

The Lamps That Lit Their Way

By Rick Olson¹

¹Division of Science and Resources Management, Mammoth Cave National Park, Mammoth Cave, Kentucky 42259

Abstract

The distinctive lanterns used at Mammoth Cave from the middle 1800s until 1938 appear to be a locally derived design. Early whale oil railroad lanterns share some characteristics of the Mammoth Cave lanterns, but L&N Railroad lanterns do not appear to have influenced the design. At this time, the design pathway appears to lead from simple open-flame tin candle lanterns to the same lantern with a petticoat lamp affixed in place of the candle, and then finally to the font or oil container being soldered onto the lamp base as one unit. This basic Mammoth Cave lantern varied somewhat over the decades, and was probably the primary light source used by Max Kaemper and Ed Bishop in their survey and exploration work. It is possible that Max and Ed had a carbide headlight or even a gas lantern to augment the feeble light from the Mammoth Cave lamps, but there is no record of such use.

Introduction

By the time that Max Kaemper and Ed Bishop were mapping and exploring Mammoth Cave, the Mammoth Cave lamp had been the standard source of illumination for many decades. It is a tribute to their caving skill and persistence that they were able to map approximately 35 miles of Mammoth Cave and make significant new discoveries in the dim light of these lamps.

Imagine trying to read a compass with a lamp designed to illuminate upward instead of down into the instrument where you need the light, and yet keep the lamp far enough away to avoid causing compass error. Yet manage they did. Delving into the details of period lighting may seem tangential to this centennial celebration, but covers give considerable attention and debate to lighting technology, and certainly an exploration of the lights used at the time gives us a better idea of how Max and Ed saw the cave.

Basic Features of the Mammoth Cave Lamp

One key feature of the lamps we still have today is the two tube burner that was an early innovation by Benjamin Franklin (Hayward 1962). He found that two wicks placed close to each other burned brighter and more cleanly than two separate wicks. The burner was mounted atop a font or oil vessel constructed of tin that was integrated into the base of the lamp. Wires

extended up from the base and were formed into a ring handle. A tin disk heat deflector was situated just below the wire ring handle. It was simple, durable, inexpensive, and apparently effective enough.

Where Did This Type of Lamp Come From?

The design of the Mammoth Cave lamp appears to be mostly locally derived, probably driven by ideas from the guides. In searching the literature on lard oil and whale oil lamps, there are a bewildering number of designs. Early whale oil railroad lamps share some attributes with the Mammoth Cave lamps (Figure 1).



Figure 1. Early whale oil railroad lanterns were similar in some ways to the Mammoth Cave lard oil lanterns. (From Hayward 1962).

This railroad lamp design had a ring at the top for easy carrying, and a font base with a two tube burner. The glass globe made it wind proof, and that would certainly be useful in the cave, but of course the glass is both fragile and would have been relatively expensive in the early to mid 1800s. Burning heavy oil could produce soot as well, and this would make it difficult to keep the globe clean. If you replace the globe and tin carrying ring with wire, and add a heat deflector disc beneath the wire ring, then a Mammoth Cave style lamp is the result.

Another lantern that may have served as a precursor to the Mammoth Cave lamp is the candle lantern in Cleaveland Avenue. This lantern has been known to park managers and guides for many years, and is essentially a Mammoth Cave style lamp with a cup for a candle instead of an oil font/burner (Figure 2). I have seen nothing exactly like it in the literature, but again, if you simplify a glazed tin candle lantern in the same way as described for the railroad lantern above, then you arrive at the design of the Cleaveland Avenue candle lantern. A similar candle lantern, in much better shape, is in the park's Curatorial Facility and is also shown in Figure 2.



Figure 2. At left is a candle lantern in Cleaveland Avenue, Mammoth Cave. At right, a similar candle lantern in the park's museum is shown.

It must have been very difficult to travel from the Historic Entrance, across Styx and Echo Rivers, up Silliman's Avenue and the Pass of El Ghor, and all the way down Cleaveland Avenue with an unprotected candle flame. Perhaps that

is why it was left where it was once better lights were available!

A lard oil or signal oil lantern that probably did not influence the Mammoth Cave lamp design is an L&N Railroad lantern that I purchased at an antique store in Uno, Kentucky (Figure 3). The font, which took a standard screw in two-tube burner, is mounted on a wider base, has a completely different handle arrangement, and is more robust and expensive compared to the Mammoth Cave lamps.



Figure 3. An early L&N Railroad lantern.

The L&N Railroad did not reach the Mammoth Cave area until after completion of the bridge at Munfordville on July 1 of 1859 with service commencing in October of the same year (Herr 1964). By then the basic Mammoth Cave lamp design was likely well established. One excellent clue as to the origin of the Mammoth Cave lamp is provided in a sketch of Nick Bransford by Danish-American artist Joachim Ferdinand Richardt (Thompson 2002). This excellent artwork was drawn in 1857, and shows him sitting with a Mammoth Cave lamp. The sketch and a detail showing just the lamp are displayed in Figure 4. In the detail, it can be clearly seen that the font is essentially a "petticoat lamp".



Figure 4. At left, a sketch of Nick Bransford by Richardt in 1857. At right, a detail of the lantern he is holding.

A petticoat lamp has a flared base supporting the font, and a fill tube off to the side of the font. This fill tube can be clearly seen in both figures 4 and 5. Underneath the petticoat base is a socket that enables the lamp to be mounted on a peg. This feature allowed the lamp to be attached to the high back of a chair to give light optimal for reading. I have no way of knowing if this ever happened, but if a wooden peg were inserted into the cup on a candle lantern of the type shown in Figure 2, then a petticoat lamp could be attached in place of a candle. This way, if you ran out of oil, then you could reach into your pocket for a candle, and continue on your way. Such a “dual fuel” feature would be very appealing.



Figure 5. A petticoat lamp is seen in the front row, second from the right. (From Hayward 1962)

According to Jerry Bransford, great great grandson of Mat Bransford, a photograph was taken in 1857 of Mat standing with guide equipment of the day, including holding a Mammoth Cave lantern (Figure 6). This lantern also incorporates a “petticoat lamp” in place of (or possibly attached to) the candle cup on the lantern type shown in Figure 2, but note that there are only three wires supporting the base.

In what must have been an unusual trip for a slave, Mat Bransford, a contemporary of Stephen Bishop, traveled to Louisville, stayed in a hotel, and had his portrait taken (Anonymous 1863, Lyons 2006). In the photograph, he is seated with guide tools of the trade, including a Mammoth Cave lantern of the type that persisted well into the 20th century. By this I mean that the font was constructed by the tinsmith making the lantern, and that the base of the lamp was the bottom of the font rather than being a tin saucer that a petticoat lamp was attached to. Mat is holding the lamp type that would come to dominate, but experimentation was far from over (Figure 7).



Figure 6. Mat Bransford holding a lantern utilizing a “petticoat lamp”.

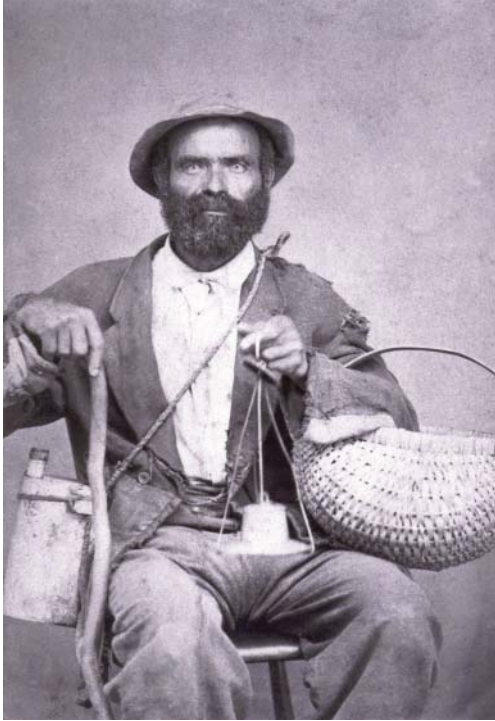


Figure 7. Mat Bransford seated with a Mammoth Cave lantern of the “final design”.

In 1866 Charles Waldach of Cincinnati, Ohio visited Mammoth Cave and took stereo photographs (Howes 1989). One particularly useful picture is of Mat and Nick Bransford at the Historic Entrance. They are seated on the grass with three Mammoth Cave lamps among other guide paraphernalia (Figure 8). The lamps are unusual in that they each have three tin vanes attached to the font that must have



Figure 8. Mat and Nick Bransford at the Historic Entrance with three unusual Mammoth Cave lamps.

been flame protectors. I experimented with my prototype reproduction Mammoth Cave lamp (made by tinsmith Bill Lawrence of Woodbury, Kentucky), and found that the vanes did help protect the flame although with some light loss. The tradeoff must not have been considered worthwhile because the vanes did not persist in subsequent lamp versions. The fonts are petticoat lamps affixed to tin saucers, and the wire handles are much higher above the flame than the lantern Nick is shown holding in the Richardt sketch (Figure 4). Another interesting aspect of these lamps is the heat deflector. They are a domed piece of tin made by a stamping process not likely done locally, and appear to be the same as in the lamp held by Eduard Martel at the entrance of Salts Cave in 1912 (Figure 24). My guess is that these heat deflectors were mass produced for a different purpose, such as a teapot lid, and that this is an adaptive use.

Charles Waldach also took a photograph of two gentlemen near Bottomless Pit. In the photo (Figure 9), one man is holding a Mammoth Cave lamp that clearly has a petticoat lamp type font,

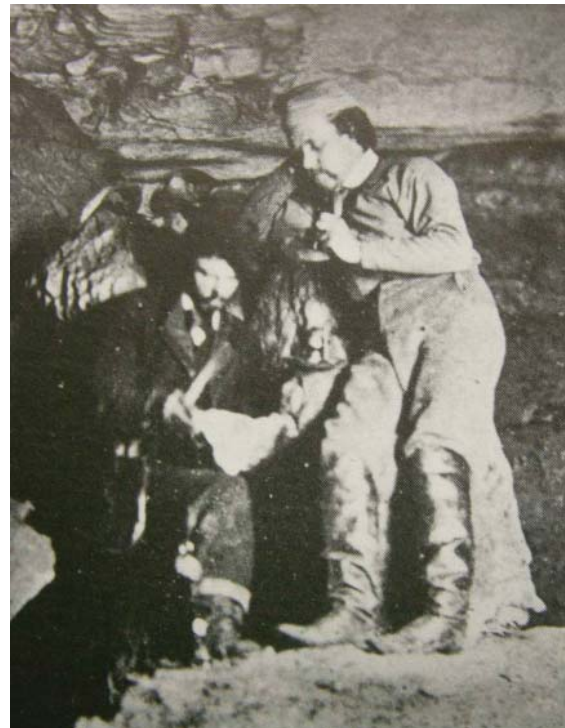


Figure 9. Photo of gentlemen near Bottomless Pit showing an early lamp design without flame protectors.

but it is not fitted with flame protectors like the lamps with Mat and Nick. Note that this was three years after Mat was photographed with what we recognize as the Mammoth Cave lamp in its final form.

When Was The Mammoth Cave Lamp Design Developed?

It is not known when lamps came into regular use in Mammoth Cave, but lard oil was in common use from 1833 to 1863. Lard oil was a by product of lard rendering, and was much more affordable than whale oil, which was commonly used from 1800 to 1840 (Kovel and Kovel 1967). In the winter of 1822-23, William Blane described a trip to Mammoth Cave guided by Mr. Miller (Blane 1824). Regarding lighting, he said “We were well provided with candles, and carried with us a small lamp, and a pot full of oil to replenish it.” Upon reaching the Rotunda, “We here lighted our candles, and proceeded on our subterranean excursion”. Based upon this first hand description, candles appear to have been the main light source, and the Mammoth Cave lamp, if it existed at all yet, does not appear to have been the dominant light source as of 1824.

In an account describing a tour of River Styx in 1844, it is stated that “The lamps are fastened to the prow; the images of which are reflected in the dismal pool.” (Bullitt 1845). No description of what kind of lamps was provided, or even whether they used oil or candles. Carefully checking letters written by visitors in the early to middle 1800s may allow the advent of dominant oil lamp use to be learned.

Who Made The Mammoth Cave Lamps?

None of the lamps examined to date in private collections and in the park’s curatorial facility have any kind of mark on them to indicate the manufacturer. In 1998, I contacted the Huntington Library, and purchased copies of Mammoth Cave estate papers from the 1800s and early 1900s. For my \$150.00 investment I got two scant references to lanterns (Figures 10 and 11). Both are from an accounting ledger;

" 11	Whrens & Ott. pipes.	+	21.80	+
" 11	Fainbanks - Morse scale	+	20.00	+
" 11	J.C. Clark Jr. Electric supplies	+	5.93	+
" 28	John Thompson. Sign painter	+	5.50	+
" 11	McGuire - lanterns	+	19.88	+
" 21	Kling - St. Jt.	+	7.20	+
Feb. 1 -	Harbo G. and Low	+	10.00	+
			<u>184.15</u>	

Figure 10. Ledger entry showing purchase of lanterns.

March 14	Dine M. W. May	9.00	+
29	Mar. Lee	23.64	
April 6.	Armour	9.75	+
	Telephone Co.	19.57	
6	McGuire Co.	18.40	+
6	Harbo Co. rent	10.	+
6	Conventual League	10.	+
" 7.	Pudic Sewell	22.5	+
9	Robinson. R. H. H.	17.28	+
27	Range	96.16	+

Figure 11. Ledger entry showing payment to McGuire Company again later in 1917.

one is dated January 23, 1917, and indicates a check was written for “McGuire – lanterns\$19.88”, and the other entry is dated April 6 of the same year for “McGuire Co.\$18.40”.

I spent part of a day at the Kentucky Library looking in old directories, but found nothing on the McGuire Company. A better researcher may have better luck. Were the checks to the McGuire Company for Mammoth Cave lanterns? Based upon photos of visitors at the Historic Entrance, likely they were because

kerosene lamps do not appear in these photos until after 1930 (Thompson and Thompson 2003). Judging from the number of variations on the basic Mammoth Cave lamp theme, many different tin smiths were engaged to make lanterns at different times.

How Many Varieties Of The Mammoth Cave Lamp Do We Know Of?

The amount of variation in the Mammoth Cave lanterns is either surprising, or isn't, depending on how you look at it. The main differences are in the construction of the font, the heat deflector, and in the wire ring handle. I know of 3 variations of the types that used petticoat lamps as fonts, 4 variations in lamps with single wire handles, and five variations in lamps with twisted wire handles for a total at this time of 12 varieties. Keep in mind that a morphometric analysis by a historian might detect more variation, and other lamp types may be found in the future. The pictures of lamps below (Figures 12-20) are presented in hypothesized order of production with particular points noted in the captions. In general, the diameter of the wire ring handle increased with time, and the height/width ratio of the front/base also increased with time, which put more light on the ground.



Ken DeJong

Figure 12. Found in Rafinesque Hall, this lamp has a narrow font, a broad flat heat deflector, and a small single wire handle.



Ken DeJong

Figure 13. This lantern was found last year in Cleaveland Avenue by National Speleological Society volunteer John Kirk. Note the small heat deflector with stamped concentric rings, and the small diameter of the single wire handle.

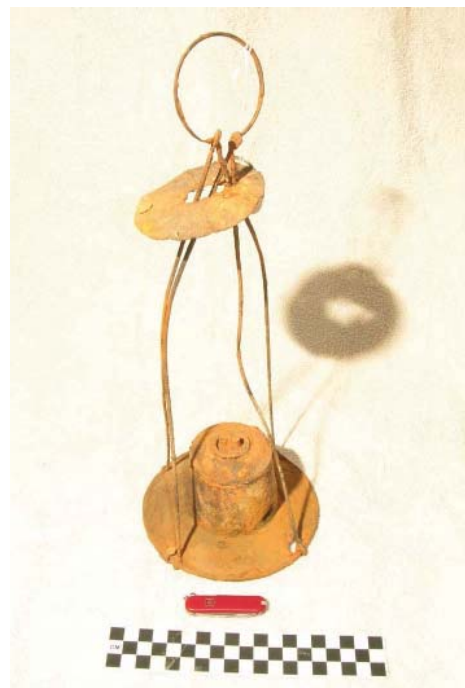


Figure 14. This lamp in the park's curatorial facility has a single wire handle, a broad flat heat deflector, and a narrow font.



Figure 15. This lamp in the park's curatorial facility is very similar to the lamp shown in the previous figure. It too has a single wire handle, a broad ridged heat deflector, and a particularly tall, narrow font.

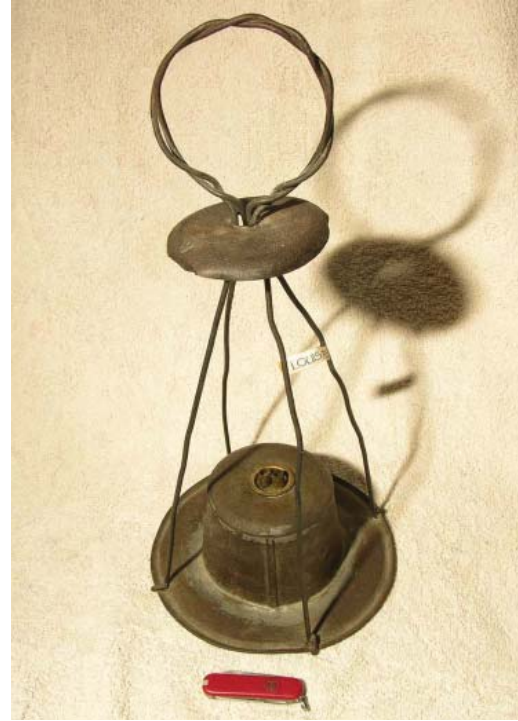


Figure 17. This lamp in the author's collection has a large loosely twisted handle, a heat deflector with a curved edge, and a flat topped font with a curved edge.



Figure 16. This lamp, also in the park's curatorial facility, has a tightly twisted wire handle, a broad heat deflector, and a domed font top stamped from a single piece of tin.



Figure 18. Like the previous lamp, this one in the park's curatorial facility has a large, loosely twisted handle and a heat deflector with a curved edge, but the font top is slightly domed.



Figure 19 . A late model Mammoth Cave lantern in the author's collection. It has a large, loosely twisted wire handle, a stamped domed heat deflector, and a domed font top. Martel is holding a lantern of the same type in figure 24.



Figure 20. Likely the last production run of Mammoth Cave lanterns, many of these were wired and used to light the hotel's Woodland Cottages until they were removed in the summer of 1996. Note the beveled heat deflector.

Were The Lamps Used in the Woodland Cottages Reproductions ?

There has been some speculation that the electrified lamps used in the Woodland Cottages were mock-ups made to look like real Mammoth Cave lanterns. However, there are two lines of evidence indicating that they were genuine lanterns. First, the fonts are "watertight" so to speak, and there would be no need to make them so that they could hold oil if they did not need to. Second, there is a lamp near the Devil's Looking Glass (Figure 21) that is almost certainly part of the same production run. Measurements were taken on both an electrified lamp and the one in the cave using a vernier caliper. The diameters of the handles measured 3.48 and 3.49 inches, the diameters of the heat deflectors measured 3.65 and 3.63 inches, and the height of the bevel on the heat deflectors measured 0.51 and 0.52 inches respectively. I can only conclude from these measurements that these lamps were part of the same production run, and that the lanterns used in the Woodland Cottages were overstock put to an alternative use after these lanterns were no longer used in the cave.



Figure 21. Lamp near Devil's Looking Glass of the same production run as those used in the Woodland Cottages.

When Were Mammoth Cave Lamps Last Used?

In an interview with former guide Parker Ritter on July 3 of 1998, Colleen O'Connor and Rick Olson learned that the Mammoth Cave lamps were last used in 1938 (O'Connor 1998). Kerosene lamps had been gradually replacing the old open flame lamps, and in 1938 the change in lighting was complete. Mr. Ritter indicated that although the fuel was called lard oil, another type of oil was likely used.

What Fuel Was Used in Mammoth Cave Lamps?

Correspondence between the American Cotton Oil Company and the Mammoth Cave Estate dated April 20, 1917 discusses purchasing a barrel of "J.V.L. Winter White Miners Oil (Figure 22). Expense records for cave lighting from 1904 and 1905 also indicate significant purchases from the American Cotton Oil Company, so likely that is the fuel that Max Kaemper and Ed Bishop used in 1908 (Charlet 1905).

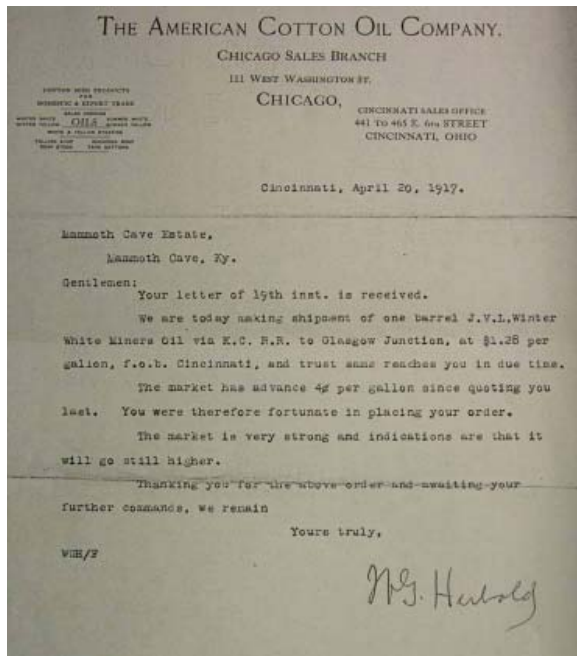


Figure 22. Correspondence between the American Cotton Oil Company and the Mammoth Cave Estate

Concluding Thoughts on Lighting Used by Max Kaemper and Ed Bishop

The ideal situation would be for us to have a picture of Max and Ed with all their cave surveying and exploring equipment included. We don't have that of course, and so we can only make inferences. In Figure 23, Ed Bishop is shown at the Historic Entrance in 1905. He is carrying Mammoth Cave lanterns in addition to his torch throwing stick. If he had a more advanced light, it is not shown. Similarly, E. A. Martel is shown at the entrance to Salts Cave with a Mammoth Cave lamp (Figure 24). He visited in 1912 and was world famous even then. If more advanced cave lights were available, then one would think he would have them. There is a slight possibility that Max and Ed may have used a carbide auto headlight (Figure 25). This speculation is based upon an account by Horace Hovey (1907), in which he describes the use of such a lamp at Cathedral Domes. Max Kaemper and Horace Hovey did correspond, so it is possible that the use of a carbide lamp was suggested. Perhaps someday more information will come to light.



Figure 23. Ed Bishop at the Historic Entrance in 1905.



Figure 24. E. A. Martel at the entrance to Salts Cave in 1912 with a lard oil lamp probably fueled with cottonseed oil.



Figure 26. Mat Bransford at the Historic Entrance with an early gas lantern.

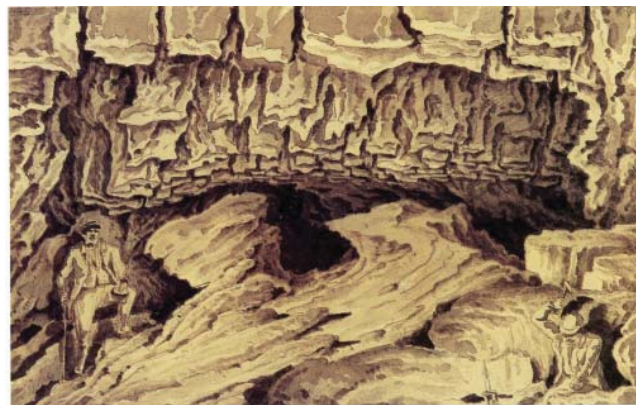


Figure 25. An antique carbide headlight of the type that Hovey might have used at Cathedral Domes.

This is a long shot, but there is a slight possibility that Max and Ed used a gas lantern during their exploration and survey work. A primitive gas lantern appears in a photo of Mat Bransford the younger (Figure 26) at the Historic Entrance in about 1915 (Lyons 2006). This lantern, or one just like it, is in the park's curatorial facility, and was made by the Akron Gas Lantern Co. I have been unable to learn anything about when these lanterns were first marketed, but W. C. Coleman began selling gas lanterns in 1902 (Kretschmann 2008). Given

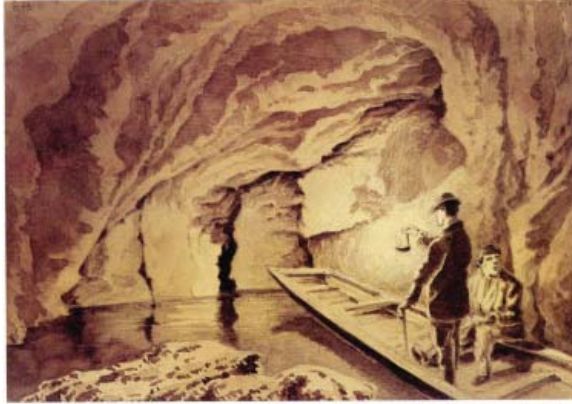
the weight and bulk of this gas lantern, it would have been inconvenient to carry, but imagine how it would show the way through the huge trunk passage they discovered and named Grand Avenue.

One final thought is important to keep in mind: at any given time, a variety of light sources were probably in use. As an example, the Mammoth Cave lantern was clearly being used by 1866 when Max Eyth visited Mammoth Cave. However, in two of the paintings he made of the cave, different light sources are shown (Binder 1997). In his painting of the Bacon Chamber (Figure 27), two gentlemen are seen with candle holders, and in his painting of River Styx, a gentleman standing in a boat is holding a bette lamp (Figure 28). Then as today, people apparently used a variety of light sources.



1. 7: Mammuthöhle. Baconchamber. Aquarellierte Zeichnung von Max Eyth, 1866.

Figure 27. A painting of the Bacon Chamber by Max Eyth in 1866 showing men with candle holders.



8: Mammothhöhle. Stvx. Aquarellierte Zeichnung von Max Eyth 1866 Inv. Nr. 111

Figure 28. A. painting of River Styx by Max Eyth in 1866 showing a man with a bette lamp.

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