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CRF Newsletter

Chocolate High in Carlsbad Cavern

by Patricia Kambesis

Some leads, no matter how inaccessible they appear, never lose their appeal. Unreachable darkness and the touch of wind on an explorer's face is enough to keep the interest alive, sometimes for decades. Such is the case for a major joint that cuts across the ninety-foot high ceiling of the New Mexico Room in Carlsbad Cavern. A strong electric light aimed straight up the joint gets sucked into an intriguing blackness with no hint of true ceiling in sight.

The southeast end of this ceiling feature holds the entry passageway leading from the tourist trail, up and down a series of ladders, and into the New Mexico Room. The joint extends the entire width of the room (200 ft.) and slices into the north wall. At floor level, a massive fudge-colored stalagmite, the Chocolate Drop, stands sentry to a corridor that is developed on the joint trend (the Chocolate Drop Passage). This passage continues northwest for 300 ft. before ending in a set of impossibly narrow fissures. The strong ceiling expression of the joint coupled with the reversing air currents in the Chocolate Drop Passage have piqued the interest of CRF cavers for over twenty years.

The air currents that issue from the Chocolate Drop Passage originate in the upper reaches of the joint trend.

However, breakdown and constricted passage dimensions prevent upward progress in the Chocolate Drop trend. The only access to the elusive ceiling fissure is straight up the sheer north wall of the New Mexico Room.

In the late sixties, Ron Kerbo noticed the winds from behind the Chocolate Drop. His reconnaissance found 140 ft. of narrow passage over water that eventually ended in a sump. With the blessing of the Park, Kerbo lowered the water level in the sump

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Todd Warren admires a Snake Dancer in the Chocolate High Room. Photo by Kris Green

INSIDE:

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Interview—an Australian perspective on Mammoth Cave archeology and CRF (p. 14)

Plus NSS meeting and awards, expedition reports, underground literature, etc.

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BULLETIN BOARD

CRF Annual Meeting: The 1992 CRF Annual Meeting will take place in Albuquerque, NM, November 14. For further details, see Schedule on back cover.

CRF Mammoth Cave Field Headquarters fund raising drive: Help make the planned Mammoth Cave field headquarters a reality. Send your tax deductible donations to the treasurer, Roger McClure, 4700 Amberwood Drive, Dayton OH 45424. Funds are also solicited for the International Exploration Fund.

Address Corrections: Please send address changes to Richard Zopf, 830 Xenia Avenue, Yellow Springs, OH 45387.

Deadline for next issue is January 1. Please make sure your submissions for the next issue reach us by the above date. MS/SH.

Notes from Here and There

The thirty-two volunteers at the NSS annual summer restoration camp at Mammoth Cave patched holes on the Discovery Tour (Rotunda and Audubon Avenue), hauled more timber out of Echo River, and removed discarded light fixtures and electrical parts. Since 1988, volunteers have removed more than 70 tons of debris from the heavily travelled areas of the cave.

Frank Deckert recently took over as the new Superintendent at Carlsbad Caverns National Park. Mr. Deckert replaces Wallace Elms, who retired last spring. **Michael Holm** has been selected as the new Assistant Superintendent at Mammoth Cave National Park. Mr. Holm, whose most recent appointment was Superintendent at Knife River Indian Villages National Historic Site, will begin his tenure

at the end of November. CRF welcomes both new appointees to their respective posts.

NSS Convention and Awards

Many JVs attended the National Speleological Society convention in Salem, Indiana, last August. The scientific sections were excellent, and many of the papers were given by JVs, especially in the biology sessions (**Rick Olson, Diana Northup, Norm Pace, Cal Welbourne, and Larry Mallory**). CRF President **Mel Park** chaired the cartography session and gave a paper on Cave Map Language, fast becoming an indispensable tool for management of CRF's Mammoth Cave data. Mel also represented CRF at a meeting of the National Cave Management Symposium steering committee; CRF will co-host the 1993 meeting in New Mexico.

The prestigious Honorary Member award went to well-known Colorado caver and CRF JV, **Donald Davis**. Donald follows in the footsteps of Red Watson, Patty Jo Watson, Ron Kerbo, and Doug Rhodes, making the fifth year in a row that the NSS' highest award has gone to a CRF JV. Cited among Donald's many accomplishments were that "he made major discoveries in Lilburn Cave in the 1960s ... and made major contributions to the exploration and scientific understanding of caves in the Guadalupe Mountains."

CRF map-making was well represented among the cartography salon awards. One of two medals went to **Mick Sutton** for the Kentucky Avenue, Mammoth Cave sheet. The winning medal reflects, of course, on the entire CRF cartographic effort at Mammoth Cave, under the direction of Chief Cartographer Scott House. Many other maps in this series are in various stages of production. Blue ribbon awards went to **Pat Kambesis** and **Don Coons** for Feng Dong, and to Pat Kambesis for Caves and Karst Features of the Zhijin River Gorge, China. In addition, Pat, Don, and **Tom Stockert** won Honorable Mentions for three other maps of Chinese caves. These maps are a product of the February, 1992 CRF expedition to Guizhou Province (see Feb. 1992 *Newsletter*).

Dave Bunnell won a blue-ribbon for a color print which has been accepted for the SpeleoProjects Caving Calendar, while Dave Bunnell and **Djuna Bewley** won a ribbon for color slides, a very competitive field. In addition Dave won an Honorable Mention for a color print. **Peter** and **Anne Bosted** were listed among the awards as usual, with a ribbon for a color slide.

Honored by election to Fellowship in the NSS were JVs **Bill Devereaux, Pat Jablonsky, Jim Goodbar, Diana Northup, Glenda Rhodes, and Paul Rubin**.

Congratulations to all the award winners.

BLM Drilling Proposal May Threaten Lechuguilla Cave

On September 18, the Bureau of Land Management released a Draft Environmental Impact Statement for exploratory gas and oil drilling in Dark Canyon, along the northern boundary of Carlsbad Caverns National Park. The proposed site is about one mile away from Lechuguilla Cave, although the boundaries of the lease area approach to within 900 ft. of known passages in Lechuguilla. There are six other known caves within the 8,320 acre lease area, including Big Manhole Cave, a blowing dig which many believe may eventually connect to Lechuguilla. The BLM's preferred alternative is a so-called "mitigated drilling scheme" in which the proposed well would be drilled 500 ft. away from known natural potential anomalies, supposedly reducing the chance of intersecting cave passages.

The proposal has been characterized by many concerned cavers as reckless for at least the following reasons: recent discoveries in Lechuguilla Cave

are trending towards the lease area; a helium release study is not yet complete, hence a sound estimate of the volume (and by deduction, the areal extent) of the cave is not yet available; air flow patterns in Big Manhole Cave suggest that Lechuguilla Cave may extend under the lease area; the use of potential anomalies to predict cave passage is not a well-proven technique and would probably be sensitive only to large voids; the release of oil or gas into unexplored passages of Lechuguilla or other caves can be expected to cause irreversible damage.

Cavers who wish to comment on this proposal should write to: Joe Incardine

Bureau of Land Management
New Mexico State Office (NM-911)
Santa Fe, NM 87502-0115
505-438-7458

Written comments must be received BY
NOVEMBER 20.

Aboriginal Dates from Mammoth Cave

Mary Kennedy

During the Labor Day expedition, the CRF Archeological Project, under the direction of Patty Jo Watson, spent one day in historic Mammoth Cave and one day in Salts Cave collecting paleofecal samples for radiocarbon dating. This is a new phase of a long-term research project to which many JVs have contributed over the years.

Although 41 radiocarbon determinations have been obtained from these two caves (13 from excavations in the Salts Cave Vestibule, 18 from samples collected in the Salts Cave interior, and 10 from the Mammoth Cave interior), only five of these are on the human fecal material that is abundant in parts of both caves. Almost 200 fecal samples have been analyzed for their dietary content. This body of evidence has figured heavily in research into the origins of horticulture in the prehistoric Eastern Woodlands of North America not only because it is one of the most abundant sources of dietary information for the time period in question, but also because it is the most unequivocal evidence for what prehistoric people actually ate. (Human feces are not preserved in most archeological sites, so inferences about diet are usually made from botanical evidence recovered from archeological features such as hearths, storage pits and the flotation of deposit from the site in general.)

The 41 radiocarbon determinations that have already been obtained range from A.D. 30 \pm 160 to 2170 B.C. \pm 70. The five paleofecal dates, however, cover a much shorter time span, from 290 B.C. \pm 200 to 710 B.C. \pm 140. We hope to recover fecal samples that represent the broader 2000 year span of prehis-

toric exploration. In addition to being dated, the contents of the samples will also be analyzed using state-of-the-art techniques.

These new dates will contribute to our general understanding of the prehistoric exploration of the system. We have noticed that the earliest cave interior dates come from lower levels such as Indian Avenue in Salts, and Ganter and Jessup Avenues in Mammoth. We are interested in seeing whether additional dates corroborate this pattern. If they do, this would suggest that exploration of Salts and Mammoth was probably accomplished quite early. Later intensive exploitation of mineral resources may have concentrated in upper level trunk passages.

Finally, these new dates will increase the areal coverage of radiocarbon dates within the cave. Samples were collected in several areas or passages that have not previously been dated, such as Wright's Rotunda and portions of Middle Salts Cave.

Twelve samples were collected, six from Mammoth and six from Salts. Two of the dates will be paid for by the National Park Service's Cultural Resource Management Division. All twelve samples will be submitted to the National Science Foundation Arizona AMS Facility where they will be dated using Accelerator Mass Spectrometry, a process that allows for direct counting of atoms of radioactive carbon rather than the indirect decay counting systems that were employed during the first 30 years of the radiocarbon dating technique. AMS dating requires a much smaller sample than conventional

Continued over...

decay counting, so items previously considered too rare to destroy can now be dated by removing a very small sample without compromising the general integrity of the object.

Using the AMS technique four dates have recently been obtained on one-of-a-kind items related to the prehistoric procurement of cave minerals. Early in 1992 BETA Analytic returned AMS determinations on the basket in Ganter Avenue (680 B.C. \pm 55), the

bark wrappings holding the rungs of the ladder in Star Chamber (550 B.C. \pm 55), a cedar climbing pole in Dismal Valley of Salts Cave (545 B.C. \pm 60), and the tip of a digging stick from Upper Salts Cave (540 B.C. \pm 60). It has long been suspected that the basket and the climbing poles and digging sticks seen throughout prehistorically explored portions of the system date to that time, but it is still gratifying to learn that one's suspicions are correct □

Names With Faces—A Photographic Record of Early Mammoth Cave Visitors

Chuck Swedlund

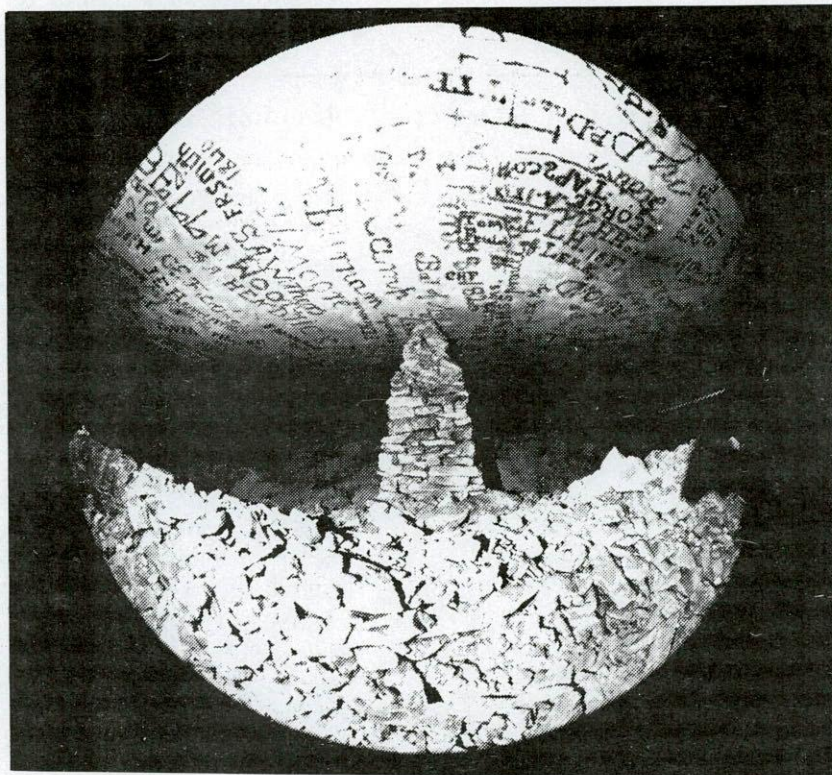
I am doing a research project, entitled *Names Without Faces: The Photographic Documentation of the Names in Mammoth Cave National Park*. The first part of the project is concerned with the names in Gothic Avenue. There are literally thousands of names on the ceiling, walls, and cairns in this passage; photograph #1 shows their intensity and complexity. The cairn in the center is the Kentucky Monument.

Some of the names reflect historical personalities, but the majority are of unknown people. A person who is unknown is, in a sense, faceless. While photographing and documenting the names, I have found some that provide additional information beyond a date or place—a profession, status, or military rank.. I like to think of these names as having a face.

It is always exciting to find a Stephen Bishop signature, the famous guide and dedicated explorer who left his name in many passages. He is mentioned and praised in accounts by early visitors. Many of his inscriptions, dating from 1838 to 1841, includes Charlotte, his wife. Another guide, John Nelson, in 1905, also celebrated a trip with his wife.

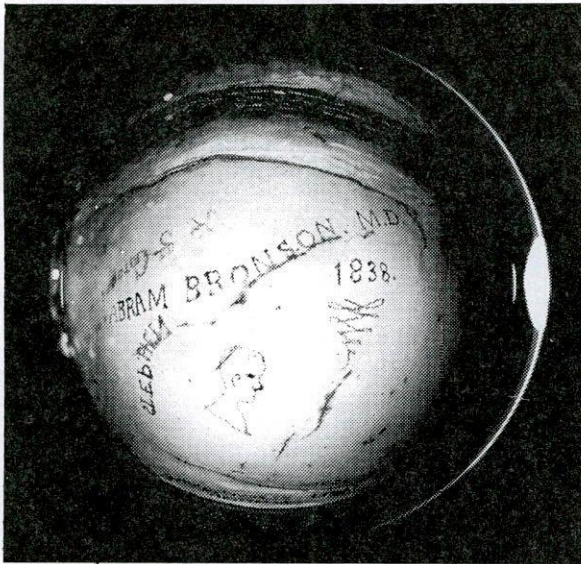
The medical profession is the most widely represented in Gothic Avenue. Jamy Learls, M.D., 1888 was found on a cairn. Abram Bronson, M.D. (photograph #2) in 1838 wrote the longest signature

in the passage, approximately 30 feet. To photograph this, I used an extreme wide angle (fish eye) lens. Near that name is the name "Stephen" with the drawing of a man's profile having African-American features plus a design. I like to think it was done by the Stephen Bishop. W.B. Powell, M.D., on September 12, 1827, took effort to record he was a "Surgeon Dentist". The Vanderbilt Dental School placed a naming rock on one of the cairns in 1905; many indi-



1) The Kentucky Monument in Register Hall

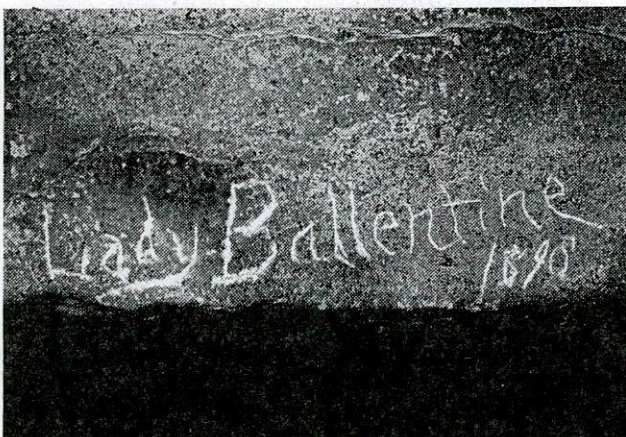
vidual names indicate a large group visitation. The dominance of the medical profession may be due to their financial ability to travel and the normal inclusion of M.D. after their name; people are not so prone to list such occupations as farmer or housewife. But an E.B. Dickman of Louisville did write "Bookseller". And a J.P. Burckhart was a Texas Ranger. There are several Civil War soldiers. One group visited on November 2, 1862. W.W. Hays (photograph #3) was a Quarter Master, 82nd Reg.,



2) The longest signature in Gothic Avenue—Abram Bronson, M.D.

Indiana Volunteers. The block of three names indicates they were from Bloomington, Indiana. Another name does not indicate a specific vocation but intrigues me; Lady Ballentine, 1896 (photograph #4) suggests a touch of nobility, or perhaps notoriety.

The process of recording the names depends on their location and concentration. In ceiling areas with a large number of names, such as in Register Hall, I use a "Track System" to photograph them. This consists of a track placed on tripods at a constant distance from the ceiling. The camera is slid down the track on a sled, with exposures made at precise intervals. This maintains accuracy of scale and ensures that no part of the ceiling is missed. Then comes the hard part: moving the track farther down the passage. In areas with great distances between ceiling and the



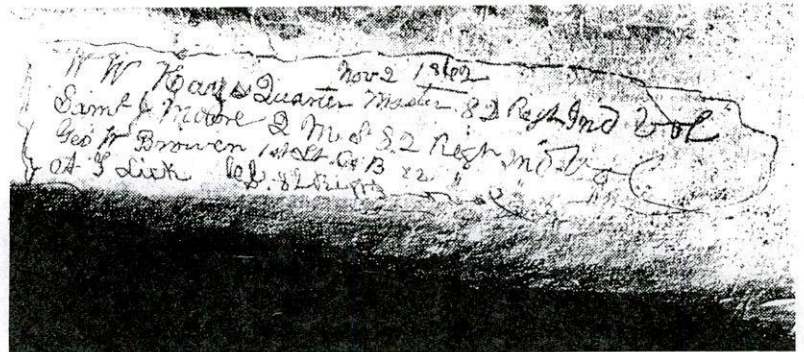
4) An aristocratic visitor, 1896

floor, the rough surface of the floor (due to breakdown or the presence of historical cairns) makes the process slow and tedious.

The resulting photographs are matched, forming a large mosaic photograph that may be examined and used for entering the names into a data base. One benefit to this approach is that the actual data recording transpires in the comfort of office or home as opposed to the standard *in situ* recording.

I am grateful to the CRF JVs who have provided the necessary labor and in-cave assistance. Also I wish to thank the National Park Service for their support. Hopefully, there will be many more discoveries, and the photographs will serve as a means for cataloging, studying and evaluating the significance of the historical names □

[Charles Swedlund is a Professor of Photography at Southern Illinois University, Carbondale.]



3) Civil War Era—82nd Regiment, Indiana Volunteers

Mammoth Cave Length Update

The most recent surveyed length available for Mammoth Cave is 336.4 miles (541.4 km). The total is made up of Central Kentucky Karst Coalition surveys for the Roppel section and CRF surveys for the remaining sections. The breakdown by section is:

Colossal	29.2 miles
Crystal	14.1 miles
Salts	19.5 miles
Unknown	44.4 miles
Flint Ridge Total	107.2 miles
Mammoth	132.6 miles
Morrison	0.6 miles
Proctor & River	36.8 miles
Roppel	59.2 miles

The pace of new survey slowed somewhat in 1992 as more emphasis went towards replacing older deficient or missing surveys, especially in the Mammoth Cave, Colossal, and Salts sections, and on survey and exploration in smaller caves such as Sides and Buffalo Creek Caves.

EXPEDITIONS

MAMMOTH CAVE

Independence Day, June 26-July 6

Leader, Scott House

The expedition, attended by about 58 cavers, was a big success, with lots of cave surveyed, relatively good food, and a great attitude on the part of virtually all participants. There was no camp manager, but everyone pitched in and helped with the cooking and cleaning.

One of the main emphases was to get a good jump on the Historic and Echo River area map sheets. Several trips were taken to ongoing small cave projects, and miscellaneous other objectives filled out the week nicely.

Mammoth Cave Ridge: The bulk of the work here was on the historic end of the cave. Two trips to Gothic Avenue brought the detailed survey to the top of the stairs down to Gratz Avenue. The survey of Gratz Avenue was completed, several side complications were cleaned up, and other side leads were begun. A replacement survey of a complicated series of pits and canyons connecting Gratz Avenue to Briggs Avenue was begun; three survey trips put a lot of the pieces together, but much interesting and technical survey remains. Two of these parties went in from Lee's Cistern in Gratz Avenue and the third climbed up from Charlotte's Dome in Briggs Avenue to a crumbly canyon where progress was tricky.

Another crew replaced much of a side passage off Jessup Avenue which connects to this same shafty area, and most of Briggs Avenue was also resurveyed. One party dropped Dry Pit in Wilson's Way and surveyed a blowing crawl at the bottom for some considerable distance. This is a good lead, and continues. Old surveys of Harvey's Avenue and Lost Avenue were also replaced.

Elsewhere in Mammoth, leads off Sophy's Avenue led to over 1300 ft. of new canyon passage. Most of this began within five minutes of the elevator; detailed mapping keeps turning up new passages in well-known areas. In the Frozen Niagara area a great climbing lead in the Cocklebur Loop ended after a few hundred feet, and a productive trip to the end of Lovers Leap Trail pretty much finished off that area. A small area off Miller Avenue was resketched and leads there were pushed, and 1300 ft. of the Lucy's Dome inlet in Mystic River was resurveyed.

River: A large chunk of the first part of the old L-survey, now named Lee Avenue in honor of early Mammoth Cave cartographer Edmund F. Lee, was resketched and some new passage was surveyed. A climbing lead out of Fritsch Avenue was pushed for over 350 ft. and continues. Rain washed out the possibility of additional River trips.

Flint Ridge: Three trips were taken to continue unravelling the secrets of the Pohl Avenue sheet. Two of the parties surveyed several hundred more feet of the Union Shaft complex, while the other crew fleshed out some tight and technical passages between Malott Avenue and Pohl Avenue. In Salts, two productive trips extended the Salts Trunk resurvey 1500 ft. (or perhaps more realistically, about 100,000 square feet) and completed a major survey loop, tying together the Dismal Valley and Corkscrew routes to Lower Salts. Another Upper Salts party surveyed a small cutaround near the collapsed Pike Chapman entrance.

Small Caves: Amazingly, a lot of small cave work got done for a hot, summery expedition complete with record numbers of ticks. Nearly 600 ft. was surveyed in upstream Buffalo Creek Cave on a trip shortened by the crew getting lost *en route* to the entrance. Rain later in the week prevented a return trip to this continuing passage. Another party surveyed between the two entrances but otherwise was washed out by heavy rain (the main entrance was a drain vortex!) Work here is being coordinated by Stan Sides. Stan will also be drawing up Adwell Cave, a 300 ft. long trunk fragment in Hamilton Valley which got mapped after a trip to Sides Cave was scrubbed due to high water.

A trip to Johnson Cave pushed the breakdown at the end with some success; while only 100 ft. was surveyed, several blowing leads were noted. Lack of a rope stopped progress at a pit. Gerry Estes is drawing this one up. One party went to White Lightning Cave (Joppa Ridge), managed to get up a difficult 45 ft. climb, and left a rope to exploit the leads at the top next time. Rick Olson is spearheading work here. Phil Bodanza is drawing up Rigdon and Dickey Pits (Flint Ridge) and took a trip to both caves to assess the old surveys and touch them up a bit. Lastly, one trip was taken to finish off a crawl in Indian Cave, which leaves one area left to finish that project. Bob Osburn has drawn most of this cave up already.

Science and History trips: But wait, there's more! The expedition also supported productive work on non-cartographic trips. Chuck Swedlund took three trips to continue work on his "Names Without Faces" project [p.4]. Chuck is systematically photographing the signatures on the walls and ceiling of Gothic Avenue. Larry Pursell took two trips in support of his name registry project in Pensacola Avenue, and another to assess the density of signatures along Main Cave between Giant's Coffin and the Cataracts.

The Lost Avenue mapping crew also did some gazetteer research along Gothic Avenue, finding the impressive Fencer on the Ceiling (a large stick figure in joint-aligned dripstone) and other obscure features, but striking out on the Man's Head and George

Washington's Face. They also made the interesting discovery that the Acute Angle in Main Cave is developed along a small fault.

Beth Estes led a pair of trips in Main Cave as she begins work on a project to sort out the hydrology and speleogenesis of the Main Cave-Kentucky Avenue continuum. Rick Olson collected crickets on a couple of trips, and a group of CRF biologists took a biosurvey trip into Hawkins/ Logsdon River. Exiting Doyel Valley proved to be more exciting than planned for CRF Chief Scientist Tom Poulson when his ascending rig jammed, but enough spare equipment was on hand for him to extricate himself.

Survey Crews: *Gothic Ave.*—1) Doug Baker, Steve Irvine, Jim Kaufmann; 2) Doug Baker, Steve Irvine, Paul Hauck; *Gratz and Harvey's Aves.*—Scott House, Phil Bodanza, Bill Putnam, Greg Sholly; *Lee's Cistern, Dry Pit*—Bill Putnam, Phil Bodanza, Dick Market, Greg Sholly; *Lee's Cistern 2)*—Bill Putnam, Greg Sholly, Tod Kramer; *Charlotte's Dome*—Phil Bodanza, Bill Baus, John Danovich; *Jessup Ave.*—Phil Bodanza, John Danovich, Bill Baus; *Briggs Ave.*—Scott House, Phil Bodanza, Sue Hagan; *Lost Ave., Gazetteer Research*—Scott House, Mick Sutton, Sue Hagan, Bob Salika; *Sophy's Ave.*—1) Dave West, Karen Willmes, Greg Sholly; 2) Dave West, Karen Willmes, Jim Greer; *Cocklebur Loop*—Tom Brucker, Bob Salika, Dan Nils; *Lovers Leap*—Dave West, Karen Willmes, Greg Sholly; *Miller Ave.*—Kevin Downs, Karen Willmes; *Mystic River*—Mick Sutton, Phil Bodanza, Bob Salika; *Lee Ave.*—Bob Osburn, Greg Sholly; *Fritsch Ave.*—Phil Bodanza, Bill Putnam, Julie Sotsky, Benjy Van Cramon; *Union Shafts*—1) Paul Hauck, Mike Lawrence, Jim Kaufmann; 2) Bill Putnam, Bob Salika; *Malott Ave.*—Paul Hauck, Richard Young, John Henderson; *Salts Trunk*—1) Mick Sutton, Sue Hagan, Bob Salika; 2) Mick Sutton, Sue Hagan, Mike Lawrence, Jerry Andrews; *Pike Chapman area*—Gerry Estes, Scott Barnes, Betsy Barnes; *Buffalo Creek Upstream*—Mick Sutton, Sue Hagan, Ted Hartman; *Buffalo Creek Entrance*—Stan Sides, Bob Salika; *Adwell Cave*—Stan Sides, Roger McClure, Mel Park; *Johnson Cave*—Gerry Estes, Dave West, Scott Barnes; *White Lightning Cave*—Rick Olson, Dick Market; *Rigdon & Dickey Pits*—Phil Bodanza, Greg Sholly, Tod Cramer; *Indian Cave*—Rick Olson, John Walker; *Gothic Ave. Signatures*—Chuck Swedlund, Roy Mevin, Keith Barnes, Ted Gwdowski, Richard Young; *Mammoth Cave Register*—Larry Pursell, Jan Spencer, Chris Conway, Harry Grover; *Main Cave Stratigraphy*—1) Beth Estes, Kay Hogan, Carol Hogan; 2) Beth Estes, Gerry Estes, Scott Barnes, Betsy Barnes; *Hawkins River Biology*—Tom Poulson, Rick Olson, Mick Sutton.

Summer, Aug. 7-9

Leader, Mel Park

Forty-six cavers participated, making this the largest August expedition in recent memory. The large crew was in part due to the influx of guests and western JVs who were ending their NSS Convention week with our expedition. Among these was the China-USA contingent jointly sponsored by the NSS and CRF. In addition, a multi-national group of

archeologists attended, went on regular survey trips, and also caved with Gail Wagner in Salts Cave.

Phil Bodanza and others arrived early and set up a new compass test course—very solid, nice and high off the ground, and trimmed level so that it can serve as well for clinometer calibration.

Non-cartography trips: Don Coons led a trip to look at surface geology and to upper Crystal, and a later trip to Logsdon River to show the Chinese, Swiss, and Mexican visitors some of the cave and its setting. Pat Jablonsky was conducted to locations throughout the tourist portions of Mammoth Cave (Frozen Niagara to Historic) to gather preliminary data for a study of lint contamination from human

Pat noted exceptionally heavy lint accumulations in places such as Giant's Coffin, and quite heavy accumulation on speleothems in the Frozen Niagara area; the latter situation can apparently lead to corrosion.

traffic. She has done this sort of work in Carlsbad Cavern, and we welcome the chance of having her work here. Pat noted exceptionally heavy lint accumulations in places such as Giant's Coffin, and quite heavy accumulation on speleothems in the Frozen Niagara area; the latter situation can apparently lead to corrosion.

Pat travelled from Colorado with Bill Yett, who headed the now in abeyance Big Manhole dig, and manages the Wind Cave survey. Bill, Pat Kambesis (with experience in the changing Lechuguilla scene), and Mel Park were able to get together for a discussion of project caving in their respective areas.

The two other non-cartography trips were for Chuck Swedlund's continuation of his "Names Without Faces" photo-documentation project along Gothic Avenue. The database of historic signatures and other objects (old newspaper scraps, parts of bottles, aboriginal cane torch fragments, dead bats, etc.) now amounts to about 1100 entries.

Mammoth Cave Survey Trips: Work continued in the Historic section of Mammoth Cave. Three parties went to Briggs and Sparks Avenues. One crew tied the Brigg's Avenue survey to River Hall and began a Sparks Avenue survey; the other resurveyed the north end of Brigg's Avenue from Vanderbilt University Hall, while the third completed the southern end of Brigg's Avenue and continued the Spark's Avenue survey as far as the entrance to Sylvan Avenue.

Work in this area continued when enthusiastic vertical crews went to Charlotte's Dome at the end of Brigg's Avenue and to Lee's Cistern, at the end of Gratz Avenue, meeting in the middle. The Lee's Cistern crew also connected their survey with "Abo

Avenue", a long crawl originating from Jessup Avenue, while the Charlotte's Dome party continued to the edge of a deep pit. Later, another Charlotte's Dome crew went out the tight, crumbly canyon to continue mapping its muddy continuation; they were stymied by running out of rope after 100 ft. of survey.

Farther east, there was a trip to map leads and do some resketching along Sophy's Avenue. Up Logsdon River, a crew put in a proper survey and resketch into the Mammoth Cutaround area at the beginning of Edmund Lee Avenue.

Two parties went to the Colossal section. One crew went to the west end of Deike Trail to put in some replacement survey in small passages; the other remapped part of the old Omega survey north of the Bedquilt maze.

In Salts Cave, the delicate job of resurveying Indian Avenue in Lower Salts was completed by two crews. This canyon is famous for its irreplaceable aboriginal footprints and a profusion of other fragile archeological remains; the second crew noted several unsurveyed side leads; other than this, the need for further entry to this area by anyone other than archeological researchers should be minimal. There was also a trip to Upper Salts, where a party put in some resurvey in Kite String, a lower level component of the main trunk, and started surveying the short loop at Grand Forks.

Small Caves: Five hundred feet of new survey was put into wet-suit passage and upper-level breakdown chambers upstream in Buffalo Creek Cave. This may become the longest cave north of the Green River. There was a short trip to map Cades Cave, little more than a rock shelter, but perhaps representing a cave entrance choked with breakdown and debris. The party also went to Long Cave to sort out which of several stations was the appropriate one to tie the remaining resurvey to.

Crews: *Crystal and River*—Don Coons, Mike Newsome, Wong An, Zhu Cheng, Bob Cohen, Shirley Sotona, Ian Baren; *Lint study*—Pat Jablonsky, Larry Mallory, Cornelia Yoder; *Gothic Avenue Signatures*—Chuck Swedlund, Frances Loyd, Cornelia Yoder; *Briggs and Sparks Aves.*—1) Scott House, Bob Osburn, Jerry Wagner, Cornelia Yoder; 2) Phil Bodanza, Jackie Kaplan, Steve McLuckie, Bob Kaplan; 3) Scott House, Jerry Wagner, Sheila Sands, Bill Yett; *Lee's Cistern*—Bill Putnam, Steve Duncan, Gregg Sholley, Chris Welsh; *Charlotte's Dome*—1) Phil Bodanza, Dick Maxey, Dean Wiseman; 2) Phil Bodanza, Lillian Novella, Shirley Sotona, Joyce Hoffmaster; *Sophy's Ave.*—Dave Ecklund, Joyce Hoffmaster, John Korabic, Rob Kaplan; *Lee Ave.*—Bob Osburn, Chris Lang, Steve McLuckie, Lillian Novella; *Deike Trail*—Tom Brucker, Roger McClure, Jackie Kaplan, Nancy Korabic; *Omega Survey*—Bill Putnam, Nancy Korabic, Kirk Francis, Gregg Sholley; *Indian Ave.*—1) Gail Wagner, Ford Cochran, Cheryl Early; 2) Dick Maxey, Pat Kambesis, Raphael Acuna, Ford Cochran; *Upper Salts*—Gail Wagner, Roman Hapka, Ernie Garza, Larry Mallory, Roger McClure, John

Korabic; *Buffalo Creek*—Walter Johnson, Chris Welsh, Cheryl Early; *Cades Cave*—Mel Park, Rob Kaplan, Jackie Kaplan.

Thanks to Betsy Park for a fine job as camp manager. The food was hearty, plentiful, and cost-efficient—a good job on all accounts.

LILBURN

July 22-26

Leader, Peter Bosted

The expedition began on Tuesday night when four cavers, led by Sequoia - King's Canyon National Parks Cave Specialist Joel Despaigne, hiked the five miles down to the cabin. On Wednesday, they entered Lilburn Cave by the Meyer Entrance and surveyed three leads in the East Stream area, finding 130 ft. of new passage. The party included a park ranger (Joanne Feldman) who wanted to learn more about the cave. On Thursday, Joanne had to leave, so the three others went to Cedar Cave to look at some leads. Unfortunately, one of the party could not fit through an awkward bend, so they aborted and checked out the data logger at Big Springs instead.

Three more cavers hiked in on Friday morning, and a party of five headed to the Thanksgiving Hall Passage, in the south end of the cave. Rather than go through the deep water upstream of the Z Room, they decided to use a cable ladder to descend a 40 ft. pit at the end of Muddy/ Bloody Ways. The 40 ft. ladder barely reached. Three cavers resketched the main passage (500 ft. long) and added a few short side leads, for a total of 700 ft. The passage is one of the nicest in the cave, with beautiful exposures of clean-washed, banded marble. This is the main stream passage, and at the upstream end one reaches Thanksgiving Hall, where the water comes from a short impenetrable boulder choke that separates it from the River Pit stream segment. The water is knee deep at most, and it is possible to stay dry by doing some acrobatics. The other two members of the party surveyed the best side lead, which had branched into three more leads after 180 ft. of survey.

The largest attendance was on Saturday. One team went to a little maze near the Hex Room, surveying 105 ft. Another crew dropped a nice, new 120 ft. pit, which turned out to connect to the White Rapids. A third party mopped up 230 ft. in side leads in the Impossible Dream Area. The fourth party checked out leads near River Pit, but didn't find any long enough to survey.

Finally, Bill Farr and two sherpas went to the South Seas, hoping to do another dive. Unfortunately, a flash flood two weeks previously had brought a sand pulse with it, and two of the three SCUBA bottles were gone, presumably covered with sand. A two hour search failed to locate them, so the dive was aborted. Finally, a short survey trip on Sunday

added 130 ft. and a new route from Glacier Hall to the Great Central Passage.

Altogether 1090 ft. of new survey was gathered, and 600 ft. of resurvey was performed to obtain better sketches. This brings the current length of Lilburn Cave to 13.3 miles.

Two new batteries for the cabin were brought in by mule, and some of the old batteries removed. The radio was also fixed. Much effort was spent trying to climb the 130 ft. tree holding the solar panels, with the goal of replacing them with new ones with twice the power. Not having expert tree climber Mike Spiess along, two days of effort yielded a height of only 40 ft. It should be easier next time, however, now that the branches have been reached.

Participants: *East Stream*—Joel Despain, Joanne Feldman, John Bair, Julie Donovan; *Cedar*—Joel Despain, John Blair, Julie Donovan.; *Thanksgiving Hall*—Peter Bosted, Joel Despain, Sara Vieweg, Julie Donovan, John Bair. *Hex Room*—Joel Despain, Sara Vieweg, John Bair. *New Pit*—Carol Vesely, Pete Shifflet, Tim DeLorey; *J Survey*—Peter Bosted, Ann Bosted, Julie Donovan; *River Pit*—Bill Frantz, Carol Conroy, Clarissa Osborn; *Dive*—Bill Farr, Jeff Frantz, Jed Mosenfelder.; *Glacier Hall*—Peter Bosted, Jed Mosenfelder; *Tree climbing*—Howard Hurr, Paul Nelson, Bill Farr, Ethan Frantz, and others.

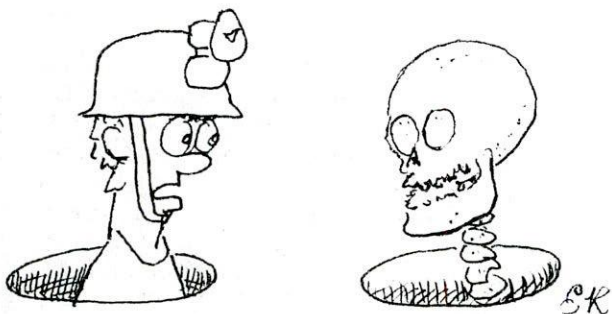
GUADALUPES

M.L. King Day, Jan. 18-19

Leader, Dick Desjardins; Report by Dick Venters

Twenty-three JVs attended the expedition. The emphasis was on checking and pushing leads in widely scattered areas of Carlsbad Cavern. A total of 630 ft. was surveyed, and four new leads were found. A team also started a mineralogical survey in Lechuguilla Cave, near the E-F Junction.

In the Bell Room, a 50 ft. pit was dropped, but there were no leads. This fragile area should be placed under visitor restriction. A check of an area of boneyard maze near the pit found many leads with good potential.



In the False Floor Room of Left Hand Tunnel, a restoration and clean-up of mud and debris from the floor was completed. Lead checking in Quintessential Right (Left Hand Tunnel) found nothing large enough to enter. There was a resurvey through 100 ft. of QR, and the same crew looked for "Kerbo's Passage" at Lake of the Clouds. They could not find it, but did find an unsurveyed fissure near the bottom of the last rope. Also at Lake of the Clouds, Hoxie's Lead was thoroughly checked out—no go. There was blowing air in the ceiling over boneyard maze in one area.

A trip to the Remarkable Crack (New Section) netted no new leads but two trips to the Guadalupe Room found a few going leads off the south wall.

In Lower Devil's Den below the Main Corridor there was a survey to a pit leading to the Oyster Beds Room, where historical signatures were noted (Frank Nicholson and others, 1930). High leads were found in the Blue Webbing Lead area, and a maze area near BWL needs further pushing. There was a trip to survey and push leads in Windowlands (Main Corridor, near Devil's Hump).

Participants: Barbara and Mike Bilbo, Gralin Coffin, Dick Desjardins, Walter Feaster, June Golaz, Tony Grieco, Bill Heath, Nancy Lamb, Thelma Leonard, John McLean, Carol Meagher, David Modisette, Rich Ness, Carl Pagano, Lee Perry, Patrick Qualls, Adam Reed, Jason Richards, Bill Rook, Spin Shaffer, Chris Sharp, Bill Sturrock.

Carlsbad Cavern Restoration: June 21-27

Leader, Dick Venters

"They're working these people too hard", was one of the quips told by visitors watching a group of volunteer cavers clean and restore the Cavern during the seventh annual restoration field camp. The many funny questions posed by visitors added to the fun and enjoyment we have come to expect at the restoration camp.

This year's efforts were centered on three areas. 1) Nearly 1000 ft² was restored at the old Lunch Room, off the Grape Arbor. There were three episodes of filling here: 1923, 1930s and 1953. The rock debris came from the excavation of the lower part of the elevator shafts. While doing research on the history of trail building in the 1920s, we came across some old photographs (c.1923) of this area, showing how it appeared before it was filled. Each photograph was copied, and the copies were used to define how the restored area should look. Flowstone, rimstone dams, pool beds, and a few historical artifacts were uncovered from under the debris. The artifacts included a one-gallon glass jar full of an unknown liquid, open and rusted paint and food cans, and a large cheese-box. The thirty tons of rock debris was relocated to the Left Hand Tunnel and an area in Pickle Alley. We hope that in future restorations we can remove most of the remaining fill.

2) Near the Doll's Theater, 3200 ft.² of floor was restored, and 4 1/2 tons of rock and clay fill was moved to a blast pit near the Chinese Theater.

3) Another 4 1/2 tons of debris was removed from an 1800 ft.² area off the trail from the old Lunch Room to the entrance to Lower Cave.

Video footage was taped of volunteers cleaning the floor and moving debris, together with a before and after overview, and interviews with volunteers and NPS staff. The video is due to be completed by October for viewing by park visitors.

Five days of close comradeship was shared and enjoyed by all the volunteers. Each participant enjoyed doing something that benefits us all, giving something back for all the enjoyment we have received from the cave. Each volunteer leaves with a feeling of gratification, knowing that visitors to the cave will enjoy seeing the fruits of their labors.

Thanks to all the volunteers and to the staff of Carlsbad Caverns National Park for their assistance and especially their enthusiasm, without which the project could not have succeeded. Until next year, cave softly.

Fort Stanton Cave, July 3-5

Leader, John Corcoran

Thirty cavers attended this very productive trip. Over 1000 ft. of compass and tape survey was done, but the majority of the effort went into beginning a precision survey using a Pentax total station instrument. A double interlocked traverse was carried into the cave [the double survey line ensures greater precision, and ensures that errors are randomized, rather than accumulating as would be the case with a single theodolite survey line—eds.]. The double traverse was carried into the cave as far as the Washtub Room where permanent reference points were set. As the precision survey progresses, a few corresponding points on the surface will be set so that cave to surface profiles can be drawn in areas of interest.

The participants also completed the survey of Mud Alley, finished the resurvey of the Sombrero Room, continued surveying the entrance maze of the New Section north of the Pagoda Passage, and started a survey of the Washtub Room Crawl. A short survey tied a station in the Main Corridor to the end of the precision survey to do a preliminary check of closure between the old and new surveys.

Other activities included setting up five photo-monitoring stations in Pagoda Passage and Helictite Hall, doing trail maintenance, removing some graffiti from the ceiling of Crystal Crawl, and installing a register in the New Section. There was also a geological investigation in the Sombrero Room to try to determine the origin of the "sombros". A rumored connection between the Sombrero Room and the second entrance was checked—an old digging site

was blowing air but no passable connection was found.

Participants: Scott Arnold, Randy Cabeen, Mary Caress, Gralin, Cynthia, Kari, and Katie Coffin, Carrie, Dorothy, Gavin, John, and Shannon Corcoran, Jim Evatt, June Golaz, Christina and Jennifer Griffiths, Fritz, Jim, and Rachel Hardy, Dennis Helfenstein, Linda Isler, Doug Kent, John McLean, Duke McMullan, Carl Pagano, Anita and Bob Pape, Charles Tuberville, Dick Venters, Wayne Walker.

Lechuguilla Biological Inventory

(an independent project, involving many JVs)

Leader, Diana Northup

The main phase of the Lechuguilla microbiological work has been completed. The results of sampling for fungal growth show that the presence of spores is correlated with human impact; for example, in the East Branch of the cave, the percentage of samples showing fungal growth varies from 6% in areas of low impact to 68% along the "trade routes" and 71% in high impact sites (camp sites, etc.). The sulfur deposits in Ghost Town did not produce fungal growth. Identification of fungal isolates to genus level is in progress.

Bacteria identified so far are all heterotrophic, and are found in natural materials (*Pseudomonas pseudoalcaligenes*), in soil and water (*P. stutzeri*) and on mammalian skin (*Micrococcus luteus*). Colonies from sulfur deposit collections apparently represent contaminants; future study of the sulfur deposits will emphasize aseptic collection techniques. Many bacterial samples still await analysis.

Follow-up investigations will concentrate on the identification of fungi and bacteria from corrosion residues and sulfur deposits, on the monitoring of pool bacteria to see if changes in composition are occurring, and on further study of the association of fungal spores with human impacted areas, by comparing carefully matched high impact and low impact sites from each area of the cave.

MISSOURI

July through September

Report by Mick Sutton

The Missouri lead-prospecting area cave inventory is winding down, with almost all the scheduled biological inventory and cave survey work now complete. Over the summer, survey crews concentrated on replacing preliminary Missouri Speleological Survey maps of two large stream caves, Posy Spring and Blowing Spring, both opening directly along the Eleven Point River within the boundaries of the National Scenic River corridor. The survey of Posy Spring was completed by mapping the main side passage, a 600 ft. long muddy crawl. Total surveyed length of the cave is 2760 ft. Some additional

biological inventory was done, including the collection of a cave spider.

Two trips went to Blowing Spring, mapping 2300 ft. up the main stream passage and the main tributary stream. One or two more trips will be needed to complete this job. The survey of Brawley Cave was completed with 120 ft. of survey in a new walking high side passage; the passage was also inventoried, yielding amongst other creatures a small spider superficially resembling the unusual troglobitic spiders of Kelly Hollow Cave. Next door to Brawley Cave, the survey of the small Rimstone Cave was completed.

The other Missouri project supported over the summer was the long-term survey of Shannon County's Powder Mill Creek Cave. Recent work here has concentrated on the Hell Hole Series, an isolated group of passages entered by an inconspicuous water crawl and discovered during the present CRF survey. It has now yielded more than one and a half miles of crawls and intricately braided canyons, some of them fairly large and well decorated. In July, two crews mapped 500+ ft. of generally unpleasant and confusing canyon passage in one area of Hell Hole. Two crews returned to a different area of Hell Hole in August, mapping 500 ft. of chert crawls, water

crawls, and contorted canyons to tidy up a multi-level area. A subsequent trip to this area finished off the multi-level maze and continued into large going canyon, well decorated with dripstone in places. Beyond the end of the survey, the passage splits into two continuing, walking high leads.

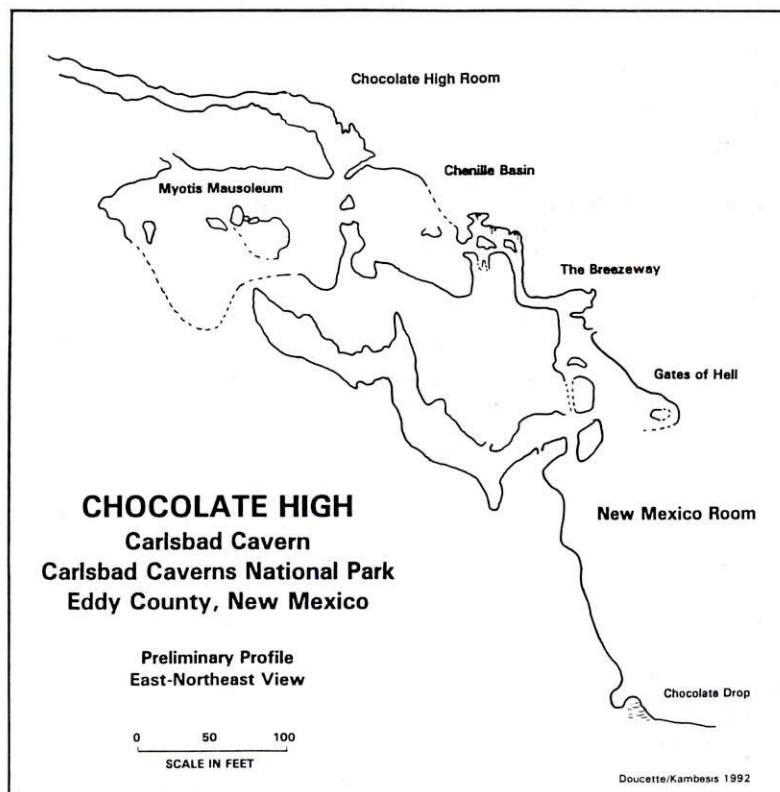
Project cartographer Doug Baker believed that the section of Hell Hole most difficult to reach might connect with another major side passage series, the Windy Crawl. Hopes of an easier route were dashed by a trip to the latter; while one party member worked on enlarging a tight spot near the entrance, the others mapped 770 ft. of relatively straightforward canyon which unfortunately headed away from the Hell Hole passages.

Survey Crews: *Posy Spring*—Mick Sutton, Sue Hagan, Tim O'Dell, Cathy O'Dell; *Blowing Spring*—1) Scott House, Mick Sutton, Tim O'Dell, Cathy O'Dell; 2) Scott House, Sue Hagan, Cathy O'Dell, Mick Sutton, Tim O'Dell; *Brawley Cave*—Mick Sutton, Chris Cone; *Rimstone Cave*—Tim O'Dell, Cathy O'Dell; *Powder Mill; Hell Hole*—1) Steve Irvine, Fred Knight, Sean Dickman; 2) Doug Baker, George Bilbrey, Mark Hudiberg; 3) Doug Baker, Steve Irvine, Tim O'Dell; 4) Mick Sutton, George Bilbrey, Cathy O'Dell, Bruce Black; 5) Doug Baker, Steve Irvine, Fred Knight; *Powder Mill; Windy Crawl*—Doug Baker, Steve Irvine, Lillian Novela, George Bilbrey.

Chocolate High ...Continued from p. 1

in hopes of finding more cave. The passage went less than 150 ft. beyond the sump then split into two high, ultra-narrow fissures. Not deterred, Kerbo still believed that the air was an indication of more cave and looked up into the lofty reaches of the fissure trend. In order to reach that lead it would be necessary to scale the vertical, northwest wall of the New Mexico Room. He mentally filed it away as one of many climbing leads in Carlsbad Cavern.

In 1983 there was renewed interest in the Chocolate Drop Passage from CRF cavers. Bob Buecher, Cyndi Mosch and Pat Kambesis started mapping in the stoopway sized passage floored with remnant pools from when before the passage was drained. Delicate shelfstone edged the old water levels and thin crusts of calcite littered the floors. Mosch and Kambesis were able to follow the air into a narrow chimney. A constricted 12 ft. climb opened up to a small breakdown chamber. The air flowed up the chimney, into the



breakdown and back towards the New Mexico Room. Was this just a circulation cell?

A second trip in 1984 (S. Goad, Mosch, Kambesis) continued the survey to a deep pool just beyond the chimney. It appeared that the pool was driving the air up the chimney and back out into the main chamber. One last survey trip in 1988 (Richards, Yett, Kambesis) mapped into the wet passage and beyond for 150 ft. before encountering the twin fissures. On that trip the air flow was reversed from that observed on the previous trips; the air came down the chimney and flowed into the New Mexico Room at floor level. Beyond the chimney and into the water passage, there was no air movement at all.

This seemed to confirm the circulation cell theory, but Kerbo never really bought the idea. In 1989, while giving Don Doucette, a caver and climber from Colorado Springs, Colorado, the grand tour of climbing leads in Carlsbad Cavern, he included the Chocolate Drop fissure. Don was intrigued with the lead and returned in February 1990 to start the first in a series of technical climbs. Doucette teamed up with Art Wiggins, Harvey Miller and Bryan Becker, and over the course of four trips attained the lofty heights of the Chocolate Drop fissure and beyond to Chocolate High.

It took three days of climbing to reach the Gates of Hell, a narrow keyhole, more than 100 ft. off the floor. This section of the climb was particularly delicate because the wall is heavily decorated with white and yellow stalactites and flowstone cascades. Low impact climbing technique left the pretties virtually undamaged.

Another day of climbing gained access to the Breezeway, an airy/aerie constriction which looked up into yet another climb. Over the course of two more climbing days the explorers gained the top of that lead, finding less than 50 ft. of horizontal passage which ended at the top of a 30 ft. pitch. The short rappel dropped them into the lower reaches of the Chenille Basin. A 15-ft. up-climb led to a dried pool lined with calcite crystals and edged with thick shelfstone—and beyond, another climb.

The cavers made short work of this obstacle and popped into a larger chamber, where an unusual concentration of bat bones inspired the name Myotis Mausoleum. There was just over 100 ft. of horizontal traverse in this chamber and the only way on, once again, was up. At this point according to the survey, they were nearly 500 ft. above the floor of the New Mexico Room. Reaching the Myotis Mausoleum required negotiating six ropes through narrow fissures, rebelay, short traverses and one rappel (into the Chenille Basin).

In March of 1992, the climb out of the Myotis Mausoleum was completed, breaking into a large, decorated room—the Chocolate High Room. The

orange and rust colored silt on the floor indicated that this was near the Yates contact (the same geological scenario as the entrance passages to Lechuguilla Cave). Doucette's team set ten survey stations and turned around in going passage. A short reconnaissance showed that there was no end in site.

Doucette returned in April with two survey teams. In the course of four days they mapped 2900 ft. of passage. Survey efforts concentrated on the westward trending passages that extended off the existing quad maps and under Oak Springs Canyon.

The only way on, once again, was up. At this point according to the survey, they were nearly 500 ft. above the floor of the New Mexico Room.

East going leads delineated a complex labyrinth of passages—the dreaded boneyard. After each trip, survey notes were plotted and a preliminary draft produced. Chocolate High extended the northern boundary of Carlsbad Cavern, headed toward a known gravitational anomaly, hinted at a relationship to Spider Cave, and opened the potential for western-trending passages.

Between May and August of this year, four additional survey trips have mapped in the Chocolate High discovery. One of the more interesting leads surveyed was the Perpetual Pushup Passage. Don Doucette, Dave Harris, Bill Allen and Jason Richards spent over six hours mapping in this very wide but low east-trending passage. Though they eventually tied back into known passage, good air movement indicates that there must be more cave.

To date approximately two miles of passage has been surveyed in Chocolate High. Leads still remain to be pushed and surveyed. The rigging for the series of climbs have been slightly changed to make for a smoother travel up and down the ropes. The Breezeway was rigged and now it is possible to do a beautiful 255-foot rappel down into the New Mexico Room.

With continued exploration and survey, we hope to find, perhaps in the northwestern reaches of this area, another hole in the floor, one that would drop 500 ft. into a sister chamber of the New Mexico Room and into going cave that would expand our collection of quad maps toward destinations even farther west □

Those involved in the exploration and mapping of Chocolate High include: Bill Allen, Bryan Becker, Paul Burger, June Clouse, Donald G. Davis, Dick Desjardins, Don Doucette, Harvey DuChene, David Ek, Kris Green, Dave Harris, Phil Hurst, Pat Kambesis, Ron Lipinski, Steve Reames, Jason Richards, Todd Warren, Art Wiggins, and Harvey Miller.

The Blind Snail of Mammoth Cave and Indiana

by Jerry Lewis

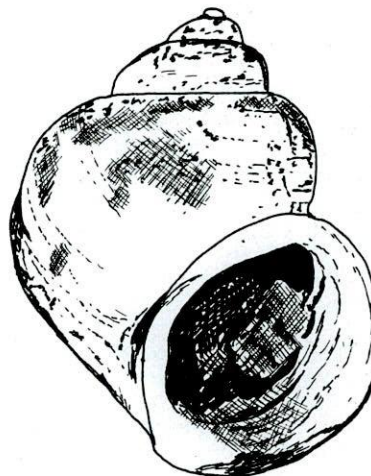
In 1990, I was contacted by Dr. Bob Herschler, a zoologist at the Smithsonian Institution, about finding specimens of Mammoth Cave's aquatic troglobitic snail (*Antroselates spiralis*). Bob had recently flown to Louisville, then driven to Mammoth Cave National Park, where a member of the Resource Management group had taken him to Shaler's Brook, in Gratz Avenue, to look for it. The snail had first been described by Leslie Hubricht in 1963 from Sibert's Well Cave in southern Indiana. The animal was otherwise documented from specimens collected in Roaring River and Echo River, Echo River Spring and streams in "a cave in Cedar Sink" (perhaps Owl Cave?), Stillhouse Hollow Cave and another "large spring" in Cedar Sink. I suspect that the snail occurs in suitable habitats throughout the base level rivers of the Mammoth Cave System. Unfortunately, Shaler's Brook lies high in Mammoth Cave Ridge and no snails were found there.

After his first disappointing experience, in the summer of 1990 Bob and I met in Louisville and drove to Mammoth Cave National Park to look for the snails in Echo River (Fourth Arch) where I had seen *Antroselates* in the past. By wading into the river and pulling blocks of breakdown from the bottom we quickly found numerous snails. They were also reasonably common at the adjacent Third Arch.

Bob asked me to try to pick up some specimens from Sibert's Well Cave; the possibility existed that the snails might not be identical to those found in Mammoth Cave, as Sibert's Well was isolated from the Mammoth Cave area population by about 100 miles.

In November of 1991 I contacted the management of Wyandotte Cave in the Crawford-Harrison State Forest to arrange a trip to Sibert's Well Cave. This led me to the Indiana Department of Natural Resources, Division of Fish and Wildlife to check on collecting permits. I was quite pleased to find out that the people in the Indiana DNR were encouraging about research and suggested that the possibilities for funding were very good for cave ecology projects.

Sibert's Well Cave lies at the base of the ridge containing the much larger Wyandotte Cave. On December 28, 1991, my wife Marie and I were kindly guided to the entrance by personnel from Wyandotte Cave. Sibert's Well was named because it was walled with stones at one time to serve as a well. Climbing down about 10 feet to the base of the well, we ducked under a low overhang. A small but brisk stream was flowing through a low cross passage. We chose to go upstream, which looked like the path of least resistance. Downstream the cave stream presumably emerges at nearby Blue River, only a



Length: 1-2 mm

Shell of *Antroselates spiralis*

few hundred feet away. Upstream the passage varied between a stoopway and a few places where one might stand up. Searching the stream we found many troglobitic isopods, but no snails. This was not surprising as the stream flow was rapid, unlike the pool areas where the snails had occurred in Mammoth Cave. Working our way upstream, after about 200 feet we found a pool and located four snails, again on chunks of breakdown. The snails were sent to Dr. Herschler, who confirmed their identity as *Antroselates spiralis*, rather than a potentially different, undescribed species.

Subsequently I submitted and received a grant funding a two-part study. The first part concerns the status of the "Mammoth Cave" troglobitic snail in Indiana. At present known in Indiana from only Sibert's Well, we are going to search for it in other caves and springs in the Sharp Creek Valley that contains Sibert's Well (and Wyandotte) caves. We will visit Sibert's Well every two months for a year to do a stream community census. In this manner I hope to establish how abundant the snail is and find out if it occurs in other local habitats.

The second part of the project will be a listing of potentially threatened and endangered aquatic cave animals for the state of Indiana. This list will be compiled from my own collection records from the last 20 years, from other zoologists' records, and from records from the literature. The goal is to supply the Indiana DNR with some data resources which can be used to merit protection for caves from the growing effects of road building, sewage treatment plants, urbanization and the like □

Mammoth Cave Prehistory—Another Perspective

At the Labor Day expedition, CRF's ardent archeologist and surveyor Gail Wagner brought to Mammoth Cave two guests, Wendy Beck, PhD, and her husband Rowan Webb, who are visiting from Australia. Gail urged the editors into the following interview, saying, "Looking at Wendy's work in Australian archeology is a fascinating way of getting some insight on what we are doing here. And Rowan was part of the early organization of Australian caving, which gives him an interesting international look at CRF." We couldn't agree more. The following is reconstructed from interviews with Beck and Webb following the cave trips each made during their weekend with CRF. (SH)

Let's start with the basics; where you're from, what you are doing.

Wendy: We're from Australia, where I'm a lecturer in archeology at the University of New England in Armidale, New South Wales. I'm on sabbatical leave, studying at the University of South Carolina in the Department of Anthropology, which is the home of Gail Wagner who brought us here this weekend.

I'm a paleoethnobotanist. My PhD is from Latrobe University, Melbourne, and was on toxic food plants, the technology aboriginal people used in the historic past for making foods safe to eat. I'm looking at how people used plants, what they used them for, how they prepared them—generally by looking at the archeological remains of plants and working out what people did with them.

Rowan, do you have an archeological background?

Rowan: That's my most recent manifestation, though I am more of a free-lancer. I started out life as an undergraduate student in zoology, and as a graduate student I did my research in plant ecology. When I finished, it was recognized that my skills and experience were best suited for running school camps. From there I got involved in alternative education, which in Victoria is supported by the government. Later, to re-excite the gray matter I decided to take up archeology.

You were involved in the early days of organized caving in Australia?

Rowan: In Victoria, where I came from, there was a great deal of speleology done early on, but by people who had only a very informal sort of organization. At Melbourne University, it was done by the Mountaineering Club of which I was a part. The Victorian Speleological Association formed out of this.

After that, I sort of dropped out of caving, though in doing my plant research I was involved in a lot of bushwacking, rock climbing and some caving. When I later started running youth camps full time, I started using caving gear for taking kids down old gold mines—an underground experience, but very different. However, I largely got away from caving until I

got interested in archeology. Then I came back to caves, more particularly to rock shelters.

What types of caves have you been involved with?

Rowan: In Victoria, though we don't have a cave system as spectacular as here, we're very fortunate to have granite caves, lava caves and limestone caves. The lava caves have been found to be archeological sites, but not the granite caves. There's been quite a lot of research done on rock shelters in Australia most of which are sandstone.

Wendy: A lot of work that I've done in paleoethnobotany has been in rock shelter sites, mostly sandstone shelters. The area I've done the most work in recently is in a small mountain range of central New South Wales.

What are you finding?

Wendy: It's been quite interesting; we're finding food remains, the remains of some toxic nuts that were used as food, string and cordage, also quite a lot of leaves and a lot of material that was used as kindling.

What we've been finding has been helpful in working out the kind of technology people had at the time and in looking at the vegetation in the past. It looks as if the vegetation has remained pretty much the same in the past 6,000 years in that area. It's good to have confirmation of that from the plant remains.

It's in many ways similar to the work done here. The age in which we're working is much the same as here at Mammoth Cave. The remains go from about 200 years BP back to the oldest ones of about five or six thousand BP.

What is it like, as a visiting archeologist, to see the Mammoth Cave system?

Wendy: Mammoth Cave with its Historic Section and Salts Cave are famous in archeological circles for a number of reasons. In part, it's because of the depth to which people in the past penetrated. That's very rare. It's probably the farthest aboriginal people have been known to get underground. We have caves in Australia where people were flint mining, but none of those would be more than say 300 feet from daylight. People were using torches, but not to the same extent they were using them here.

It's nice to come to a place you've read about in the textbooks. Patty Jo Watson's work, and the work of CRF and the other scientists here, is of course known throughout the world. You can tell the students a lot more if you've actually been to a place rather than just imagining it.

Another thing is the very good preservation of plant material in Mammoth Cave. It isn't as good in rock shelters. Shelters vary a lot, depending on which

way they face, how big the opening is, what the overhang is like. If things are kept dry, they tend to survive. But as soon as they get damp at all, it gives the microflora a chance to grow which destroys any organic material.

Mammoth and Salts Caves are, of course, really well known for their paleofeces. It's quite a rare find and gives a direct look at what people were eating, which you don't get any other way. I think in Australia we have probably one or two examples of feces in caves, and that's it. Unfortunately, most of the ones we saw yesterday were disturbed, which I can see is a problem in the kind of environment like upper Salts where there have been a lot of people trafficking through over the years. Still, it's interesting to see it there.

It brings to me the real human scale of what's going on. When you look at art on the wall, somehow it's a step removed from thinking of the people actually being there. The feces seemed to bring home to me the human element.

Rowan: There are several well-known archeological sites in limestone caves in Australia. Clogg's Cave in Victoria was one of the caves which demonstrated that aborigines were living well away from major stream courses during the Pleistocene. In the Nullarbor Plain, Koonalda Cave has rock art consisting of finger scratches in the roof which have been dated to 20,000 to 22,000 years old.

Incredible.

Rowan: Yes, that comes as a bit of a surprise to Americans who have difficulty getting provenance for all the colonization of the Americas. *[At a rock shelter site in Pennsylvania, artifact dates of 16,000-19,000 years have been obtained - Eds.]*

How would they have dated finger scratchings?

The scratchings were associated with carbon from torches. Some of them were actually covered up by an accumulation of sediment which included carbon from torches.

There's another place, the only one I've been actively involved in, where a cave called New Guinea Two had a hearth in it which had been completely covered by calcite. It also had art—scratchings on the wall and things like that. The dig is an interesting mix of mining, caving and straight archeological techniques. The top of the deposit had a date I think of about 12,000 years ago.

Wendy, you saw the charcoal drawings in Salts. Some might argue that they are recent, perhaps made by tour guides in the last century. Are you convinced of their aboriginal authenticity?

Wendy: If I were in Australia I would be, from their shape and the way they are executed. I guess the experts here are in a better position to judge. Patty Jo Watson is fairly convinced, and she would know.

In Australia, most of the rock shelter art is painted, though there are charcoal drawings in some areas. What I saw yesterday is quite similar in some ways to charcoal drawings in Australia. There are differences—different animals, different symbols. The checkerboards wouldn't be a common thing in Australia, but a lot of what you see is abstract art.

Is there a similar problem with disturbance of the remains as you noticed in Salts?

Wendy: In some archeological sites there is, but probably not so much in the caves. There are very few caves that have both archeology and interesting formations in Australia, so people are not as attracted

When you look at art on the wall, somehow it's a step removed from thinking of the people actually being there. The feces seemed to bring home to me the human element..

to the caves. Also, there are far fewer people in Australia. I was quite staggered to see the numbers of people at the Mammoth Cave visitor's center. However, in any public area, and this goes for Australia as well, there is always the problem of disturbance of archeological material

You have to think of management tools to overcome that. We have boardwalks, for example, where you don't disturb the deposits at all. The same sorts of things could be done here, I guess. But where you've got an area like Indian Avenue in Salts, it's very, very hard to protect it except by blocking access, which is a very controversial thing to do, especially in such a large system as here.

That's a point. You're talking about something 300 feet in length needing protection, but in Mammoth we're talking about miles and miles of passage.

Wendy: Exactly. I think that's something that will require a great deal of management planning. I would think that input from archeologists would be very important in the planning process. The scale is so immense here, it raises the question of how do you assess the significance of any particular passage. It's a unique place with no other models to go on.

Had you seen ancient aboriginal footprints before your trip here?

Wendy: No, no. I don't think I have. Again, it brings out the human dimension, doesn't it, to see a footprint in the dust such a long, long way from the entrance. So unexpected.

One of my disappointments in Salts as a non-archeologist is I never come upon something that I can say, "There's a moccasin, there's a basket". Do you still find those kinds of intact remains in Australia?

Wendy: Yes, sometimes. No moccasins, no baskets. But what we do find sometimes are wooden artifacts, for example, boomerangs.

Which one wouldn't find here.

Wendy: True, though you do have throwing sticks. We have found boomerangs in the area I've been working in the last ten years, most of them cached on ledges. We found a little wooden item we think is a grub stick. It's a very narrow twig with a hook on one

There's a project for anybody interested in anthropology—to see how a group like CRF works together and solves a problem and produces a product.

end. It was probably used for extracting grubs out of trees. And all sorts of bone tools have been found, mostly spatulas with a ground end, cached up on the ledges. Burial sites with skeletons have been found, and some contain items like net bags or feathers. So you do find unusual artifacts, well-preserved.

One of the results of Watson's work in Salts was its importance in dating early cultivation. When did cultivation start in Australia?

Wendy: With the Europeans. Australian aborigines were hunter-gathers right up until contact with whites. They certainly managed a lot of their plant resources through firing the landscape, but they didn't plant or harvest on a large scale. Interestingly, the neighboring island of New Guinea had horticulture 10,000 years ago. At times there was a land bridge from there to Australia, but cultivation never got there. It's one of those things that has to be explained in social ways.

Obviously mapping is a baseline for archeological research. Are there similarities between cave archeology done here and in Australia?

Wendy: It's much the same, really. Certainly mapping for archeology has always been a bit of a compromise between being really precise and getting the work done in a reasonable time. Very similar techniques would be used to map archeology and to map caves in Australia.

Rowan: The surveying techniques are not vastly different for archeology than for cave mapping, though usually archeological mapping is to a better order of accuracy, in part because you can carry larger and more delicate gear into a rock shelter.

Cavers have particular abilities and particular needs. Most of them don't go beyond compasses and clinometers—adequate for most of what they do. It is only rarely that they come across a problem that can only be solved by higher order accuracy. Archeologists, on the other hand, are trying to precisely determine spatial position, which can be important in working out a living floor for example. If you've got an entire living floor excavated then you can draw

the placement of the various levels, from making stone tools to recent occupation. In Australia, the most detailed sort of mapping used to be done to within perhaps 5 millimeters. Now that you can use EDMs in these sorts of excavations, you can measure to plus or minus a millimeter. People are starting to ask questions that can only be answered by that sort of gear. But then, they tend not to crawl through sumps to get to the sites.

Wendy: Here, most of the mapping is done by the cavers. In my situation, the archeologists would have to do their own because there wouldn't be any other maps available. In Koonalda Cave with the famous finger markings there were speleologists involved. But in most places, the archeologists have to do the mapping themselves.

Yesterday was your first trip into the Mammoth system, Rowan, and you didn't get to see any archeology.

Rowan: No, not at all. But I quite enjoyed getting to see a section that is called Roppel, I believe. It was the first caving I've done in some 25 years. I had to borrow some boots to go on the trip.

Any impressions about the cave or about CRF?

Rowan: The system is vast. Vastly complex. And I'm impressed with the level of CRF's activity here. To me, it is very interesting to see this as a cave system that demands and receives a lot of commitment and a lot of organization.

This sort of activity—fifty people on an expedition—would rarely occur in Australia. Because we don't have labyrinthine braided streambeds in the limestone, we couldn't send more than 20 people in a cave and expect them to do anything without tripping all over one another.

It's interesting seeing the complexity of the cave and the organization's adaptive response to it, both growing in concert. I started being impressed by Richard Zopf's "Introduction to the Mammoth System," a spiel he's obviously given to a lot of people.

He gives it routinely to new JVs.

Rowan: It covers all sorts of things that you would want if you were into resource management and curation. He didn't shy away from any questions, including my own.

One question I asked was if anybody had done a survey on how effective his spiel had been. There's a project for anybody interested in anthropology—to see how a group like this works together and solves a problem and produces a product. In many activities, people more and more will find that it is the amateur bird observers and the amateur midge collectors who get together with people with professional skills in that field and work on a problem. CRF is already up and running and has been doing this for a long time.

It's not likely to achieve its morally stated aims for a long time yet. It's worth studying how you go about it.

It was nice to do some cave survey. That was very satisfying, especially for a person who is as rusty at the physical techniques as I am. But when I remained in camp with our daughter the first day, as I was watching people get up, eat, get their gear set up and move out, I wasn't just looking on in envy. I was actually enjoying myself. The level of conversation that goes on in the field house in terms of analysis, and in terms of people's commitment, is impressive. One of the things I learned from running camps and from organizing expeditions, and I've done quite a few, one of the things you look at is the emotional

geography and how people move through it and how groups form and reform. CRF moves in a marvelously interesting pattern.

Had you been caving before yesterday, Wendy?

Wendy: Only as a tourist, so going into Salts was exciting for that reason alone. I enjoyed it a lot more than I thought I might. I especially enjoyed going into Mummy Valley where you have those wonderful polished surfaces where the aborigines climbed down. And all those piles of charcoal and burnt cane just lying in the crevices next to the polished rock. It was a really well-traveled path. I think I must have felt something like what the aborigines felt as I made my way down. Really lovely □

The Underground Reader

THE WILDERNESS UNDERGROUND: Caves of the Ozark Plateau. by H. Dwight Weaver; James Huckins and Richard Walk, photo editors. University of Missouri Press, 1992

It's hard to figure this book out. At best, it is a very nice picture book that also contains a strong conservation message. At worst, it contains very little useful information. My guess is that the book is aimed for the coffee-table nature-book market but almost nowhere else. In its efforts to harbor a strong conservation ethic the book almost never refers to caves by name or county or even state. This, inevitably, makes for a very boring book for cavers. Somehow my curiosity is not satisfied by captions like "Descending sheets of water formed vertical fluting in the limestone bedrock of this large dome." or "Seemingly by design, white calcite fringes these curtains on a cave wall."

Dwight Weaver has written extensively about Missouri caves and this book contains what is probably his best writing ever. However, there is little here that cavers probably don't already know. Since little geographic information is given (such as concentrations of caves or elevations that caves form at) the text begins to get a little flowery in order to fill the required space: "Waterfalls are spellbinding additions to the underground wilderness, and show caves that contain them are envied attractions. Trickling or thunderous, waterfalls are inevitably entertaining." Okay! But why do waterfalls form in caves?

One, poor, map of the Ozark Plateau is the book's sole graphic. No other areal maps, geologic sections, cave maps, charts, or explanatory diagrams are included. This is a major drawback. Just one diagram showing the stages of cave development in the Ozarks would have been nice.

The book was carefully constructed with only a few errors showing up here and there. The photographs are very nice but inevitably frustrating.

(They could have said things like "This type of dome is common among the caves within Mississippi River karst areas.") The conservation message is very strong and repeated often and it is in this framework that the book succeeds, in much the same way that Sierra Club books work—lots of pretty pictures accompanied by a strong message will hopefully make laymen aware of the fragile resource. For cavers, however, it's just pretty.

Reviewed by Scott House

Mammoth Cave historian **Stan Sides** contributed a section on the history of the saltpeter industry for the recently published *Kentucky Encyclopedia* (John E. Kleber, ed.; University Press of Kentucky). The book was published to celebrate the bicentennial of Kentucky Statehood. Although Mammoth Cave was far from the first Kentucky saltpeter mining site, it was the most important and best documented operation in the period leading up to the War of 1812.

CRF has recently begun receiving *Cave Science*, a publication of the British Cave Research Association. The journal has a distinctly international scope. Some of the topics covered in recent issues are:

- * Karst landscapes of Guizhou province, China (Zhang Yingjun *et al.*)
- * A new fossil primate from a Cuban cave (E.J. Salgado *et al.*)
- * Speleogenesis of the Ukrainian gypsum mazes (Alexander Klimchouk)
- * Survey of a 600 m deep cave in the Norwegian Arctic (Stein-Erik Lauritzen *et al.*)
- * Speleogenesis in the Bahamas (John Mylroie *et al.*)
- * A proposed underground laboratory in Rat's Nest Cave, Alberta (Chas Yonge.)

Any JV wishing to borrow an issue can write to the editors (address, p. 2). We will publish lists of contents from time to time.

CALENDAR

CRF ANNUAL MEETING IN ALBUQUERQUE

This year's Annual Meeting will take place in Albuquerque, New Mexico at 1.00 pm on Saturday November 14 at the University of New Mexico Biology Building, Room 100. The meeting will be followed by an all-you-can-eat buffet dinner at the County Line Restaurant (cost \$17.50 per person, gratuity included). There will be an open bar. Following the meal, JVs are invited to the house of Carol and Alan Hill for an after-the-meeting party.

Lastminute prognosticators should *immediately* notify Fritz Hardy, 505-345-1709.

MAMMOTH CAVE

Thanksgiving, Nov. 25-29. Phil DiBlasi, 502-588-6724 (office) or 502-551-6920 (mobile) 7 am-4 pm; 502-968-3576 (home 4 pm-9 pm—phone is turned off after 9 pm) or leave a message at 502-589-2340.

New Year, Dec. 31-Jan. 3. Kevin Downs, 502-933-4406
President's Day, Feb. 12-15. Paul Cannaley, 317-862-5618.

Early Spring, March 26-28. Jim Borden, 606-223-2677
Spring, April 30-May 2. Stan and Kay Sides, 314-335-1469.

Memorial Day, May 28-31. Mel Park, 901-272-9393.
Independence Week, July 2-11. Scott House, 314-287-4356.

Summer, Aug. 6-8. Tom Brucker, 615-331-3568.

Labor Day, Sept. 3-6. Bob Osburn, 314-772-5813.

Columbus Day, Oct. 8-11. Neil and Terri Hammond, 317-786-2092.

Thanksgiving, Nov. 24-28. Phil Diblasi (see Thanksgiving 1992, above).

New Year, Dec. 30-Jan 2, 1994. Kevin Downs, 502-933-4406.

First and last dates are arrival and departure dates. Notify the expedition leader or Operations Manager, Jim Borden, 606--223-2677 two weeks in advance.

**CAVE RESEARCH FOUNDATION
P.O.BOX 443
YELLOW SPRINGS, OH 45387**

ADDRESS CORRECTION REQUESTED

GUADALUPES

Thanksgiving, Nov. 26-29. Carlsbad Caverns NP. Jason Flesher.

MLK Day, Jan. 16-18, 1993. Carlsbad Caverns NP.

President's Day, Feb. 13-15. Carlsbad Caverns NP. Duke McMullen.

Early Spring, March 20-21. Guadalupe Mts. NP. Tony Grieco.

Spring, April 24-25. Guadalupe Mts. NP. Tony Grieco.

Memorial Day, May 29-31. Carlsbad Caverns NP.. Pat Helton.

Carlsbad Cavern Restoration Field Camp, June 20-26. Dave and Sue Ecklund.

Independence Day, July 3-5. Fort Stanton Cave. John Corcoran.

Summer, Aug. 7-8. Fort Stanton Cave.

Labor Day, Sept. 4-6. Carlsbad Caverns NP.

Columbus Day, Oct. 10-16. Lincoln NF. Dick Venters.

Thanksgiving, Nov. 24-28. Carlsbad Caverns NP.

Late Fall, Dec. 18-19. Carlsbad Caverns NP.

NB: Please note a change in procedure: to sign up for an expedition, notify the Personnel Officer, Dick Desjardins 505-344-7053 (7-9 pm MDT) or the food coordinator, Fritz Hardy 505-345-1709 at least one week in advance. Other expedition leaders to be announced.

MISSOURI

Nov. 7-8. Doug Baker, (314) 878-8831.

Dec.12-13. Scott House, (314) 287-4356.

Jan. 16-17; Feb. 20-21; March 20-21

Most trips originate from Alley Center in the Ozark National Scenic Riverways but others may be held at Forest Service campgrounds. Please call the expedition leader or Scott House (see above) a week in advance.

CALIFORNIA

Lava Beds, Nov. 26-29. Janet Sowers, 510-528-6515.

Lilburn, Jan. 23, 1993. Mike Spiess, 209-434-3321 (H), 209-431-8100 (W). Organizational meeting in Fresno; site to be selected.

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