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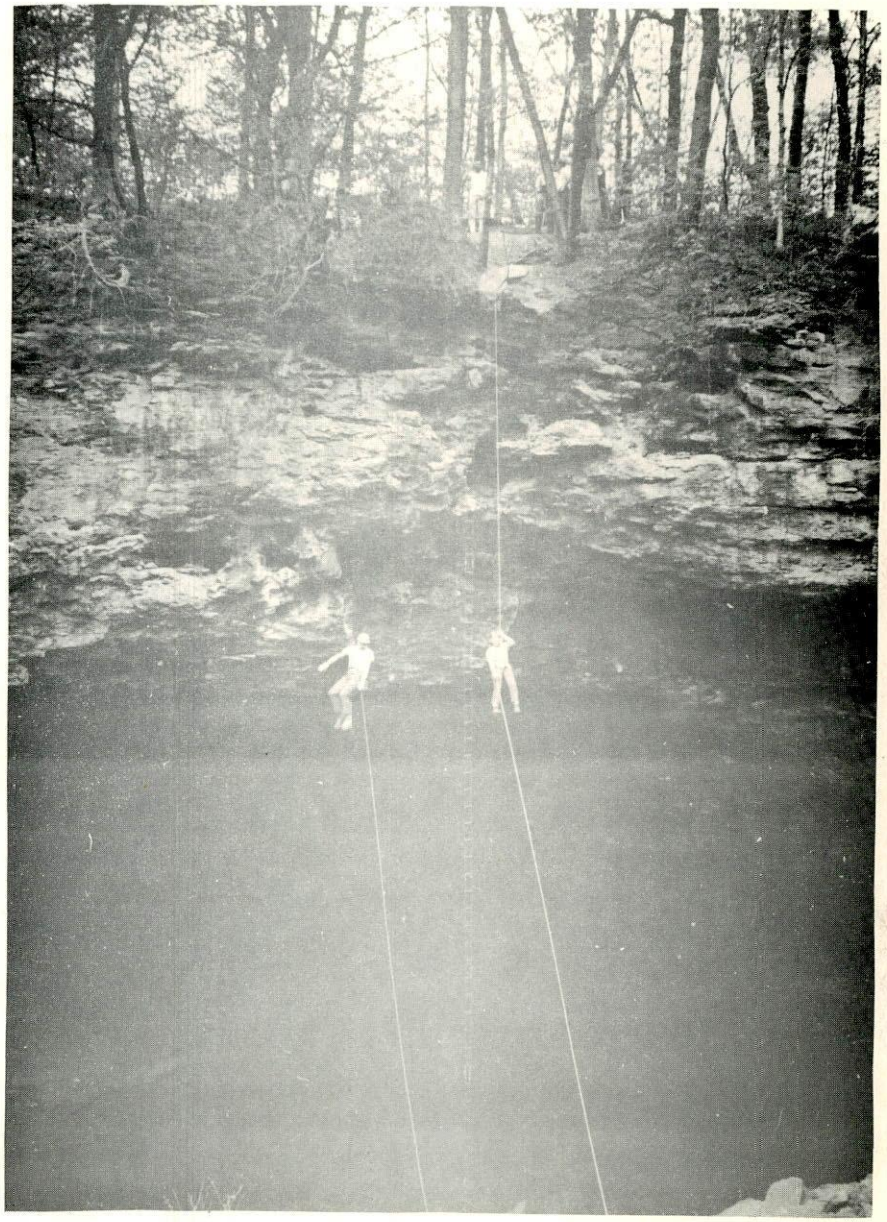

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COVER PICTURE: Dave and Sue Nicholson rappeling at Maquoketa Caves State Park.

Photo by Les Goldstein

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Volume Five Issue Three

C O N T E N T S

TO GRADE A MAP

The following grade system for maps was constructed by the Cave Research Group of Great Britain, printed in the Winter quarterly issue of the Wisconsin Speleologist for 1966, and reprinted in The Intercom, April-June, 1966.

Grade 1- A rough diagram from memory and not at all to scale; no measurements taken.

Grade 2- A sketch-plan, roughly to scale, but no instruments used for measurements. Directions, distances, etc. estimated.

Grade 3- A rough plan and survey. Directions by a small pocket compass graduated to 10 degrees; distances taken with a market stick or knotted cord of known length.

Grade 4- Map from directions taken with a prismatic compass graduated to single degrees, but its error unknown; distances found with a measuring tape or marked cord.

Grade 5- Map from directions read to the nearest degree with a calibrated prismatic compass equipped with a clinometer; metallic tape is used to ascertain distances.

Grade 6- Map from readings of a calibrated prismatic compass and clinometer mounted on tripods, or by a miners dial. Distances taken by chain or steel tape.

Grade 7- Map good enough to permit the drilling of a new entrance. A theolodite is used for bearings and slopes; distances ascertained by steel tape, chain, or tacheometry.

THE SMALLEST CAVES IN IOWA

James Hedges

General Summary

The 1969 field trip covered over 1100 miles in northeastern, north central, and east central Iowa during the period April 30 through May 8. Its objectives were these: to make a detailed examination of the caves in the Desmoinesian (Pennsylvanian) sandstones, to obtain surveys, photographs, and notes on the present status of the glacières ("ice caves") and to locate and study additional caves in the St. Peter sandstone. A few other caves conveniently near the route traveled were visited also.

I departed Iowa City, alone, early on the morning of April 30th. My first stop was at an abandoned quarry east of LeGrand, in Tama county. This quarry is opened in the top of an isolated rock knob a mile or two southeast of the famous LeGrand fossil quarries. The quarry floor intersects several impenetrable crevices through which one may glimpse a network of small, debris-filled passages in the underlying beds. The passages are collectively referred to as Piddler's Cave. A large spring flows out from the north base of the knob. Several other limestone exposures occur nearby. A prospecting trip to the area seems warranted.

The remaining stops that day were at Coal Bank Hill Ice Mine and Wildcat Cave, both of which are on the Iowa River north of Eldora in Hardin County, and at City Park Cave in Eldora. I tried to locate Rattlesnake Cave, on the bluff near Wildcat Cave, but was unsuccessful.

Before leaving Eldora, I went to Pine Lake State Park in search of Bud Bloudek. Bloudek was park officer at the Maquoketa Caves during the time when I was mapping the caves there. He no longer is stationed at Pine Lake but fortunately was there on business and very kindly invited me to spend the night with himself and his family at Dolliver Memorial State Park. He said that during his tenure at Pine Lake, a bulldozer nearly fell into a cave in a borrow area at the east end of the Hwy 175 bridge at Eldora. The opening has now been filled.

A number of publications on Iowa geology, natural his-

tory, and conservation mention "caves" in Boneyard Hollow, Woodman Hollow, and elsewhere along the Des Moines River valley south of Fort Dodge (cf. "Iowa Parks" pp. 85-93). All of these places are precipitous ravines which over a distance of from one-half mile to perhaps three miles descend steeply from the level of the Wisconsin drift plain 150 feet to that of the Des Moines. At many places the walls of the gorges rise vertically from the water's edge upward for several tens of feet.

Boneyard Hollow is now included in Dolliver Memorial State Park. I hiked up the hollow before presenting myself at Bloudek's house, but saw nothing other than a few small shelters.

The morning of May first, I examined Woodman Hollow, a state preserve a few miles up the river from Boneyard Hollow. At the upstream end of Woodman Hollow is a waterfall, 10 feet in height, beneath which is a shelter cave 30 feet wide and eight feet deep. I do not know whether or not it has a name. It is so small as to be not worth remembering.

The Ledges State Park, near Boone, is sometimes said to contain caves. I did not go there. Don Wymore checked it in 1960 and reported finding nothing of interest (Wymore, 1960).

The largest cave in Webster County, a cave known to nearly everyone for miles around, is Wildcat Cave east of Coalville. I visited the area and surveyed a large shelter beneath an ephemeral waterfall, which I assume to be the "cave".

While searching for Wildcat Cave, I drove past two houses in front of which rested large, flanged, cast iron boiling kettles of the type described by Burton Faust (1967) in his posthumous "Saltpetre Mining in Mammoth Cave, Kentucky". One now is being used as a decorative object. The other is part of an accumulation of side-yard trash. It is possible that saltpetre was once manufactured at Coalville, using earth from beneath chicken coops or from other non-cave sources as raw material. More likely, the kettles were used for rendering lard or boiling soap. Faust was an expatriate Iowan, a native of Brooklyn. Were he still alive, he might be able to supply the answer.

I drove north through Fort Dodge after leaving Wildcat

Cave, to a spring which is said (Hale, 1955, p. 48) to flow from St. Louis limestone into the Des Moines river near the mouth of Lizard Creek. I thought that perhaps there might be an enterable opening there, but a farmer in the adjacent field said there was none. The river was at such a high stage that the spring was submerged.

Cliffs of St. Louis limestone 10 to 15 feet in height occur along the valley of Lizard Creek. I walked upstream from the highway for half a mile, hoping to see something of interest, but the rock is everywhere solid and unbroken.

The wrinkles of age enfold a gathering clan of legends. The Iowa Grotto must be growing old, for it now has a legend in Don Wymore. Several times during the grotto reunion at Dubuque, I was asked to repeat the tales of "Edick Cave", of the "Muenster Cave Affair", and of "The Cedar Rapids Grotto" for the benefit of a new generation of Iowa cavers. I now present a fourth, newly discovered, chapter,"Bridge Cave".

Wymore went to Iowa Falls in 1960 and, upon returning, announced the discovery of a small cave there. No location is given in his report. The one in my file I must have obtained from him privately. My directions state that the cave exists in the river bluff, beneath the bridge, at the corner of Mildred and Walnut. The entrance dimensions are 10 by 15 feet and the cave is 40 feet long.

I drove right up to Mildred and Walnut, found the bridge, a footbridge, but cast about in vain for the cave. A passing high school student said that there were two caves, unnamed, in Wildcat Glen, but was unable to provide detailed directions to them. One of the caves, he said, can be reached only by wading. This is true, also, of Bridge Cave. None of the adults whom I questioned knew of Wildcat Glen. A gas station attendant ("as you travel, ask us") advised looking along Rocky Run, which is a wild, trash-filled gorge in the southeast part of town. Wymore states that only small holes are to be found here, which is true. Outcrops occur from the power plant at the mouth upstream past the hospital, about a quarter of a mile. A number of shallowly-undercut cliffs are present, plus a few solutional pockets, but nothing at all remarkable. The reader may imagine what oaths seared my lips as the legend of Bridge Cave grew and metamorphosed in the chrysalis of my mind, finally to stretch its mealy wings and flutter away to perdition in the waning afternoon.

However, the time spent in Iowa Falls was not entirely wasted. I received directions at the gas station to Power Plant Cave, and was able to survey and describe it before leaving town.

Camp that night was made at Dutton's Cave in Fayette County. After breakfast on the morning of the second, I took a flashlight and went to see if the crawlway was flooded. The batteries gave out in a few seconds and, not wishing to go out in the rain to get another light from the car, I heaved a rock in the general direction of the sump. A deep "ker-plunk" indicated that the crawlway was, in fact, full of water. Rarely, the water drains out and several hundred feet of additional passageway are exposed (Jagnow, 1967). A shallow trench recently has been dug between Steeple Cavern and the entrance. Fill material exposed in the banks of the trench consists of perhaps as much as 25% rounded pebbles. Some of the pebbles are of glacial origin and must have entered the cave through sinkholes upstream.

I surveyed the Brainard Ice Cave, a few miles north of Dutton's Cave, then drove on to Decorah. The Decorah Ice Cave contained a great deal of ice, perhaps as a consequence of the wet spring. Ice was continuous across the passage floor after only 15 feet and extended to the foot of the slope beyond The Division. Only an average amount was present at Locus Glacialis, however.

Dougherty Cave, north of Waukon, was found by a stroke of luck. The place had been reported only once before, by Samuel Calvin in 1896, and had not been heard of since. Calvin located the cave as being on the farm of James Dougherty in French Creek township. Before leaving Washington, I found a Dougherty property in a contemporaneous platbook and made a note of its location. Arriving in the area, I espied an old stone house in the indicated section and, enquiring there, was given exact directions to the cave.

The last cave seen on May second was Wehrhan's Mill Cave, in southern Allamakee County. I had been there in 1966 (Hedges, 1967), but did not at that time prepare a survey of it.

May third was the first day of the Iowa Grotto reunion at Dubuque and on this day, at least, I was assured of having company. Tom Backer and Ed Schott of Rockford, Illinois met me at White Pine Hollow State Park and the three of us set

off to map Yew Ridge Cave. On the way, we met David Morehouse and some other Iowa Grotto members, who most obligingly guided us to the entrance. While we were preparing to go in, Gil Peterson (Madison, Wisconsin) came battling up through the brush and joined us. It developed later that Dan ver Ploeg (Bloomington, Indiana) was there, also, but could not find the cave. Yew Ridge Cave is extremely demanding. The four of us, all experienced cave surveyors, labored nine hours to prepare only 251 feet of survey.

Peterson and I drove past Creamery Cave on the way to the banquet that evening. The Meadowgold plant in downtown Dubuque has been razed, exposing the bricked-up north entrance to the cave. The south entrance is partly collapsed. A gas station is being erected on the property.

Ver Ploeg, Ed Smith (Cedar Falls), and I went to Sampson Ice Cave the next morning. Ver Ploeg demonstrated the overland capabilities of his VW microbus. We also surveyed the cave. Sampson Ice Cave slopes into the hillside at 28°. Its floor is ice-covered throughout. Descent and ascent are possible only by wedging the feet against one wall and pressing the hands against the other, spread-eagle fashion. I lost traction about half-way down and finished the trip on my back, hands and feet in the air. Smith was already at the bottom, camera in hand, but became so concerned with changing the focus in order to compensate for the rapidly closing distance between us that no pictures of the event were obtained.

Ver Ploeg bade us good-by when we had finished at Sampson Ice Cave and left for home. Smith and I went on down the road to Bixby State Park. On the way, we stopped at Route Three Cave. The cut has caved badly. Several new entrances were visible, in addition to that of Route Three Cave, but the face was so unstable that we dared not try to reach them.

We re-surveyed the Bixby Ice Cave and took notes on its present condition. The attached map sheet contains, in addition to the new map of the Ice Cave, an earlier survey of Cool Cave and a location sketch prepared by Lawrence Blackwood.

I had been told that the owner of Searryl's Cave suspected that his cave had been stripped of its speleothems, and that he wanted me to check it for him. Smith and I drove there after leaving Bixby, but the man was not at home.

Smith thereupon had to return to Cedar Falls. I took advantage of the few remaining hours of daylight to look for the Canton Ice Cave. Three hours of bushwacking produced only two small holes behind the Canton cemetery. Disgusted, I went into town and enlisted the aid of a local boy - a grandson of the late Mr. Jones who had given Ver Ploeg and I directions to the place in 1961 (Hedges, 1961). He showed me the Blowhole, a talus cave located in the same bluff. We also found two small crevices filled with snow and ice, but not the Ice Cave itself. I gave up after an hour and went to camp.

On the morning of May fifth, I returned to Searryl's Cave and talked with the owner. He stated that he had called the sherriff one night to break up a drinking party on the road near his house and complained bitterly about cavers who liked to spook his cattle to see them run. However, he explicitly absolved Iowa Grotto members from suspicion in connection with vandalism at the cave. And, he said, during the winter when there are no cows with calves in the adjacent fields, he might consider letting people visit the cave. If you have a serious project in mind, for which it is essential to visit this specific cave (bat banding, speleothem mineralogy, etc.), write a letter to Mr. Cletus Hughes, Route 2, Cascade. You may be allowed to go in. Under any other circumstances, please do not bother him. This is not a caver's cave.

I examined the cave as far as the terminal crawlway. Happily, it has not been stripped. Searryl's Cave is still one of the most nearly pristine caves in Iowa. And the cave fairies, ah, the cave fairies. Whistling, warbling, twittering, twaddling, giggling, gurgling, limpidly laughing little girls' voices. Both rooms in the cave are nearly hemispherical in shape. As a result, musical tones generated by water dripping into shallow pools and their changing harmonic reinforcements reverberate endlessly. Only a very little imagination is needed in order to hear the voices.

The bat colony appears to have about recovered from a raid made upon it some 10 years ago. I counted 35 in half of the first room and estimated that 100 were present. 10 or 15 were seen in the second room, and a few more elsewhere in the cave. This is the largest known cave bat colony in Iowa.

The attached map is from a previously unpublished survey by George Darland and myself. We did not enter the terminal crawlway; this portion of the map is modified from a survey by Stuart Peck which appeared in Spelunking in 1961.

Near the mouth of Farm Creek, a tributary of the south fork of the Maquoketa a few miles southwest of Searryl's Cave, a small cave was reported to exist at the site of Clay Mills, a deserted pioneer village (Barnett, 1968). It was toward Clay Mills that I now directed my attention.

Every successful caving trip, in addition to fellowship, the surmounting of obstacles, and other common rewards, has at some point a profound aesthetic experience. Unlike mountianeering, in which the time and place of the climax always are clearly in view, foreseen, anticipated, and programmed into the sequence of activities, caving provides no foreknowledge of its time and place, nor even a certainty that the event will occur. If gratification comes, it arrives unheralded, stealthily, bursting upon one in the turning of a corner, the illumination of a hidden grotto, the sudden realization that one is treading a virgin pathway. As in the giddying flash of insight during which the scientist receives the solution to his problem, awareness of discomfort, dispair, and exhaustion is transmuted into a nectar of joy and, long after the experience itself has passed, the memory of its ecstasy lies gentle on the mind.

This is not a group phenomenon. It is intensely personal. Flowering in solitude, it withers beneath the vulgar stare. I have witnessed it rarely; once, when emerging from Goat Bluff Cave into a calm, starry night, again, while resting in the entrance of Grandson Cave watching cloud shadows play across the Mississippi, this year, sitting in Clay Mills Cave musing upon the agrarian philosophies of Crevecoeur and Thoreau.

Who cannot gaze, with Volney, upon the ruins of empires and feel himself touched by the strivings of men long gone. Here are nine vacant foundations. Three houses yet totter before the grave, bracing themselves vainly against the elements for the day when their walls once again may shelter happy hearts and ring with children's laughter. The mills are gone, the dam has burst, and trees as old as I rise sturdily in the center of the road. But, though the horticulturist long ago was clasped to the bosom of his mother

earth and the names of his children grown dim on their tombstones, the apple trees bloom this spring at Clay Mills. Were I to return in season, I might pause to munch an apple where his wife loved and his children played. The living do not for long treasure thoughts of the dead. Yet, far beyond the time when the woodbine twineth and the whangdoodle whangeth men will pause to smell of our flowers and to taste of fruit, and to bless their ancient, unknown benefactors. The mill stream murmurs, the wagon wheels sigh, and horses' hooves drum dim tattooes across bridges where once three roads met to unite pioneer commerce with industry. I should hope that my trees will bloom and my orchard bear fruit so long after my bones are dust and my roof tumbled down!

It was with difficulty that I turned my back upon Clay Mills. The cave itself is virtually worthless. As said by Barnett, it can be satisfactorily illuminated by one flaming potato chip bag. The importance of the place, in retrospect, lies in the associations which it evoked. Solo caving can be highly rewarding. (Typist's note: The Iowa Grotto does not advocate solo caving.) One is not plyed with questions to be answered or bombarded with data to be written down, nor is one continually exhorted to see this, to do that, or to hurry and catch up whenever he pauses to meditate.

Though the philistines may jostle, a large share of the aesthetic rewards of caving are obtained through reflectiveness, as a result of turning off one's extraneous thoughts and resting, motionless, in total submission to the spell of the local environment. Dripping water, the flutter of wings, cave fairies twittering, tapestries of wildflowers, a fish leaping in the dusk, hoarfrost sparkling, the odor of a bee tree, ruins, shapes, tactile impressions, the quiet darkness - friends and neighbors assist in the enjoyment of none of these. What are the adventures of Thor Heyerdahl, surrounded by friends and the world listening to his radio, when laid alongside the feat of Sir Francis Chichester. So it is with group caving: safe, congenial, and generally blah. Everyone should go caving alone at least once.*

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*I am not suggesting that anyone should undertake Neff Canyon Cave with a piece of candle and a length of clothesline. The solo caver should at least be as well equipped as his gregarious brethern and large, complex, or difficult caves, especially, are not suitable objects for his attention.

My last stop before returning to Iowa City was at a cave in Picture Rock Park, Jones County. Indian Bluff Cave was reported (Mauer, 1969) to be 380 feet in length. I expected to cut it down to size in a few hours and move on. What a delusion! I surveyed 350 feet of excruciating crawlway in about 10 hours the night of May fifth and the morning of the sixth, and explored 50 feet further without reaching the end. Out of 27 sight lines, only five were longer than 20 feet. The longest was but 36 feet. The shortest was five. Midnight misery, indeed.

Other caves are said to exist in the Picture Rock area (McIvor, 1968). A recreational lake is to be constructed between Picture Rock and Monticello (Norlin, 1969). I do not believe that the water will be high enough to flood any caves, but the area should be checked over carefully before the dam is completed.

With Indian Bluff Cave, the major effort was concluded. Two other, shorter, excursions took place later. On the way to Muscatine the next afternoon, to trade phonographs and records with a fellow antiquarian, I stopped at Wildcat Den State Park. There are two sandstone caves here, both of them quite small.

On the 8th, I took my wife and daughter to Palisades-Kepler State Park in hopes of seeing some of the small caves there. Unfortunately, the river was so high that we were unable to reach any of them. Surveys prepared by Don Wymore in 1959 and carefully revised by George Hedges last year are included with this report. One additional cave, Ten-Meter Cave, is said to occur between Mallory and Storehouse Caves (Blackwood, 1960).

Thus ended, not with a bang but a whimper, my 1969 field trip. Next year, at Christmastide, I anticipate completing the surveys of Yew Ridge Cave and of Indian Bluff Cave. Yew Ridge will require two days, Indian Bluff, one. Another four days, more or less, will be spent mapping and running leads in Jones County. Anyone who might be willing to come along may drop me a line next fall and request details of the trip.

New Caves

City Park Cave
NW/SE/NE 8 87 19W 1000' (elevation)

City of Eldora
Hardin County, Iowa

City Park Cave opens six feet wide and ten feet high in the river bluff. It continues with the same dimensions, sloping gently upward, for 20 feet, whereupon it ends in breakdown. No good spots for digging were seen. The cave is developed in Eldora sandstone (Desmoinesian:Pennsylvanian). It appears to be natural in origin. There is no aphotic zone.

Coal Bank Hill Ice Mine
SW/NE/NW 5 87 19W 1000'
Carroll Hobson, Route 1, Eldora
Hardin County, Iowa

The Coal Bank Hill Ice Mine probably is an old adit. It does not appear to be of natural origin. There is a trench and mine dump at the entrance. The adit slopes gently downward for 20 feet, ending in ice and breakdown. It is six feet wide and 18 inches high at the entrance. The floor was entirely covered by ice on 30 April 1969. The entrance is in a dense woods, faces north at the base of a steep bluff, and probably never receives direct sunlight. There is no aphotic zone. A petrified log protrudes from the left wall about half way back. Coal Bank Hill Ice Mine is excavated in Eldora (Desmoinesian:Pennsylvanian) sandstone.

Dougherty Cave
NE/SW/SE 32 99 5W 1180'
(tenant) Bernard Welsh, Route 2, Waukon
Allamakee County, Iowa

Dougherty Cave is a single circular chamber developed in the St. Peter sandstone (Chazyan:Ordovician). A 15-foot free drop ends on top of a talus cone at one side of the room. There are no speleothems. THIS CAVE IS HIGHLY UNSTABLE. Great "elephant ears" of matted tree roots hang from the ceiling above fresh breakdown. The owner says that the cave has filled in a lot recently and that it formerly was more extensive. Calvin (1896) states that the cave was 60 feet deep when he visited it. At the lowest point in the cave, there possibly is a sand-filled extension leading westward beneath the ridge. Excavation would be difficult and probably unrewarding, however. Besides, at the present rate of collapse, the cave will have ceased to exist within 50 years. There is no aphotic zone.

Piddler's Cave
SE/NW/SE 7 83 16W 950'

Tama County, Iowa

Piddler's Cave is unenterable. It was partly collapsed by quarry machinery, and is mostly filled with quarry waste. Five joints, of two joint sets, are involved here. The original openings appear to have been about three feet deep and one or two feet wide. Surface depressions in the quarry floor indicate that about 200 feet of passage once existed. The cave is notable for the extremely delicate, iron-stained cave coral which occurs on rubble blocks within it. The same feature occurs in bedding and joint openings elsewhere in the quarry. Piddler's Cave was developed by solution of Hampton limestone (Kinderhookian:Mississippian).

Power Plant Cave

NW/NW/SE 18 89 20W 1075'

-

Hardin County, Iowa

The entrance to Power Plant Cave forms a rectangle two feet wide and one and one-half feet high. A crawlway leads 12 feet to a tee. To the left, a crawlway leads upslope for 15 feet to a very tight second entrance. To the right, there is a 15-foot long crawlway ending in a small room. There are two ceiling cavities in the cave. One occurs five feet from the entrance, the other is five feet from the tee. The floor consists of thin, channery silt over bedrock. Power Plant Cave resulted from solution of Hampton (Kinderhookian:Mississippian) limestone. It is 45 feet in length. There is no aphotic zone.

Wildcat Cave

NW/SE/SE 10 88 28W 975'

Marvin Sawyer, Route 2, Duncombe

Webster County, Iowa

Wildcat Cave is a large, horseshoe-shaped shelter in Desmoinesian (Pennsylvanian) sandstone. Its maximum height is 25 feet and its maximum length, 14. It becomes lower and shallower toward the ends of the horseshoe until the cliffs no longer overhang. The floor of the cave is about 10 feet above the floor of the hollow, from which it is separated by a steep slope conformable with the dripline.

Wildcat Cave is well-known locally. The entire hollow seems to be referred to by this name. Several "caves" are said to be present. I visited only this one, which occurs at the steepest part of the hollow.

Revised Descriptions

Bobcat Den
SW/NW/SW 17 77 1E 610'
Wildcat Den State Park, Muscatine
Muscatine County, Iowa
The entrance to Bobcat Den is a four-by-six foot opening in a low cliff. The passage becomes too low to follow after 25 feet. The cave is developed in medium-grained Desmoinesian (Pennsylvanian) sandstone. The rock is cross-bedded, platy, friable, buff-colored and calcareous. It is slightly case-hardened. Bobcat Den has the morphology of a solutional cave, including several phreatic wall tubes. Vandalism has been very severe. There is no aphotic zone.

Clay Mills Cave
SW/SW/SE 10 85 1W
Sagers
Jones County, Iowa
Clay Mills Cave lies 50 feet above Farm Creek just above its confluence with the Maquoketa. The entrance is six feet wide and four feet high. A crawlway leads onward. The passage bends to the right, the floor rises one foot, the passage bends to the left, the floor ascends another foot, and the cave pinches out 23 feet from the entrance. Clay Mills Cave is dry and dusty. There is no aphotic zone. The only speleothems are a bit of cave coral. Many small animal bones are lying on the floor. I collected a handful near the end of the cave and gave them to Prof. Semken of the U. of I. Geology Department. The cave was dissolved out of Hopkinton (Niagaran:Silurian) dolomite. It probably is a member of the Aftonian shallow-phreatic series.

Devil's Hole
NE 15 98 8W
Decorah City Park System
Winneshiek County, Iowa
Other elements of the Ice Cave fissure system run along the bluff for about 300 feet. There are two or three partly roofed sections in addition to the Ice Cave. The first of these has been referred to as the Devil's Hole. The name might well be applied to all, as a group. The maximum depth of the openings is about 75 feet. All may be entered by walking down talus slopes. Bats sometimes are present in them. Prof. Christiansen once found ice on the floor of one, but I saw none on May second, 1969. The Devil's Hole has not been

mapped. It arose from the expansion of joints in Galena (Mohawkian:Ordovician) limestone.

Indian Bluff Cave
NE/NW/SE 32 86 2W 920'
Jones County Board of Conservation, Anamosa
Jones County, Iowa

The entrance to Indian Bluff Cave is 15 feet wide and six feet high. A damp crawlway leads up breakdown to a small room. There is a ceiling cavity in this room, and another a short distance beyond. From the room, a crawlway descends into the aphotic region. A sharp bend to the left, with a puddle, is only 10 inches high. Beyond this bend is a short side passage to the left. Ahead is a second squeeze less than 12 inches in height. The cave is now fairly dry. A bit of cave coral may be seen in the first part of the cave, plus some flowstone and soda straws. There are no speleothems beyond this point, however. After the second squeeze, the passage bends to the left, then bends to the right twice. Between the two right-hand bends is a short section three feet high but less than 12 inches in width. At the last left-hand bend, there is a drop of one foot. The passage meanders slightly after the two right hand bends, keeping to the left. Another right-hand bend, another left-hand bend, and the passage enlarges to form a room scarcely six feet in height — the Standing Up Room. This is 250 feet from the entrance and is the first place high enough in which to stand erect. From this room, a low walkway leads to the right, ascending gently. At the top of the slope, a short side-passage extends to the right. The floor then descends slightly to a sharp right-hand bend, where there is some breakdown. The passage now meanders slightly, keeping to the same general direction. My survey ends 90 feet beyond the Standing Up Room. The cave continues unchanged about 50 feet further, at which point there is a third squeeze less than 12 inches high with a low crawlway beyond.

Indian Bluff Cave is developed in the Pentamerus member of the Hopkinton dolomite (Niagaran:Silurian). There is some spongework present; beyond the Standing Up Room, the dirt floor is higher in the center than along the walls. This is a depositional feature, not the result of later erosion or excavation. There are no breakdown scars on the ceiling and the edges of the breakdown blocks are rounded. Indian Bluff Cave probably is a shallow-phreatic cave of Aftonian age. Between the entrance and the first squeeze, the cave is damp and water was dripping at many places. Beyond the first squeeze, it is comfortably dry. On May 4 and 5, 1969, air was blowing out strongly from the entrance. At the first squeeze, the current was nearly strong enough to extinguish

a candle. Thereafter, the velocity of air movement diminished, although it remained noticeable throughout the crawlway. A few bats were seen in the cave.

Wildcat Cave
NW/NW/NE 5 87 19W 1040'
Ben Primus, Route 1, Eldora
Hardin County, Iowa

The entrance to Wildcat Cave is four feet wide and five feet high. A crawlway 45 feet in length comprises the cave. Near the end, several small petrified logs are exposed in the floor. They are oriented parallel with the passageway. Contrary to earlier reports, Wildcat Cave is developed in Eldora sandstone (Desmoinesian:Pennsylvanian), not in limestone. Two phreatic tubes are present in the right-hand wall.

Wildcat Den
SW/NW/SW 17 77 1E 610'
Wildcat Den State Park, Muscatine
Muscatine County, Iowa

Wildcat Den is a rock shelter about 30 feet deep. There is a phreatic tube at the left which may be followed for about 10 feet. The cave is developed in buff, calcareous, platy Desmoinesian (Pennsylvanian) sandstone. The rock is cross-bedded and somewhat case-hardened, medium-grained, and friable on fresh exposures. Vandalism has been very severe. There is no aphotic zone.

Yew Ridge Cave
SW/SE/NW 8 90 2W 1020'
White Pine Hollow State Park
Dubuque County, Iowa

Yew Ridge Cave was first reported by Steve Barnett in 1967. Only fragmentary descriptions have been published. The cave is a very large, rugged, expanded joint in the Kankakee and Edgewood dolomites (Alexandrian:Silurian). It is estimated to be over 700 feet in length. I have visited only the west section of the cave, which is said to be the smaller and easier of the two.

The entrance pit, which is easily descended, appears in the quarry floor as a four-by-six foot rectangle. It drops 15 feet to the crest of a two-way talus. A large passage runs east and west parallel with the bluff face. To the west, the floor leads steeply downward for 40 feet. After two short drops over large blocks, there is a 45° side passage to the left. It is said to be extensive. Forty feet further is a

135° side passage to the right. This right-hand passage slopes gently downward for 20 feet, ending at an 18-foot pit. A rope is useful here, although for a good climber not essential. At the base of the pit, a passage runs east and west sub-parallel to the main passage. To the east, it ends in breakdown after 20 feet; to the west, it curves to the left and ends in breakdown after 30 feet. Just west of the pit is a short intermediate-level passage to the left. Continuing west in the main passage, one passes over an 18-foot drop. It is best to proceed on the original level by walking on, variously, chockstones and ledges. Thirty feet beyond the drop, the main passage ends at a 90° tee. To the right, the opening is too narrow. On the left, a passage extends 10 feet to a boulder choke.

The cave is of walking height throughout, except locally. The passages are mostly 20 to 40 feet in height and one to four feet in width. All have rubble floors. No evidence of significant solutional activity is to be seen. Beyond the first right-hand side-passage, the cave is aphotic. A preliminary copy of the survey will be sent on request.

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A Report

on

AN EVALUATION OF CLIMBING DEVICES

David Nicholson
January 21, 1969

Abstract

Jumars, Hieblers, Prussik knots, Buchmann knots, Hedden knots, and Spong knots are all devices for climbing a rope. The question of how safe they are can only be answered by experimentation. This report presents one experiment designed to answer this question from the viewpoint of how much weight each device will hold. Conclusions and recommendations based on the results of this experiment are presented at the end of this report.

Introduction

In the past few years, several devices have been developed to enable an explorer to climb a rope. Six of these devices will be considered in this report. Two of them, the Jumar (Swiss-made with a toothed clamping mechanism), and the Hiebler (German-made with a smooth clamping mechanism) are of the mechanical ascender classification. The other four devices are special knots. They are: the Prussik, the Bachmann, the Hedden, and the Spong. Appendix A illustrates all of these devices. Each of the special knots were tested with three types of rope: Manilla, Nylon, and Polyethelene.

The purpose of this report is to analyze the maximum load-bearing ability of each device and make recommendations as to when each device should be used. These recommendations will be restricted to the above mentioned devices since they appeared to be the best types of rope climbing devices. Similarly, only two types of climbing rope are being considered in this report, Sampson 2-in-1 (a soft, nylon rope made with a woven core placed inside a woven cover) and Plymonth Goldline (a stiff, three-strand, twisted, nylon rope). Both ropes have 7/16 inch diameters since this is the usual size for climbing. No attempt is being made to evaluate these climbing devices by any other properties (e.g. ease of use, reliability, complexity, etc.) than that of maximum load-bearing ability due to the extreme difficulty of obtaining non-prejudiced data.

This report will be divided into five major parts: (1) the test procedure, (2) the test materials, (3) the test results, (4) the possible inaccuracies and inconsistancies, and (5) conclusion and recommendations. The test results will be sub-divided into each of the six types of climbing devices. A brief discussion of how each device reacted during the testing will be included in these sub-divisions. Comments pertaining to the climbing line will also be included here.

Experimental Work

Test Procedure. In order to obtain the information needed to evaluate each climbing device, a laboratory experiment was devised using a Riegle testometer. This machine consists of two heavily built platforms which are moved apart by an electric motor. It is capable of applying up to sixty tons of force. As the lower platform moves downward, a stretching force is placed on the test specimen. This force simulates placing a weight on the specimen just as there would be during actual use. The amount of force on the specimen is shown by a pointer on a balance scale built into the machine. When the test specimen breaks, the indicator on the scale quickly moves to a smaller number.

The experiment was divided into two series of tests: One series using the Sampson 2-in-1 rope as a climbing line, and the other using the Plymonth Goldline as a climbing line. Each series tested all of the devices: the Jumar, the Hiebler, and all four knots tied with each kind of rope. Three tests were made on each device in order to obtain an average value for the device. This system of testing resulted in forty-two tests for each series, or eighty-four tests for the complete experiment. Each test was run until the climbing device failed by either breaking or sliding rapidly down the climbing rope. The raw data obtained from these tests is given in Appendix B.

Test Materials. As mentioned above, Sampson 2-in-1 and Plymonth Goldline were used for the climbing rope. The Sampson 2-in-1 was chosen because of the recent controversy pertaining to its ability to withstand the toothed cams of the Jumar. Goldline was used as a standard of comparison since almost all serious climbing is being done on this type of rope.

The mechanical ascenders, the Jumar and the Hiebler, were chosen because of their extreme popularity and because they

differ completely in the way they grip the climbing line. It was questionable whether the toothed cam of the Jumar would fail before the smooth cam of the Hiebler would. Because of their widespread use and simplicity, only four special knots were chosen to be tested. Manilla, nylon, and polyethelene were used for the special knots since they are the most common sling materials.

Test Results. All six climbing devices will be dealt with individually in this section. Each of the special knots will be discussed with respect to all three types of sling material.

1. Jumar. This device did very well during the tests on both Sampson and Goldline. There was no slippage on either rope before failure. Both ropes made a shredding sound just before failure. When the Sampson failed at an average value of 1552 pounds, only the outer sheath broke. The Jumar slid down the rope about an inch, causing the sheath to become fused together. The core showed no signs of being damaged on any test; only the sheath was damaged. After failure, the Sampson, with the Jumar still on it, held 750 pounds. It would appear that the rumor that only the outer sheath of Sampson supports any load when used with Jumars is true since the core was never damaged in any of the tests. The Goldline, although holding more weight, an average value of 1640 pounds, suffered more damage after failure. One strand of the three broke completely, a second one was severed more than halfway through, while the third was severely mauled. Despite this condition, the Goldline was still able to support 600 pounds. The Jumar showed no signs of malformation or damage during any of the tests. It would seem the Jumar is designed rugged enough so the only limiting factor is the strength of the climbing line.

2. Hiebler. This device proved very disappointing. When tested with the Sampson rope, the cam tended to pull sideways, moving around the rope, thus bending the hinge-pin. This caused the rope to become pinched between the side of the cam and the main body of the Hiebler. Only two Hieblers were available for testing, and both were damaged after only one test apiece. The first Hiebler gave a value of 930 pounds while the second gave only 920 pounds. The third test with Sampson rope was not conducted since the range of the first two tests was so close. Both Hieblers were repaired by straightening the hinge-pin before testing them with the Goldline rope. The first test on Goldline broke the Hiebler at only 820 pounds. Failure was

caused by bending the hinge-pin so much that the rivetted head of the pin sheared off. Since the Hieblers were borrowed, no further tests were made with this device on the Goldline rope in view of the possibility of breakage. It would seem the Hiebler has a structural defect due to the tendency for the hinge-pin to bend and pull apart. One possibility that was not investigated for this report is that perhaps the Hiebler was designed for a smaller diameter climbing rope than that used. This would allow the cam to close farther and thus prevent it from bending sideways.

3. Prussik Knot. This knot, when tied with manilla rope, held an average of 717 pounds on the Sampson and an average of 837 pounds on the Goldline. The knot failed on the Sampson by sliding rather than breaking the sling. There was no slippage on the Goldline rope. The sling would break next to the Prussik knot.

Nylon was the best material for the Prussik knot as the Sampson held an average of 1407 pounds and the Goldline held an average of 1103 pounds. This material did not slip much on either rope until there were over a thousand pounds of force on it. When the knot did slip, it only went about an inch, then welded itself to the climbing rope.

Polyethelene rope did not do well with the Prussik knot. On Sampson, the knot held only an average of 360 pounds and on Goldline only an average of 793 pounds. There was practically no slipping under a light load, but as the load increased, the knot started to slide steadily. This knot worked better on Goldline probably because the plastic rope could fit into the grooves on the Goldline and thus could not slide as easily as it could on the soft and smooth Sampson.

4. Bachmann Knot. Manilla did not hold at all well with this knot. Sampson had an average value of 360 pounds and Goldline 287 pounds. Because of the stiffness of the manilla rope, it was very difficult to tie this knot. The stiffness of the rope could be the reason the knot did so poorly.

The nylon rope seems to be the best material to tie a Bachmann knot with since Sampson gave a value of 1703 pounds and Goldline 1620 pounds. There was a little sliding with the lighter loads, but after 150 pounds, the rate of slipping decreased rapidly. Sampson, perhaps due to its soft, smooth surface holds nylon better than Goldline.

The polyethelene rope did not hold well on Sampson with the Bachmann knot. An average value of 333 pounds for Sampson and 903 pounds for Goldline was obtained for this knot. This material seems to hold a light load on Goldline quite well, but will not support a heavy load on Sampson without sliding rapidly.

5. Hedden Knot. The slack in the knot would not come out when it was tied onto the Sampson because the manilla rope was very stiff. This resulted in an average value of only 93 pounds for the Sampson rope. When this knot was tied onto the Goldline, it was possible to tie the knot a little tighter. This gave an average value of 967 pounds for the Goldline by breaking at the knot with little or no slipping.

Nylon did a tremendous job with the Hedden knot. There was no slipping on either the Sampson, with an average value of 1540 pounds, or the Goldline, with an average value of 1550 pounds. When the nylon sling did break, it always broke at the knot after welding itself to the climbing rope.

Once again, the polyethelene rope held better on Goldline than Sampson. This time it was with the Hedden knot. Sampson gave a value of 420 pounds, while Goldline gave a value of 1287 pounds. There was some slipping with both types of climbing rope which ended in rapid slipping at the end of the test.

6. Spong Knot. Manilla rope did very poorly with this type of knot on Sampson with a value of only 170 pounds. The knot would not tighten up on the Sampson rope and hence would not support much weight. A better showing was made with Goldline with a value of 737 pounds. Although this still is not very high, the manilla sling broke at the knot. There was no slipping during all of the tests when the knot was tied on Goldline.

When the Spong knot was tied with nylon rope on the Sampson, it tended to slip continously although not as fast as the machine was pulling it. This gave a value of 1077 pounds for the Sampson. The Goldline did much better with a value of 1550 pounds and no slipping at any time. The nylon sling finally broke at the knot during each test.

Polyethelene rope did fair with the Spong knot. There was little or no slipping with a light load, although the knot

did start to slip on the Sampson at about two-hundred pounds. Goldline gave a value of 1150 pounds while Sampson gave only 303 pounds. The plastic sling did not show any sign of wear or damage after any test.

Possible Inaccuracies and Inconsistancies

A possible source of errors in connection with the special knots tied with manilla rope is the fact that the rope was new and very stiff. This prevented the knots from tightening up on the climbing line, thus resulting in a lower value than would be expected from a used manilla rope. This problem was also encountered with the polyethelene rope. It was slippery enough to prevent tightening up the knot. The only way to remedy this situation was to put at least fifty pounds of tension on the loop.

Another point in question is the validity of the results obtained from the slow rate of loading used. Under actual field conditions, the load would not be applied at four inches per minute, as it was in the laboratory, but would be applied as fast as possible. A faster rate of loading would make the knot tighten up faster than a slow rate of loading. This would probably result in higher values for some of the devices, particularly those that consistantly slid under light loads.

Conclusion and Recommendations

Several conclusions can be reached on the basis of the data presented in the preceding sections and Appendix B. Some of these conclusions are:

1. All devices except the Hiebler, the nylon Prussik knot, and the manilla Bachmann knot hold better on Plymonth Goldline than on Sampson 2-in-1.

2. The Jumar holds better than any other device tested.

3. The Hiebler is structurally unsound at loads over 900 pounds.

4. Nylon is the best material to tie special knots with.

5. Manilla and polyethelene rope are not suitable materials to use with Sampson 2-in-1 climbing line.

Using a safety factor of at least ten-to-one as a basis, the following recommendations pertaining to climbing devices are offered:

1. If you can afford the cost, use Jumars.

2. The second best climbing device is the Bachmann knot tied with nylon rope.

3. The other knots tied with nylon rope are within the safety margin.

4. Do not use Hieblers or special knots tied with either polyethelene or manilla rope.

KNOTS

Overhand

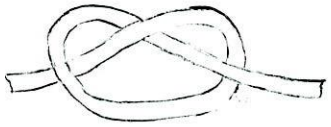


Figure Eight

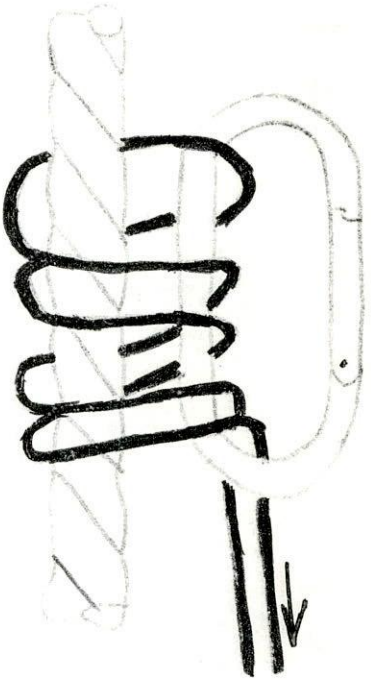
Plymouth, the makers of Goldline and many other ropes recommend that a figure eight knot be used in place of an overhand knot. The figure eight is easier to untie, more secure, and injures the rope fibers less than an overhand. The figure eight is appropriate any time an overhand would be.

Appendix A

Special Knots for Rope Climbing

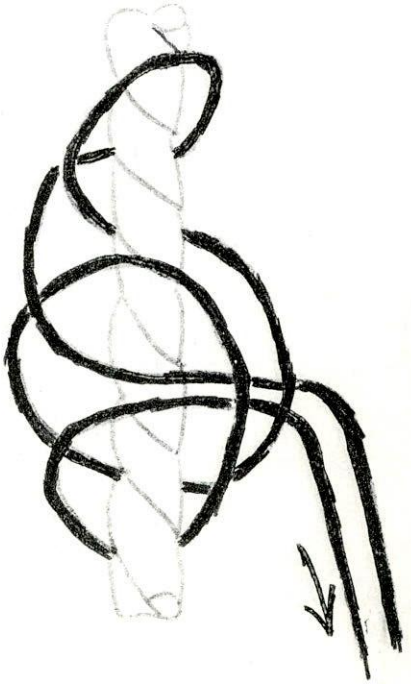
Prussik Knot

Bachman Knot



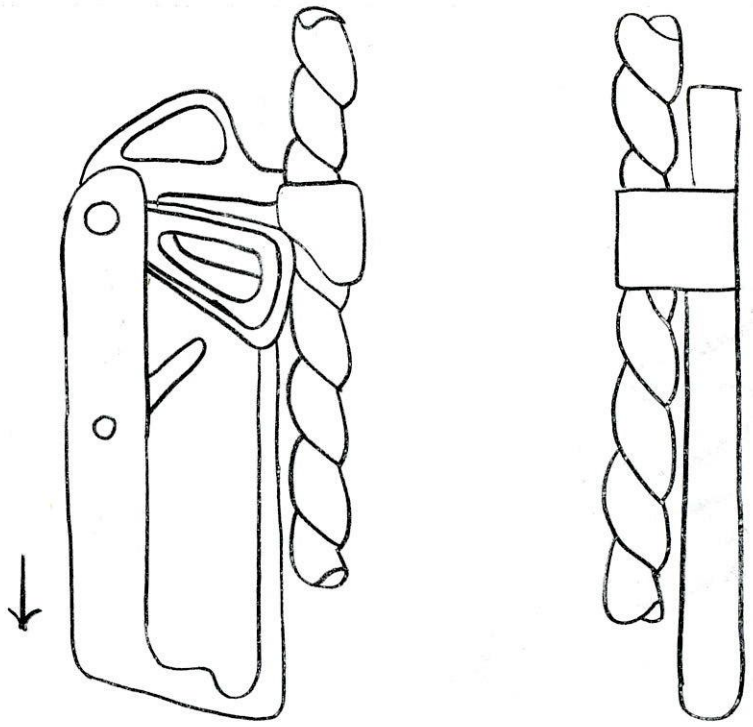
Hedden Knot

Spong Knot

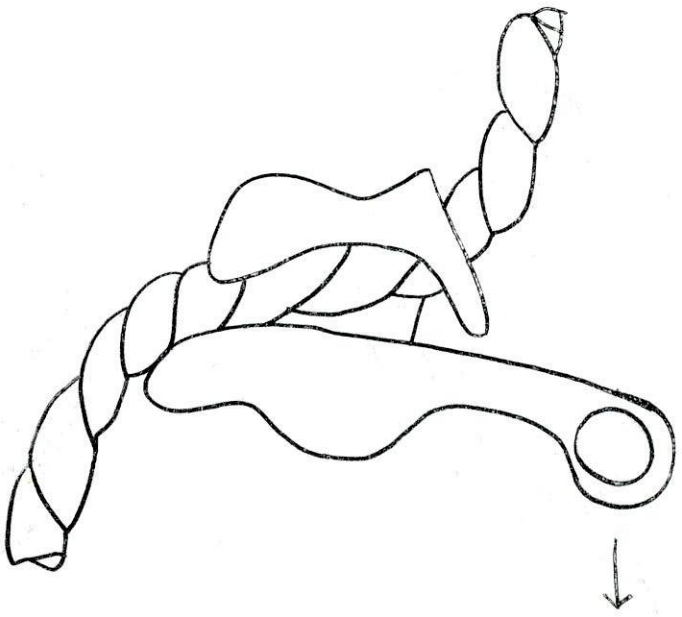


Mechanical Ascenders for Rope Climbing

Jumar



Hiebler



APPENDIX B

Raw Test Results
(all values are in pounds)

Climbing Device		Test No.	Sampson 2-in-1	Average	Plymonth Goldline	Average
Jumar		#1	1550		1650	
		#2	1585	1552	1750	1640
		#3	1520		1520	
Hiebler		#1	930		820	
		#2	920	925	???	820
		#3	???		???	
Prussik:	Manilla	#1	870		800	
		#2	640	717	790	837
		#3	640		920	
	Nylon	#1	1420		1070	
		#2	1240	1407	1140	1103
		#3	1560		1100	
	Plastic	#1	425		740	
		#2	260	362	900	793
		#3	400		740	
Bachmann:	Manilla	#1	200		340	
		#2	630	360	220	287
		#3	250		300	
	Nylon	#1	1880		1760	
		#2	1650	1703	1430	1620
		#3	1580		1670	
	Plastic	#1	330		560	
		#2	320	333	900	903
		#3	350		1250	

Raw Test Results Cont'.
(all values are in pounds)

Climbing Device		Test No.	Sampson 2-in-1	Average	Plymonth Goldline	Average
Hedden:	Manilla	#1	110		970	
		#2	120	93	1080	967
		#3	50		850	
	Nylon	#1	1500		1500	
		#2	1500	1540	1560	1550
		#3	1620		1590	
	Plastic	#1	650		1330	
		#2	340	420	1030	1287
		#3	270		1500	
Spong:	Manilla	#1	50		760	
		#2	210	170	650	737
		#3	250		800	
	Nylon	#1	1480		1540	
		#2	1500	1077	1590	1550
		#3	1590		1520	
	Plastic	#1	300		1350	
		#2	290	303	1200	1150
		#3	320		900	

CORRECTIONS AND EMENDATIONS

James Hedges

Some trip report authors, in other grotto newsletters as well as in The Intercom, have begun to refer to mine shafts as "vertical shafts". Those of us who are familiar with the Upper Mississippi Valley mining district are unlikely to be mislead by this. However, with cavers in most other parts of the world it may be otherwise for, to cave geologists, a "vertical shaft" is a natural, vertical opening developed by water trickling down a joint plane above the water table. The vertical shafts in Mammoth Cave, Kentucky are good examples. The "Steeple Cavern" in Dutton's Cave, Iowa is another.

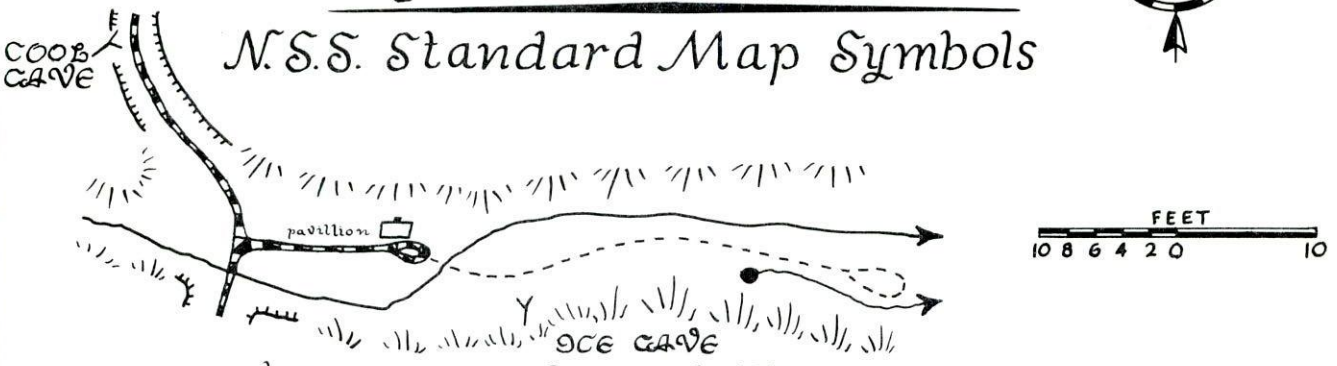
To a miner, a man-made, vertical opening connecting the mine with the surface is, simply, a "shaft". A shaft is, by definition, vertical. A man-made, vertical opening connecting levels within the mine (but not connecting with the surface) is a "winze". A horizontal, man-made passageway connecting the mine with the hillside is an "adit". A horizontal, man-made passageway connecting different parts of the mine is a "drift". A vertical, man-made enlargement of a drift, made from below, is a "stope".

For the sake of cavers in other regions, most of whom are not, as we are, also miners, it would be best to use "vertical shaft" only to describe natural cavern features. The appropriate miners' terms should be used when describing features in the mines.

Members of the former Quint Cities Grotto (Davenport area) spent many hours searching for cave entrances in the vicinity of Ozark Spring, Jackson county. Nothing of consequence was found. More recently, about two years ago, Dave Jagnow and Steve Barnett devoted considerable time to diving in the spring itself, also without gaining entry to the hypothectical master cave beyond. We all agree that a large cavern system should exist here but, now that careful probing of both the resurgence and the overlying ridge has failed to produce a useful entrance, I doubt that any more time should be spent working in this locality. Blasting is out of the question, because the adjacent Ralston Mill is an historical site.

Caves of
BOXBY STATE PARK
Clayton County, Iowa

N.S.S. Standard Map Symbols



Location sketch by Lawrence Blackwood, 1959.

COOL CAVE

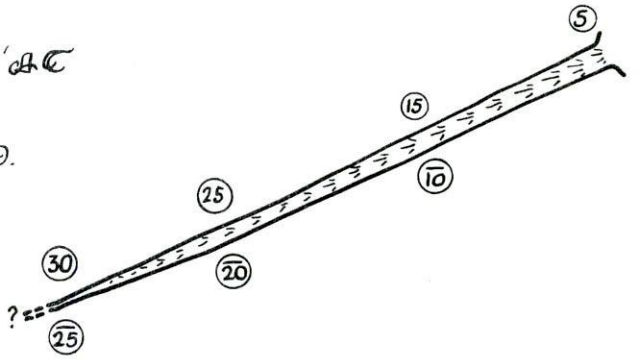
NW/SW/SW 23 91 5W 1050'AT

C.R.G. Grade 2 survey by George Darland and James Hedges, 1959.

Edgewood Quadrangle

Alexandrian Dolomite

surveyed length 40 feet



BOXBY ICE CAVE

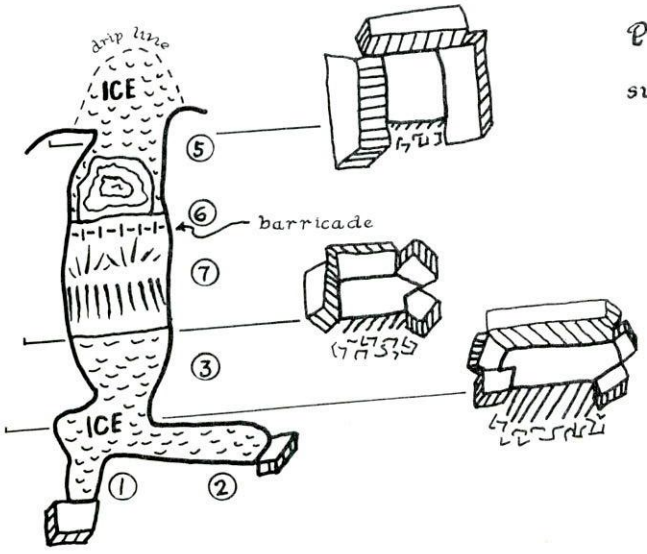
SE/SE/SW 23 91 5W 1030'AT

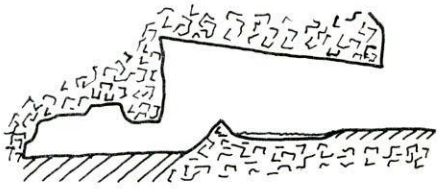
C.R.G. Grade 6 survey by James Hedges and Ed Smith, 1969.

Edgewood Quadrangle

Pleistocene coluvium

surveyed length 30 feet





JAMES HEDGES

2-70

CAVES IN the St. PETER SANDSTONE

Allamakee COUNTY, Iowa

N.S.S. Standard Map Symbols (1961)

C.R.G. Grade 6 surveys prepared by James Hedges, 1969.

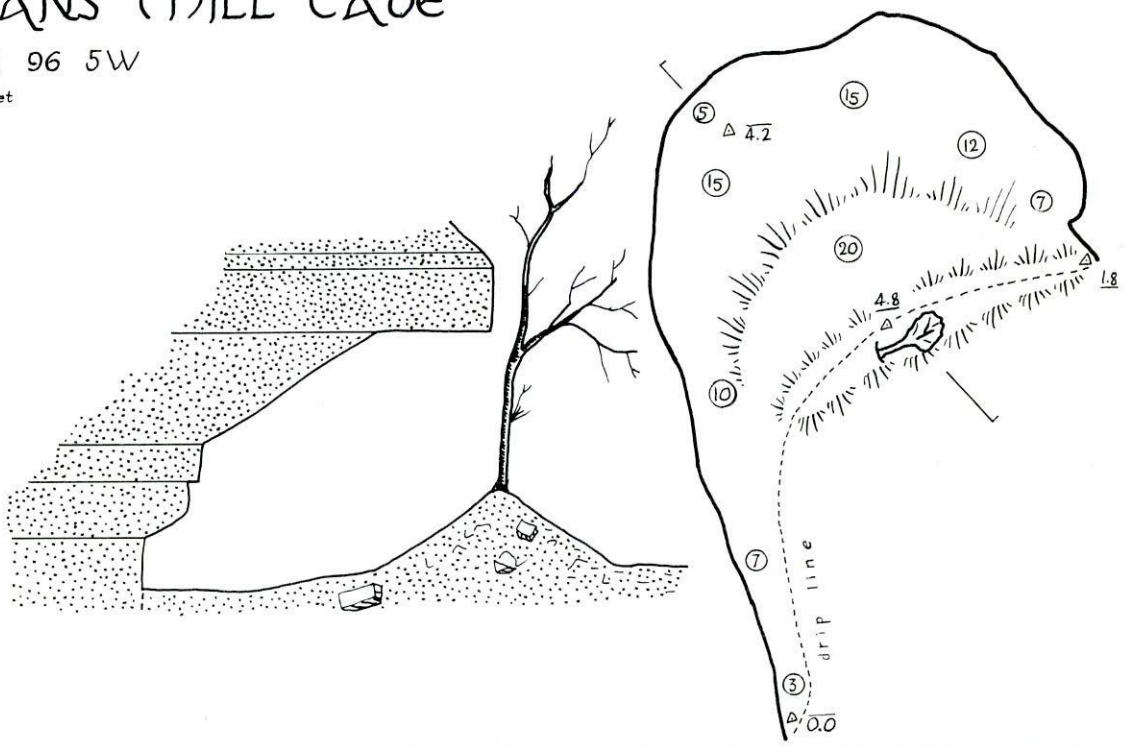
FEET
10 0 10 20 30

Waukon quadrangle

WEHRHANS MILL CAVE

NE/SW/NE 8 96 5W

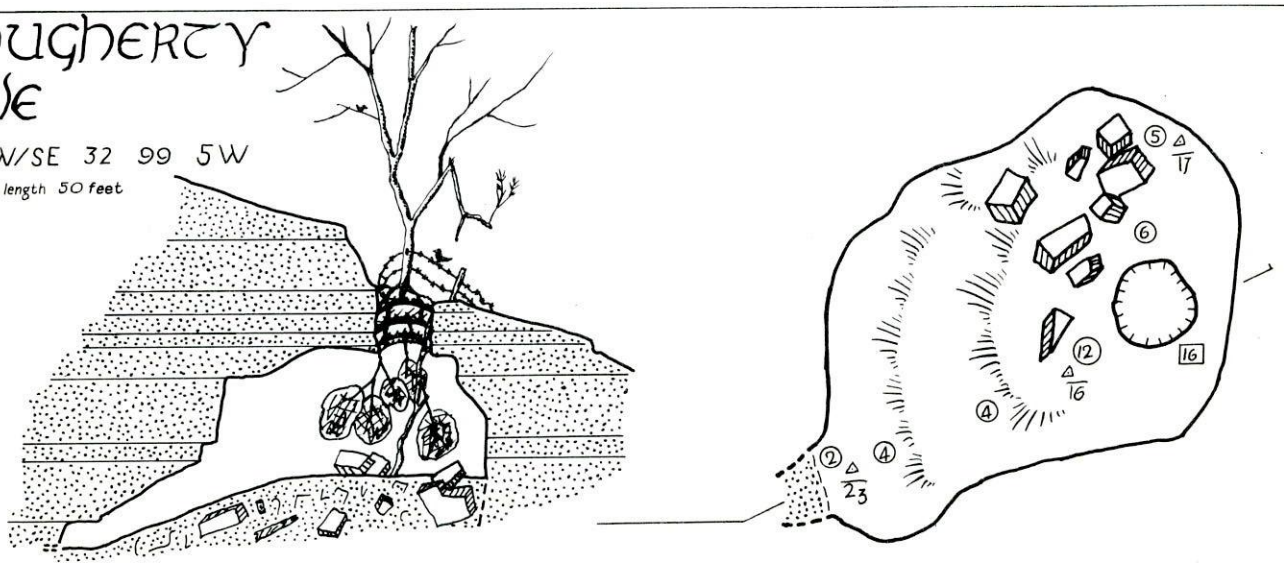
Surveyed length 60 feet



DOUGHERTY CAVE

NE/SW/SE 32 99 5W

Surveyed length 50 feet



JAMES HEDGES 8-68

CLAY MILLS CAVE
Jones County, Iowa

SW/SW/SE 10 85 1W 790'

N.S.S. Standard Map Symbols (1961)

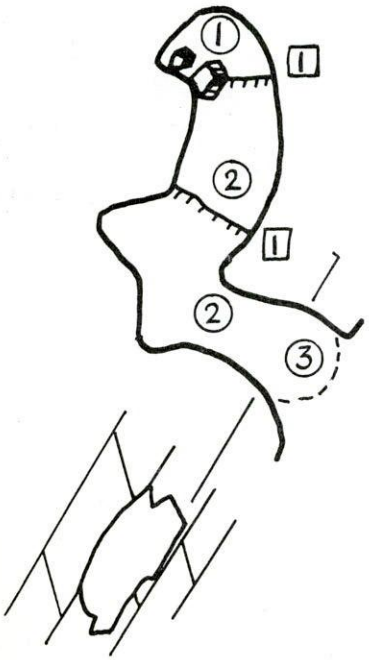
C.R.G. GRADE 6 SURVEY
PREPARED BY JAMES HEDGES
1964

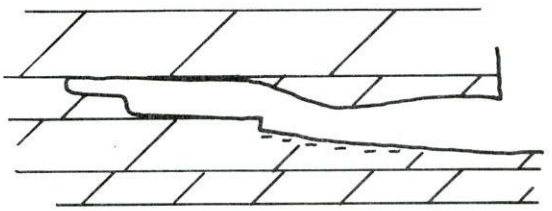
SUPPLEMENTARY SYMBOL

DRIP LINE

PEOSTA QUADRANGLE
HOPKINTON DOLOMITE
SURVEYED LENGTH 23 FEET

FEET
10 8 6 4 2 0 10 20





JAMES HEDGES 8-64

POWER PLANT CAVE
HARDIN COUNTY, IOWA
NW/NW/SE 18 89 20W

N

6°

FEET
10 8 6 4 2 0 10 20

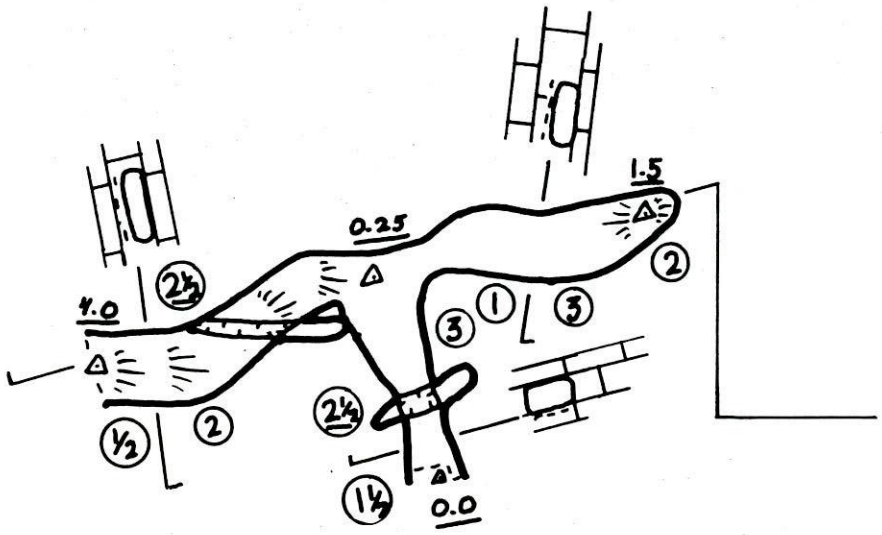
N.S.S. MAP SYMBOLS

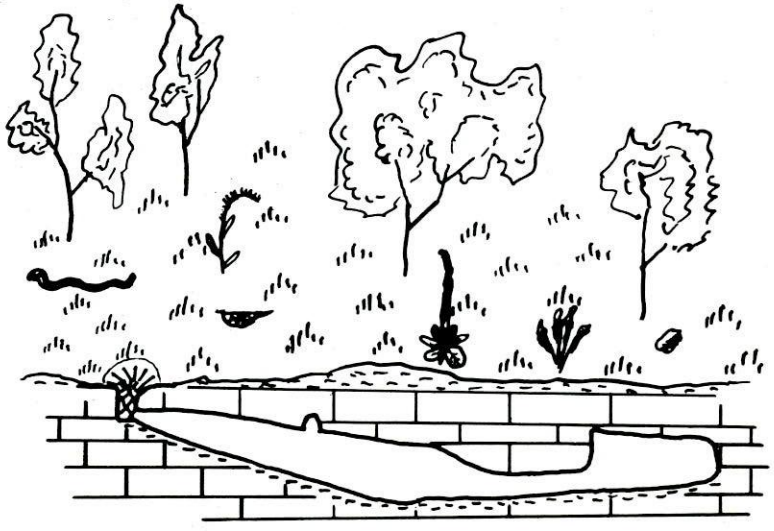
SUPPLEMENTARY SYMBOL:

// DRIP LINE

WATERLOO SHEET
HAMPTON LIMESTONE
SURVEYED LENGTH 45 FEET

C. R. G. GRADE 6 SURVEY PREPARED BY JAMES HEDGES, 1969.





JAMES HEDGES 2-70