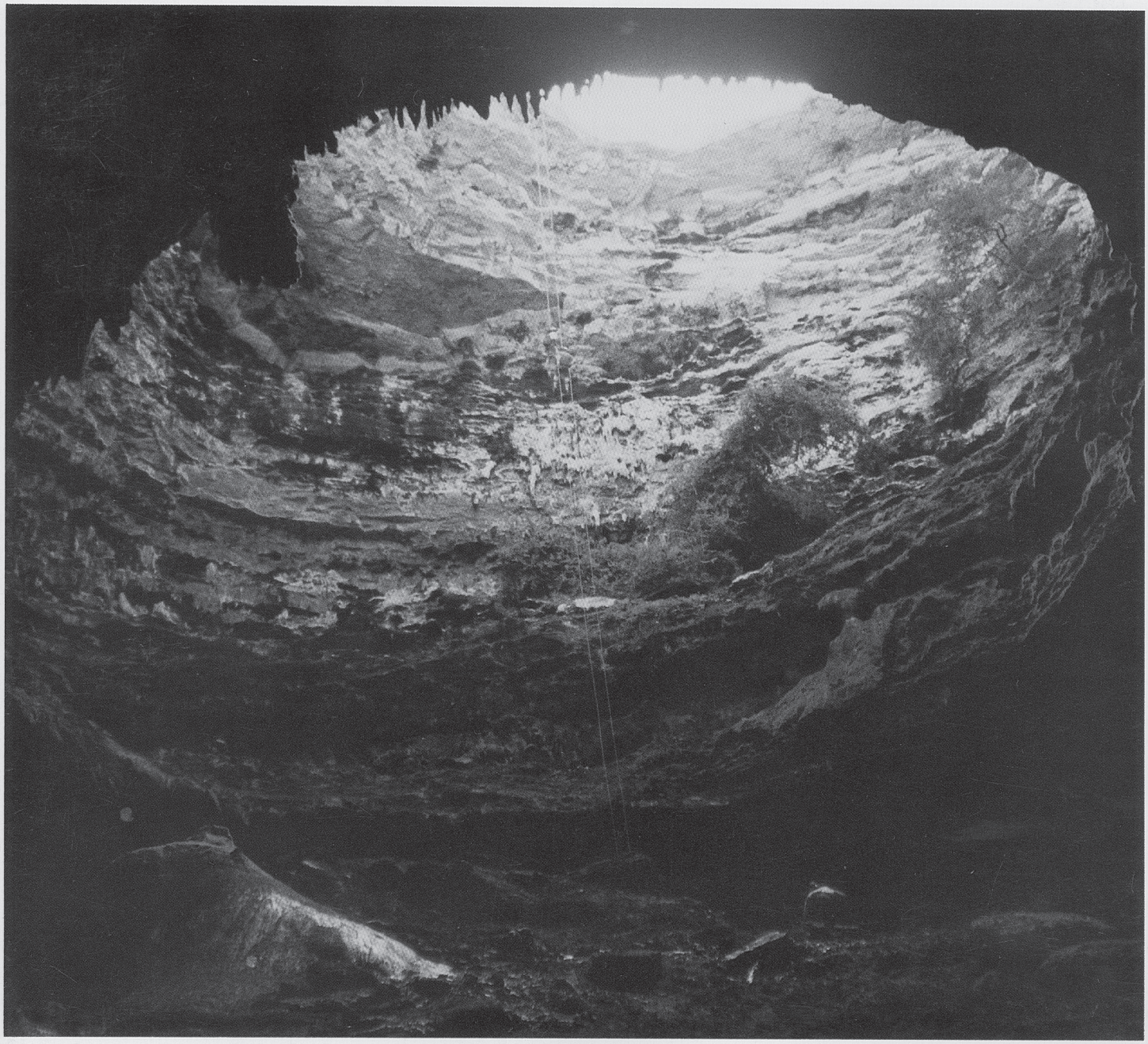
PHOLEOS

JOURNAL OF THE WITTENBERG UNIVERSITY
SPELEOLOGICAL SOCIETY

Volume 14 (1&2) August, 1994



The Wittenberg University Speleological Society

The Wittenberg University Speleological Society is a chartered internal organization of the National Speleological Society, Inc. The Grotto received its charter 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.

The National Speleological Society

This is to certify that

Wittenberg University Speleological Society

having fully complied with all the requirements established by the Board of Governors, and having accepted the responsibility which such status entails, is hereby chartered in the National Speleological Society, and is entitled to all due rights and privileges: in testimony whereof the President and the Chairman of the Internal Organizations Committee have hereunto set their hands and the Seal of the Society, this 14th day of May, 1980.

H. Thomas Rea
PRESIDENT

Evelyn H. Bradshaw
INTERNAL ORGANIZATIONS COMMITTEE CHAIRMAN

G-268
INTERNAL ORGANIZATIONS NO.

Cover: View from The Breakdown Mountain of two cavers climbing out of The Devil's Sinkhole, Edwards County, Texas.
Photo by H. H. Hobbs

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SUBSCRIPTION RATE: 1 Volume - (2 issues) - $5.00, Single issues - $3.00. Send to Grotto address.
EXCHANGES: Exchanges with other grottoes and caving groups are encouraged. Please mail to Grotto address.
MEETINGS: Wednesday evenings (when Wittenberg University classes are in session - call to confirm), 7:00 p.m., Room 206, Science Building (corner of Plum and Edwards - parking available in adjacent lot), Wittenberg University, Springfield, Ohio.

Editors' Note

Because of budgetary constraints we have had to publish both issues of Volume 14 of *Pholeos* under the same cover. We are confident that this is not a trend for future volumes and look to be back on track for Volume 15.

Articles herein address the 1994 NSS Convention held in Texas, a review of the literature pertaining to environmental problems in karst areas, a historical analysis of an Indian romance classic, a brief overview of the Cumberland Plateau, a description of a small sandstone cave in Tennessee, and a brief account of the Southeastern Cave Conservancy.

Numerous photographs indicate some of the work and places visited as W.U.S.S. members conduct ecological and geological studies in caves in TAG country as well as in Indiana, Kentucky, and Ohio.

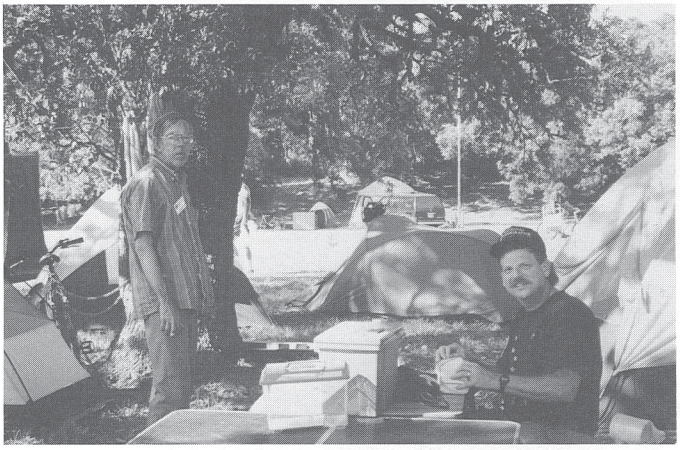
-Horton H. Hobbs III
Acting Editor

Congratulations are extended to **Bill Simpson** (NSS 23665) for being named **Fellow** of the NSS and to **Kevin Simon** (NSS 32937) for receiving the **Mitchell Award.** Both are no longer Springfield residents but they cut their "caving teeth" as members of W.U.S.S. and contributed much to the grotto. Also, **Mike Hood** (NSS 24166), Chair of the Awards Committee, is congratulated on a fine job in hosting the Awards Ceremony at the NSS Convention in Texas. **Dawn Fuller** (NSS 36542) is acknowledged as the first individual to become a **Life Member** of W.U.S.S. Congratulations!

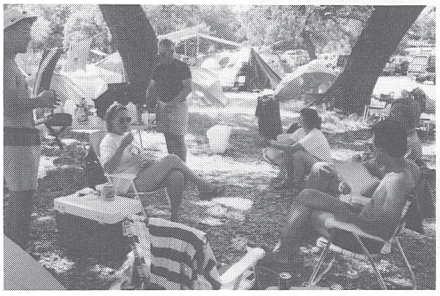
An Account of the 1994 NSS Convention Brackettville, Texas

by
Susan K. Hobbs (NSS 31935)
(photos by H. H. Hobbs III)

The 1994 NSS Convention held 18-25 June in Brackettville, Texas..... enlightening, informative, entertaining, fulfilling, enjoyable, and HOT, HOT, HOT!

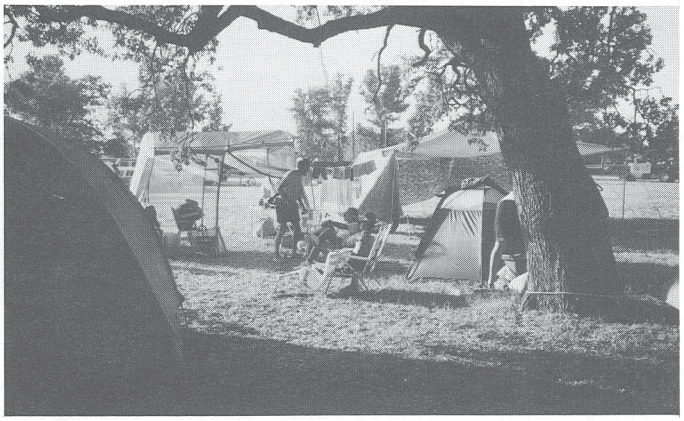


Δ *Figure 1. James Reddell and Bill Elliott, cave biologists from Texas, at NSS convention camp at Fort Camp Springs, Brackettville, Texas.*



Figures 2-5. Camp at Fort Camp Springs, Brackett-ville,

Δ *Figure 2.*



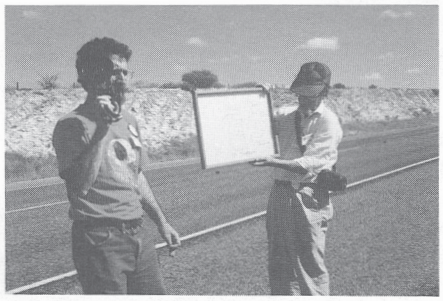
Δ *Figure 4.*

Δ *Figure 5.*

Cavers (and some non-cavers!) from all over the world assembled in this small town of just over 1700 for the 51st annual convention of the National Speleological Society. The official convention location was Fort Camp Springs, a 2700-acre restored Army Cavalry post. This ideal setting gave all in attendance an opportunity to catch up on history. Camping space was abundant (even a few Live Oak trees with Ball Moss and Black-Widow Spiders!!)(Figures 1-5) as well as accommodations for those who desired "air-conditioned" comfort!

◁ *Figure 3.*

The area was buzzing with activity on Saturday, June 18th as people started to arrive in anticipation of several field trips on Sunday. These included the Archaeology/Biology Tour, Geology Tour (see Figures 6, 7), and Scenic Tour, two of which ended that evening at Green Cave, located in nearby Kickapoo Caverns State Natural Area, to view the spectacular bat flight. Evening at the campsite was spent discussing caves visited or those to be entered during the week.



Δ *Figure 7. Trip leader George Veni with Will White lending a hand on the Geology tour.*

The convention officially opened Monday, June 20th at 8:30 A.M. at the Empty Saddle Sculpture and Flagpoles area. The Prairie View Trail Riders welcomed cavers in Texan fashion with an authentic covered wagon drawn by a team of two horses and two mules. An official Memorandum from Ann Richards, Governor of Texas, was read declaring June 20-24 as "Cave Awareness Week" in Texas. Out-going President Jeanne Gurnee introduced new NSS President Dave Luckins. The sessions, meetings, symposia, luncheons, and other official business commenced. The day was highlighted with the Unites States Exploration Session as well as the Archaeology Symposium. For the more energetic, the vertical contests began.

While all activities were progressing (including many trips to surrounding caves), the temperature and humidity were also on the increase. Therefore, the HUGE spring-fed swimming pool (fed by Las Moras Spring) was a popular meeting place for "breaks" and for cooling off after caving. Bill Elliott from Austin took some of the WUSS'S to Kickapoo Cavern (Figures 8-10) in the afternoon. They returned after a good trip but there was some moaning about individuals being not too photogenic (even though the cave was!), being photo sherpas, and about flash bulbs firing prematurely on bare fingers! (OUCH!!)

▷ *Figure 8. Bill Elliott at gated entrance to Kickapoo Cavern.*

Δ *Figure 6. View into Mexico from Amistad Dam, visited on the Geology tour.*

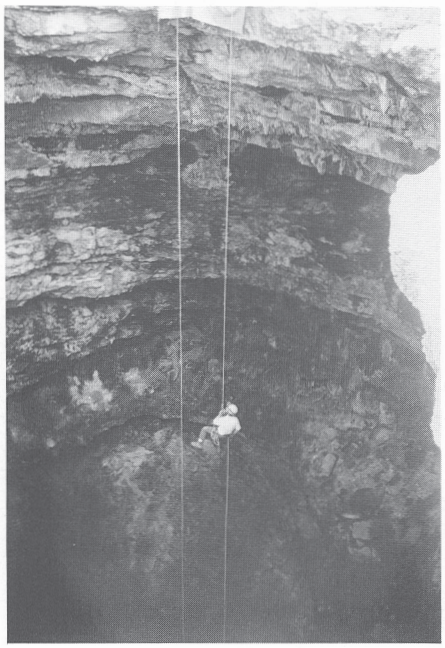
Δ *Figure 9. A large colony of the harvestman, Leiobunum townsendii, from the entrance area of Kickapoo Cavern, Kickapoo Caverns State Natural Area, Texas*

Δ *Figure 10. Ceuthophilus sp. densely congregated on the ceiling near the entrance of Kickapoo Cavern. Kickapoo Caverns State Natural Area, Texas*

A highlight of all conventions is the Howdy Party and this year was no exception. Buses transported the group seven miles from town to Alamo Village, a movie set used for filming. As you walked down the dirt streets, you could imagine Marshall Dillion, Chester, Miss Kitty, John Wayne, and others hard at work. A gunfight even erupted as we visited the jail and saloon! The food was wonderful and such a selection. Later in the evening we strolled up the dusty road to the replica of the Alamo and were entertained by a reenactment of the famous battle (Figure 11). As night fell on the old fort the cavers (as only cavers can!) danced until midnight to the music of a great band. For the meteorologists in the group, Mother Nature displayed a tremendous lightning show. Tuesday morning was rapidly approaching so we headed back to camp.

Δ *Figure 11. Reenactment of the Battle of the Alamo, Alamo Village, Kinney County, Texas.*

Tuesday promised to be a full day. Cars were packed early in the morning as most in our area headed for Devil's Sinkhole in Edwards County, the state's fourth deepest pit. The Texas Parks and Wildlife Department purchased the cave in 1985 and the pit had been "closed" until it was opened for the convention. Not to miss this opportunity to do this classic pit, Josh Abdulla from Indianapolis, Kevin Simon a former WUSS and graduate student from Virginia Tech, Andy Franklin from Dublin, Ohio, as well as Howard and Charles Kronk, Bill Stitzel, and Horton Hobbs (WUSS'S from Springfield, Ohio) left the campground by 7:00 A.M. They arrived at the pit after an interesting off-road drive leading off of the main highway near Rocksprings. They were the first cavers to get to the pit except for the "Pit Master" and thus were the first to enter the cave (Figure 12), beating the hoard of cavers that soon poured in. This spectacular shaft is about 14m in diameter and about 35m down the pit it immediately opens into an immense room (Front Cover), measuring 138m long by 76m wide. The 42m free-fall rappel ends on top of a breakdown mountain with boulders coated with guano leading down to The Lake Room (see Figure 13). A large colony of bats roosts high on the ceiling above the southern part of the breakdown mountain room and swallows noisily dive in and out of the pit. After spending a little over an hour in the bottom all climbed out (Inside Back Cover) to the intense heat and a large number of cavers bouncing the pit. When they left, six ropes had been rigged in the entrance!



Δ *Figure 12. On rope in the Devil's Sinkhole, Edwards County, Texas*

While some of the WUSS'S bounced the pit, the rest of us hopped in a van and headed "south of the border" for a shopping trip to Ciudad Acuna, Mexico. It was fun bartering with the "locals" as we found numerous, colorful souvenirs. It was sultry with no water to drink!?!! We all met back at the campsite and then boarded busses for the optional trip to the Caverns of Sonora, a 2.5 hour trip but no complaints - the busses were air-conditioned! We were greeted at the cave and treated to a Texas feast prepared by World Cowboy Outdoor Cooking Competition champion Wayne Sawyer. What a feast - brisket fahitas, beans (more beans!!!), salad, guacamole, etc. Groups of no more than 20 (with two very cautious guides per group) were led to the cavern. No use spending time describing the splendor of this cave. Words cannot relay the beauty and delicacy. It was so gorgeous that it almost seemed unreal (Figures 14, 15).

Wednesday arrived very quickly after returning to camp around 2:00 A.M.! (I awoke feeling sad - convention is halfway over.) This day would be filled with numerous sessions: International Exploration, Vertical, Biology and Paleontology Poster sessions, to name a few. Oh yes - another cave trip, this time to Webb Cave in Kinney County (Figure 16). Bill Elliott, Luis Espinasa (a graduate student I believe from SUNY), John Holsinger (from Old Dominion University in Norfolk), Kevin, Howard, Bill, and Horton followed the well beaten road to the entrances and rigged the deepest entrance drop, about 20m. All rode the PMI down and spent an interesting hour or so touring the cave and checking on the cave swallows (Figure 17) and on the bat population. Bill Elliott and Horton scrambled up a large guano pile to examine the bats and immediately encountered "bad air" -high concentrations of CO2 have been reported previously from this section of the cave and this condition was still present yet they were able to capture (see back cover) several bats. After numerous photographs (Figure 18) and identifying them as Myotis and not the "Old Man Bat," the bats were released and the cavers returned to the surface (Figure 19).

In the afternoon it was time to visit the vendors and other local shopping establishments and museums. (We may have to "hitch" home since the gas money disappeared in the Old Commissary Building?!) Early evening was spent sitting around our tent site discussing the days' activities and preparations for Thursday. (Some in our group had to start thinking about the next two days - scientific paper presentations!) After a few short hours - party time again. We all ventured to the pool area for an evening of swimming, dancing (a fantastic band), liquid refreshments (even Coca-Cola!), and conversation.

The biologists were up early Thursday morning, showering and preparing for the Symposium on Biodiversity

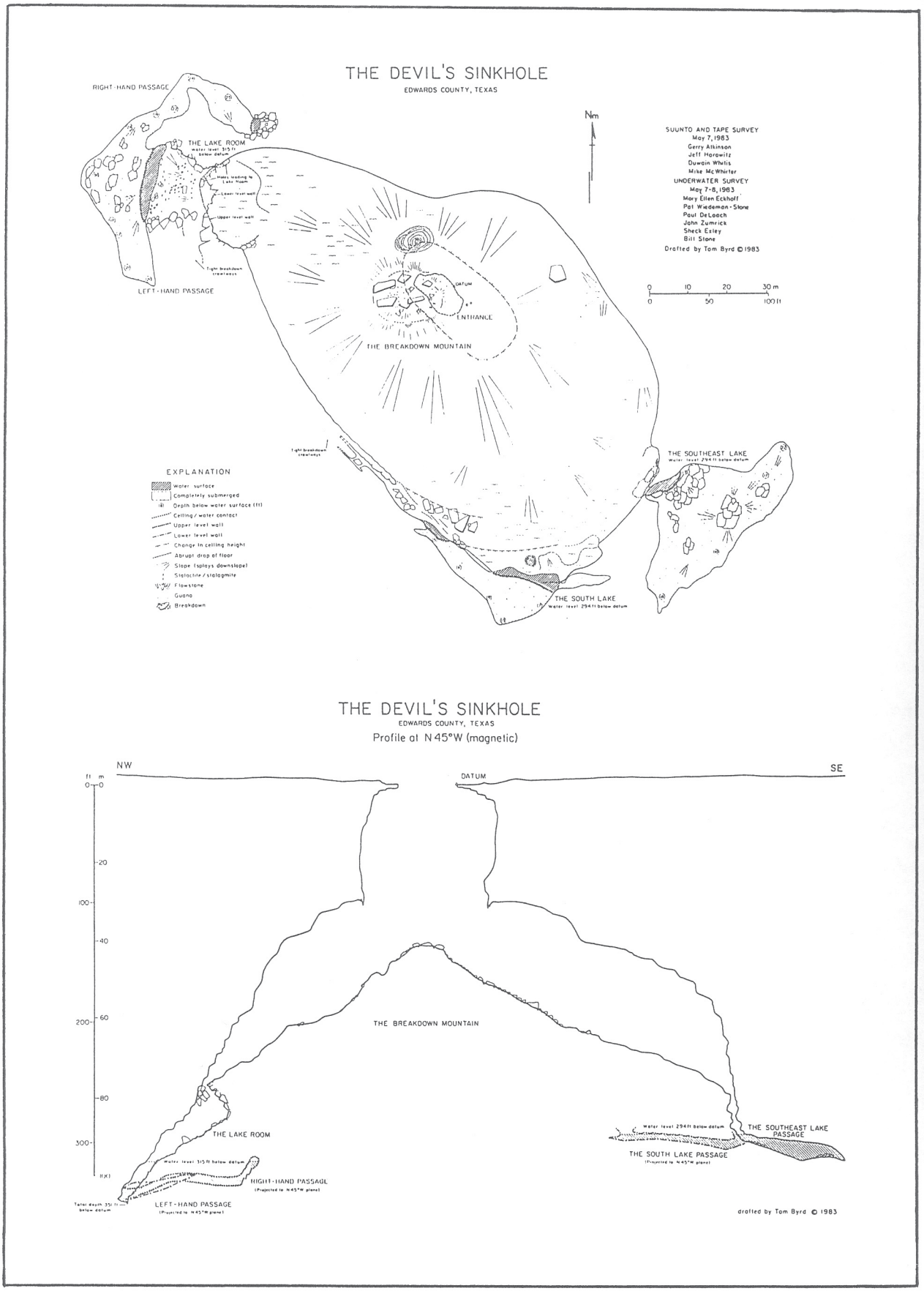


Figure 13. Map of Devil's Sinkhole

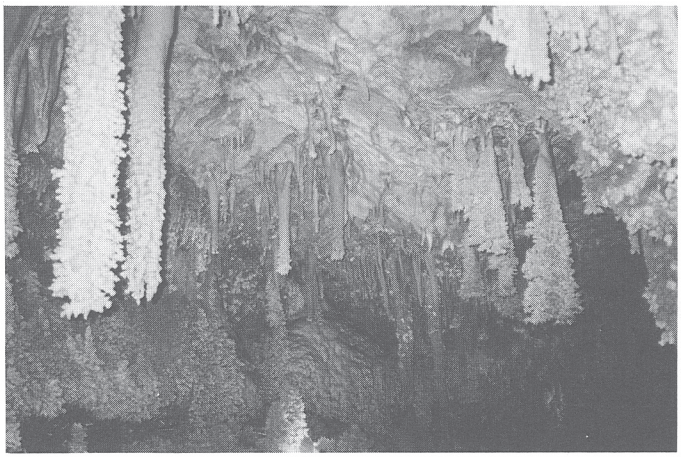


Figure 14. Caverns of Sonoa, Sutton County, Texas

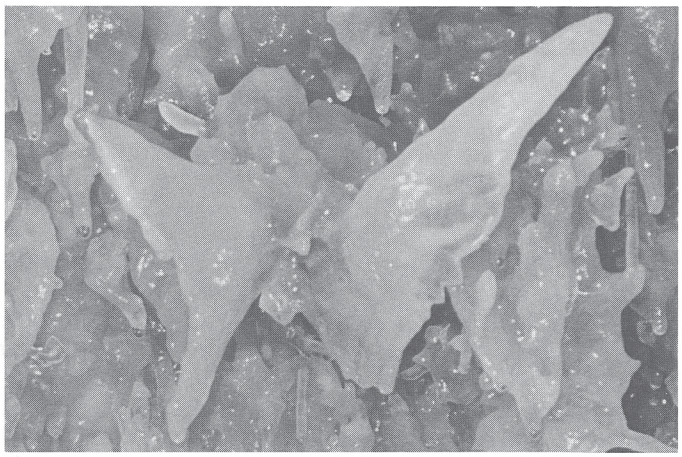


Figure 15. The unique speleothem, "The Butterfly," Caverns of Sonora, Sutton County, Texas

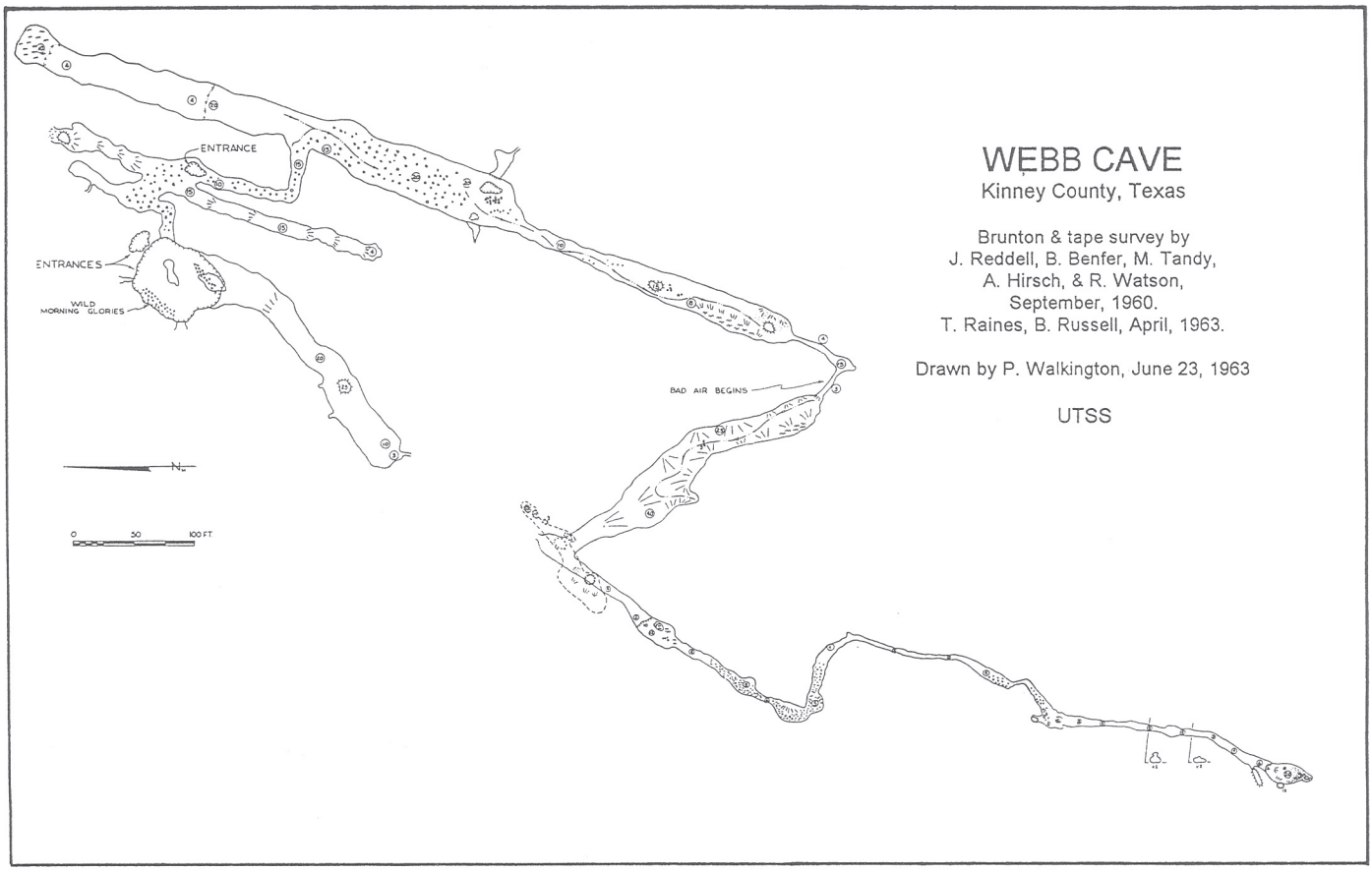


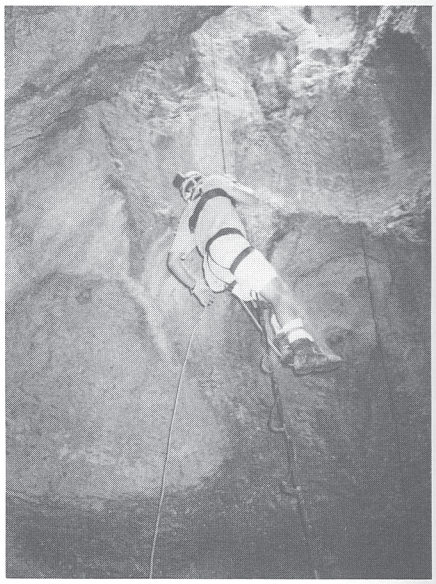
Figure 16. Map of Webb Cave, Kinney County, Texas

◁ *Figure 17. Juvenile cave swallows in nest, Webb Cave, Kinney County, Texas.*

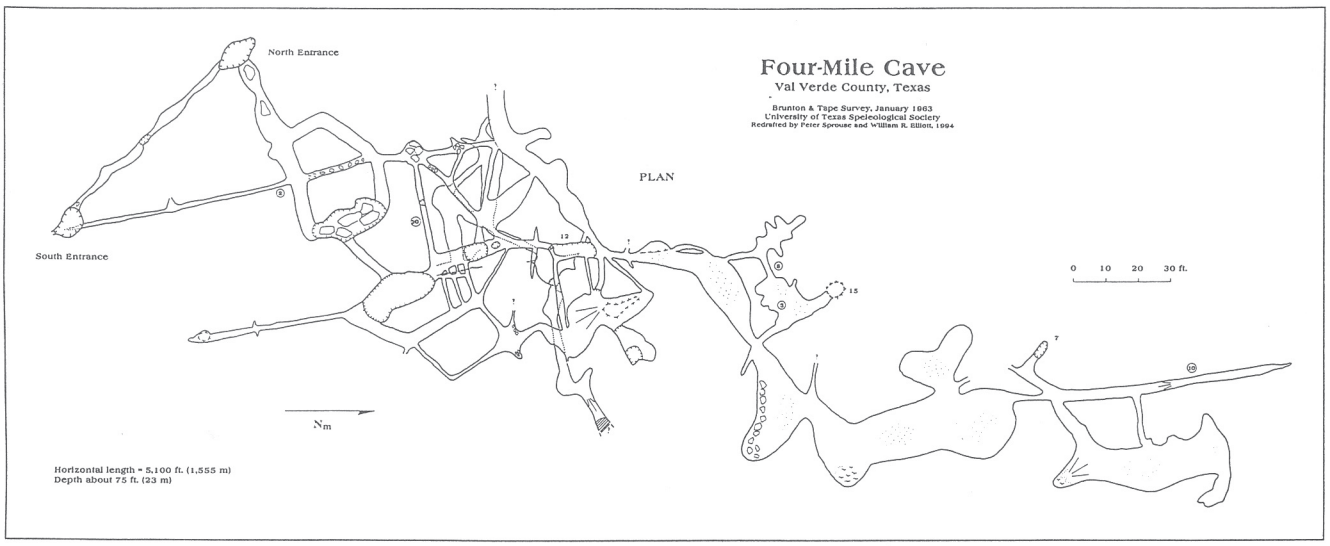
Δ *Figure 18. Myotis velifer incautus in Webb Cave, Kinney County, Texas.*

and Conservation of Cave Faunas. The papers were expertly presented and all in attendance gained valuable information. At the same time Bill Mobley's Blood Donation Drive was in full swing. If the number of Blood Drive T-shirts was any indication, the drive was a huge success. Other sessions held were Equipment and Techniques, Social Sciences, and the Geology Poster sessions. (Did members of our group find time to go caving again??). After our daily "dip in the pool" and our evening visit to the Crazy Chicken, it was off to the Civic Center for the NSS Photo Salon. As always, the Salon was very professionally presented and a real treat. Back at camp, the citronella "bucket" was lit and conversations commenced once again.

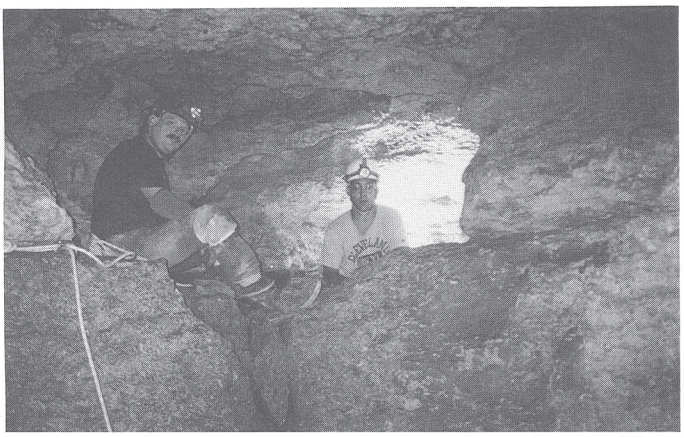
Could it be Friday - the last "official" day of convention? The biologists were up early again preparing for the 8:15 Biology and Paleontology Session. It was a repeat of Thursday's session -excellent and informative. At the same time the Video and Multi-Projector Slide Program was being shown at the Civic Center. Excellent comments were circulating around camp about the quality of this program. After that afternoon's "dip" it was time to "dress up" for the banquet held at the pool area. Ever heard of a sit-down dinner for approximately 1200? What a Texas treat -chicken-fried steak, mashed potatoes, green beans (more beans!!), rolls, cake, iced tea, and wine. With bellies full, it was up the road to the Amphitheater for the NSS Awards for 1994. This was followed



▷ *Figure 19. Kevin Simon climbing out of Webb Cave, Kinney County, Texas*

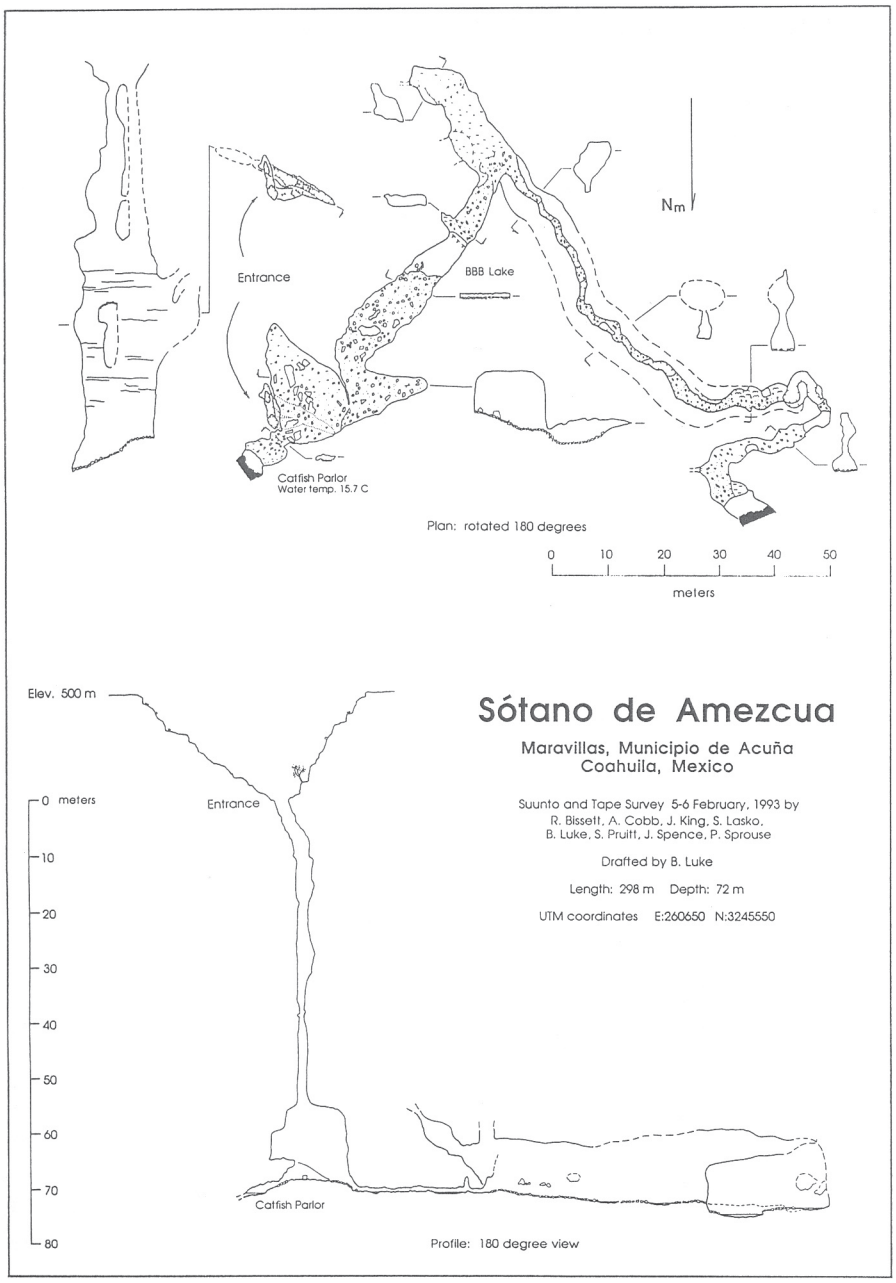


Δ *Figure 20. Map of Four-Mile Cave, Val Verde County, Texas*



◁ *Figure 21. Entering a maze area in Four-Mile Cave, Val Verde County, Texas*

▷ *Figure 22. Entrance sinkhole of Sotano de Amezcua, Coahuila, Mexico.*



Δ *Figure 24. Map of Sotano de Amezcua, Coahuila, Mexico.*

by a talk by Larry Mallory. With the "official" business over, the convention drew to a close.

Even though the convention was officially over, we planned to stay in Brackettville until Monday. Everyone was up a little later on Saturday morning and a fairly large group of biospeleologists gathered by 10:00 A. M. to go to 4-Mile Cave (Figure 20). Two entrances led to numerous crawls, several maze areas (Figure 21), and to some large passages. They seemed to have a good trip, spending a little over two hours in the cave. Upon their return we all relaxed and cooled off at poolside. Arrangements were made with Señor Amezdcua to visit a cave on his large ranch in Mexico on Sunday. We all turned in relatively early in anticipation of a busy, enjoyable, last full day in Texas.

Sunday began early and Bill Elliott, Steve Smith (North Carolina), Howard, Charlie, and Steve Kronk, Bill Stitzel, Kevin Simon, Dave Hubbard (Virginia), Dan Fong (The American University), and Horton headed into Mexico. After a long, dusty, and bumpy ride they arrived at the large sinkhole entrance to Sotano de Amezcua (Figure 22). Two pits (Figure 23)(65m - 213 ft deep) opened into a vertical rift, the last part of the drop came through the ceiling of a large room and intersected an intermittent stream passage (relatively dry this day). An 8m crawl

upstream lead to Catfish Parlor (Figure 24). A number of blind, colorless, troglobitic catfish (Figure 25) were observed in the pool and much time was spent watching this undescribed species of cave-adapted fish. All ten bottomed the pit and even had a little time to enjoy the desert. After a long, dusty drive they returned to camp about 10:00 P. M. The rest of us had a great day on a return visit to Ciudad Acuna where we definitely spent tooooooooo much money$$!

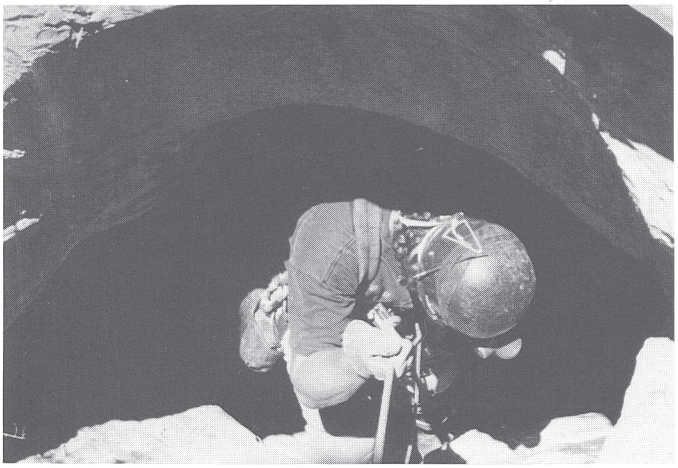
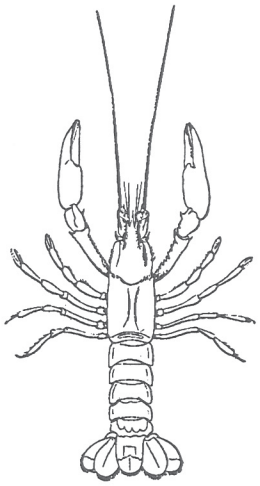


Figure 23. On rappel in Sotano de Amescua, Coahuila, Mexico.

Figure 25. Prietalla sp., an undescribed species of blind catfish from Catfish Parlor, Sotano de Amezcua, Coahuila, Mexico.

In summary, the 51st NSS Convention was a huge success and we commend all that had a part in its organization. We will always cherish the wonderful memories of our visit to Brackettville. We took lots of pictures, left lots of dusty footprints, and killed lots of wonderful time!



A Review of the Literature Treating Environmental Problems in Karst

by
Anne E. Huddle (NSS 35118)

Karst refers to land underlain by soluble rocks. Solubility makes karst important to human land use decisions. Hydrogeologic processes governing karst generate unique land use problems in relation to impact on the karst system, groundwater development and maintenance, flooding, engineering problems, and sinkhole occurrence.

Before land use decisions can be made or environmental problems can be rectified, a basic understanding of the physical processes related to karst must be gained. Section one of this review provides general background on karst. These texts provide information on developmental process, hydrogeology, and biological parameters.

Section two evaluates human impacts on karst regions, through agricultural processes, industrial waste, deforestation, and removal of natural resources. Removing vegetation increases rainfall intensity, reduces soil infiltration capacity, and allows greater runoff. Increased solutioning from runoff or removal of earth materials can produce subsidence.

The greatest environmental problem facing human beings today is locating and protecting the viability of groundwater. Sections three and four investigate the relationship between groundwater and karst. The relationship is traced from groundwater development and maintenance to flow patterns and contaminant behavior. Research into every aspect of a given location and its surroundings is necessary if a cost effective and long term land use plan is to be implemented. Poor development choices result in aquifer contamination that can be rectified only with knowledge of the dynamics of the affected system.

Hydrology governs karst dynamics. Karst regions are prone to flooding, and the danger increases if the surface cover is removed. Human interference in karst dynamics increases hazard potential. A system is needed to predict, prevent, and control flood occurrence. Section four of this review looks at flow dynamics in karst.

Karst signifies solubility. Solutioning of rock implies a potential for structural weakness. This weakness often manifests in sinkholes. Poor land use choice can add to the probability of sinkhole occurrence. Sections five and six, respectively, pertain to the problems of construction on karst and the general dynamics of sinkholes.

I. GENERAL BACKGROUND

Beck, B.F. and W.L. Wilson, ed. 1987. Karst Hydrogeology: Engineering and Environmental Applications. A.A. Balkema, Rotterdam, 467 pp.

Proceedings of the Second Multidisciplinary Conference on Sinkholes and the Environmental Impacts of Karst in Orlando, Florida (9-11 February 1987). Extensive information on sinkholes, groundwater pollution, flooding, and engineering problems in karst areas.

Culver, D.C. 1982. Cave Life: Evolution and Ecology. Harvard University Press: Cambridge, 189 pp.

Provides an in-depth introduction to the cave environment and fauna. Good discussion of the physical controls on the environment and a genetic analysis of how these conditions have affected speciation and community dynamics.

Hackney, C.T., S.M. Adams, and W.H. Martin. 1992. Biodiversity of the Southeastern United States: Aquatic Communities. John Wiley & Sons, Inc.: New York, 779 pp.

Contains chapter on caves and springs. Provides concise background on the physical controls on karst ecosystems, an introduction to the fauna of such systems, and human impact on these systems. Extensive reference list to all of these topics.

Dilamarter, R.R. and S.C. Csallany. 1977. Hydrologic Problems in Karst Regions: Western Kentucky University: Bowling Green, 481 pp.

Collection of papers covering a wide range of water problems associated with karst. Locating potential water sources, their development, potential problems, and human impact. References for each specific topic are provided in each paper. Solid reference source.

Dreyboldt, W. 1988. Processes in Karst Systems: Physics, Chemistry, and Geology. Series in Physical Environment, 4: Springer-Verlag, 288 pp.

White, W.B. 1988. Geomorphology and Hydrology of Karst Terrains. Oxford University Press, New York: 464 pp.

Reference list is an extensive review of individual subjects within the text. Covers the mechanics of karst development and its morphological features. This information is placed on the geologic time scale and also applies to relationship of this environment to human land use and water resources.

II. HUMAN IMPACTS

A. Chemical

1. Agricultural Waste

Weiss, J. 1991. Agricultural chemicals: the karst case. E.P.A. Journal, v. 17(5), p.10.

2. Radon

Gammage, R.B., C.S. Dudney, and D.C. Wilson. 1992. Subterranean transport of radon and elevated indoor radon in hilly karst terrains. Atmospheric Environment, Part A, general topic, v. 26(12), p.2237.

Hunyadi, I., J. Hakl, and L. Levant. 1991. Regional subsurface radon measurements in Hungarian karstic regions. International Journal of Radiation Applications, v. 19, p.321.

B. Miscellaneous

Beck, W., and A.D. Arenas. 1989. Karst terrains: resources and problems. Nature and Resources, special edition, p. 19.

Ford, D.C. 1993. Editorial; Environmental change in karst areas. Environmental Geology, v. 21(3), p.115.

Herak, M. 1990. Geotectonics, karst morphology, and environmental problems. Environmental Geology and Water Sciences: v. 15(1), pp. 59-60.

Brief illustration of poor land choice realized by current knowledge of a region's geomorphology and tectonics. Limited references by the author himself.

Huntoon, P.W. 1992. Hydrogeological characteristics and deforestation of the Stone Forest karst aquifers of South China. Groundwater: v. 30(2), pp. 167-176.

Evaluates the effects of land use in terms of the hydrogeological characteristics of the area. The problems caused by poor land use choice are set forth as an example of how current knowledge can prevent such mistakes from ever occurring again. Interesting case study.

James, J.M. 1993. Burial and infilling of a karst in Papua, New Guinea, by road erosion sediments. Environmental Geology: v. 21(3), p.144.

Kemmerly, P.R. 1989. The karst contagion model: synopsis and environmental implications. Environmental Geology and Water Sciences: v. 13(2), pp.137-143.

This model applies to a specific region in Kentucky and Tennessee. It is possible that this strategy could be applied to other areas. It related the region's geomorphology to water problems. This article is difficult to understand and follow.

National Parks Conservation Association. 1992. Drilling means risk for Lechuguilla Cave. National Parks: v.66 (September/October), p. 14.

Discusses the potential destruction of a cave as a result of industrialization. Potential pollutants are natural gas and oil. Strict maintenance of drilling is promised, but conservationists feel risk is too great.

National Parks Conservation Association. 1992. Logging plans put Russell Cave at risk. National Parks: v. 66 (November/December), pp.14-15.

Good application of the possible problems generated by clear cutting in karstic areas. Brief description of physical effects possible for a cave ecosystem.

Sauro, V. 1993. Human impact on the karst of the Venetian Fore-Alps, Italy. Environmental Geology: v. 21(3), p.115.

Tejada, S. 1985. EPA goes underground at Kentucky superfund site. EPA Journal: v. 11, pp.26-27.

III. GROUND WATER AND KARST

A. Development and Maintenance

Balcerzak, W. and J. Mylroie. 1960. Influence of karst processes on water quality. San Salvador Island, Bahamas. The Compass: v. 67(4), pp.232-239.

Assesses this island for potential water quality problems by research into the geology and climate. This particular location is an interesting study site due to a clear separation of human land use and nature by the presence of small populations confined to discrete villages.

Bardossy, A. and L. Duckstein. 1992. Analyses of a karstic aquifer management problem by fuzzy composite programming. Water Resources Bulletin: v. 28(1), pp. 63-73.

Presents a mathematical application to aid in decision-making for multiple objective water resources, Paper is limited in usefulness unless the reader has a strong background in mathematical theory and computers.

Komatina, M. 1990. Hydrogeological approach to investment in karst for possible modification of groundwater regime and increase of recoverable resources. Environmental Geology and Water Sciences: v. 16(2), pp.149-153.

Provides solutions for artificial protection of water resources and their utilization in a karst area. The hydrological basis for such works are provided and then each type of work is reviewed in theory, application, and areas for feasible implementation. References are limited to mainly the author's own prior research.

Kressic, N., P. Papic, and R. Golubovik. 1992. Elements of groundwater protection in a karst environment. Environmental Geology and Water Science: v. 20(3), pp.157-164.

Takes a multidisciplinary approach to the evaluation of groundwater management. Clear, concise argument of the proper steps to take in decisions concerning situations of probable groundwater contamination. Emphasizes the need for such plans to exist in local or regional urban plans.

LeMoreaux, P.E. 1989. Water development for phosphate mining in a karst setting in Florida - a complex environmental problem. Environmental Geology and Water Sciences: v. 14(2), pp.117.

Deliberate presentation of hydrogeological analysis needed to research and implement difficult land use choice despite natural restrictions. Methodical treatment that gives an excellent example of how such planning should be performed. Explains and defines various techniques for development and maintenance.

Milanovic, P. and B. Aghili. 1990. Hydrogeological characteristics and groundwater mismanagement of Kazerun karst aquifer, Zagros, Iran. I.A.H.S. publication: n. 207, pp.163-171.

Regional description of aquifers and their geology and physical controls. Good discussion of potential problems for quality management. Suggestions given as to possible strategies to adopt. No sources listed!

Zogovic, D. 1990. Storage water tightness problems and technical solutions in the highly developed karst area of the Niksic Polje, Yugoslavia. I.A.H.S. Publication: v. 207, pp.85-93.

Applies specific solutions to prevent and limit water loss to three case studies of storage reservoirs. Documentation of the region's hydrogeology and clear application of this information in the proposed solutions and maintenance methods. Reviews past assumptions and techniques for such undertakings.

B. Groundwater Flow and Contamination

Bonacci, O. 1993. Karst spring hydrographs as indicators of karst aquifers. Hydrological Sciences Journal: v. 38(1).

DeStephen, R.A. and C.P. Benson. 1993. Groundwater withdrawal impacts in a karst area. Environmental Geology: v. 22(4), p.314.

Dreiss, S.J. 1989. Regional scale transport in a karst aquifer, I, component separation of spring flow hydrographs. Water Resources Research: v. 25(1), pp.117-125.

This paper provides the experimental basis for a technique of monitoring a karst aquifer's transport. Methods involve analyzing chemical fluxes in spring discharges. Reviews past techniques for such study.

Dreiss, S.J. 1989. Regional scale transport in a karst aquifer, II, linear systems and time moment analysis. Water Resources Research: v. 25(1), pp.126-134.

Utilizes linear systems analysis to convert tracer data of flux in spring flow chemistry in order to generate travel time distributions of water in an aquifer. This system is suited to karst because it evaluates regional scale transport without knowing the internal structure of the aquifer.

Elkjatib, H. and G. Gunay. 1990. Analysis of sea water intrusion associated with karstic channels beneath Ovacik plain, southern Turkey. I.A.H.S. Publication: n. 207, pp.129-132.

Provides background on the processes leading to saltwater intrusion. Relates events to the geology and physical conditions characterizing particular areas. Stresses need for knowledge of location of fresh/saltwater interface for proper management using the technique of electrical conductivity.

Elmecki, M. 1990. Impact of quarries on karst groundwater systems. I.A.H.S. Publication: n. 207, pp.3-6.

Discusses pollution in aquifers and changes in groundwater flow due to the removal of an aquifer's protective cover. Provides the parameters for choosing site locations. Short and to the point.

Field, M. S. 1992. Karst hydrology and chemical contamination. Journal of Environmental Systems: v. 22(1), p.1.

Green, W.D., L.P. Elliott, and N.C. Crawford. 1990. Investigation of nonpoint source pollution associated with karst aquifer systems. Transactions of the Kentucky Academy of Science: v. 51(3/4), p.177.

Lekhov, A.V. and A.L. Petrov. 1988. Determination of parameters of pollutant transport in migration tests of fissured and karstic rock. Water Resources Bulletin: v. 15(4), p.315.

Scanlon, B.R. 1989. Physical controls on hydrochemical variability in the Inner Bluegrass karst region of central Kentucky. Ground Water: v. 27(5), pp.639-646.

Emphasis on areal and temporal variations in physiochemical characteristics of groundwater in respects to variability. Organization of water analyses by major ion chemistry. Reviews past studies in relation to methods and previous foci. Clear organization of methodology and techniques.

Scanlon, B.R. 1990. Relationships between groundwater contamination and major ion chemistry in a karst aquifer. Journal of Hydrology: v. 119(4), pp.271-291.

Correlates groundwater with potential contaminant sources of soil-organic matter, organic/inorganic fertilizers, and septic tank effluent. Groundwater is evaluated per major ion chemistry. Many helpful diagrams. Suggestions given for future groundwater management based on similar analyses.

Thorn, R.H. and C.E. Coxon. 1992. Hydrogeological aspects of bacterial contamination of some western Ireland karstic limestone aquifers. Environmental Geology and Water Sciences: v. 20(1), pp.63-73.

Indicates that a relationship between bacterial contamination and hydrogeology could be useful in managing small groundwater supplies. Ends with further questions concerning high precipitation and bacteria as possible quality indicators. Clear methodology and techniques.

IV. KARST AND FLOODING

Arikan, A. and L. Tezcan. 1990. A rainfall-runoff model for large karstic areas. I.A.H.S. Publication: n. 207, pp. 225-230.

Based on computer modeling, so a background in computers is recommended for true understanding of this paper. Model is based on two catchments - surface and subsurface - with no interacting boundaries.

Benzedan, E. and M.S. Klcay. 1990. Flood frequency analysis in karst river basins. I.A.H.S. Publication: n. 207, pp.187-202.

Determines non-karst system models are applicable in karst regions. Paper is filled with charts, tables, and diagrams. Complex and difficult to follow.

Currens, J.C. and C.D.R. Clark. 1993. Flooding of Sinking Creek, Garrett's Spring karst drainage basin, Jessamine and Woodford Counties, Kentucky, U.S.A.. Environmental Geology: v. 22(4), p.337.

O'Hara, M. 1990. Flood hydrology of Western Jamaica: a study in a karstic limestone environment. Singapore Journal of Tropical Geography: v. 11(2), p.100.

V. KARST AND CONSTRUCTION

Almaleh, L.J., J.D. Grob, and R.H. Gorny. 1993. Ground stabilization for foundation and excavation construction in Florida karst topography. Environmental Geology: v. 22(4), p.308.

Benevente, J., J. Cardenal, and J. Cruz-Sanjulian. 1990. Karstic hydrological investigations for the construction of Rules Reservoir (Granada, Spain). I.A.H.S. Publication: n. 207, pp.25-31.

Utilizes information concerning the environmental effects of a de facto reservoir in order to determine possible effects of a similar proposed reservoir. Good information of seepage in karst reservoirs. Organization is clear, and diagrams are useful.

Fischer, J.A., J.J. Fischer, and R.W. Greene. 1993. Roadway design in karst. Environmental Geology: v. 22(4), p. 321.

Garlanger, J.E. 1991. Foundation design in Florida karst. Concrete International. Design and Construction: v. 13(4), p.56.

Gularte, F.B., R.A. Griffis, and J. E. Kasunich. 1993. Case study of compaction grouting for foundation support in karst terrain. Earth and Marine Sciences Building, University of California, Berkeley. Environmental Geology: V. 22(4), p. 291.

Hubbard Jr., D.A. and W. Balfour. 1993. An investigation of engineering and environmental concerns in Florida karst topography. Environmental Geology: v. 22(4), p. 326.

Vick, S.G. and L.G. Bromwell. 1989. Risk analysis for dam design in karst. Journal of Geotechnical Engineering: v. 115(6), pp. 819-835.

Safety assessment stressed as mandatory in early stages of development. Development requires geologic analysis, observation, and subsurface investigations. Such techniques are then applied to specific situations. Good organization. Orivudes akterbate design styles for high risk areas.

Zhang, Q., S. Tian, and Y. Mo. 1993. An expert system for prediction of karst disaster in excavation of tunnels or underground structures through a carbonate rock area. Tunnelling and Underground Space Technology: v. 8(3), p. 373.

VI. SINK HOLES

Beck, B.F. 1993. Editorial; "Multidisciplinary conferences on sinkholes and karst: Past, present, and is there a future?" Environmental Geology, v. 22(4), p. 289.

Hamilton, N.D. 1989. Iowa surface drainage law and groundwater quality protection: Is there a potential landowner liability for plugging agricultural drainage wells and sinkholes? Drake Law Review, v. 39(4), p. 809.

Huber, G. 1990. Landowner perceptions of sinkholes and groundwater contamination. Journal of Soil and Water Conservation: v. 45(2), p. 53.

Survey of farmers and their awareness of sinkhole dynamics. The majority were well aware of problems and actively implemented methods to control runoff and waste from entering these systems. Methods include

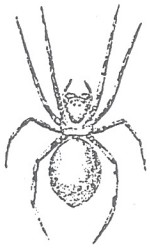
plugging, filter strips, diversions, contour stripcropping, seeding drainage areas, and eliminating or reducing farm chemical use.

Jancin, M. 1993. Subsidence and sinkhole development in light of mud infiltrate structures within interstratal karst of the coastal plain, S.E. United States. Environmental Geology: v. 22(4), p. 337.

June, J. 1992. Shifting ground: Urbanization and sinkholes. Environmental and urban issues: v. 19(2), p. 16.

Open-file reports on sinkholes and related karst features in Dauphin and Cumberland counties, 1989. Pennsylvania Geologist: v. 20(3), p. 14.

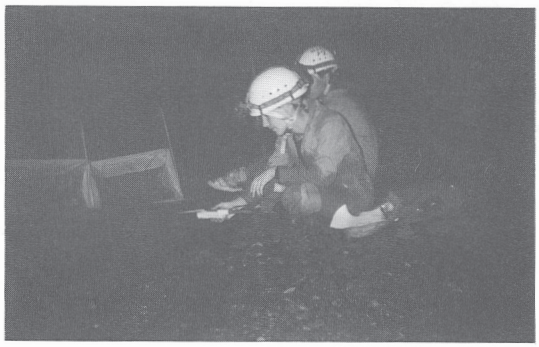
Wilkonson, J. 1980. Sinkholes. Iowa Conservationist: v. 47(11), p. 6.



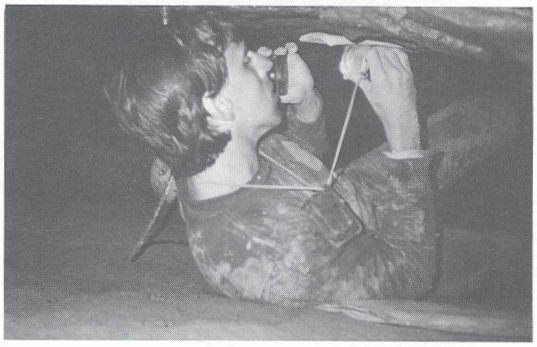
A Pictorial Account of the Research Activities of W.U.S.S

by
Horton H. Hobbs III (NSS 12386F)

The following photographs depict a variety of activities and projects that members of W.U.S.S. currently are engaged in or have recently completed. Research grant funds from a variety of sources have been utilized to conduct work associated with biological and geological aspects of caves and karst. This research has taken place in Alabama, Georgia, Indiana, Kentucky, Ohio, and Tennessee over the last several years and much work is in progress. These photographs do not include survey work, a significant part of the W.U.S.S. efforts, particularly in Carter County, Kentucky.

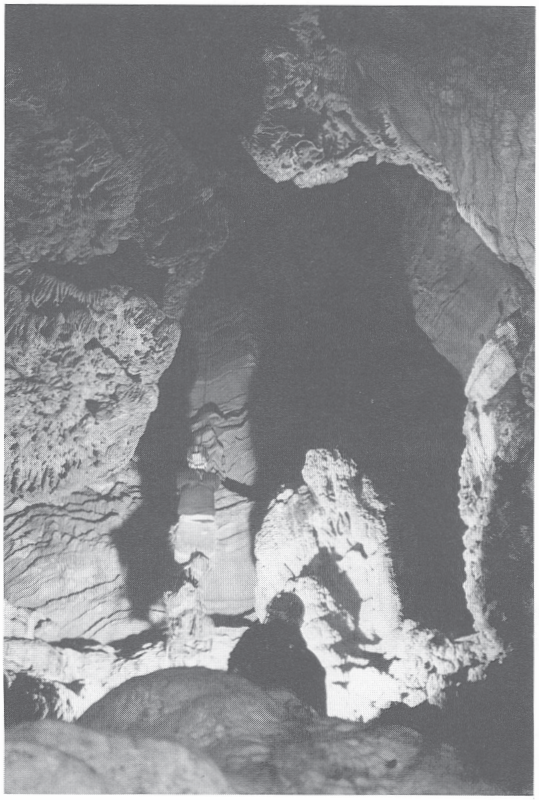


◁ *Anne Huddle gathering stream data in Cobble Crawl Cave, Carter County, Kentucky.*

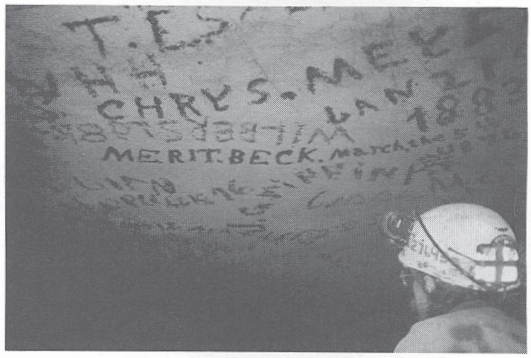


▷ *Scott Engel measuring strike and dip in Adams Creek Cave, Carter County, Kentucky.*

▽*Beginning climb out of one entrance to Cagle's Chasm, Marion County, Tennessee.*

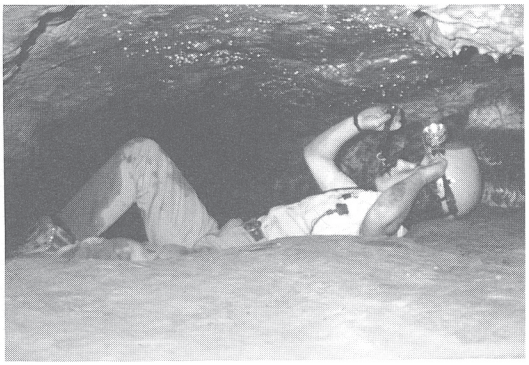


Δ *Gathering stream data at Lower Old Man's Cave, Hocking County, Ohio.*

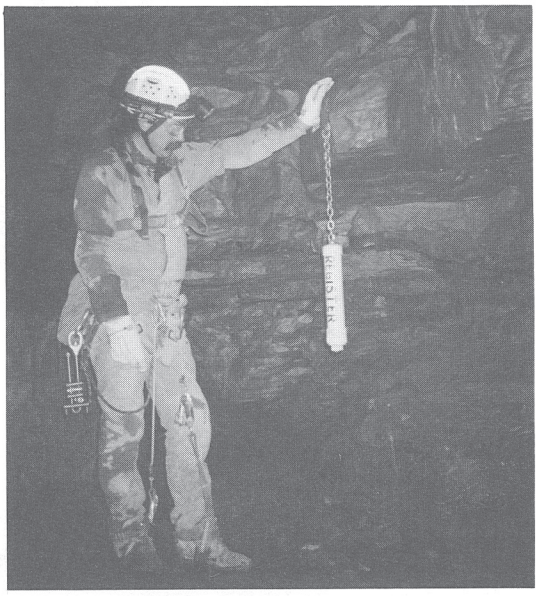


▷*Old signatures in Click's Cave, Washington County, Indiana.*

◁ *Taking physico-chemical data from stream at entrance to Dillion Cave, Orange County, Indiana.*



▷ *Looking for biota on ceiling in Patton Cave, Monroe County, Indiana.*

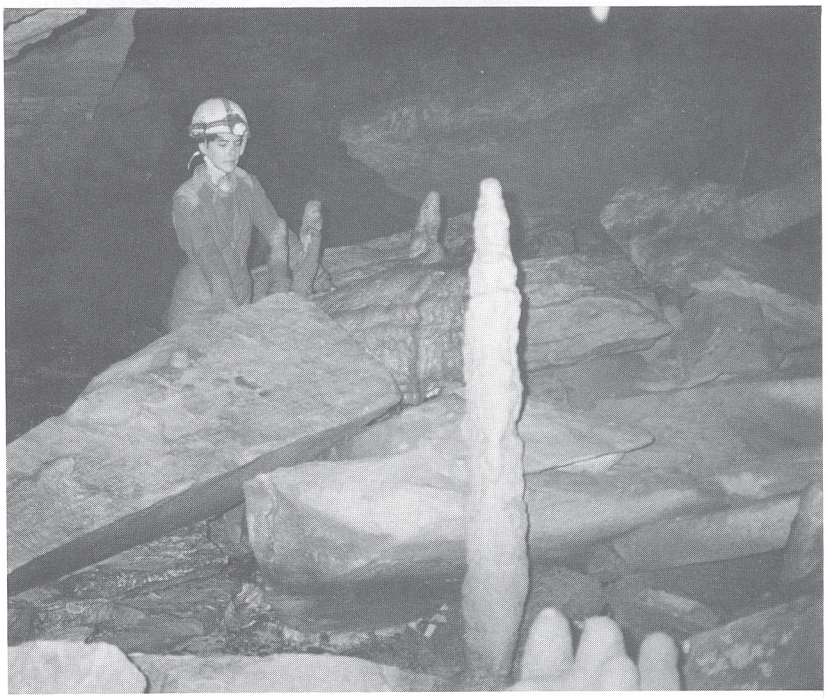


Δ *Newly placed register at base of entrance drop, Gory Hole, Lawrence County, Indiana.*

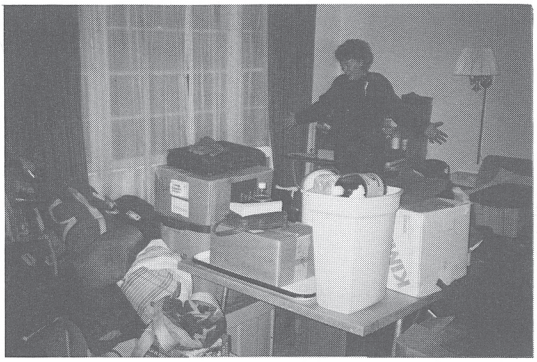
◁ *Rappel into Fuzzy Hole, Lawrence County, Indiana.*

▽ *Nice totem poles in the New Section of Marengo Cave, Crawford County, Indiana.*

Δ *Monitoring cave stream physicochemical parameters in Dillion Cave, Orange County, Indiana.*



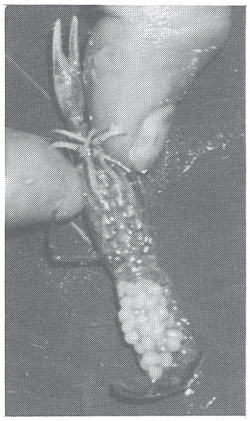
Δ *Annette Summers, Anne Huddle, and Howard Kronk after a great trip to the New Section of Marengo Cave, Crawford County, Indiana.*



Δ *A surprised Sheila Moss at the invasion of her Huntsville, Alabama house by WUSS.*

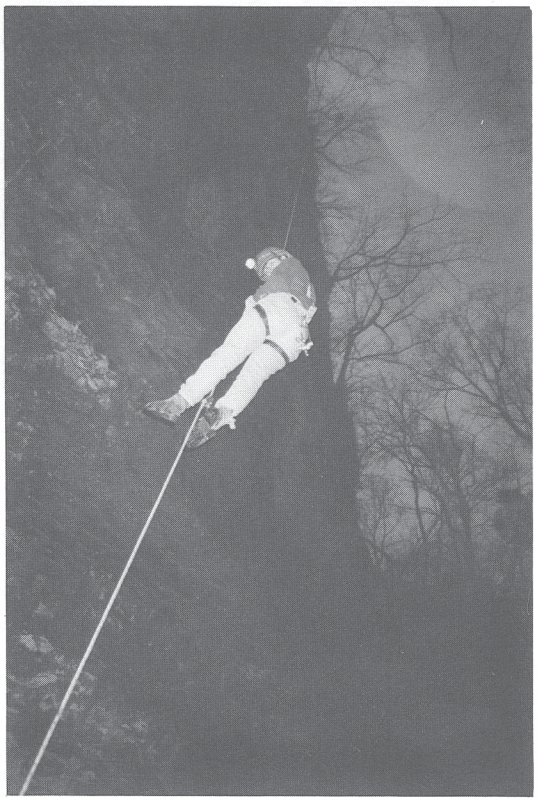
◁ *Thirty-third annual Cumberland Caverns Christmas party, Cumberland County, Tennessee.*

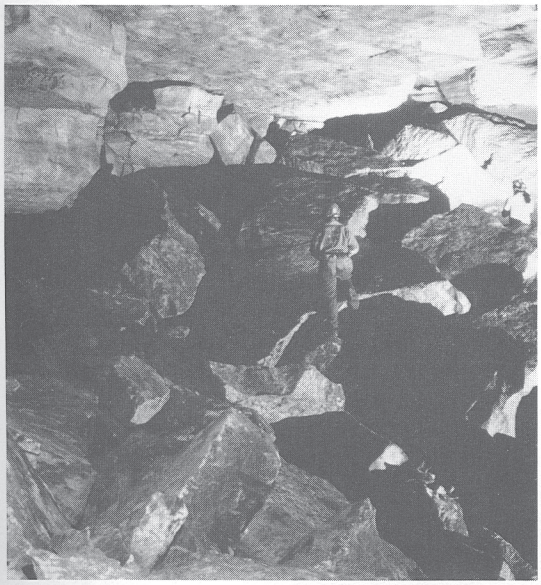
Δ *Soda straws and helectites in the New Section of Marengo Cave, Crawford County, Indiana.*



Δ *Orconectes (Orconectes) inermis, female blind crayfish from New Section of Marengo Cave, Crawford County, Indiana.*

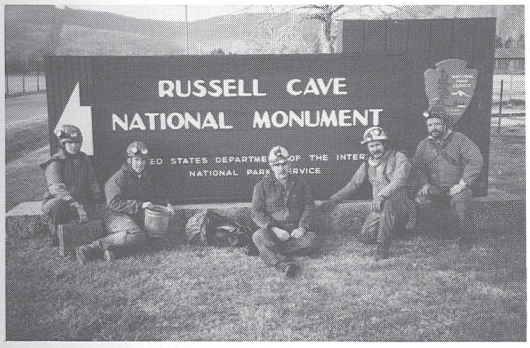
∇ *Rope-walker climb out of Balcony Sink, Jackson County, Alabama.*





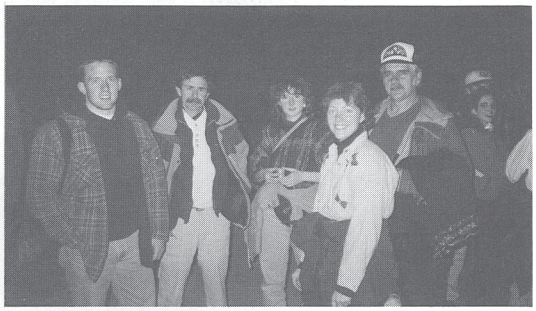
◁ *Upper level passage in Russell Cave, Jackson County, Alabama*

▷ *Deep pool near Picnic Entrance, Russell Cave.*



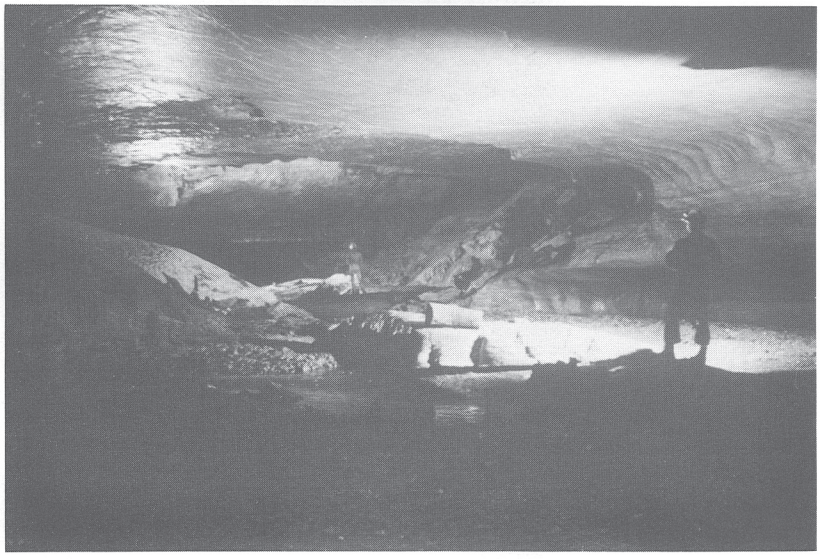
◁ *Annette Summers, Toby Dogwiler, Larry Bond, Bill Stitzel, and Dave Culver at Russell Cave.*

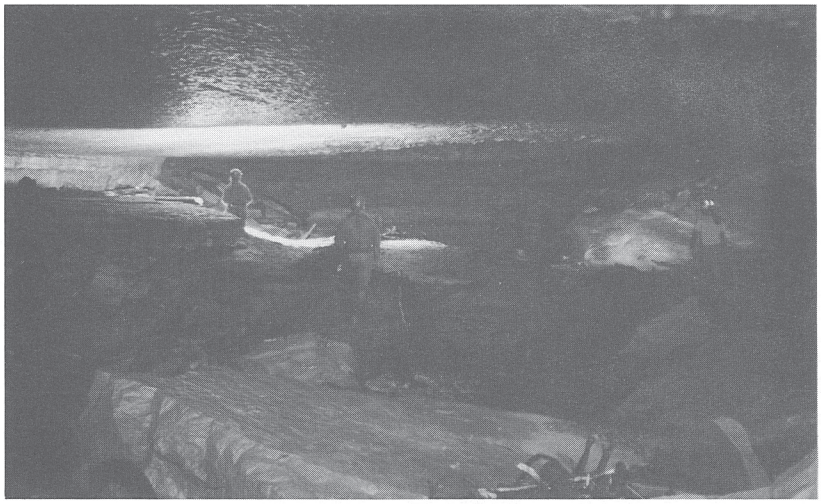
▷*Toby Dogwiler, Bill Stitzel, Annette Summers, Sheila Moss, and Larry Bond at the 1993, 33rd annual Cumberland Caverns Christmas party.*



∇*Annette Summers and Larry Bond processing collections in work building, Russell Cave.*

∇ *Main stream passage in Russell Cave.*



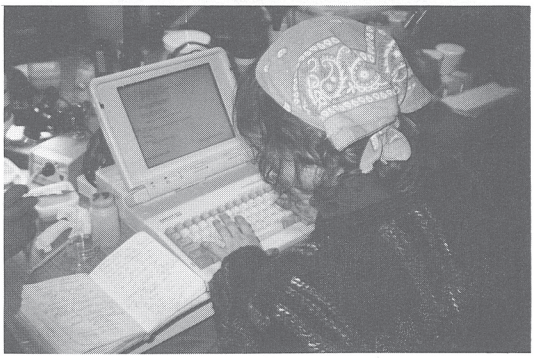


Δ Dead end pool in main level , Russell Cave.

◁ "Chemists" Bill Stitzel and Toby Dogwiler running water samples in work building at Russell Cave.

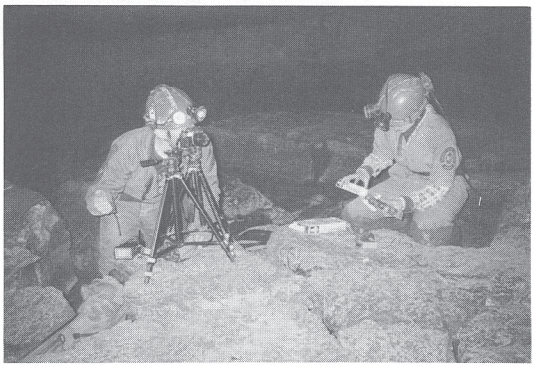
▷Transferring field notes to the lap-top.

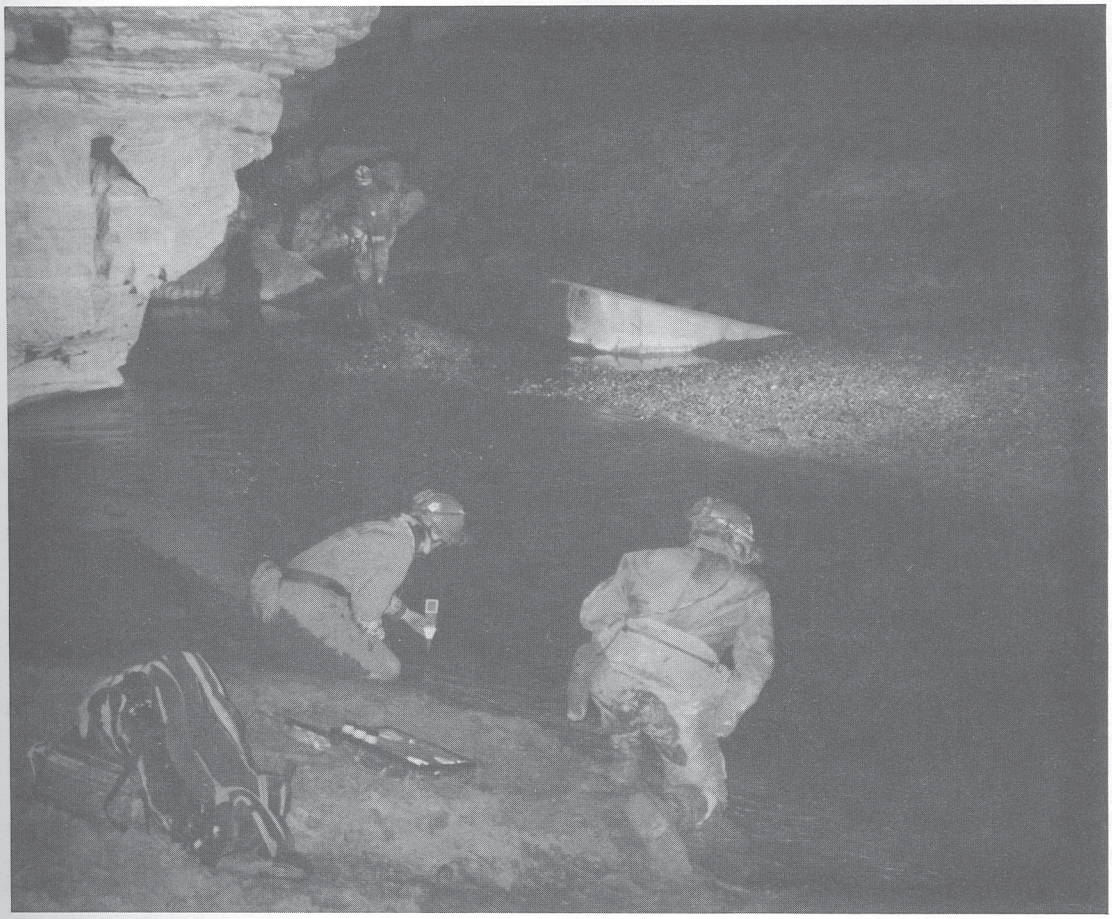
Δ Christmas tree for researchers in work building at Russell Cave.



◁ Upper level paralleling main stream passage in Russell Cave.

∇Setting up photograph in Russell Cave.





◁*Gathering data near Pig Entrance, Russell Cave.*

▷*Recording physico-chemical data in Russell Cave main stream passage.*

The Manuita Story of Saltpetre Cave, Carter County, Kentucky

by
Angelo I. George (NSS 7149F)

An Indian romance has entertained tourists in Carter County's Saltpetre Cave for over sixty years.[1] It is a story of undying love and affection between Princess Manuita and the Cherokee Indian brave, Huraken. Classic literature, stage plays, film, and local traditions formed the core of the Manuita narrative. Elements of the story seem to have been taken in part from William Shakespeare's *Romeo and Juliet*, with heavy overtones from Broadway and cinema Indian love life depicted in: *Rose Marie* (Broadway 1924, film 1928) with the popular Charles R. Friml song, "The Indian Love Call;"[2] and followed by the 1930 Eddie Cantor classic, *Whoopee*. Public preference for these visions of backwoods romance of Indians, Canadian Mounties, cowboy dudes, and lovely women was then melded with the tradition of John Swift's silver mine. The Manuita story contains fairly standard fare love motifs enveloped in a cave setting using Swift's silver mine as a model that was lacking in *Rose Marie*, *Whoopee*, and *Romeo and Juliet*.[3] With no factual Indian cave romance to draw from, the Manuita story is unique among commercial caves during this time period.[4]

The birth and development of the Manuita account started with John F. Lewis' purchase of the Carter Caves property on January 24, 1924. Tourists were shown an excavated grave in the floor of the cave. During Lewis's re-commercialization, new trails were improved, and there was one grave-like excavation made by John Plummer.[5] The hole was made so the guides would have something to talk about while in the cave with visitors. This excavation became central to the development of the Manuita narrative. By May 1924, Willard R. Jillson called the spot in the cave floor an "open grave of a traditional Indian princess," which had "been opened and bones and relics exhumed."[6] Maturation continued with the empty grave where once was found "an Indian princess, mummified, was spirited away to parts unknown."[7]

By 1931, only the Indian princess motif survived with a whole new story development about a lost silver mine and the "beautiful old story of the Cherokees, which has come through the ages, and is being kept alive by the present generation."[8]

About two hundred years ago, Huraken had discovered a secret silver deposit presumably somewhere in Saltpetre Cave.[9] He mined the deposit and made jewelry in hopes of attracting the attention of the radiant Indian princess Manuita. Their love grew on the bonds of silver as their bliss prospered. Warfare broke out between their tribe and another. Huraken and a number of braves went off to battle. The war continued and the princess longed for his presence. After some time, the braves returned from battle without Huraken, who was presumed lost during the conflict. The princess' longing turned to grief and mourning. In this deep depression, she knew that white men sometimes committed suicide to ease the pain of grief, and she decided death was better than to face the future prospects without him. One day at sunset with remorse too much to bear, she went out of the village and jumped off the highest cliff she could find. Unknown to her, Huraken "on that same night...was on his way back to claim the fair princess, daughter of the chief."[10]

Huraken had been on a quest to acquire riches to give to the old chief in order to secure the hand of the princess. He fashioned a sliver tomahawk attached to a peace pipe shank that had been cast from the mineral wealth in the treasure cave.[11] The braves assumed Huraken had been killed in battle, where in effect, he had deserted and retreated to the cave.

On his trek back to his village he walked beneath the suicide cliff where he found the mangled body of Manuita. Now, *he* was grief stricken, and he picked up her body and carried her off to his treasure cave and buried her deep in the interior.

Tribal members captured him on suspicion that he murdered Manuita. Circumstantial evidence produced a death sentence. Tied up, he awaited the final hours that would end his life. It rained that evening; the buck skin shackles were loosened sufficiently to permit his escape. For weeks he wandered as a fugitive, all the while the memory of Manuita haunted his soul.

He hiked back to the cave once again to gaze upon the grave of his beloved princess. In the solitude of his soul, he decided to give himself up to the old chief. His one last death wish was to be taken back to the cave so as to see her grave one last time.

He was led to the entrance and went into the cavern alone. The Indians of his tribe thought the cave was "the dwelling place of evil spirits." They waited and waited, even days, but Huraken never returned to the surface. With alarm, "the Indians became terrified, thinking it an evil omen, and fled the country."[12]

When white men discovered the cave, they found an open grave belonging to the dead princess. "Where Huraken took the body or what happened to him was never found, but the legend lives on."[13]

The narrative adventure has a surprising amount of internal detail, imagery, with character and plot development. It comes to the public full blown, where before 1931 none of the romance and the silver mine in the cave had existed. The language cadence is not Indian prose, rather it possess a high polish of great literary style.

It is neither legend nor is it folklore. There are clear roots as to where the substance of the Manuita chronicle came from.

Key elements of the Manuita story consist of: the noble savage; unrelinquished love, even in death; Indian battles; imprisonment; and a cave setting. This is pure romance. In fact, it is French literature from the Romantic Movement (1750-1832). The whole Manuita story is rewritten with all the major scenes displayed in *Atala or The Love and Constancy of Two Savages in the Desert*, by François Auguste René de Chateaubriand.[14] The immensely popular book was first published in 1801. It is a classic and one of the great books produced during the Romantic Movement.

Chateaubriand's Queen Atala and the Indian brave Chactas become embodied as Manuita and Huraken in the Carter Caves story. A natural bridge and cave become the climax and anticlimax in the prose novel and is central in Saltpetre Cave. Chateaubriand's story unfolds thusly.

During an Indian battle in Florida, Chactas is captured and taken on a long march to a village. Atala, the queen of the tribe falls madly in love with the captive brave. A courtship ensues with Atala spiriting Chactas away into the woods where they are discovered by the tribe, and he was taken away to be burnt at the stake. Atala vows to rescue her lover. Getting the guards drunk, Atala sneaks into the compound and releases him from his bounds. They made their way through Tennessee and into Kentucky. "In this dark and bloody ground," they found a hermit cave occupied by an old monk named Father Aubry. In the same setting was a natural bridge with an Indian cemetery beneath its arch.

As the love drama unfolds, Chactas goes on a long voyage to the Niagara Falls. Atala falls sick with remorse over Chactas long absence and sinks to near death in the cave. Believing she has broken a death bed vow to her mother always to remain a Christian virgin, she professes her love for Chactas to the good monk. The following day she took poison and died. The good father buried her beneath the natural bridge.

In time, Father Aubry is tortured and put to death by the Indians. Chactas returns to the grotto, to learn of all the misfortune. The natural bridge had caved in and buried the entrance to the cave. Fate was on his side. He finds the grave of Atala and that of Father Aubry, collects their bones and ashes, and returns to Natchez with their remains on his back.

The basic outline of the Manuita story is contained in *Atala*. Chactas (as a captive war prize) falls in love with Queen Atala; he is sentenced to death, only to escape with Atala. Huraken pursues the love interest of princess Manuita; later he is believed to have killed Manuita, and is sentenced to death, by the tribe. A Kentucky cave is found where the rest of the action takes place in each narrative. Chactas goes on a long journey to Niagara Falls; Atala laments his extended departure and falls sick. Manuita is grief stricken when Huraken is believed killed in battle. Atala takes poison, while Manuita jumps off a cliff. Huraken and Chactas return to their respective caves, find, and dig up the graves of their love ones. The bodies of Atala and the monk are collected and removed from the cave to Natchez, and parts unknown for Manuita.

Analysis of the Manuita story shows that plot line detail is similar to action events from a French romance novel called *Atala*. With only a slight variation, especially if it is recalled from memory, it suggests the Carter Caves management had the Atala motif in mind during the manufacture of what some call folklore of Saltpetre Cave.

In the 1920s and early 1930s, a kind of Indian mania sparked the public interest. An Indian Wigwam Village for motoring tourist was built north of Cave City on 31E. Similarly there was the immensely popular Broadway stage play and film *Rose Marie* coupled with the early color film Indian pageantry *Whoopee*. The Indian fad provided a popular climate for the birth of the Carter Cave romance in depression era America.

END NOTES

1. Angelo I. George, "Carter Caves Chronology of Historic Events, Carter County, Kentucky." *Pholeos*. 1990, Vol. 11, No. 1, p. 11-14.

2. The invention of sound or talking motion pictures had only been successfully introduced a year before *Rosemary* with the *Jazz Singer*.

3. The Romeo and Juliet crypt is a metaphor for a cave.

4. There were also imitators, especially Wyandotte Cave's introduction of F. I. Bentley and the wounded Indian in 1941. The novella *Tongo the Hero of the Luray Caverns*, (Otto Ulbrich Co., Buffalo, New York, 1922(?)) is a fictional cave romance. It is structurally different than the Carter Caves story. I do not know what effect the *Tongo* book had on the lore and promotion of Luray Caverns.

5. John Plummer, personal oral communication, February 1, 1992. This was also the year *Rose Marie* opened to favorable reviews on Broadway. The "grave" and tailings obviously post date the pre-1816 saltpeter mining era.

6. Willard Rouse Jillson, *Kentucky State Parks*, Kentucky Geological Survey, 1924, p. 26; Anonymous, "See Kentucky First," The Courier-Journal, (Louisville, Kentucky)l May 23, 1924.

7. Anonymous, "Veritable Pandora's Box of Natural Wonders in Region of Carter's Caves," *Louisville Herald Post* (Louisville, Kentucky), March 2, 1930. During this time period, George G. Morrison was exhibiting the Indian mummy Little Alice (Al) at the New

Entrance to Mammoth Cave. Clearly, Carter Caves management was trying to garner some recognition by promoting their own lost female mummy.

8. James D. Keith, "Simon Kenton Believed to Have Sought Refuge in Carter County Cave," *Kentucky Progress Magazine*, 1931, Vol. 3, No. 6, p. 47-48; reprinted from *Kentucky Post*, (Louisville, Kentucky). [James D. Keith], "Legend of Cherokee Princess Kept Alive at Carter Caves," copy in Mammoth Cave Office files, p. 23-46. The last item is abridged from Keith's Simon Kenton article. This is the one that has been widely reprinted and Carter Cave guides study this version for public presentation.

9. Joe Creason, "A Spookish Question: How's Little Manuita?" *The Courier-Journal*, (Louisville, Kentucky), March 20, 1971.

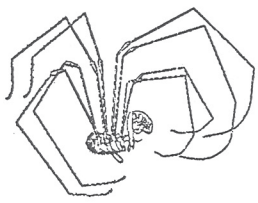
10. James D. Keith, "Simon Kenton," p 47.

11. Keith introduces Swift's Silver mine story in his article along with the peace pipe motif.

12. James D. Keith, "Simon Kenton," p. 48.

13. Ibid.

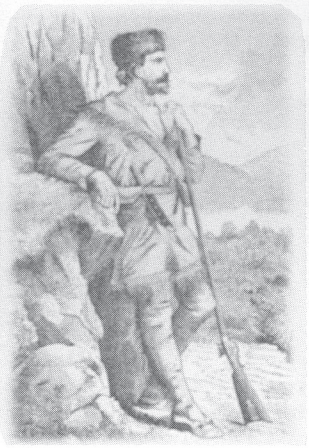
14. François Auguste René de Chateaubriand, *Atala or The Love and Constancy of Two Savages in the Desert*, Caleb Bingham, translator, and William Leonard Schwartz, editor, (Stanford University Press, Stanford University, California, 1930). Contemporarily, the James D. Keith Princess Manuita story appears in 1931. There are earlier English printings of *Atala*, but the 1930 edition would have had a much wider circulation in book stores and libraries.



The Cumberland Plateau and Long Rockhouse Cave

by
H. H. Hobbs III (NSS 12386F) and Horton H. Hobbs IV (NSS 24198)

An anectdotal introduction begins in the 1700's when Daniel Boone was compelled by a lack of "elbow room" to move westward beyond Cumberland Gap in the 1760's. He turned to the north along the Wilderness Road and made history in the rugged, untamed part of the country now called Kentucky. In 1779, James Robertson led some settlers to the Cumberland River bluffs and split his party into two units. The women and children, along with heavy farm equipment, were sent by flatboat down the Holston and Tennessee rivers and on to the Ohio River, up the Ohio to the Cumberland, and upstream along the Cumberland to Nashville. The remaining party passed through Cumberland Gap but turned south and proceeded to middle Tennessee where they reunited. The flatbed flotilla took the long way rather than the direct route because a very real barrier to western migration in the eighteenth century stood in their way: the Cumberland Plateau. Like the Great Wall of China, but 100 times higher and 80km wide the Cumberland Plateau then and today presents difficulties and inconveniences to the traveler and modern engineer.



The Cumberland Plateau is a part of the Appalachian Plateau that extends in a southwesterly direction from southern New York to central Alabama (crossing ten states). The plateau section makes up some 600km from east central Kentucky southwest to north central Alabama. In Tennessee it is a broad, flat-topped, ridge approximately 300m higher than the Great Valley of east Tennessee to the east or the Highland Rim to the west and has a general elevation of approximately 550m. Rimming the plateau edge is an almost continuous escarpment, broken by narrow, steep-faced, drainages cut back into the plateau. The eastern edge is an abrupt excarpment with only minor notches carrying water eastward into the Tennessee River whereas the western edge is more rugged and deeply incised by the Cumberland, Duck, and Elk river tributaries draining off the tableland. These differences between the east and west flanks of the plateau can be attributed to the Appalachian Mountain building episode some 250 million years ago during the formation of the supercontinent, Pangaea. As the continental masses came together, internal forces fractured and folded rock layers, resulting in the uplift and formation of the Appalachian Mountains. These forces extended sufficiently far to the west to bend the eastern edge of the plateau, but not the western. Thus, along the eastern edge the rim-rock is tilted and in some places even standing vertically. Where the escarpment is characterized by sloping sandstone layers, erosion is slowed and the shape of the escarpment is controlled by the direction of the folds. This factor is almost entirely absent from the western part of the plateau where the same rock layers form the horizontal west rim-rock. The formation of the western escarpment of the plateau is associated with the removal of the Pennsylvanian caprock from the Nashville Dome, a structural high along the Cincinnati Arch. This probably was initiated during the Mesozoic Era and once the resistant Pennsylvanian caprocks were removed by erosion from the central part of the structure, slope retreat began. By the late Cretaceous, the continuous expanse of caprock was breached, and erosion continued in the area of the dome developing a plain-like surface upon the cherty, erosionally resistant, lower Mississippian rocks that formed the floor of the expanding Central Basin. Sapping of the underlying limestones is the primary reason for rapid slope retreat and is responsible for the steep slope angles along the western Cumberland Plateau escarpment.

All of the middle section of Tennessee was at one time capped by a thick sequence of Pennsylvanian aged sandstones, conglomerates, and shales. Over large areas, this resistant caprock has been removed entirely, exposing chemically much less resistant Mississippian limestones. Here, conduit caves are formed by subterranean stream invasion along retreating escarpments that are produced by the more rapid dissolution of underlying carbonate rock. Thus, numerous caves occur along the western caprock escarpment (also along the Highland Rim Escarpment - see Barr 1961 and Matthews 1971). It is only in the Cumberland Plateau area that the caprock continues to protect the underlying limestones

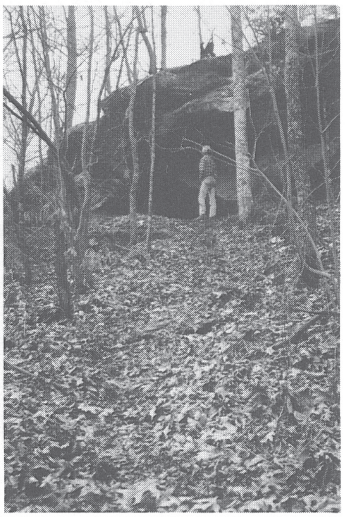


Figure 2. Sandstone outcrop with entrance to long Rockhouse Cave.

from rapid solution processes and thus little karst development occurs. For additional, more in depth treatment of the character-istics and processes resulting in the Cumber-land Plateau, refer to Milici 1968, Matthews 1973, Miller 1974, Crawford 1987, Ogden 1989, and Crawford 1989.

Even though karst development on the Cumberland Plateau is limited, erosion and weathering processes do result in numerous small sandstone caves and overhangs. One such example is Long Rockhouse Cave, a small feature in east-ern Cumberland County, Tennessee. The main entrance is located about 10m above Long Rockhouse Branch at an elevation of approximately 510m. The 2m high by 7m wide entrance overlooks the branch that is covered mostly by rhododendrons and Mountain Laurel (Figures 2 and 3). The cave is developed along fractures in the crossbedded sandstone (Figure 4) for a total horizontal length of 55m. A second opening to the west of the main entrance is a short crawlway that joins the main cave (see map).

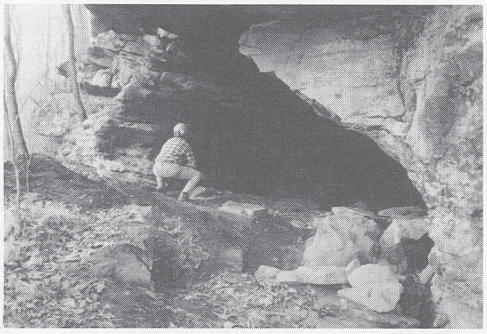


Figure 3. Entrance to Long Rockhouse Cave; note signs of excavations and earth pile on left.

Figure 4. Entrance area of Long Rockhouse Cave; note excavated floor, ceiling joint, crossbedding, and breakdown slabs.

The cave consists of one room with a small, low alcove extending to the southwest for about 6m (see map). The floor of the front and middle portions of the room is uneven and virtually covered with slab breakdown (Figures 4 and 5), although little breakdown is present in the back third of the room (Figure 6). Numerous excavation holes are scattered throughout the cave, evidence of much digging for artifacts. When we surveyed the cave on 26 March 1992 there were recent signs of earth work and a large pile of "waste" soil was in front of the main entrance (Figure 3). No organisms were noted in the cave except two small spiders in the southwest alcove; the air temperature of the cave was 7.6°C; surface air temperature was 6.7°C. Several small drip pools were noted on the floor along the west wall of the front third of the cave, but were absent on a subsequent trip 18 March 1994. Considerably much more excavation activity had occurred since the 1992 trip.

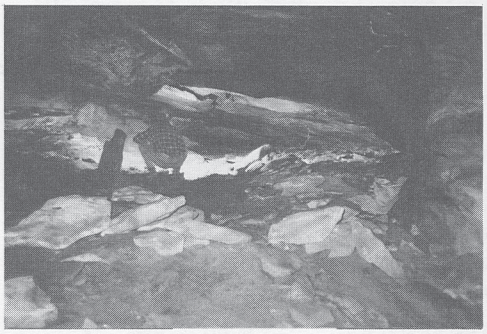


Figure 5. Middle section of Long Rockhouse Cave; note excavation in foreground and breakdown-covered floor.

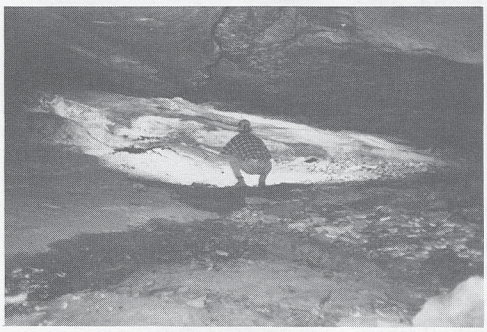


Figure 6. Back section of Long Rockhouse Cave; note ceiling joint and absence of breakdown.

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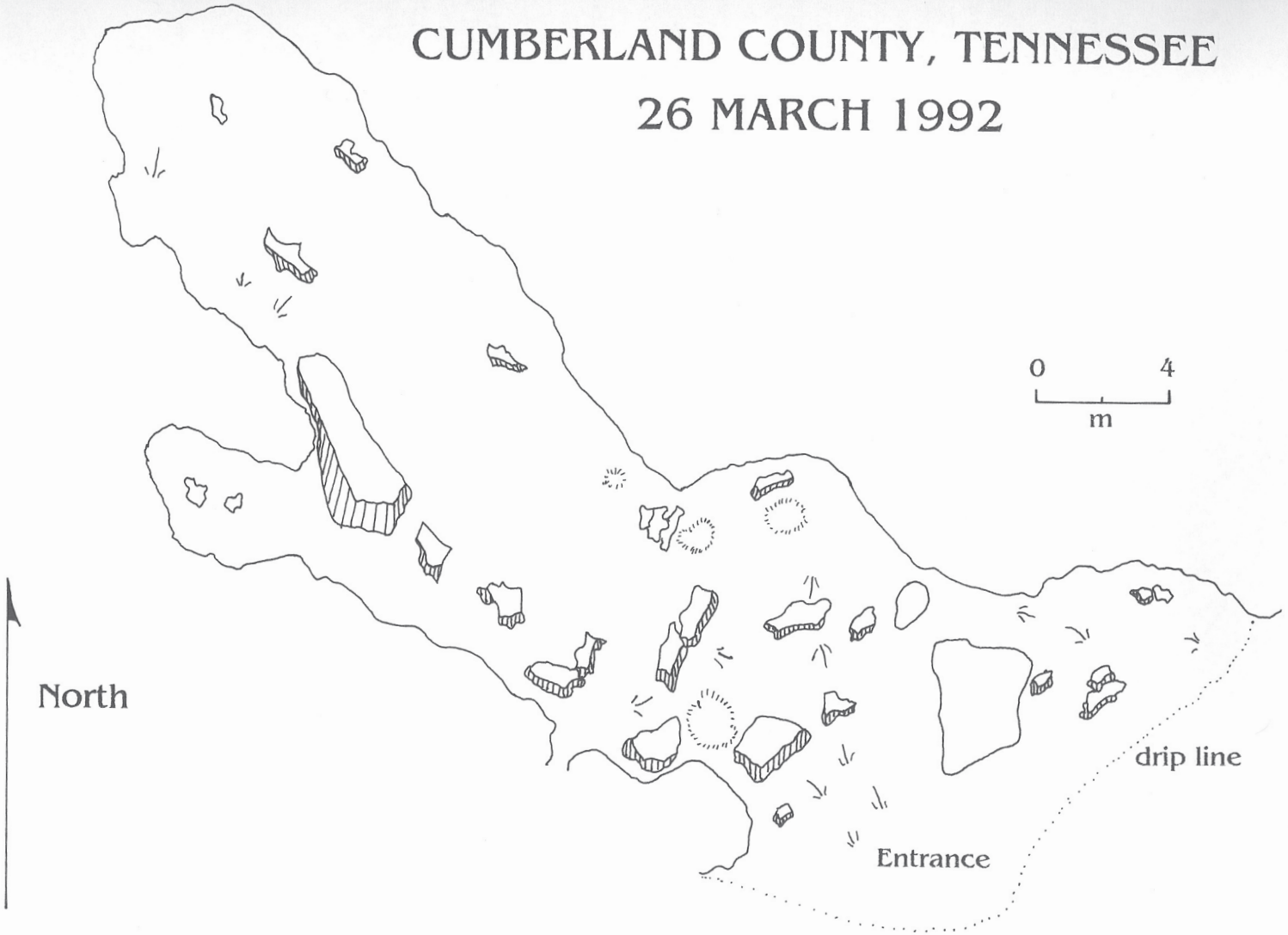
LONG ROCKHOUSE CAVE

CUMBERLAND COUNTY, TENNESSEE

26 MARCH 1992



H4

Neversink: The Classic Tag Pit[1]

by
Bill Putnam (NSS 21117)
Southeastern Cave Conservancy

Folks, we have a great opportunity today. The Southeastern Cave Conservancy is making a serious attempt to buy Neversink, the classic TAG pit. We need your help. Cavers from all over the country have visited this 160 foot pit near Scottsboro, Alabama. Its beautiful waterfalls and fern covered ledges have made it a favorite subject for cave photographers as well as pit bouncers. The cave serves well as the cover illustration for Bob Thrun's book "Prusiking", one of the seminal publications on single rope techniques for caving. Many cavers have enjoyed this spectacular cave over the years, and I'm sure that many besides myself have thought how nice it would be if we owned it, so that access could be secure forever. Well, circumstances have made that a real possibility, but your help is urgently needed to make it reality.

One of the SCC's primary activities is to secure access to caves for cavers, through purchase, lease, easement, donation, or management of caves and cave lands. Potential acquisitions are carefully evaluated. In the case of Neversink, we have talked with the owner and he is interested in selling the property. The SCC is negotiating to purchase the cave and surrounding property, and things are progressing very well. We have made a preliminary survey to locate the boundaries and the pit, have researched the deed and title, and everything looks good. The owner was already aware of the pit and is concerned about safety and liability. He has closed the cave for now. The neighboring landowners are aware of this, and there have been a couple of recent incidents of cavers being turned away.

It takes a lot of work to swing a deal like this. Please help us out with Neversink, and STAY AWAY for now. Things are progressing well and it would be a tragedy if someone blew the whole deal by aggravating the owner or the neighbors. Things are moving fast, and the only real limiting factor is the speed with which we can raise the cash. If you want to be involved, figure out how many times you've been to Neversink over the years, add the number of times you're likely to go in the future, multiply by some reasonable dollar figure, and send a check to the SCC to help us buy it for you. All contributions are tax deductible. Send pledges or contributions to the address below, or contact Kris Green at (404)378-2836. I urge all TAG cavers, as well as cavers from other areas who visit TAG, to consider joining the SCC and helping to support projects such as the acquisition of Neversink. Membership costs only $15 per year, and $14 of that is tax-deductible. We are attempting to purchase two large tracts of land containing several popular and classic TAG caves, including Neversink, Cemetery Pit, and Hurricane Cave, so contributions above the regular membership dues are desperately needed. Directed contributions are welcome.

The SCC is a not-for-profit corporation (501-c-3) dedicated to cave conservation, caver education, and access preservation. It was formed by a group of TAG area cavers in 1991, and currently has about 100 members. Members receive a newsletter which reports on SCC news, issues, and projects. The Conservancy is governed by an elected Board of Directors comprised of seven active cavers from Alabama, Tennessee, and Georgia. Board meetings are held quarterly and rotate around the TAG region so that members from all areas have an opportunity to attend. We recently held our Winter Board Meeting in Chattanooga, TN at the SERA Winter Business meeting. The current SCC board members are: Kris Green (Chair), Bill Putnam (Secretary), Alexis Harris (Treasurer), Paul Ballinger, Linda Tucker, Diane Cousineau, and Kenneth Huffines.

Our third Annual Members Meeting will be held at 1pm on Saturday, April 9 in Chattanooga at the UTC Student Union building. Everyone is invited to attend. Contact Bill Putnam for details or directions. The SCC is not affiliated with the NSS, though all the Directors and most of the members belong to the NSS. The SCC is fortunate to have the generous support of several NSS Grottos in the Southeast as well as the NSS Southeastern Region Association (SERA). The Conservancy currently owns one cave, Howard's Waterfall Cave in Trenton, GA, and is negotiating to acquire several others. In addition to cave acquisition, SCC projects include: staffing monitoring and information tables at Pettijohn's and Howard's Waterfall; trail and road maintenance for the Pigeon Mountain Wildlife Management Area; a recycling project at the TAG Fall Cave-in; and the development of a TAG cave-ownership and access database.

For more information on SCC projects and activities or to volunteer assistance, you can contact any of the Directors. My phone number is (404)822-0003, and the address for SCC correspondence is:

Southeastern Cave Conservancy
c/o Bill Putnam
1865 Eagle Summit Court
Lawrenceville GA 30243

You can also contact SCC Chair Kris Green at (404)378-2836. Kris is handling the fund-raising for Neversink, and needs pledges. If you can help, please give him a call.

And remember: "When the gates are finally closed and locked, where will you go caving then?" -SCC slogan, courtesy of Kris Green

[1] - *reprinted from Nittany Grotto News, 41(2), May 1994*

Mexican Brown Bat, Myotis velifer incautus, in bad air section of Webb Cave, Kinney County, Texas.

Charlie Kronk on climb out of The Devil's Sinkhole, Edwards County, Texas