthophilus* sp., as well as spiders (*Meta ovalis*) and a cave salamander (*Eurycea lucifuga*) were seen on numerous trips. While never actually observed, the presence of a pack rat is undeniable and the team from the second trip hopes he/she sets himself/herself on fire with their lighter! It also should be noted that Lake Cave is far enough away from any trails to warrant the idea that it is rarely visited by humans. The only indication of a human presence was a signature dated 1898 found on the ceiling above the stream in the back of the cave (Figure 8).

***Figure 8**: The only identifiable signature was found nearly in the back of Lake Cave on the ceiling above the stream. Photo by L. Oxenrider*

A connection between Lake Cave and Sinus Cave was never found despite numerous attempts at voice and light contact at the most likely locations in each cave. The resurvey of Lake Cave was a useful test of the new survey technique and technology the club is currently using. For a complete look at the new survey gizmos and gadgets please consult page 17 in this issue.

FILM REVIEW

"The Cavern"

A Descent into Something, Alright

A film review by Katy Nichols

If you are in the mood for a film that not only challenges the status quo of caving but also taps into the issues of both feminism and anatomy, well then, friend, you are in the mood for "The Cavern: Descend into Terror." In 2005, director Terry Lee Robins underwent a true labor of love to bring us eighty-one minutes of cinematic adventure. Need I say, that every caver, nay, every man what calls himself decent, has benefited in ways innumerable.

The viewer of "The Cavern" is taken on a journey through a cave most mysterious and introduced to the intimate sounds of the exposed intestine. One cannot help but weep when the naïve, attractive cavers find themselves in the warped grasp of a fiend suffering from the weight of intense post-adolescent insecurities and horniness. Ah! The torment, the beauty. It breaks the heart asunder.

So please, when you are intoxicated enough with the spirits that you may enjoy the music of the lower digestive track, remember the story that inspires many a dream, remember "The Cavern." Thank you.

Stacy's Pit

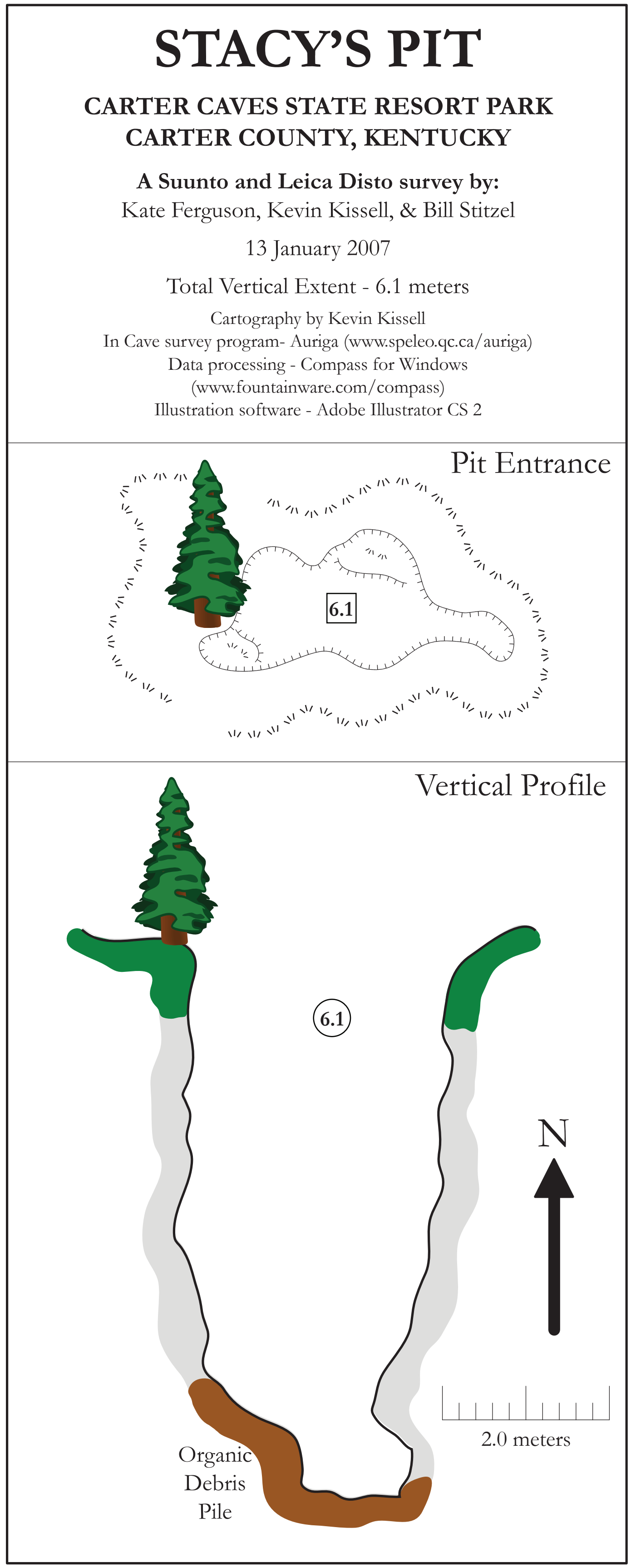
Carter Caves State Resort Park, Kentucky

Kevin Kissell (WUSS #0530, NSS #54578)
Kate Ferguson (WUSS #0544, NSS #56925)
Bill Stitzel (WUSS #0132, NSS #27643)

Figure 1: *Bill Stitzel rappelling into the inky abyss of Stacy's Pit! Photo by K. M. Kissell*

13 January 2007

This particular pit was found early last year by Dr. Hobbs and Stacy Wharton on one of their many GPS trips in the park. While the pit is not very large it was decided that it was indeed worth surveying, plus it is not like it was going to take much time to survey anyway. The six meter deep pit is located on the east side of the valley, 500 feet north of Bowel Cave; it is one of many small pits and caves located in the upper section of the Horn Hollow Valley. Taking only one shot to finish, which Bill successfully completed after rappelling into and free climbing out of the pit, it is located next to a large tree (Figure 1) on a fracture running from east to west. The nondescript pit could possibly be pushed deeper, for the floor was never actually found, since the bottom of the pit is filled with a large organic debris pile consisting of leaf litter and tree branches. No water was seen on the day of survey and no drain was located anywhere on the unseen floor. One cricket, identified as *Hadenoecus* sp. was seen on the day of survey. With the one and only shot completed, the team packed up and moved to a more promising pit up valley known as Gnawbone Pit; the survey had taken only a few minutes (it took longer to rig the drop than it did to survey the pit!)



Sleeping Underground,

Scrubbing Cave Walls, and Hauling Trash - What a Typical Weekend!

Linda Oxenrider (WUSS #0535)

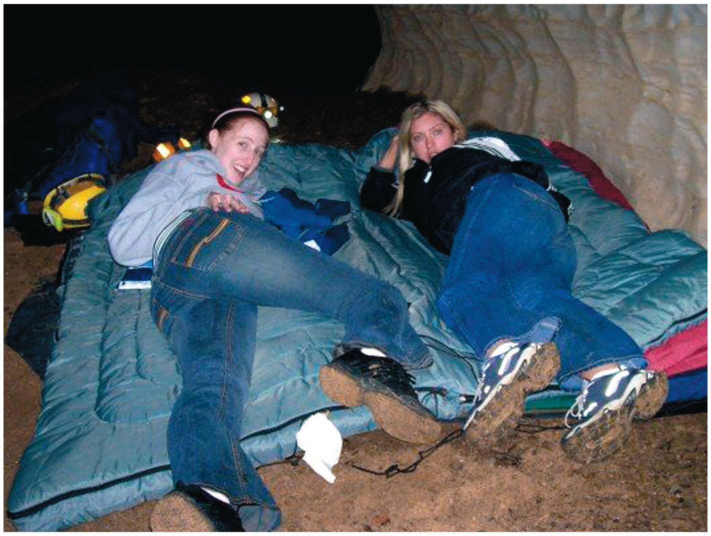


***Figure 1**: Linda Oxenrider and Margaret Arwood pose before getting ready for bed deep inside Redmond Creek Cave. Photo by K. M. Kissell*

***Figure 2**: Linda Oxenrider and a fellow caver use wire brushes and water to remove spray paint found in numerous spots within the cave. Photo by M. Arwood*

I consider myself to be an adventurous person; obviously you have to be to be a caver. But when I was standing in the middle of a cow pasture looking for a place to sleep I was hesitant to call a nearby cave, Redmond Creek Cave, my sleeping quarters for the night. But two of my best friends convinced me that it would be a fun adventure. So in we went, looking for a bed in a cave! Having never been in Redmond Creek Cave before we were unsure what we would encounter and if we would find a suitable location to erect a sleeping bag bed. A few hundred meters into the cave we found a nice dry spot that was just screaming "sleep here." I could hear the bats grinning with joy as a blond, a brunet, and a redhead snuggled up, as snug as bug in a rug, or in this case a sleeping bag (Figure 1). There was not a single trace of light at that depth in the cave and we all slept great. We were abruptly awakened by Bill Walden in the morning. I could hardly believe that the sun was shining outside; as we emerged from the cave with our bed in tow we were greeted by a beautiful Kentucky day. We met a few new cavers who were eager to start the cleanup of a nearby pit, Disappointment Pit and graffiti removal in the Redmond Creek Cave. Both the pit and the cave are located within a three mile wide sinkhole, the largest in Kentucky. Bill Walden informed us of the choices for how to spend our day, first hauling trash up and out of the pit or scrubbing graffiti off of cave walls; naturally we choose the cave. Margaret Arwood and I decided to clean up the yellow spray paint that was located on the walls throughout the cave but mostly concentrate on the area near the entrance of Redmond Creek (Figure 2). We used wire brushes, water, and an exorbitant amount of elbow grease to remove as much of the graffiti as we could. Kevin Kissell and eight other cavers were up on the hillside in an adjacent valley at a small pit known as Disappointment Pit doing another clean up. This one involved hauling trash and debris out of the 20 foot pit which had doubled as a trash can for many years (Figure 3). The pit which was located between two dilapidated old houses, most likely from the early 20th century and was choked with everything from baby diapers and tires to building supplies and a small lawn mower engine. All in all the group used a pulley to haul more than 60 garbage bags of trash and an innumerable number of bucket loads of large debris from the small pit. With many sore backs and rumbling tummies the

exhausted cavers retired to Bill Walden's Kentucky vacation home for a hearty bowl of homemade chili provided by his wife and enjoyed a relaxing evening. After many hours of discussing worldly matters the weary cavers each claimed a comfortable spot on the floor and proceded to dream of trash-less and graffiti-less caves. The three of us again shared our sleeping bag bed, except this time we were in the comfort of a heated porch instead of the sexiness of an underground cavern. The next morning we went back to the pit to remove the trash bags and debris we had hauled out the day before. We were then faced with the challenge of getting all the trash bags down the wooded hillside that leads from the pit to the dumpster. Lucky, the courteous landowner was standing by to save the day with a large tractor, trailer, and chainsaw. After some chainsaw assisted tractor maneuvering we successfully loaded up the tractor and proceeded to the dumpster. With a long drive looming ahead the WUSSes bid adieu to a successful cleanup crew, promising to return for another fun weekend of cleaning.

Figure 3 (left)*: Using a line of volunteers and a haul system, the cavers were able to remove numerous trash bags and large pieces of debris. Photo by L. Oxenrider*

SQUEEZEBOX VICTORY

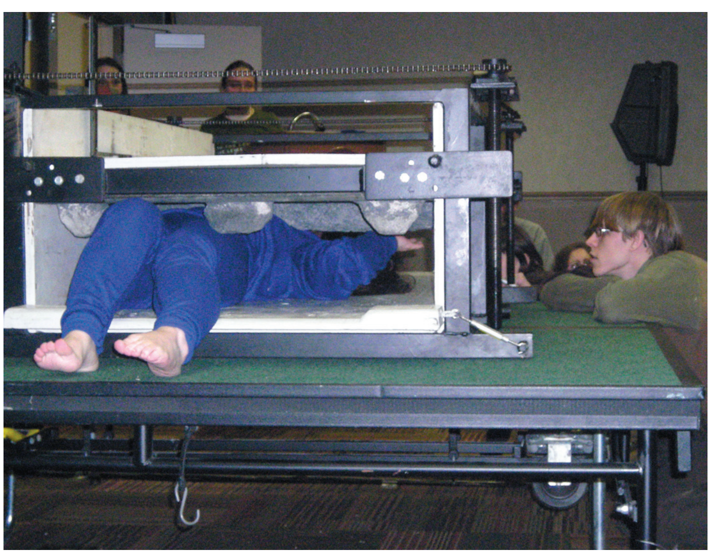


Photo 1*: Last years WUSS champion, Erick Twaite, looks on and coaches as Rachel Horowitz makes her winning run through the vicious and rocky Crawl-a-thon squeezebox. Photo by K. M. Kissell*

WUSS has another Crawl-a-thon Squeezebox champion in our ranks! Rachel Horowitz ignored the small, bleeding, gash on her head, caused by her winning run through the box, to take victory in her weight class at Crawl-a-thon 2007. Like a true WUSS, Rachel signed the box and used her own blood to put a thumb print below her name! All of us at WUSS would like to thank Rachel for incurring bodily harm in the pursuit of a win and we all wish her many squeezing victories in the future.

Photo 2*: Rachel signed the box, and in true WUSS fashion, used blood from her own head wound to imprint her thumb below her signature!*

"Who's Going In First?"

A recollection by members of the Miami University ECO-REU Program on their trip to Carter Caves State Resort Park, Kentucky led by WUSS student cavers and advisor Dr. Horton H. Hobbs III.

Erin Sams, Hiram College, Hiram, OH (samsee@hiram.edu)
With assistance and input from
Alison Maye , Wittenberg University
Peter Sebastian, Bethel University
Tim Bankroff, Miami University
Diane Silcox, Miami University
Ashley Wick, Drake University

Forward by Jim Oris, Professor of Zoology, Miami University, Oxford, OH (orisjt@muohio.edu) (Wittenberg, Biology B.A., 1979)

From June 7-9, 2006, Dr. H.H. Hobbs III participated as a visiting scientist as part of a National Science Foundation supported program, "Research Experiences for Undergraduates: Ecology of Human-Dominated Landscapes" (aka "ECO-REU") at Miami University (Oxford, OH). His visit included meeting with students and faculty, presenting a lecture on karst landscapes, and hosting a very rigorous introduction to caving at the Carter Caves State Resort Park (KY). The ECO-REU program at Miami University sponsors 12-13 advanced undergraduate students from campuses across the U.S. each summer for a 10-week intensive, research-based internship program (http://www.muohio.edu/ecoreu). We were fortunate that Dr. Hobbs was able to spend so much time with the group in between his own caving and research survey trips to West Virginia. Dr. Hobbs demonstrated his typical high-energy zeal for the study of living things and showed everyone involved what it is truly like to engage minds and teach in a long-lasting fashion simply through the love of one's profession. Dr. Hobbs and Wittenberg WUSSes, Kate Ferguson and Kevin Kissell, guided the group through 13 caves in a day-and-a-half of walking, crawling, wading, and sliding, including: Bio Cave, Skylight Cave, Smokey Bridge Cave, Cascade Cave, Sandy Cave, Waterfall Cave, Bat Cave, X-Cave, Saltpetre Cave, Laurel Cave, Horn Hollow Cave, Rimstone Cave, and H_2O Cave. What follows are the highlights of the trip and reflections of a few of the ECO-REU students who participated in the trip and learned the difference between "spelunking" and "caving".

For many of us, the group excursion to Carter Caves State Resort Park in Carter County, Kentucky was full of new experiences. Even to the few (including myself) that had gone "spelunking" before (as it turns out, to be a "Caver", one must first pass the rank of "Spelunker" with flying colors), crawling, climbing, and wading through one wild cave after another brought a whole new high. We were fortunate to have our very own karst expert, Dr. Horton H. Hobbs III, to guide us over the landscapes of "karst country" and encourage us to venture into the depths of the earth. No cave we entered was an empty, dark abyss, for every trickling stream and tiny ceiling crevice was teeming with life. Some members of our group faced their fears by entering the caves on our first day, while others found solace and intrigue in the exotic beauty of the underground world.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★

The afternoon was hot and muggy- ideal conditions for taking a trip underground. After a brief visit to a few dry and spacious caves, we were all eager to follow Dr. Hobbs as we reached our first "real" cave entrance, although some people were more convincing than others in their enthusiasm. To enter the cave, it was necessary to walk through a deep, cold stagnant pool before crawling our way into the entrance. Not only did this water smell horrendous, it was also some of the murkiest water we had ever seen. Once we were past the water, we paused at the cave entrance so that Dr. Hobbs could explain a bit of cave history to us. From the sound and look of things, this was going to be a long, wet, and very dirty trip.

Upon entering the cave, Wittenberg student Alison Maye recalls, "As I began to take note of my surroundings, I saw stalactites, stalagmites, flowstone, and even a few cave creatures! The water that was running through the cave

Miami University ECO-REU participants pause for a group shot at the beginning of their Carter Caves adventure (i.e., we weren't muddy – yet). From left to right: (front row) Sonii Kollie (Rutgers Univ.), Peter Sebastian (Bethel Univ.), Lisa Aschemeier (Miami Univ.), Alison Maye (Wittenberg Univ.); (middle row) Michael MacMillan (St. Olaf College), Natasha DeLeon (Univ. Puerto Rico Mayaguez), Kim Mace (Miami Univ.), Will Tardy (Ohio Univ.), Erin Sams (Hiram College); (back row) Julian Resasco (Oklahoma State Univ.), Horton Hobbs (Wittenberg Univ., expedition leader), Tim Bankroff (Miami Univ.), Jim Oris (Miami Univ., Faculty Advisor), Shawn Wilder (Miami Univ., Graduate Assistant). Missing from photo: Ashley Wick (Drake Univ.) and Diane Silcox (Miami Univ.).

was so clean and clear that it was hard to imagine the water just outside the cave had been the exact opposite. As we walked through the cave in a hunched over position, I tried to lift my head up as much as possible to take note of all the natural beauty around me, even though this meant bumping my helmet on the cave ceiling more than once. "Ouch!" The beauty and the numerous creatures we saw exceeded what many of us expected. I had been in public caves and those that were set up for tourist viewing, but nothing compared to the power and grace of the walls that seemed to be displaying themselves just for us to see.

Having similar past experience in the caves, Peter Sebastian of Bethel University has fond memories of childhood trips to the underground. "There is a whole other world in caves I have never seen before. Sure I had been on cave tours as a kid, but it's not the same world you see when you get on your hands and knees and crawl through the tiniest passages that can still physically fit your body. There are albino crickets, bats, and other creatures of the dark to be seen that just are not found on your typical cave tour." As the day wore on, it seemed our fondness and comfort in the caves grew stronger. There were members of the group who saw the caves as challenges to overcome, for the most part, with smiles on their faces. Ashley Wick, a student at Drake University, likes to think of herself as a thrill seeker, but she was not quite so confident on this day. She says, "Months ago, if someone would have asked me if I was claustrophobic I would have scoffed. When Dr. Hobbs pointed to what seemed like a crack in the wall of the cave and said ‘Who is going first?’ I felt my throat close up a bit. So that is what claustrophobia feels like! I was secretly cheering myself on inside as I crawled through the (fairly short) tunnel. I am forever thankful for the chance to discover a fear that I didn’t know I had, face that fear, and overcome it - all in the safety of HHHIII’s watch!” So, as I and these group members can testify, that first long afternoon spent in the dark was something to remember. As Miami’s Diane Silcox can attest, the afternoon was not only memorable, it stayed with us in our sore bodies through the night as we settled into the campsite and it remained with us as we wearily got to our feet the next morning. Those of us that were hearty enough, volunteered to subject our bodies to more, and we were not disappointed.

Probably the most memorable event of our episodes in the caves was the total lights-out, when we all spread out in a large clearing, turned off our headlamps, and waited. Nothing. No noise, no movement, and absolutely the darkest black I had ever seen. But then, it seemed as if the cave was as loud as an oncoming train and the buzzing in my ears would not cease. Again, Alison Maye explains how she felt at the same moment, “As everyone else began to turn out their headlamps, I took a deep breath, whispered a prayer, lifted my hand, and slowly turned off my light. I sat very still and waited for my eyes to adjust to the darkness. A strange thing happened though—they didn’t. I felt completely blind, but at the same time, I wasn’t worried. The darkness was almost calming, and I quickly forgot about that “scary cave creature” jumping into my lap. As I realized that my eyes were not going to adjust to the darkness, I began to listen. At first, it seemed very quiet, but suddenly my ears felt as though they were pounding. It was like sound was pouring into my ears and I couldn’t get away, but at the same time, my brain was telling me that the cave was silent. The saying, ‘Silence is deafening’ suddenly struck me and I realized that the person who coined that phrase must have been sitting in a cave.” Peter Sebastian saw a stark contrast of the darkness in the caves compared with our daily misconceptions of darkness. Living in a light-polluted atmosphere has made him forget what complete darkness is like. “There was no moonlight, clock light, or computer screen to dampen the effect of total darkness that enshrouded us when we turned our headlamps off. For just those few minutes of meditation, the whole trip would have been worth it.” Like Alison, Peter, and the rest of us, Tim Bankroff of Miami University was just as stunned by the intensity of the darkness and the sound of the silence. “I could hear my heartbeat in my ears,” he said. “I also began to understand that, for obligate cave dwellers, eyes or other photo-sensory organs were useless. So at that moment, I felt a distant connection to organisms about which so little is known. I finally knew why I was there.” I think those few moments were a turning point in the trip for many of us. Not only had we become entranced by the beauty and the mystique of the caves, we had now seen that the emptiness that so many assume fills a cave is in fact another world, able to be seen only by those who are willing to let it come to life.

If Dr. Hobbs thought he was just going to take our group to the caves and be forgotten, he was certainly wrong. The thirteen of us seemed to have a bond from the beginning of our summer program, but this trip made our new friendships grow quicker than any of us expected. Again, Tim Bankroff put it best- “You know what they say, ‘Those who cave together, stay together.’ After all, if there’s mud on everyone’s face, it’s no big deal. Now we even have something in common. As far as I knew, speleology was a new and strange science to which Dr. Hobbs awakened all of us undergraduates. For two days, the above-ground world was passé as we explored the dark subterranean karst landscape of Kentucky. We climbed up, down, over and crawled into, around, and under so many caves and cave features that I was beginning to feel a little troglocolous, if you know what I mean.” What’s more, Dr. Hobbs showed us how much fun science can be. We are all a part of the REU program for the simple reason that we want experience in ecology research, so what better way to learn than by seeing the biodiversity and landscapes up close? The caving trip has had a lasting effect on our own enthusiasm for the program, for our individual projects, and in some ways carried us through the summer not as thirteen research interns, but as “the ECO-REU group.” Our thanks go out to Dr. Hobbs, because his attitude towards life and loving what one does with his or her life was spread onto each of us, somewhere beneath all of that cave mud.

3 Watt Mini Maglite LED

Kate Ferguson (WUSS #0544, NSS #56925)

Figure 1: *Small 2-AA Mini Maglite and the larger 3-AA brother.*

It's a familiar scene. Pacing up and down the flashlight aisle at Wal-Mart, you'll be caving just as soon as you pick up another back-up light (I mean, it's only $15) and grab some AA's, and you can't decide if you should go with the cheap light over here or that other cheap light over there or…what's that? O Frabjous Day! It's a new Mini Maglite to replace the one your last survey project ate. And this one, dear friends, isn't at all like your old Mini Maglite. That faithful friend's time has passed, and lo, the LED generation cometh.

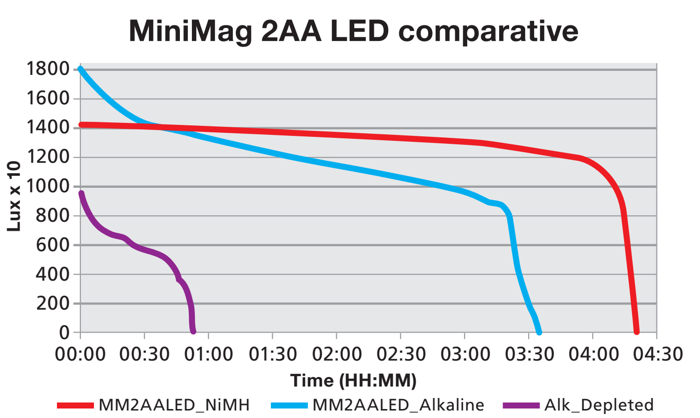


Figure 2*: Comparison of battery types, as prepared by the dear folks at the Candlepower Forums. This will convince you to switch to NiMH batteries, yes?*

This was the enviable situation I found myself in mere months ago. Still reeling from my loss, and actually needing another light, I became the proud owner of WUSS's first 2-AA 3-watt LED Mini Maglite. My life was forever changed. I could blind my comrades as never before.

This light comes in two sizes, the common 2-AA and the abnormally long 3-AA (Figure 1). I chose the smaller one, since the 3-AA model seemed too long to handle comfortably. The light performs really well by itself in-cave, but like most handheld lights, is best for spot-lighting. The bright white beam is tight or diffuse, as you choose since the beam can actually be focused, much like traditional Mini Maglites. The light drop after 3 hours (Figure 2) would be enough encouragement only to use this as a primary light when absolutely necessary. However the sheer brightness and Maglite durability should make it a staple in a caver's pack.

Specifications

	2AA	3AA
Overall Length	6.607 in. 167.8 mm	8.596 in. 218.3 mm
Barrel Diameter	.709 in. 18 mm	.709 in. 18 mm
Head Diameter	1 in. 25.4 mm	1 in. 25.4 mm
Weight without battery	2.4 oz. 68.04 g	2.88 oz. 81.64 g
Weight with battery	4.15 oz. 117.75 g	5.44 oz. 154.22 g
LED	3 Watt	3 Watt
Energy Management	✓	✓
Balanced Optics	✓	✓
Projecting Beam	✓	✓
Focusing Beam	✓	✓
Batteries Required	(2) AA size alkaline	(3) AA size alkaline

"Descent" Style Ice Axes

Caleb Heimlich (WUSS #0539, NSS #55745)

Things to consider when purchasing an ice axe for your next expeditionary caving trip into the unexplored mouth of Hell. First and foremost you have to consider your experience level. If you've had experience with ice climbing you probably don't need this review, as you will be familiar with the tools and will be able to adjust them according to your demon fighting needs. If, on the other hand you have previous demon slaying experience, but no ice climbing experience, I would encourage you to try before you buy. The weight, swing, and overall "feeling" of your axe will be something you will probably only be able to gauge in person. If you have neither demon fighting or ice climbing experience, this review is meant only for a basic introduction. PLEASE seek the tutelage of an experienced individual.

One Axe or Two?

As demonstrated in *The Descent,* one axe is often sufficient and two may very well get in the way of any adrenaline fueled escape. It's good to have a free hand for grasping a torch or the neck of the offending miscreation. Should you carry a spare? It's possible this will come in handy, but this is less of a black and white answer. It is apparent that given a long enough time line, any demon slaying cave explorer will eventually dispatch with all safety equipment and lighting in favor of torches and blood splattered sports bras. You have to make your own decision about an extra axe here based on your ideal pack size and weight considerations. For a good compromise on a backup axe, consider the Camp XLA 210 hyperlight, or the Grivel Alp Monster or Grivel Lil' Monster. (See reviews below)

Leashed or Leaseless?

With the popularity of leashless climbing and dry tooling on the rise, your average or burgeoning explorer will come to the question, "Which style axe will be best for the dispatching of unknown photosensitive fiends who want to munch on my entrails?" It is the opinion of this humble reviewer (quite against the grain of "old school" mountaineers) that one should go leashless. If you are leashed up, you will not drop your axe, however this may become a problem in frantic escape crawls in smaller phreatic tubes. You don't want to be jerked to a sudden halt and rendered into lunch by your axe hooking something. Also, this limits your ability to change axe wielding arms in a dramatic fashion. However, that is not to say that you must use the newer style, aggressive, dry tooling axes specifically made for dry tools or aggressive ice. Using a traditional straight shafted glacier axe may suit most situations best as it is more versatile. I prefer a straight shaft, or ideally, a slightly positive shaft with a low profile pinky catch which will help you hang on to your leashless tool in those wide arcing, power swings which are the most efficient way to dispatch a fiend with a single blow if you have enough "elbow room" in the passage.

Types of Tools. Pros and Cons

Glacier Axes/Technical Glacier Axes

Grivel "Monte Bianco"

Pro – Round shafts which are good for bludgeoning or blocking even without a direct pick strike.
Pro – Good for beginners.
Pro – Always have the option for a hammer or adze.
Con – Sometimes too light if you prefer a heavier axe.
Con – Picks are not as down turned, making them less effective in very close quarters or grappling.
Pro – Usually work far better for splinting compound tibio-fibular fractures sustained while chasing bioluminescent fungal matter.
Pro – Stows and draws from a harness loop very quickly.

Aggressive Axes/Dry Tooling Axes

Grivel "Monster"

Pro – Often have heavier, more substantial swings.
Pro – Excellent for very close quarters/grappling.
Con – Many new models such as Grivel's "monster" have flat shafts only good not as versatile as a rounder shaft in fighting actual monsters.

(Performs very well on ice though!)

Con – Do not stow/remove quickly in a harness loop. You better just carry it around.

Con – Most drytooling axes do not have the option for a hammer or an adze.

Helpful Hints

• Get an axe that has interchangeable hammer and adze options. Or an axe with a compound pick that has one or the other. Why not be able to use BOTH sides of your axe when facing a cavern full of echolocating, cannibalistic, mutant humanoids?

• A low profile, removable pinky rest will help you hang on to that smooth glacier axe in an all out demon piercing swing-fest.

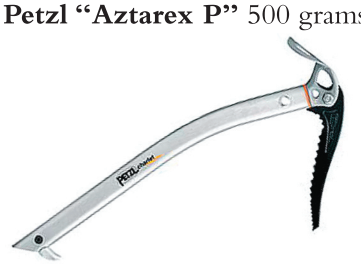
• Wrap some sticky hockey tape around the handle of your axes. This not only improves grip in that peanut butter mud or unidentifiable slime in the blood-red monster lagoon, it will also keep beginner alive longer.

Reviews

Grivel "Air Tech" 458 grams, 48-53cm

This classically positive, technical glacier axe sports a removable pinky catch and a very nice swing. A little on the light side for fending off the larger cave creatures, but excellent for the lithe ones. Both hammer and adze available. Stout point at the bottom for demon piercing versatility.

Petzl "Aztarex P" 500 grams, 50cm



Wonderful, ergonomic swing. Performs in close quarters well with the pick and the hammer for keeping your fiend at a very comfortable arms length.

Grivel "Lil' Monster" 475 grams, 32cm

Short and light with a flat shaft. Billed as Grivel's "beginner" axe, it has a knuckle guard to keep new ice climbers from black and blue fingers, but works great with a straight on punch! Doesn't really have a "swing point" so don't look for much punch in this little number and it is very short, so not much range. It also does not have an adze or hammer option. It would, however, be great for a spare axe.

Grivel "Alp Monster" 550grams, 38-44cm

This shorter axe also has a flat shaft and an aggressively down turned point. It does have the benefit of a fixed hammer and nice bottom point. The straighter shaft does slide almost as much as a technical glacier axe, though the handle is a little wider, making a quick draw from a harness loop a little more cumbersome. It's heavier and longer than the Lil' Monster, and would make a decent primary axe, and also bridges the gap into a good spare axe. It swings better than the Lil' Monster, but not quite as well as some of the other longer, classically positive technical glacier axes.

Caver's Word Search Answers *from page 13*

C																	P	F	
A				S	U	R	V	E	Y							M	L	B	
V					C	L	I	N	O	M	E	T	E	R	A	A		E	S
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			X																

Rebecca Stewart

Dear Wittenberg Professors,

I just wanted you to know that I'm alive and currently living in Japan (near Tokyo) working as an ALT (assistant language teacher) teaching English at two senior high schools. This job has definitely been an adventure and I really enjoy my students. My base school is Kawagoe all boys high school. Being the youngest female teacher- well let's just say- I get a lot of compliments!

Kawagoe high school is one of the designated super science high schools (SSH) in Japan. It's pretty cool. They have an accelerated science curriculum (for both the boys and girls school). Every Monday freshmen have lectures by guest speakers on different science topics. Some have even been professors from universities (I go to listen - not necessarily understand!). I particularly enjoyed the representative from Honda Company who came to talk about their walking robot and the physics behind walking. Along with funding speakers, they also receive grants to travel. Some freshmen last summer went to Hawaii to study the geology and astronomy of the big island.

Beside the obvious English club, I am also involved in biology club. My first experience with these boys was dissecting a frog. I tried my hardest not to show my disgust with the smell. If I could dissect a cat in vertebrate zoology, surely I should handle this! I enjoy still being involved with science and helping my students love the subject too. I visited the National Science Museum in Tokyo for the freshmen field trip, and in December the school held a huge science fair where I saw my first silkworm! (Bio club has pet frogs, snake, and apparently they grow silkworms).

I've also been told that they would like for me to do a lecture sometime on a particular science topic of my own interest ("something only Rebecca knows"). My predecessor (the ALT who I took over for) also gave science lectures. To add to that, my predecessor (as I will) do the presentations all in English! Kawagoe high school is a higher level high school, so they are continually challenging these boys. I am excited to share some science with them whether that will be caving, spotted turtles, or even about an environmental issue. I really don't know where to begin. I know how difficult it is to follow Japanese presentations, so I don't want these students falling asleep during mine! Any suggestions would be wonderful.

Attached are some pictures of me in Japan. I climbed Mt. Fuji last year and this year during a new year's party I tried on a kimono.

I hope the new semester has started up well at Witt and things are going smoothly. I just wanted to let you know how I have been. I am really happy with my placement here, and my other high school is just as wonderful. It is not science related but I participate in their tea ceremony club.

Sometimes there is just too much testosterone at Kawagoe, so Hanno (co-ed high school) is a great relief!

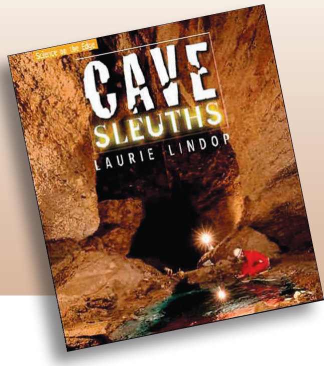
Oh- My new address is:
Rebecca Stewart
2-305 Kyoshokuin jutaku
4-28-5 Senbamachi
Kawagoeshi, Saitamaken
JAPAN 350-0034

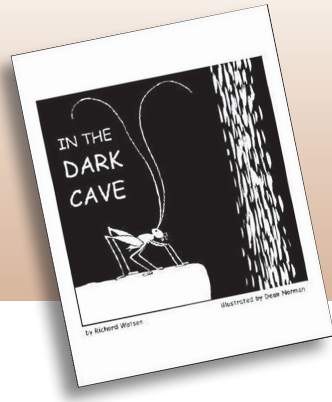
Just reply if you would like a postcard from Japan!
Sayonara,
Rebecca

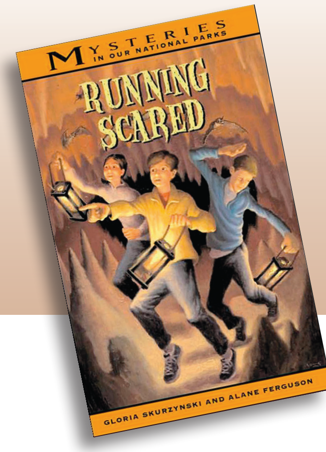
Shelf Notes from a Librarian Caver

Polly Barger (WUSS #0555)

For your Little Cavers, I have three recommended reads, a nonfiction featuring some of our own WUSS group, a picture book, and a 4,5,6 grade read.







Cave Sleuths

Written by Laurie Lindop, this children's nonfiction book not only gives ample information for a book report on the science of speleology, and what scientists have learned about cave formation, cave types, and inhabitants, but also shows some really nifty photos of people and places you may recognize (not that I would have any bias towards some of the scientists being from WUSS…). Dr. Hobbs has two copies if you are interested in having a look. The book can also be found by its ISBN number: 0-7613-2702-9. I would guess that libraries near caves, or with active cave grottos, should be able to get it for you through Inter-Library loan or special order.

Publisher:
Twenty-First Century Books, a division of Lerner Publ. Group
241 First Ave. North
Minneapolis, MN 55401 USA
Released 2006, Science on the Edge series DDN 551.44

In the Dark Cave

This story-in-rhyme picture book is written by Richard Watson with some really good illustrations by Dean Norman. This is definitely a one-of-a-kind picture book for children who wonder why their relative repeatedly trundles off to crawl about in damp, dark places underground. This came to me in 2005 in a library book preview box and I was certainly surprised to see it included.

Geared for children under the age of 8, it is a book illustrated entirely in black and white and includes cartoonish, yet accurately drawn (I was impressed by this) cave rat, cave cricket and cave bat. The storyline follows them hanging out in their cave doing "cave stuff" until one day they are visited by a cave explorer, who drops to the cave floor, then climbs back up, spotting the inhabitants in his headlamp as he ascends. The ISBN for this book is 1-59572-038-3, and also in the new format 978-1-59572-038-2.

Publisher:
Star Bright Books, Inc.
New York USA
www.starbrightbooks.com
Released 2005.

Running Scared

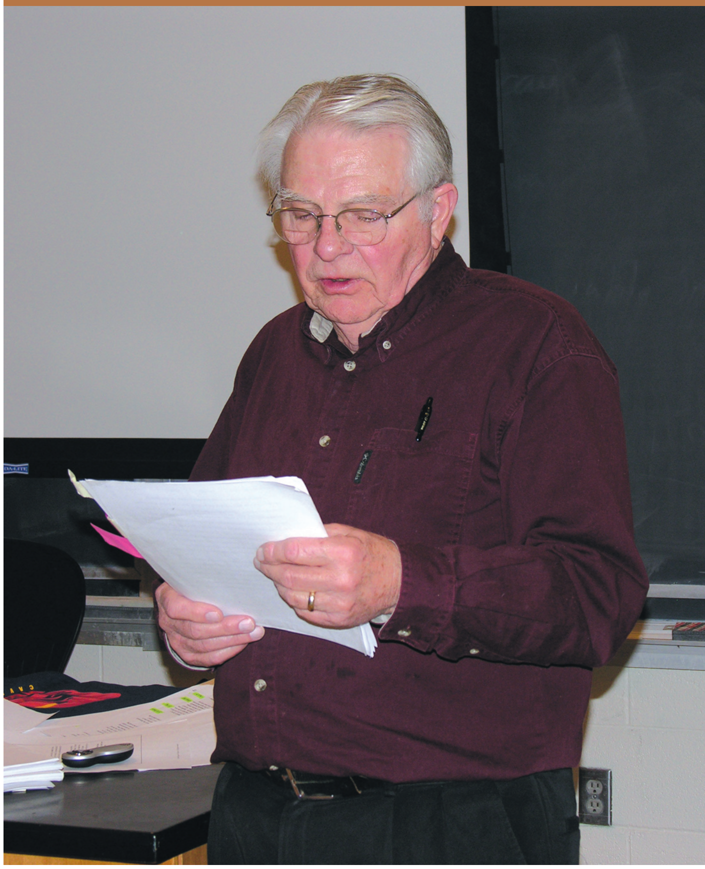
The setting is Carlsbad Caverns. The plot involves poachers, a college student or two, three children, and a cave rescue team. You can probably guess the skeleton plot, but the devil is in the details. Sorry, I can't give you more or you won't check out the book. The acknowledgments and afterward sections include a tidy map of the Park and its orientation within the state, a historical summary of the Caverns and recognizes Carlsbad Caverns employees for their help in filling in details.

This is number eleven in a series of adventure books sponsored by the National Geographic Society that give special attention to details when necessary. Some suspension of belief has to be included, however, since the children make typical child mistakes, but somehow become adult enough to solve their problem. (Maybe they should be teenagers...).

This particular book is co-authored by Gloria Skurzynski and Alane Ferguson. Stories in the series average 150 pages and would be excellent for a teacher (that caves and has a reading slot in their lesson plan) or a child who likes a moving plot and a taste of the old television show, 'MacGyver'. These books would certainly appeal to a science-minded child, or a Jr. rock climber/caver, or any child with a high level of comprehension and vocabulary skills. (If this does not include you, you should probably buy a dictionary).

The ISBN is 0-7922-6948-9
National Geographic Society
1145 17th Street North West
Washington, D.C. 20036 USA
Released 2002, Mysteries in Our National Parks

GUEST SPEAKERS



Roger Brucker *– This year we were lucky enough to con Roger Brucker into speaking with us not once but twice. In the fall Roger's talk, "Floyd Collins and Stephan Bishop: Founders of Mammoth Cave" was a real treat, complete with excerpts from his not yet published book on the life of Stephan Bishop. Early in January, Roger again graced us with his presence and gave an intriguing and humorous talk on his lifetime of discovery.*

Megan Porter *– Returning after having graduated a decade ago, former WUSS, Megan Porter came and gave an excellent talk on "Life after Wittenberg: Caving Adventures of a Former WUSS". Using personal stories and wonderful photography Megan showed us that there really is caving life after college and, as in her case, you can actually making a living out of it.*

Good Caver, Bad Caver *– WUSS started the year off in our typical fashion with a demonstration for all the newbies highlighting the differences between a good caver and a bad caver. Caleb Heimlich donned his smelly, muddy cave gear to demonstrate his take on the good caver. While our infamously illustrious Gerty tried to do the same; can you guess which one is the bad caver?*

Thank You!

All of us at WUSS would like to extend our thanks to those brave individuals who came and spoke to us this year, if you are interested in speaking to the club or know someone who would make a good speaker, please contact us as we are always looking for future speakers.

GALLERY

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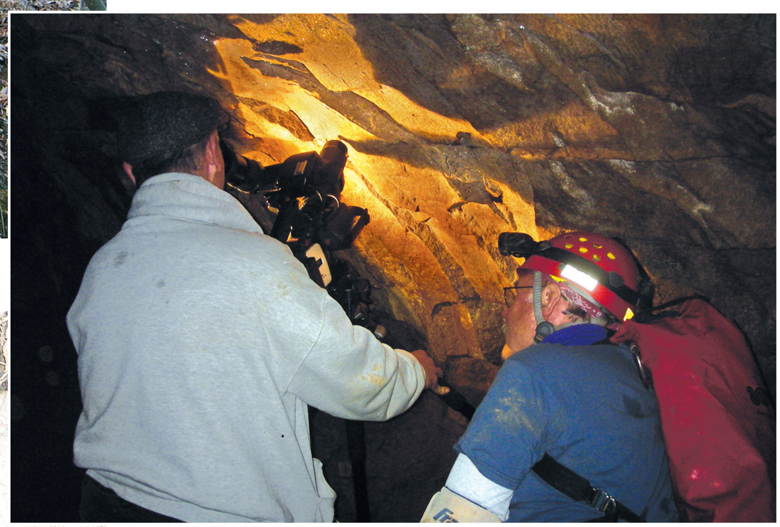
Photos contributed by Kevin Kissell, Katy Nichols, Jeff Sorenson, and Aaron Taylor.



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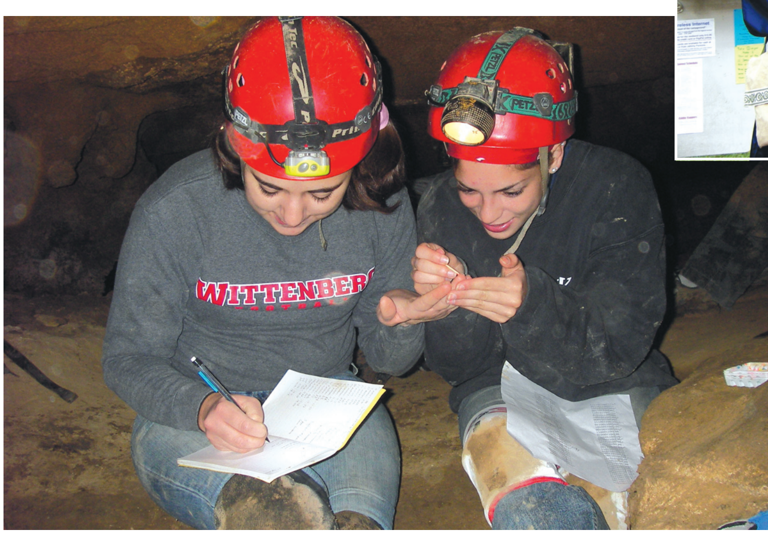

INFORMATION FOR CONTRIBUTORS

PHOLEOS

Journal Of The Wittenberg University Speleological Society

EDITORIAL POLICY: Manuscripts treating basic research in any aspect of speleology will be considered for publication. They must not have been previously published, accepted for publications, or be under consideration elsewhere.

All manuscripts are to be in English. Metric and Celsius units must be used, and SI units are preferred. The CBE Style Manual, the Handbook for Authors of Papers of the American Chemical Society, and Webster's Ninth Collegiate Dictionary are useful guides for matters of form and spelling.

The original of the manuscript must be typed double-spaced on one side of white bond paper approximately 8.5 x 11 inches, leaving margins of one inch. Use triple-space above headings.

The most effective way to submit a manuscript is as an attachment to an e-mail message sent to the editor. A second approach is to submit three (3) hard copies of the manuscript, figures, and tables along with a CD-ROM of the manuscript, figures, and tables in separate files.

Number pages consecutively at the top right-hand corner. Underline scientific names of genera and lower categories. Acknowledgments should be on a separate, double-spaced page. Each figure and table must be referred to in the text. Text references are by author, followed by year of publication.

The sequence of material in the manuscript should be as follows.

1. The *title* page should include the title, author's name, affiliation, WUSS and NSS membership number, and mailing address.
2. The *abstract* should not exceed one double-spaced page. It should contain a summary of significant findings and note the implications of these findings.
3. The *introduction*.
4. *Methods and materials.*
5. *Results.*
6. *Discussion*.
7. *Literature Cited*. List all publications referred to in the manuscript alphabetically by first author on a separate sheet of paper (double-spaced). Each citation must be complete, according to the following examples:

   Journal Article:

   Peck, S.B 1974. The food of the salamanders *Eurycea lucifugá* and *Plethodon glutinosus* in caves. NSS Bulletin, 36(4): 7-10.

   Book:

   Moore, G. W., and N. Sullivan. 1997. Speleology: Caves and the cave environment. St. Louis, Missouri: Cave Books.

   Chapter:

   Hobbs, H.H. 1992. Caves and springs. *IN*, C.T. Hackney, S.M. Adams, and W.A. Martin (eds.), Biodiversity of Southeastern United States/Aquatic Communities. John Wiley & Sons, pp. 59-131.

8. *Figures and Tables* should be self-explanatory, with captions of tables placed above and those for figures situated beneath. Each table and figure should start on a separate sheet. Headings and format should be consistent. Originals for all figures and tables should be submitted with the manuscript or, if in electronic form, should have a minimum resolution of 300 dpi.

Address all manuscripts and correspondence concerning editorial matters to

Editor, *Pholeos*
c/o Horton H. Hobbs
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Wittenberg University
P.O. Box 720
Springfield, OH 45501-0720

Bill Stitzel (WUSS #0132) adding fluorescein dye to stream in entrance of Pinch-out Cave. See article "Preliminary Description of a Small Karst System in Carter County, Kentucky" on Page 7.

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