Overview of Lighting in the Middle Ages:

Lighting in the Middle Ages was varied and debatably useful. The main source of light was sunlight but sadly they had not learned how to store such energy so an alternative was used in the darkness. Controlled fire was the only source of light available during those long dark hours. While uncontrolled fire was indeed a source of light, I would speculate that it might not have been a welcome source of lighting.

Hearths, torches, oil lamps, and candles were the main sources of lighting. Fuel in a hearth would likely have been wood, charcoal, dried seaweed or peat. The kitchen fire may have helped to illuminate parts of a dwelling and, for some one-room spaces, may have been the only illumination.

Torches could have been made from faggots of wood or a single stick or reed. Small to large faggots of twigs were sometimes used, and there are some naturally occurring candle type substances such as candlewood from bogs.

Oil lamps could have been as simple as a wick stuck into a container of fuel using animal fat fuels such as tallow or plant oil in their natural oil forms. These oils also could have been made into candles. Wealthier people could have used beeswax as their candle fuel.

Lighting with Candles

In this paper I will only be discussing one popular method of lighting from the Middle Ages that remains with us today - the use of tallow and beeswax for making candles. Tallow and beeswax were the typical everyday candle wax used in Europe and the Americas until the 18th century, when the whaling industry stimulated the development of spermaceti wax.

Within the middle ages, there seems to be four main types of candles available for purchase:

- Tallow of one type of animal the cheapest type usually made of cow suet
- Tallow of mixed animal fat cheap usually made of 2/3 cow suet and 1/3 lamb suet (Sim, p.45)
- Tallow with beeswax midrange expensive (Sim, p.46)
- Beeswax the most expensive (frequently used in churches)

What is a Candle?

Candle technology requires three things

- 1. A fuel source
- 2. A means of bringing the fuel to a chemical reaction
- 3. A regular and gradual supply of Oxygen

The fuel for a candle is hardened - usually hardened tallow, beeswax, or a combination of them.

As a candle burns, the fuel becomes available to the flame by capillary attraction up the wick, allowing the flame to continue burning until all fuel is spent. (Faraday, p33)

The candle fuel helps determine the heat of the flame and thus the amount of light produced by the fuel source. Fuels burn at different temperatures, and the lower the temperature of combustion, the lower the amount of light that is produced. (Sim, p.46)

The wick plays a very important role in the combustion of a candle by bringing the fuel to the combustion source. Because of this it is important to have a reliable material that is just the right diameter



Wick snips – V&A Picture by author 2008

without being too thick as to impair the regularity of the flame nor too slim as to keep the fuel from reaching combustion. To this end, medieval candle makers generally used linen threads 3-5 twisted together, as a wick. (Sim, p45)

There is some indication that wool and silk may have also been used as wicking materials (Gies p31). I have to wonder, though, if burnt wool would have been used by any but the very poor as the smell must have been quite nasty.

All organic compounds when burned will emit some carbon (soot) due to incomplete combustion. Sooting is primarily a factor of wick length and flame disturbance. (Faraday, p35) This is why wick trimming was very important. If one allowed the wick to become too long, larger amounts of soot were released into the air. Special tools were developed for the purpose of wick trimming. In fine houses and churches, one could find wicking snippers similar to the one pictured here. Other houses might use a simple knife.

Who made candles?

"When I grow up, who will I marry, the butcher, the baker, the candlestick maker?" Many children are familiar with this rhyme – we used to chant it while jumping rope on the playground and as with so many rhymes, this one comes to us through tradition.

Candle making, as you will see, is a long messy process and many medieval people preferred to purchase candle rather than make their own. The "Wax Chandlers' Company" Guild established by royal decree in 1358 in London, restricted the sale of bees wax within London and allowed only those on the guild to make and sell beeswax candles. (Bishop, p243) Edward IV granted a Royal Charter to "The Worshipful Company of Tallow Chandlers" in 1462. This allowed the "Worshipful Company" to set the price tallow candles could be sold at. They guild was also able to regulated trade of tallow candles both in and outside the City of London. (McKey et al., p364).

Many poor and rural people still made their own candles from tallow or other available materials, including bees' wax.

The Medieval Candle Making Process:

Making Tallow:

The first step in making a Tallow candle is to render the tallow from Suet. Suet is unprocessed animal fat. It comes from the back and loin area of an animal, usually from a sheep or cow but any animal can be used. It is quite smelly and the aroma continues for hours. There were some town and cities, which ban the rendering of tallow within town limits, as the order was considered especially nasty. (Geis, p342) When one considered what medieval town probably smelled like, one can only guess at what they considered an unacceptable aroma.

One would chop up the suet into smaller bits and put it into a large pot with 1 cup of water for every 2 pounds of suet. This would be set to simmer for about 4-6 hours. This was usually done over an ember fire, which would be fed throughout the day. One did not want the suet/water combination to boil as this would actually burn the fat and when the tallow was made into candles, it would burn with an even more unfortunate odor. (Sim, 46).

Once the suet was rendered, one would pour it through a cheesecloth type fabric or metal mesh strainer to separate out any impurities. One would let the pot set and allow the tallow to rise to the top and set as a hard white material. One would then take the tallow out of the pot, wipe away the impurities on the underside of the tallow and then render and strain it again. This was done 2-3



Tallow on top of water and impurities after first staining.



Underside of tallow after first rendering – note the little flecks of brown – these are impurities.

useless above 80 degrees as it would melt.

times, each taking 4-6 hours or as many times as needed to remove impurities. Poorer quality suet would require more rendering.

One also needed to harden tallow, as if one used tallow alone, one would have the equivalent of "Crisco on a wick". Not notably useful in warm weather above about 70 degrees and totally

In order to harden tallow, one added 1tsp of alum for every 16oz of tallow. Alum was imported from the Mediterranean but was not considered costly, as it was needed for a variety of household chores. Additionally, potash (mainly potassium carbonate) was frequently obtained from burnt seaweed but could also come from burnt wood from a hearth. (Chambers). In addition to the Alum or potash, this is when one would mix one's suet together using 2/3 beef and 1/3 lamb suet for the best candles according to Roy Wilde, clerk of the Worshipful Company of Tallow Chandlers, London.

Beeswax can be melted without water, and purified by straining through cheesecloth as needed to remove impurities.

After melting and perhaps mixing tallow or beeswax, one can proceed to making candles.

There were 2 basic ways to make candles:

- 1. Dipping creating candles called dips
- Roman method or dripping creating candles called drips

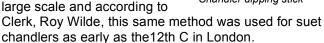
Dipping a wick into a container of suet or wax makes dips. One built the candle layer by layer. This can be a slow process but by dipping multiple wicks at the same time, one could manufacture many candles at once.

Today, there are dipping paddles, dipping sticks and dipping circles still in existence. Each was used to dip multiple wicks into a large pot or trough. The container of material was kept at



Children modeling a dipping method using round paddles

a warm but low temperature to facilitate the dipping. This seems to work well on a large scale and according to





Chandler dipping stick

The only drawback to this method is the amount of fuel material one needed to have available to dip into. It had to be a deep enough container to make tallish candles and still account for the loss of material onto the candle for each dip.

Beeswax works very well for this method due to the quick cooling of was and how quickly it solidifies. Hardened suet works too, it just takes a little longer between each dipping as it takes longer to cool and somewhat solidify.

In the drip method, one slowly pours cooling tallow or wax at the top of a suspended wick, and the wax (and/or tallow) should cool and harden onto the wick. If the new wax is too hot, it will melt away the previous drips, so the new wax should be just hot enough to pour and stay liquid with no lumps but not so hot that it melts away previous layers. The drip method is messier than dipping, but can produce a usable candle with less total fuel and equipment, such as might be the case in a poorer household. Dripping was used by the Romans hence this method also being described as the "Roman Method" well into the 18th century. (McKay et al p.366)

My Candles

Below is a chart of how tallow and beeswax candles were made in medieval times compared to how I produced mine.

| | Medieval process | My process |
|----------------------|---------------------------------|---------------------------------|
| Obtain suet | Gathered from butchering | Purchased from organic |
| | livestock or purchased from | butcher |
| | butcher | |
| Rendered suet | Simmered for hours over hot | Simmered for hours over low |
| | coals | heat |
| Strain suet – first | Metal mesh | Metal mesh |
| strain | | |
| Strain suet – | Cheese cloth type fabric | Cheese cloth |
| second strain and | | |
| again as needed | | |
| Melt tallow for dips | Melt over low heat using a tall | Melt over low heat using a tall |
| | container | container |
| Wick material | Linen, silk or wool | Cotton and wool |
| Dip bar or tree | Wooden Dip bar or tree, | dip bar |
| | paddle, circle etc | |
| Hardening agent | Pot ash, Alum, other | Alum |
| (tallow) | | |
| Heating pot/ dipping | Large metal pot of cast iron or | Modern pan |
| pot | some other metal. | |

My Process:

Since I was new to candle making, I wanted to try dipping as well as dripping and I wanted to use suet and beeswax. I was producing a variety of representational styles so I didn't invest in any large-scale pots or dipping wheels. I made a simple wooden rack upon which to hang my wicks on which I was working. I was also hampered by a small workspace as I was limited to my kitchen, oh the woes of living in a city!

I began by rendering my beef and lamb suet, which I had purchased from an organic butcher. I chopped it up and put it into water. None of the information that I have found so far seems to specify when to add your alum or potash so I added my alum at this point. The smell wasn't too bad but I was only rendering about 5 pounds. The lamb actually stunk pretty badly and I had to open the windows and bring out a fan.



Rendered for 3rd time

I let it cool, pulled off the hardened suet, which at this point is considered tallow, wiped the back and rendered it again. On the third render, I actually used a double boiler to melt the suet and strained it through a cheesecloth folded 6X. The point of rendering multiple times, it is to get the suet as clean as possible. When a candle burns, any impurities interrupt the wicking process and impact the effectiveness of a candle. (Faraday, p33)

Since the majority of home made candles made from tallow were likely to have been done by rural or poorer city families it seems logical to conclude that they may not have a lot of fuel material to work with so using the Roman method seemed like a logical starting point for making suet candles.

After all of my tallow was ready, I mixed my beef and lamb at a ratio of 2/3 beef to 1/3 lamb tallow

and thought I was ready to start but I discovered that I needed to let the suet cool quite a bit, down to almost 98 degrees F. This allowed the tallow to set more effectively and not melt the previous pours.

I did one using a spun wool piece as the wick and one using a braided cotton wick. I used wool as there was mention of this in the literature and I wanted to see how well it would work. I used cotton for the other as I could not find any linen and I don't have the skill to make my own.

I was having a difficult time getting the suet candles to build up into anything looking like candles from manuscripts (which were likely beeswax anyway). I just couldn't get them very thick. At one point, my suet on the wool slithered off entirely and I had to start again. This showed me that I needed to let my layers cool way more that I was allowing. Important learning moment – one can't rush this process!



Roman Method

Next, I mixed my suet with a very small amount of beeswax. I used 1 TBS with 2 cups of suet. It was suggested that these materials were mixed but the amount of beeswax was minimal. The really amazing thing with this combination is that the next drip candle I made built up really effectively. It still feels really greasy, but has a better smell to it.

The main drawback to this method seems to be that the wick is not reliable in the middle of the candle; this will cause uneven fuel melting and will cause the flame to flicker and produce a little less light. On the other had, if one made many of these each year, one would likely get much better at it[©].

Then I moved onto beeswax candles. I used the drip method on this material with really effective results but if one could afford to use beeswax, it seems likely that they would have been making dipped candles for richer uses.



Beeswax dips

Dipped candles are better because the wick stays in the center of the candle thus creating better fuel use and less spluttering and flickering.

For my dipping process, I used plastic cups so that I could dispose of them when I was finished. Once wax cools, it sticks to everything. Dipped candles can only be a long as the pot into which you are dipping so my candles are very short.

This was, however a much faster and more satisfying process than the suet. The wax hardens fairly quickly so you have to move along. In the period vats, the wax were kept at a constant temperature to avoid any lumps developing as the wax cools. To avoid this issue, I had a pan of warm water that I put the wax filled

cup into every few minutes to keep it liquid and non-lumpy.

Overall, this was a great learning project. I learned a lot about suet and how to render and prepare it to make candles as well as discovering it many other uses. The beeswax was pretty predictable to work with as I had tried this before using a mold back in high school.

I discovered that the Roman method was much more prevalent than I realized. I thought that candles were always dipped so learning another really effective method was great. I'll be able to make beeswax candles using the Roman method in my confined kitchen. I'm not sure about making any more suet candles, as that is really messy, smelly and very, very time intensive.

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