

CAVE ARCHAEOLOGY AND THE NSS: 1941–2006

GEORGE CROTHERS¹, P. WILLEY², AND PATTY JO WATSON³

Abstract: Like most other branches of speleology, cave archaeology in the U.S. grew and developed significantly during the mid to late twentieth century. Originally viewed as marginal to mainstream Americanist archaeology, pursuit of prehistoric and historic archaeology underground is now widely accepted as making valuable contributions to knowledge of human past. The National Speleological Society played a central role in that development and continues to do so. We outline the establishment and growth of cave archaeology in North America, with special emphasis on relations between the NSS and archaeology performed in dark zone, deep cave interiors.

INTRODUCTION

The NSS has directly participated in cave archaeology through cooperation, education, and conservation. Members of the Society have made notable contributions to the science by reporting the location of archaeological sites, participating in their investigation, and by equipping scientists with the techniques and technology needed to work safely in the cave environment (Damon, 1991, p. 283).

Cave archaeology was a central NSS concern from the first days of the Society's existence. There was an Archaeology Committee as well as Committees on Membership, Grottos, Records, Publications, Photography, Exploration, Mapping, and Publicity at least as early as 1948 (Damon, 1991, p. 196). At the second Annual Meeting of the NSS in 1945 (the first such meeting was in 1941; the three subsequent meetings were cancelled because of World War II), a featured speaker was Frank Hibben talking about his archaeological work in Sandia Cave, New Mexico, and about putatively pre-Folsom artifacts from that site. A few years later, Hibben was the banquet speaker again at the 1953 NSS convention, presenting a lecture entitled "Ancient Cave Life in the Southwest."

Archaeologists were also included on the NSS award lists during the 1950s. Emil Haury (1951), Henri Breuil (1955), and Carl Miller (1957) all received Honorary Membership in the NSS for their work in cave archaeology: Haury for his Ventana Cave, Arizona, research, Breuil for his research on Paleolithic painted caves in France, and Miller for his excavations in Russell Cave, Alabama.

According to brief summaries in Damon (1991), papers on archaeological topics were often presented in the annual convention sessions. Specific mention of such papers is made in passing for the 1949, 1952, 1953, 1954, and 1956 conventions. In 1958, Carl Miller as the banquet speaker described his archaeological work at Russell Cave showing movies made there by the National Geographic Society. At the 1970 convention, some of Russell Trull Neville's silent movies filmed in various caves (including Salts Cave, Kentucky) were shown. The NSS still owns copies of these Neville films, which were made during the

1920s and 1930s by "the Caveman," as Neville was often called.

Despite interest in cave archaeology within the NSS governance and some portion of the membership during the first few decades after the organization was formed, systematic, long-term archaeological research by professional archaeologists in the dark zones of big caves in the Americas did not get underway until the 1960s. There are probably several reasons for this, but primary among them is the difference between rock shelter archaeology and archaeology conducted in subterranean spaces never illuminated by natural light. Research in rock shelters has been a normal part of field archaeology since the earliest days of the discipline everywhere it was practiced, but the only aspect of cave archaeology widely recognized before the 1980s was documentation of Upper Paleolithic paintings in southwestern Europe. (And, in fact, the authenticity of those dark-zone paintings was established only after a long period of heated debate beginning in the late 1800s and continuing well into the early twentieth century.) Most archaeologists specializing in the early culture history of the Americas did not think that cave dark zones, if they thought about them at all, were places frequented by or even known to ancient human groups. Therefore, cave interiors were outside the research realm of mainstream, mid-twentieth century Americanist archaeology.

Nevertheless, as the NSS and affiliated or associated organizations, such as state and regional surveys (e.g., the Tennessee Cave Survey) and voluntary but formally constituted research groups (e.g., the Association for Mexican Cave Studies and the Cave Research Foundation) grew and proliferated, cavers began making archaeological, biological, geological, and paleontological discoveries that drew increasing numbers of non-caver scientists into the underground world.

¹ Department of Anthropology, University of Kentucky, Lexington, KY 40506 USA, george.crothers@uky.edu

² Department of Anthropology, California State University-Chico, Chico, CA 95929 USA, pwilley@csuchico.edu.

³ 2870 Solterra Lane, Missoula, MT 59803 USA, pjwatson@artsci.wustl.edu.

A SHORT HISTORY OF DARK-ZONE CAVE ARCHAEOLOGY IN THE UNITED STATES

Because our focus here is on cave archaeology in subterranean spaces with extensive dark zones, we maintain a distinction between archaeology in rock shelters and small caves with no true dark zones, and archaeological research in the dark zones of deep cave interiors. The distinction merits emphasis because rock shelters are so often referred to as caves, and because

In the most fundamental sense, archaeology in caves is simply archaeology, with all the characteristics of field archaeology done anywhere But, of course, archaeology underground is different in one significant detail from archaeology done in other terrestrial locales: archaeology done inside a cave interior means archaeology done in the dark. Adequate lighting is a problem for every single individual at every moment (Watson, 1998, p. 5; see also Watson, 2001).

Moreover, so far as we know, no ancient people ever actually inhabited cave dark zones, although there is ample evidence that they often explored them, quarried them, and/or used them as storage locales, depositories for the dead or places to contact the spirit world. Hence, archaeologically speaking, cultural deposits in deep cave contexts are usually special purpose sites, secular or sacred or both. Moreover, in dry caves, which make up a large proportion of dark zone sites, preservation of anything and everything left in a specific underground location is virtually complete no matter how delicate or how old or young it may be. This means that the basic techniques used in aboveground sites (including rock shelters and deposits at the mouths of large or small caves) for identifying relative ages and cultural sequences can seldom be applied underground. Radiocarbon or other archaeometric means of dating (all of which are rather expensive) must be secured for individual items to obtain the basic chronological information that all archaeologists require: how old are these remains?

Technical problems of the sort just indicated may help explain the marginal position of cave archaeology in the U.S. before the 1980s, but in fact any and all cave sciences were generally regarded as rather peripheral endeavors until the latter part of the twentieth century (e.g., White, 2003).

THE BEGINNINGS OF SYSTEMATIC CAVE ARCHAEOLOGY: 1890–1960

In the late eighteenth and early nineteenth centuries, when Euroamericans began exploring large, dry caves in the eastern U.S., such as Mammoth and Salts caves in Kentucky and Big Bone and Hubbards caves in Tennessee, they noted that prehistoric people had preceded them in many instances. Much of the Euroamerican exploration was driven by the saltpeter mining business, especially during the War of 1812 and on a smaller scale during the American Revolution. Archaeological remains preserved in these dry caves became antiquarian curiosities, especially

the desiccated or mummified bodies of prehistoric Indians found in remote passages or unearthed during nitrate mining (George, 1990).

Stories of these discoveries quickly spread in print and in folklore, with numerous artifacts and a few of the mummies coming to rest in museums. While these discoveries generated further interest in caves and helped build a fledgling cave tourist business following the War of 1812, archaeology as a discipline did not develop as a scientific field until the late nineteenth and early twentieth centuries.

Beginning in 1858, William Pengelley's systematic excavation of archaeological and paleontological deposits at Brixham Cave and Kent's Cavern in England was a revolutionary advance in archaeological recording techniques, and helped prove the co-existence of humans and extinct Pleistocene animals in Europe by demonstrating their co-occurrence in the same geological deposits (see McFarlane and Lundberg, 2005). A young archaeologist, Henry Mercer, used these new techniques in America in an attempt to answer a similar question: the antiquity of humans in the New World (e.g., Mercer, 1896, 1897, 1975). While Mercer never successfully identified human remains or artifacts of human manufacture in the same stratigraphic layer with Pleistocene remains, he systematically sought out cave sites from eastern North America to the Yucatan, including dark-zone deposits, in what was one of the first formally scientific archaeological research programs in the Americas.

A later example of systematic work in dark-zone cave archaeology was that of Alonzo Pond. An archaeologist employed by the National Park Service, Pond was sent to Mammoth Cave by the NPS Chief Historian in 1935 to investigate a desiccated body discovered by two cave guides. The body of this prehistoric Indian was found on a ledge some two miles into the dark zone from the natural entrance. The ancient caver had been crushed to death by a large breakdown block he had apparently undermined while digging through crystal-bearing sediment underlying it. Most of Pond's work in the cave was to oversee raising the multi-ton boulder and removing the body, but he also collected numerous artifacts from other locales in the cave and made observations on the nature of prehistoric mining activity there (Pond, 1937).

CAVE ARCHAEOLOGY COMES OF AGE: 1960–1970

Interest in the archaeology of Mammoth Cave accelerated in the 1960s, as reflected in popular publications by Douglas Schwartz (1960, 1965) and Robert Hall (1967). The Cave Research Foundation (CRF) also began long-term archaeological work in the Mammoth Cave area at this time. The CRF Archeological Project, directed by Patty Jo Watson, began working in Salts Cave (Watson, 1969a), then in Mammoth and other smaller caves in and near Mammoth Cave National Park (Watson, 1974).

The CRF Archeological Project marks the beginning of more systematic integration of the caving community into

scientific archaeological work. Although CRF was organized as a private non-profit foundation distinct from the National Speleological Society in order to conduct research in National Park Service managed caves, most of its members are also members of the NSS. The CRF Archeological Project also was the beginning of concerted efforts to bring dark-zone cave archaeology into the mainstream of scientific archaeological research and publication in the U.S. Research undertaken by the Project was funded in part by the National Endowment for the Humanities, the National Geographic Society, and the National Science Foundation. Watson and other CRF archaeologists frequently presented papers at regional and national archaeological conferences, such as the annual meeting of the Society for American Archaeology, and published their results in *American Antiquity*, the leading archaeological journal for work in the Americas (Bennington et al., 1962; Robbins, 1971; Watson and Yarnell, 1966). Results of research by CRF Archeological Project personnel were also published in the *NSS News* (Ehman 1966; Watson, 1966), in the *NSS Bulletin* (Freeman et al., 1973), and in the *Proceedings* for the 4th International Congress of Speleology (Watson, 1969b).

While the CRF Archeological Project was underway in Kentucky, NSS cavers made a spectacular archaeological discovery in the southwestern U.S. (Ellis and Hammack, 1968). Feather Cave, New Mexico, was a well-known site that had been excavated during the 1950s. In 1964, members of the Sandia, Pecos Valley, and El Paso NSS grottos joined forces to explore a small lead that had not been investigated by the archaeologists. After crawling approximately 12 meters through the tight passage, the NSS cavers entered a room of moderate size that seemed to be undisturbed, and contained masses of ceremonial offerings including hundreds of miniature arrows, miniature bows, and pahos (prayer sticks), as well as several pictographs. Realizing the significance of their discovery, the cavers left the remains undisturbed and reported them to the regional chairman of the NSS, Robert Willis, who contacted archaeologist Florence Hawley Ellis. Because news of the discovery had spread, it was decided to collect all materials in the cave after everything had been recorded and documented in place. It was suggested that the cave was a Mogollon shrine dedicated to Earth Mother and Sun Father, visited during biannual solar ceremonies, and was probably about 600 years old. Today, such a find would probably not result in removal of the artifacts. Rather, the first priority would be to keep the discovery quiet, gate and otherwise protect the site, leaving the material in place to respect the beliefs of Pueblo Indians who still visit such caves for ritual purposes.

CAVE ARCHAEOLOGY ENTERS MAINSTREAM AMERICANIST ARCHAEOLOGY: 1970–PRESENT

During the late 1970s and 1980s, NSS cavers began reporting archaeological remains in several dark-zone caves of the eastern U.S. A group of cavers, exploring and

mapping a large Tennessee cave that came to be known as Jaguar Cave, discovered a remote passage containing a series of human footprints preserved in the mud floor. Carefully avoiding the track way, the cavers kept their discovery quiet but alerted Watson to the find. Over a number of years the footprint passage was carefully mapped, resulting in the documentation of 274 complete footprints left by nine different individuals. Radiocarbon dating of torch charcoal associated with the prints indicates that the prehistoric cavers entered this passage some 5,400 years ago (based on calibrated radiocarbon ages), the earliest dark-zone cave exploration yet known for the eastern U.S. (Robbins et al., 1981; Watson et al., 2005).

Other discoveries by NSS cavers soon followed the Jaguar Cave work. 3rd Unnamed Cave, Tennessee, first reported to contain a few aboriginal footprints preserved in a remote passage, was found during subsequent archaeological investigation by Watson to be a significant chert quarry, which also contained petroglyphs on the ceiling of the quarry passage. The glyphs and associated quarrying activity, which dates to the Late Archaic and Early Woodland periods, was first published by Charles H. Faulkner (1988), and later was more thoroughly described by Jan Simek (et al., 1998). Twelve of fourteen radiocarbon dates from 3rd Unnamed Cave fall between 2800 and 3800 years B.P. (calibrated ages; Crothers et al., 2002). Analysis of the chert quarrying activity eventually became Jay Franklin's Master's thesis project at the University of Tennessee, Knoxville (Franklin, 1999).

Also during the 1980s, members of the Detroit Urban Grotto, who were mapping the Fisher Ridge cave system east of Mammoth Cave National Park, discovered a few isolated prehistoric footprints and a large crosshatched petroglyph far back in the dark zone of this extensive cave. CRF Archeological Project personnel documented the prints and petroglyph and obtained two radiocarbon dates on associated charcoal (2800–3600 calibrated years B.P.; Kennedy et al., 1984), but the site has not been fully published.

Under the auspices of the CRF Archeological Project, Crothers completed a Senior Honors Thesis at Washington University in 1981 documenting the remains left by would-be rescuers in Sand Cave, Kentucky, during their failed attempts to free Floyd Collins, who was trapped and died there in 1925. One of the first applications of historical archaeology to a cave setting, this thesis was published in the *NSS Bulletin* (Crothers, 1983).

In the early 1980s, a local caver discovered prehistoric drawings on mud-coated walls in an east Tennessee cave, which he reported to Howard Earnest, a U.S. Forest Service archaeologist, and Charles H. Faulkner at the University of Tennessee, who agreed to investigate the site. Faulkner enlisted the help of NSS cavers from the East Tennessee area, especially the Smoky Mountain Grotto, to document and ultimately to gate this important late

prehistoric (Mississippian) ceremonial locale (Faulkner et al., 1984; Faulkner, 1986). Faulkner's work at this site, which came to be known as Mud Glyph Cave, initiated a cave archaeology program at Tennessee that continues today. The Mud Glyph Cave project was particularly important because it alerted the caving community to these fragile remains, and many more such subtly decorated caves have now been reported for the Kentucky-Tennessee-Alabama-Georgia karst region (e.g., Faulkner, 1988, 1997; Faulkner and Simek, 1996; Simek et al., 1997).

In May 1986, for example, NSS cavers attending the annual Louisville Grotto's Speleofest found an extensive array of geometric renderings traced in the mud floor of a large, low room well back in the dark zone of a cave now known as Adair Glyph Cave. The cavers notified Philip DiBlasi, a University of Louisville archaeologist, who subsequently obtained a radiocarbon determination for charcoal in the glyph room, indicating that the glyphs date to the Late Archaic period (3500–4200 calibrated years B.P.; DiBlasi, 1996), similar in time to the 3rd Unnamed Cave dates.

Another very important discovery of ancient symbolic renderings in a cave dark zone was made during the early 1990s at a site in Missouri known as Picture Cave (Diaz-Granados and Duncan, 2000, Plates 12–17). In contrast to Adair Glyph Cave and Mud Glyph Cave, the artwork in Picture Cave (which is late prehistoric, hence much closer in age to the renderings in Mud Glyph than to those in Adair Glyph Cave) consists primarily of pictographs created in red, black, and, rarely, white pigments. Many of the items and entities depicted can be fairly readily referred to themes, events, or supernatural beings described in the complex oral traditions of ethnographically and ethnohistorically known midcontinental American Indian groups.

In 1981, NSS cavers from the Clayton County Cavers Grotto rediscovered evidence of prehistoric human activity in Big Bone Cave, Tennessee (Blair and Sneed, 1983; Matthews, 2006, p. 145), the same cave that Henry Mercer visited in 1896. Blair and Sneed's much more recent discoveries and subsequent reporting to Watson eventually led to Crothers's Master's thesis project at the University of Tennessee (Crothers, 1986, 1987). Big Bone Cave, like Mammoth and Salts caves, has exceptional preservation and contains numerous torch remnants, gourd bowls, woven bags, and footwear left by prehistoric gypsum miners. In fact, one important result of Big Bone Cave archaeology is demonstrating that pre-Columbian gypsum mining was a widespread activity extending well beyond the Mammoth Cave region.

Larry Matthews' summary of Big Bone Cave speleological history has just been published by the NSS (Matthews, 2006). This volume contains numerous illustrations and descriptions of historic and prehistoric remains in the cave, and is a good guide to the abundant literature on this famous Tennessee site.

In 1988, NSS cavers discovered a small cave, high up in the Colorado Rocky Mountains, that they named Hourglass. Subsequently, while mapping passages several hundred meters into the dark zone of Hourglass Cave, they came upon human skeletal remains they thought were prehistoric. They contacted archaeologists and other appropriate personnel whose investigations revealed that the bones are those of a man approximately 45 years old who died in the cave nearly 8000 years ago (Mosch and Watson, 1997). This seems to be the earliest record in the Americas of dark-zone exploration in a high-altitude cave.

Beginning in the 1960s when the Association for Mexican Cave Studies was initiated (for a history, see <http://www.amcs-pubs.org/>), and becoming especially noticeable since the 1980s, NSS cavers have been actively involved in Mesoamerican cave archaeology. One recent result is the NSS Maya Caves Project (Schaeffer and Cobb, 1991). Archaeologists and cavers have been particularly active in Belize (McNatt, 1996; Moyes, 2002; Peterson, 2006), Guatemala (Brady and Scott, 1997), and Mexico (Hapka and Rouvinez, 1997; Rissolo, 2003). The NSS 2004 Ralph Stone Graduate Fellowship was awarded to a study of karstic and sacred landscapes at a Late Classic site in Guatemala. Even more recently, several NSS members exploring high-altitude caves in South America (Peru) have found numerous archaeological materials, including human remains (Knutson, 2006).

Through the 1980s and into the 1990s new archaeological discoveries in caves clearly had a synergistic effect, driving discoveries of more archaeological material in cave dark zones. As cavers reported sites and these finds became known through presentations and publications, more cavers came forward with other discoveries. Watson also taught a summer field course in cave archaeology during the mid-1980s at Mammoth Cave through Western Kentucky University's Center for Cave and Karst Studies that was popular among NSS cavers. Somewhat later in the 1980s and 1990s, two Earthwatch Institute funded volunteer projects were begun that integrated cavers into structured archaeological research projects. One is the Maya Ceremonial Caves Project (1988–1992), the other is the Cultural Resources Survey of Mammoth Cave (1993–2005). Such specialized courses and active archaeological projects that welcome volunteers can introduce cavers to the nature of archaeological remains found in caves and to the wealth of information that can be obtained when resources are protected and carefully studied.

BIOARCHAEOLOGY IN THE DARK ZONE OF CAVES

Bioarchaeology is the study of human biology revealed in archaeologically-recovered human remains, most often whole or partial skeletons. This information provides insights into the lives and biological characteristics of past

peoples, such as population structure, health, illness, and diet. Cave bioarchaeology is bioarchaeology applied to human remains found in caves.

Cave bioarchaeology focuses upon several different data sources: human skeletal and mummified remains, paleofeces, and footprints. Before information of any sort can be gained, however, such materials must be recognized and reported to relevant specialists who can carry out appropriate research while protecting these fragile remains (Hubbard, 1996). The NSS and its members have contributed to bioarchaeological knowledge by reporting human remains found underground.

Human remains in caves are either mummies or skeletons. As noted above, mummies have been described from caves in Peru (Knutson, 2006) as well as from Kentucky and Tennessee caves (Robbins, 1971; Tankersley et al., 1994; Watson and Yarnell, 1986). Contrary to nineteenth century practices (see George, 1990, 1994; Meloy, 1971), mummies are now usually examined *in situ* in caves and left there if security can be guaranteed. Where remains are not threatened by destruction, preservation in place is the preferred alternative to collection and curation of human remains, in deference to wishes of many Native Americans.

More often than mummies, prehistoric skeletons or partial skeletons are found in caves. There are several NSS-related summaries concerning cave skeletons for several southeastern U.S. states (Hubbard and Barber, 1995, 1997; Turner, 1985; Willey, 1985).

Sometimes skeletons in caves have been studied *in situ*, and in other cases they have been removed for laboratory analysis and curation. As just noted for mummies found in caves, it is preferable to leave human skeletal remains *in situ* underground unless they are threatened by looting or other destruction. *In situ* analysis may limit the information that can be gathered, but in some situations, such as pit caves where remains are exposed in the talus cone, basic data can be collected without disturbing the bones. Bull Thistle Cave, Virginia, is an example of an undisturbed pit cave where human bones exposed on the floor of the pit were documented, and then the cave was gated to protect the site (Willey and Crothers, 1986).

Unfortunately, remains in caves are vulnerable to looting, so bioarchaeologists may have to remove skeletal material for curation above ground. There are, however, some instances of remains looted from Tennessee caves that were subsequently recovered, analyzed, and published (Whyte and Kimball, 1997; Willey et al., 1988).

Reports of recently excavated and described cave skeletons include those from Texas pits (Bement and Turpin, 1991; Ralph et al., 1986; Turpin, 1985), from Hourglass Cave in the Rocky Mountains (Mosch and Watson, 1997), from a northwest Georgia cave (Crothers, 1991; Sneed and Sneed, 1991; Willey, 1991), from southwest Virginia caves (Boyd and Boyd, 1997), from central Kentucky caves (Haskins, 1988), and from an East

Tennessee cave (Faulkner, 1987). In one case, analysis of skeletons occurred decades after they were excavated (Tucker, 1989).

Most of these skeletal reports are descriptive, usually including basic data for each individual (age at death, and sex), paleopathology (diseases and injuries, such as healed fractures), and alterations to the bones after original deposition. Such reports are quite general, and usually lack problem-oriented approaches. In contrast, there are a few specialized analyses of human bones from caves. These include the use of geographic information systems and estimations of the minimum number of individuals from Honduran caves (Herrmann, 2002), rodent modifications of bones in a Middle Tennessee cave (Klippel and Meadows, 1991), reconstruction of diet based on the dental pathology characteristic of remains found in a Texas cave (Marks et al., 1991), DNA analysis of the Hourglass Cave skeleton (Stone and Stoneking, 1996), and inference of prehistoric diets based on stable isotope data for skeletons from a Virginia cave (Trimble and Macko, 1997).

The most common bioarchaeological remains found in caves, other than human bone, are human paleofecal deposits. Paleofecal analysis was an important part of the CRF Archeological Project because of the direct dietary information they contain (Gremillion and Sobolik, 1996; Marquardt, 1974; Stewart, 1974; Yarnell, 1969, 1974). In addition to dietary constituents of the paleofeces, analysts have studied pollen (Bryant, 1974; Schoenwetter, 1974) and endoparasites (Dusseau and Porter, 1974; Fry, 1974), and have even retrieved hormonal data to determine sex of the defecator. In a study of 12 specimens, all twelve indicated male hormonal ratios (Sobolik et al., 1996). In a study of human paleofeces from Big Bone Cave, Charles T. Faulkner (Faulkner, 1991; Faulkner et al., 1989) examined dietary components and evidence for endoparasitic infection. His analysis was aided by a grant from the NSS to radiocarbon date one of the specimens.

Prehistoric footprints are perhaps the rarest of all bioarchaeological materials, having been found in only a few caves. NSS cavers discovered most of the prehistoric footprints documented in North American caves. So far, only the prehistoric footprints in Jaguar Cave have been adequately described (Robbins et al., 1981; Watson et al., 2005; Willey et al., 2005), thanks in large part to support by NSS members who reported the discovery, mapped the cave, and aided in photographing and casting the foot impressions.

CONCLUSIONS

Archaeology in the dark zones of caves has come into its own as the NSS celebrates its sixty-fifth anniversary. There are a growing number of archaeologists who specialize in the nuances of doing archaeology underground. It is now more common to include chapters on

the archaeology of cave resources in synthetic and regional works (e.g., Crothers et al., 2002), and there are now enough practitioners to make up large portions of edited volumes (e.g., Carstens and Watson, 1996) or entire journal issues (e.g., Sherwood and Simek, 2001; Steele, 1997). National and regional archaeological conferences now commonly have entire symposia dedicated to archaeological cave topics (e.g., Symposium: Cave Archeology in the Appalachian Mountains, *Journal of Cave and Karst Studies* v. 59, p. 132–165). Archaeologists are also beginning to investigate saltpeter mining cave sites in a systematic fashion (Duncan, 1997), an aspect of historic archaeology in caves that has been too long neglected.

In addition to the CRF Archeological Project and several Mesoamerican cave archaeology projects (see the Mesoamerican Cave Archaeology Network <http://www.calstatela.edu/academic/anthro/mesocave.html> for a current listing), there are active cave archaeology programs at California State University-Los Angeles (directed by James Brady), the University of Kentucky (directed by George Crothers), and the University of Tennessee-Knoxville (directed by Jan Simek). Although there are now many more formally trained specialists carrying out research in cave archaeology than ever before, NSS avocational cavers will continue to be indispensable to the discovery and documentation of archaeological remains in the dark zones of caves.

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