Late antiquity: the twilight of mouldmade lamps

Abstract: The article examines clay lamp evolution in late antiquity and explores the probable reasons for the dominance of mouldmade lamps during the first Christian centuries and the possible causes which led to their disappearance at the close of late antiquity.

Keywords: late antiquity, lighting devices, mouldmade lamps, wheel-made lamps, reproduction, imitation, regeneration, olive oil

A number of issues related to the evolution of clay lamps in late antiquity are considered in this article, investigating the tentative reasons behind the changes that occurred. Excavations in recent years have yielded a significant number of wheel-made lamps dating from the 1st to the 6th–7th centuries, both in the Mediterranean and in the northern regions associated directly or indirectly with the Roman Empire. The continuous presence of wheel-made lamps throughout the Roman period and in late antiquity is archaeologically documented. Wheel-made lamps dating from the 1st to the 7th centuries have been found in the territory of

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present-day Romania, Bulgaria, Germany, Egypt, Algeria, Cyprus, but also Greece [*Fig. 1*].[1]

The study of Anastasia Yangaki concerning the pottery from Eleutherna (Crete, Greece) for the period from the 4th to the 7th century (2005) and her paper about one category of wheel-made lamps common during the 6th and 7th centuries AD in various regions of the

Fig.1. Wheel-made lamp from the Thessaloniki Agora, late 6th–early 7th century AD (After Zachariadis 2011: Cat. No. 112)

1 Wheel-made lamps from the 1st to 7th centuries AD attested from the ancient world:

Romania	Scorpan 1973: 209; Roman 2000; Cvjetićanin 2006: Figs 7–9; Isac and Roman 2006: 79–80, 132–133, Nos 240–251
Bulgaria	Kuzmanov 2002: 257–260, Cat. Nos 53–87
Germany	Goethert 1997: 148–155, Nos 112–115 (Trier)
Egypt	Bailey 1988: 274, Q 2272 MLA, Q 2273 MLA, Q 2275 MLA, Pl. 56
Algeria	Bussière 2000: 36, Pl. 13
Palestine	Macalister 1912: Pl. CI(a), No. II; Rosenthal and Sivan 1978: 122–123, No. 508
Cyprus	Oziol 1977: 45–46, Nos 96–98, Pls 7, 96–98, Pls 57, 98
Greece	Abadie-Reynal and Sodini 1992: Fig. 35, L88, Pl. XIII, n [L88], o [L89], p [L90] (Thassos), Bailey 1988: 418, Q 3339, Q 3340, Q 3341, Pl. 125 (Kalymnos) Baldini and Parello 2001: 167–171, Pl. XXXI, c–g, Fig. 128, No. 1047, Fig. 129, No. 1215 (Gortyn) Kallipolitis and Petrakos 1963 (Aegina) Lazaridis 1965 (Nea Anchialos) Poulou-Papadimitriou 2000: Fig. 20 (Amnisos) Roumeliotis 2001: 262, 266, No. 18, Pls 6, 18 (Kos) Triantaphyllos 1972 (Thrace) Yangaki 2005: 456, 475, Fig. 67, Pl. XVII (Eleftherna) Zachariadis 2011 (Thessalonica)

eastern Mediterranean (2019) give a very informative classification and typology, and lay the foundations for easier integration of all wheel-made lamps into specific categories and subcategories.

At this point, it is worth pointing out that we have to deal with utensils, wheel-made lamps in our case, differently in each region, contrary to the case of wheel-made lamps (J.W. Hayes, personal communication, 2006), the classification and dating of which may rely on parallel examples. This is because while the process of reproducing mouldmade lamps results in similar, if not identical copies, the makers of wheel-made lamps are not able to copy them in an identical way; they render the general form of the lamps roughly, but not in detail. Based on new data, even some Broneer types, considered until recently a reference point for lamps of the Byzantine period, are properly revised and dated to late antiquity. The non-glazed lamp 1518 (Broneer 1930: Pl. XXIV, No. 1518) and the glazed 1519 (Broneer 1930: Pl. XXIV, No. 1519) are considered earlier than the 9th century; more specifically, they are dated to the 7th–8th centuries.

Therefore, it is evident that wheel-made lamps continued to be present throughout the Roman period and in late antiquity (Bailey 1972: 13). The view that after the 7th century mouldmade lamps become rarer, while coarse wheel-made lamps, often covered with glaze, begin to be manufactured and continue for several centuries in the Byzantine region (Buckton 1994: 18) should be refined. Clearly, what actually happened in this period is a remarkable increase in the number of wheel-made lamps compared to earlier times.

However, one is faced with a number of issues when considering the data presented above, namely:

- Has a continuous presence of wheel-made lamps been confirmed for all regions of the Roman Empire, or only for some of them?
- Did the production of wheel-made lamps continue without interruption in the important centers of wheel-made lamp production, such as Athens, Corinth, Patras and Carthage? For Tunisia, Michel Bonifay reported a return to wheel-made lamps six centuries after their abandonment, that is, in the 6th century (Bonifay 2004: 427–430, Fig. 24), whereas for Algeria, Jean Bussière listed five different types of wheel-made lamps of which the earliest, E (VI,1), dates to the 3rd–5th centuries and the most recent, E (VI,5), to the 5th–7th(?) centuries (Bussière 2000: 36, Pl. 13).

The specific difference between the manufacture of lamps in the period from the 1st to the 7th century AD and that of the preceding period is the introduction of moulds[2] for clay lamp production. Moulding was adopted in the 3rd century BC (Bailey 1975: 4; Petropoulos 1999: 62)[3] and was widely

2 One should not overlook the smaller percentage of handmade clay lamps (Bailey 1972: 13).

3 Although moulds were used in Greece for the manufacture of clay figurines (terracottas) at least from the middle of the 6th century BC, this procedure does not appear to have been used for lamps before the 3rd century BC (Bailey 1972: 13).

and systematically employed from the 1st century BC onwards. But even as mouldmade lamps dominated workshop production, wheel-made lamps continued to evolve (Bailey 1975: 15–16; Sampson 1987: 90).

For the considerations below, the following has been taken into account:

– for a lamp to be lit in its simplest form one needs a container for the fuel and a wick to absorb it, so that it can burn in air (Bailey 1972: 9; Buckton 1994: 18; Bussière 2000: 127); all the other features are complementary, sometimes practical, such as handles, and sometimes decorative, such as relief motifs on the discus and on the shoulder of mouldmade lamps.
– lamp shape depends on and is largely determined by parameters such as: a) use in different contexts (e.g., for domestic or commercial lighting, for funerary or votive use [Bailey 1972: 12], for ceremonies such as in the *Lychomanteion* of Patras); b) functionality (e.g., lamps should not smoke, mice should be prevented from getting to the oil and insects from falling into it, fuel should not spill) (Bailey 1972: 9); and c) economic parameters (e.g., acquisition and functioning cost) (Wunderlich 2003: 252).

Fig. 2. Indication of mass production of mouldmade lamps: here, Attic lamps from the 4th–6th century AD, Athens, pottery workshop from Ayion Asomaton Square (After Papanikola-Bakirtzi 2002: Cat. No. 110)

Why then did moulds dominate the manufacture of lamps in the 1st century BC? And why was the trend reversed in favor of wheel-making at the close of late antiquity? Are they the inverse of one another? Or are they not?

REASONS FOR THE PREDOMINANCE OF MOULDMADE LAMPS

1. ***Mass production of and trade in wheel-made lamps dating from Hellenistic times (Drougou 1983: 10; Nikolaou 2004: 49, 54)***

The *Pax Romana* facilitated population movement and trade, while the development of trade itself increased the need for the mass production of ceramic objects. Some indications for the operation of mouldmade lamp workshops, such as those of Corinth (Broneer 1930; Bruneau 1971; 1977; Broneer 1977), Patras (Petropoulos 1999) and Athens (Karivieri 1996), allow us to assume that in the Roman period, mass production was combined with a high degree of specialization, as attested by a large body of evidence:

a) Mouldmade lamps were within the means of practically anyone desiring to purchase an elaborate object of this kind, that in some cases imitated a much more expensive metal lamp (Bailey 1972: 19). Moreover, mouldmade lamps copied these precious lamps in detail. This innovation led to higher demand and demand opened the way to mass pro-

Fig. 3. Lamps of suitable form facilitating stacking both during baking in the kiln and transportation (*Vogelkopflampen* of 1st century AD date) (After Chrzanovski 2006: 15, Fig. 9)

duction (Sampson 1987: 105) [*Fig. 2*], resulting in lower production costs and offering increased trade opportunities.

b) Handles appear not to have been embodied in the mould at first (Giuliani 2005: 40, Fig. 13). They were later incorporated (Andreadi 2002: Cat. No. 17), clearly indicating an intent to create durable products on a mass scale. Indeed, in the 1st-century workshop A of Patras, where the Hellenistic tradition was still strong, handles are not incorporated into the mould but are added afterwards. In the later workshop B, active in the 2nd and 3rd centuries, they are already incorporated into the mould (Petropoulos 1999: 59).

c) Further proof of high specialization is the unique and exclusive character of lamps as products that were fired separately in the ceramic kiln (Bailey 1975: 7) or together with other mouldmade material, such as tiles and bricks (Curta 2016: 102). Specialized production is also indicated by the suitability of lamp forms for stacking both during baking and transportation [*Fig. 3*].

d) The desire of lampmakers to sign their creations, along with the possible development of trade in lamp moulds and seals (Iconomu 1976: 146; Minčev 1977) imply the importance of the use of moulds in lamp production. Imitations and replicas of products of large workshops were made by local workshops and had a limited range (Bailey 1972: 18, 19). These copies were not usually thought of as "pirated", the name of the creator or owner of the business being mostly considered as a form of brand or advertising (Bailey 1972: 23).

Therefore, the improvements in the production processes increased quantity, whereas simplification of the same production processes reduced the time and cost of the enterprise (Harris 1980: 136). However, at this point, it should be emphasized that the specialized mouldmade lamp workshops seem to have produced on a small scale. Wasters, which include both lamps and other clay vessels, coming from a small workshop excavated in Kotzia Square in Athens imply such a conclusion; the workshop seems to have operated from the later years of the 3rd to the first quarter of the 4th century AD (Zachariadou 2006: 320, Fig. 5).

2. *Integration with other ship cargo*

The small size of lamps in relation to their quantity would have made it easier to integrate them with the other cargo on merchant ships.

3. *Increased demand for mouldmade lamps for various uses*

Lamps were increasingly used for lighting public and private spaces (Isac and Roman 2006: 27), votive and funeral offerings (Karivieri 2008), religious ceremonies and games (Bailey 1972: 11). Moreover, the spreading availability of olive oil even in areas where olives do not flourish encouraged the use of mouldmade lamps (Harris 1980: 136).

4. *Mobility of craftsmen within the boundaries of the Roman Empire*

Craftsmen moving about within the imperial realm could have facilitated transmission of technical expertise (Bruneau 1980). At the same time, lamps that were eventually imitated may have been

transferred to other regions as personal belongings of state employees, immigrants and refugees (Bailey 1975: 10).

5. *Army movement*

It also seems probable that luxury mouldmade lamps appearing in the remote provinces of the Roman Empire were carried there by Roman legionaries. In confirmation one may cite the mouldmade lamps in Roman Switzerland, coincidental with the stationing of the XIII legion there in the 1st century BC (Meylan-Krause 2011). Military supply lines would have ensured that soldiers had lamps similar to those they were used to in their homelands, as well as the olive oil required as fuel.

6. *Lamp manufacturing improvement and development at both construction and aesthetic levels (Bailey 1972: 21)*

Until the 3rd century BC, lamps were strictly utilitarian objects without anything that was not essential. This was largely determined by the production method, the limitations ensuing from the nature of the potter's wheel. The innovation of lamp moulding offered the opportunity for new styles, mass production and decorative designs (Bailey 1972: 18). For example, lamp manufacture improved when the nozzle was incorporated into the body of mouldmade lamps, making the whole more durable than when the nozzle was just attached (Bailey 1972: 15). Also, because no potters' wheel was required, the skills required to produce a mouldmade lamp were now different and more akin to the sculptor's arts. By the 5th century when mold replicas became a commodity, even less skill was required.[4]

The decline in aesthetic quality was demonstrated by Corinthian lamps imitating North African ones, in which the joining of two pieces of clay is converted into a sloppily executed decorative element. Early Roman mouldmade lamps offered the opportunity for rich decoration (Bailey 1972). Moreover, the time spent by an artisan to create a mould can be regarded as minimal considering the large number of lamps that can be produced from such a mould.

REASONS FOR THE DECLINE OF MOULDMADE LAMPS AT THE CLOSE OF LATE ANTIQUITY

Late antiquity is a time of major change in the Roman Empire; economic prosperity declines and as long-distance trade contracts, it is replaced by middle-distance commerce (Gerolymatou 2001: 353), which leads in turn to the abandonment of certain routes and itineraries (Gerolymatou 2001: 349–354). These developments are contemporary with a gradual decline and the final disappearance of mouldmade lamps which occurs at different times in different regions. Moreover, it seems that occasional raids and natural disasters also triggered changes in technology and economy on a local scale (Garnett 1975: 185; Karivieri 1998: 423; Herrmann and van den Hoek 2002: 6).

4 I would like to thank the anonymous reviewer for this idea.

1. *Shrinking of organized and specialized production, which had triggered development and evolution*

The potter's wheel was in continuous use, being necessary to produce cooking vessels and storage and transport containers, but amphorae and jars were much more difficult to make than lamps, which could easily be entrusted to an assistant or apprentice. It was evidently easier to produce wheel-made lamps, especially when workshops lacked specialization and know-how. For example, even in the well-organized Athenian lamp workshops of the end of the 6th century and the early 7th century, lamp-makers imitated imported lamps from Asia Minor and North Africa in a coarse local clay (Karivieri 1998: 424–425). The gradual decline of organized production is evidenced by the flaws that appear in mouldmade lamps, that is, cracks where the two parts of the lamp are joined, through which the fuel tends to leak. Poor quality clays and uneven firing techniques also contributed to a decline in quality. Thus, the low quality of mouldmade lamps caused by the lack of specialization and the use of worn-out moulds (a mould can produce about 30–40 lamps as a contemporary experiment has demonstrated, A. Karivieri, personal communication) could have prompted lamp-makers to turn to wheel-made forms.

Fig. 4. Factory lamps (*Firmalampen*) found in Bavay, adapted at some point to a different fuel than olive oil (After Motsianos 2019: 52, Fig. 7 | photo courtesy A. Hanotte)

2. *Reduced stimulus from imports of new types of lamps*

Limited influx of new lamp types in some regions would have reduced the interest in making copies. Moreover, perhaps a decrease in the availability of plaster counterfeit molds, resulting from trade disruptions, meant that local potters had to meet the demand for lamps by making them on the wheel.[5]

3. *Reduced demand for luxury mouldmade lamps*

The reduced demand had multiple causes. One was the emerging Christian aesthetic which revered light as holy and denounced earthy riches. Another cause would have been the costs of the lamps themselves, but also that of the fuel, that is, olive oil, which began to disappear from some areas owing to declining trade (Bailey 1972: 20; Gerolymatou 2001: 348, 355). The cost of fuel may have also discouraged poor households as the amount of oil consumed in a lamp was 8 g per hour. This equals to 300 calories in nutritional value. Therefore, in poor households, lamps consuming fats would have actually vied with the other food consumers at the table (Bailey 1972: 10–11; Pavolini 2003: 124; Wunderlich 2003: 256). Animal fat, an alternative fuel to olive oil, was not suitable for mouldmade lamps, which normally had a closed form. Thus, wherever olive oil was lacking, cheap alternative solutions were used in the northern provinces of the Roman Empire. Factory lamps (*Firmalampen*) found in Bavay [*Fig. 4*], in today's northern France and some pieces revealed in the necropolis of Heidelberg (Hensen 2009: 433–435, Fig. 6) exemplify this trend. They are characterized by an apparently deliberate removal of the discus, probably in order to use a solid combustible, such as animal fat. This adaptation suggests a desire on the part of the owner to reuse a more elaborate mouldmade lamp in place of a coarser one, as indicated by the examples circulating in 1st–2nd century AD Gaul (Hanotte 2008; Hensen 2009: 433–435, Fig. 6).

4. *Local production*

Certain areas were either isolated from major centers of lamp production or they covered their lighting needs with simple wheel-made lamps produced locally.

5. *Limited mobility of craftsmen*

Social upheaval and military raids would have restricted the mobility of itinerant craftsmen.

6. *Introduction of glass lamps*

Finally, the growing popularity of glass *kandelai* (lamps) and candles in late antiquity, from the 4th–5th century on, may have limited the demand for clay lamps. This was particularly true of churches and monasteries, which opted for the glass *kandelai*, as these could provide light in all directions serving general lighting needs, especially during night processions. Large processional candles appear also as an integral component of Christian ritual.

5 I am grateful to the anonymous reviewer for this remark.

THOUGHTS AND CONCERNS

Certainly, the reasons that led to the development of mouldmade lamps as well as the ones that led to their gradual disappearance and to the subsequent (re) turn to wheel-made lamps, were multiple.

The earliest manufacture of mouldmade lamps seems to have been directly connected with the production of relief-decorated vessels. They appear in the same period and disappear almost simultaneously. They present the same technical characteristics and probably were targeted for the same buyers. It is also possible that both the mouldmade lamps and the relief-decorated vessels were modeled on metal originals. However, the case of the workshops in La Graufesenque and Millau in the south of France could lead us to assume that the evolution of mouldmade lamps and relief-decorated vessels was parallel, but not identical. This is because, despite the huge production of relief-decorated vessels in these areas, not a single lamp seems to have been made there between AD 10 and 150. Many of the motifs on mouldmade lamps with relief decoration are similar to the ones on contemporaneous relief-decorated vessels.

It is also interesting to observe a combination of techniques used for wheel- and mouldmade lamps. This occurs in a type of lamp manufactured in the late 2nd and early 1st centuries BC. More specifically, decorative elements created in separate moulds or by stamps were added to the wheel-made body of the lamp (Bailey 1972: 22). A similar example is given by a 5th century AD lamp referred to as "Vandal" (*Couleurs de Tunisie* 1994: 58, Nos 25–27).

Through the centuries the production of wheel-made lamps was apparently integrated into ceramic workshops and it seems that under certain conditions, the potter's wheel continued to be used for the manufacture of simple, functional lamps throughout late antiquity, even when mouldmade lamp production was in its heyday. The production of wheel-made lamps was clearly secondary to that of mouldmade lamps in the first Christian centuries, but it seems that it did not disappear completely. The decline of mouldmade lamp production at the close of late antiquity goes hand in hand with the reestablishment of wheel-made lamps.

It seems, therefore, that the manufacture of mouldmade clay lamps constituted a large and impressive "parenthesis" in clay lamp technology spanning a time approximately from the 1st century BC through the 7th, 8th and in some cases 9th century AD. The closure of this "parenthesis" reasonably coincides with the reestablishment of wheel-made clay lamps.

The only certainty is that even if mouldmade lamps did not fade away completely at the close of late antiquity, their flame was flickering out. The already blowing wind of economic, social and technological change was growing stronger and it would not be long before mouldmade lamps disappeared entirely. The "wheel" continued to turn, leading to the next stage of wheel-made lamps: the glazed devices of the Middle Byzantine period.

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