Antiquity 2020 Vol. 94 (377): 1314–1324
https://doi.org/10.15184/aqy.2020.156

Research Article

What's that smell? New directions for materials studies

Sarah Newstead[1,*] & Tânia Manuel Casimiro[2]

[1] Atlas Coal Mine National Historic Site, East Coulee, Canada
[2] IHC/IAP, Universidade Nova de Lisboa, Portugal
* Author for correspondence: ✉ pitboss@atlascoalmine.ab.ca

'Smellscapes' have become an increasingly popular concept in recent years. Here, the authors argue for a new direction in sensorial archaeology by focusing on the 'smell of things' or the potential information held in the odours of archaeological objects. They offer a case study using early modern earthenware ceramics from Portugal—renowned for the distinctive smell and taste imparted to their contents—to explore the possibility of developing standardised analytical techniques and vocabularies that would allow archaeologists to describe the odours associated with artefacts.

Keywords: Portugal, Estremoz, ceramics, odour, smellscapes, sensory archaeology

Introduction

The study of smell and other sensorial approaches have become important facets of phenomenological archaeological perspectives in recent years. Smellscapes (or how smells influence social space), however, are only one way that we can access olfactory information from the past. This article seeks to push the consideration of smell in another, less familiar direction: materials analysis and interpretation. We introduce this new direction with a case study of Portuguese early modern earthenware cups, which were recognised, traded and acquired for their smell and taste (Newstead & Casimiro 2018). As this type of ceramic seems to retain a unique smell that withstands archaeological taphonomic processes, it offers an ideal example through which to highlight the archaeological study of object smell.

In the modern Western world, smell is a sense that is denigrated as unreliable, subjective, even bestial (Classen *et al.* 1994: 3–4). Yet smell is, and has always been, a fundamental part of the human sensorial experience. Archaeologists have explored smell in the context of perceptions and constructions of space; under the general umbrella of sensory archaeologies, such 'smellscapes' have become increasingly common (e.g. Murphy 2013). While this recent smellscape research enriches how we interpret archaeological sites and materials, the study of smellscapes differs from the direct study of object smells.

Received: 30 June 2019; Revised: 30 October 2019; Accepted: 7 November 2019

The 'smell of things'

The archaeological study of the 'smell of things', or object smell, has been deemed difficult or impossible; scent is widely considered ephemeral, degradable and subjective, and therefore unsuitable for serious materials research (Bartosiewicz 2003). Hence, although smell is a common theme in sensory archaeologies that actively embrace the study of constructed or hypothetical past smellscapes, archaeologists tend to shy away from engaging deeply with the *things* that cause smells within spaces and, in particular, the smell of things that have been recovered from archaeological contexts. We treat smelly things as vanished remnants of the past, rather than important sources of information that endure in the archaeological record. Certainly, there are some exceptional finds to contradict this generalisation, such as the occasional find of ancient cosmetic products or foodstuffs (e.g. Evershed *et al.* 2004). These rare finds are often framed within a discourse of taphonomic processes: the 'original' smell is degraded by the ravages of time and therefore the significance of further consideration is diminished. But is this idea of the near total erasure of past material smells valid, or does it reflect the fact that, as researchers living in a modern, deodorised world, we simply fail to recognise the potential of smell as an attribute of artefacts? Why do we accept the visual and tactile patinas inherent to archaeological materials, but not the olfactory equivalents? Despite decades of calls for self-reflexivity in archaeological research, has our general 'smell-blindness' caused us to miss a major potential attribute of the things we study?

Without doubt, it is challenging to study smell. Scents are entangled with human emotions and, consequently, the ways in which people react to those smells and the reception of scent can be very personal. Scent interpretation can also be culturally influenced. Even the distinctions between enjoyable and unpleasant smells can be traced to the structural foundations defining group identities within any society (Almagor 1990: 255–58). At the very core of Western thought and language, we lack basic direct descriptors for smell. In English, we have many words to describe directly and distinctly the visual, the tactile and the tasteful, yet we do not have similar words to describe smells in lay usage. Smells are almost always described in simile, and rarely directly. The Portuguese pots we discuss below, for example, are described in the seventeenth century as smelling like a fresh morning after rain (Magalotti 1695). This particular simile compares the smell of wet clay pots to the wet ground; it is transversal through time, as we all recognise the smell of wet earth. The specific smell of a fresh morning after rainfall that each of us may recall, however, is influenced by culture and geography. Someone from the Pacific Northwest Coast of North America, for example, would recall a different smell than someone from Iberia, due to variation in soils and levels of rainfall, along with many other factors specific to these regions. This lack of specificity in descriptions presents a serious challenge for studying smell. Our problem with conceptualising smell has a historiography stretching back to ancient philosophers and historians (Corbin 1986: 5–8; Bradley 2015: 4–6), and we suggest that this may be a fundamental reason why there has been a reluctance to incorporate olfactory considerations into the archaeological approaches to the identification, categorisation and interpretation of the materials that we study.

Our sense of smell (olfaction) has also been difficult to study at the chemical and molecular levels, with research highlighting the complexity in the way that humans perceive scent and the inability of scientists to develop fully functioning artificial alternatives to scent

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press

perception (i.e. 'artificial noses') (Malnic *et al.* 1999: 713; Sell 2014: 205). The complexity of olfaction and the paucity of clearly measurable points of reference for chemical analyses have held back scientific research into how humans interact with and perceive smells compared to that of other senses, such as sight or hearing, both of which have clearer, more measurable points of perception and relate to phenomena (light and sound waves) that are more amenable to measurement. Nevertheless, this delay does not mean that there are no sophisticated techniques for analysing smells and scent perception. Chemists and biologists have closely studied scent for decades, albeit commencing later than research undertaken on other senses, such as sight or hearing, and there is now a corpus of literature on investigative techniques for the analysis of smell and scent perception. Extending well beyond academic interest, many industries rely on the ability to identify, categorise, preserve and replicate an almost endless variety of smells consistently (Goodner & Rouseff 2011). The multi-billion pound perfume and household scent industries would have never developed if scientists had not devised reliable ways to study the complexity of scent. If archaeologists wish to make use of these techniques, it will be necessary to translate them in ways appropriate for archaeological materials and questions, as well as to develop a fundamentally new vocabulary that would allow us to record, describe and engage with the olfactory attributes of the artefacts and contexts that we study.

To illustrate our argument, we present a case study of early modern ceramics. A benefit of working on historic periods is that textual sources offer insights into the use and significance of material culture, meaning that we do not have to make some of the interpretative leaps required for the study of pre-literate periods. It was these textual sources that initially allowed us to recognise the possibility of preserved scent in the early modern Portuguese ceramics that comprise this case study. The initial use of highly contextualised case studies to explore the scent of archaeological materials is critical for the development of effective methods of recording olfactory attributes that mitigate issues of cultural and modern biases—issues inherent to the study of scent in objects.

Pottery, smell, obsession

In the sixteenth century, Portugal and several Spanish New World colonies began to produce fine earthenware ceramics renowned for their scent. These delicate, unglazed vessels—called *púcaros*—provoked obsession in their Southern European consumer base and the colonial New World, and drove near industrial-scale production, peaking in the second half of the seventeenth century (Casimiro & Newstead 2019). The particular smell of these vessels and their ability to impart a desirable scent and taste both to water and the surrounding air were highly valued attributes.

Púcaros are found abundantly throughout Portugal and were frequently exported, labelled 'Estremoz cups', to places such as England and the Netherlands. Their primary use was for the consumption of water, a practice that continued into the twentieth century (Newstead & Casimiro 2018). In a 1647 letter, noted seventeenth-century chronicler Vicente de Nogueira orders a dozen púcaros, made with 'good clay with a good smell' (*bonissimo barro e cheiro*). He is very specific about their size and shape, as different cups would make him spill his water (Serafim 2011: 289). Some púcaros were plain redware cups, while others were richly

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press

decorated with stamps, incisions or with quartz stones or small pieces of glass that formed patterns (Casimiro & Newstead 2019). These decorations may have served to distinguish their consumers, and while simple cups and jars are found in archaeological contexts throughout Portugal, the decorated examples tend to be absent in lower income households (Casimiro *et al*. 2019). There were also deep, plate-like, highly decorated vessels made from the same clay, which, when wet, were known to give off a strong, earthen smell. We believe that these vessels were not used to hold water for consumption, but rather for perfuming the household environment, as described by Magalotti (1695).

A considerable corpus of literature was written about these vessels, with each production area being associated with a distinctive scent (Magalotti 1695; Leão 2002). Although the taste imparted by these cups to their contents is less commonly referenced, smell is the most common descriptor; the cups were reported to give an earthen taste to water (Vasconcellos 1921). Archaeological examples of púcaros from several different production zones are found across Europe. We have worked for several years to explore how the vessels' basic physical attributes related to specific production areas, focusing on form, visual fabric attributes and, more informally, tactile qualities. Initially, as we were working exclusively with curated materials, all of the sherds and vessels examined were dry, and thus gave off no scent. With our awareness of the wider contemporaneous literature, however, it became increasingly difficult to ignore the possibility that we might be overlooking the important scent attributes of these archaeological vessels. In the literature on púcaros, for example, we noted a universal connection between *clay* and *water*. We had access to complete twentieth-century púcaros made in Estremoz in central Portugal (Figure 1)—the most well-known production area in the seventeenth century—and made from the same, or very similar, clay to their early modern counterparts. Púcaros from Estremoz and the surrounding area are recorded as having the strongest and finest scent of all such vessels, exhibiting a scent distinct from similar púcaros produced closer to the coast, such as at Lisbon. These scent characteristics are probably connected to the clay from which the púcaros were made. The Upper Alentejo area, in which Estremoz is located (Figure 1), is known for its marble quarries. A type of clay known in Portugal as *terra rossa* forms between marble blocks, and is distinguishable not only for its colour, but also for the smell and taste it imparts to water (Newstead & Casimiro 2018). We have not yet been able to test the clay sources to establish what attributes within the clay are responsible for its distinctive smell. We are not certain if they are organic or inorganic compounds or potentially a mixture of both. An added complication of this testing will be to establish which exact compounds survive the firing process.

When modern, unglazed vessels made from Estremoz-area clay (Figure 2) are filled with water they exude a strong, distinctive smell that is very similar to how Magalotti (1695) describes them in the seventeenth century, like sunburnt earth 'exhaling' after a rainfall. These ceramics easily perfume a room and, as also described in the seventeenth century, their smell evolves as the vessels dry (Magalotti 1695). Their scent permeates the air and provokes strong reactions in people, as smells often do. Our Southern European colleagues are often astonished at the memories that are evoked of hometowns, grandmothers' houses and childhoods when we fill these vessels with water to demonstrate their sensory effects. These scents have been etched into the cultural memory of the Portuguese people for centuries; perhaps the ubiquity of these vessels in Portuguese colonial territories may have permitted

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press

Figure 1. Provincial map of Portugal (drawing by S. Newstead).

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press

Figure 2. Twentieth-century earthenware vessels from Estremoz, Portugal (photograph by S. Newstead).

settlers to invoke a memory of home. Estremoz clay vessels gathered an obsessive early modern following, as their smell was considered particularly 'healthful', perhaps because it encapsulated olfactory attributes of the Southern European countryside (Magalotti 1695; Vasconcellos 1921). The connection between liquid and smell is critical, as this is the point at which the embedded 'volatile' molecules responsible for the vessels' smells are released.

The New World Iberian colonies also produced púcaros, especially México. There is no evidence, however, that these vessels exuded any smell in the same way as the Portuguese cups, and they were probably intended only to imitate the shape and decoration of Portuguese púcaros. The former were consumed predominantly in the New World territories, with only a small number of imports known from the Iberian Peninsula, and they were probably not in high demand in Europe. The comparative lack of European demand for New World púcaros suggest that the smell of the Portuguese púcaros was an important attribute for European consumers.

'Smelly' twentieth-century púcaros do not provide a convincing argument for the persistence of smell in the archaeological record in their own right. Rather, they flag the potential of earthenware production areas to manufacture ceramics with distinctive smells, and the possibility that consumers actively chose pottery vessels because of these attributes. Unglazed earthenware pottery forms a major constituent part of the archaeological record in many parts of the globe. There is a pervasive idea among archaeologists that such earthenware does not have any smell as the firing process burns off the organic materials that might

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press

cause smell. We argue, however, that this perception stems from the fact that the study of archaeological ceramics—at least in the English-speaking world—originated in places where household ceramic technology changed significantly in the eighteenth century to produce scentless, almost glass-like pottery: the whitewares that we continue to use today. Our basic conceptualisation of domestic pottery as a material is influenced by over 250 years of production and marketing that have convinced us that ceramics are inert and scentless. This, we argue, has muted our recognition of additional sensory attributes in the archaeological ceramics that we study, many of which are neither inert nor scentless. Many readers will be familiar with the smell of archaeological potsherds as they are being washed, and those who have washed ceramics from different areas of the world may have noticed that not every wash smells the same. Should we not consider these smells to be a potential attribute of the pottery, rather than just a characteristic of the washing process or the soils from which they were recovered?

We have illustrated the persistence of archaeological smells by further experimentation on Portuguese ceramics. Lisbon is blessed with extensive archaeological assemblages containing many complete púcaros from the sixteenth and seventeenth centuries. When seventeenth-century vessels from Montemor-o-Novo (Figure 1)—a production centre with similar clay sources to that which produced the famous Estremoz pots—were filled with water, they released a strong, distinctive and persistent scent. This attests to the physical durability of the 'volatile', scent-causing molecules, despite the ceramics having undergone various taphonomic processes (Figure 3). As with the smell of potsherds during washing, the scent of these vessels was latent until exposed to water in our experiments.

More convincingly, when assemblages of sherds from the same archaeological contexts are compared by wetting, those sherds with visual and petrographic attributes identifying them as Estremoz and Montemor-o-Novo products smell differently to sherds from vessels produced in Lisbon (Gomes & Casimiro 2018). Documentary records indicate that consumers actively chose these pots for their distinctive smells; the recognition of these smells by archaeologists has the potential to provide new data on the relationships between scent, consumer choice, domestic behaviours and perceptions of health in the past. Smell and health were interlinked in many ancient societies (Classen *et al.* 1994), not just in early modern Europe, and being able to record and track physical scent attributes in objects will facilitate new perspectives on the ways in which people interacted with material culture in the past. The reputation of the Estremoz cups, as well as other vessels, for imparting a special taste and smell to water endured into the twentieth century. A 1906 report about a match factory in Lordelo do Ouro (Porto) mentions that all of the employees were well taken care of, with special concern given to their health, and everyone had access to drinking water kept in Estremoz ceramic vases (Direcção Geral do Comércio e Industria 1906: 5).

The written sources only describe the drinking of water from these vessels. To take our research further, we have also tested the cups with other beverages. Wine was one of the most commonly consumed drinks in early modern Portugal (Leão 2002). Could people have also used Estremoz púcaros to drink wine? To investigate, we tasted wine that was decanted into twentieth-century Estremoz púcaros. The vessels changed the way the wine tasted and smelled, and the results were unpalatable. This may be the reason why seventeenth-century sources, such as Magalotti (1695), only mention púcaros in the context of water drinking. While we found that the taste of water held in twentieth-century Estremoz púcaros

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press

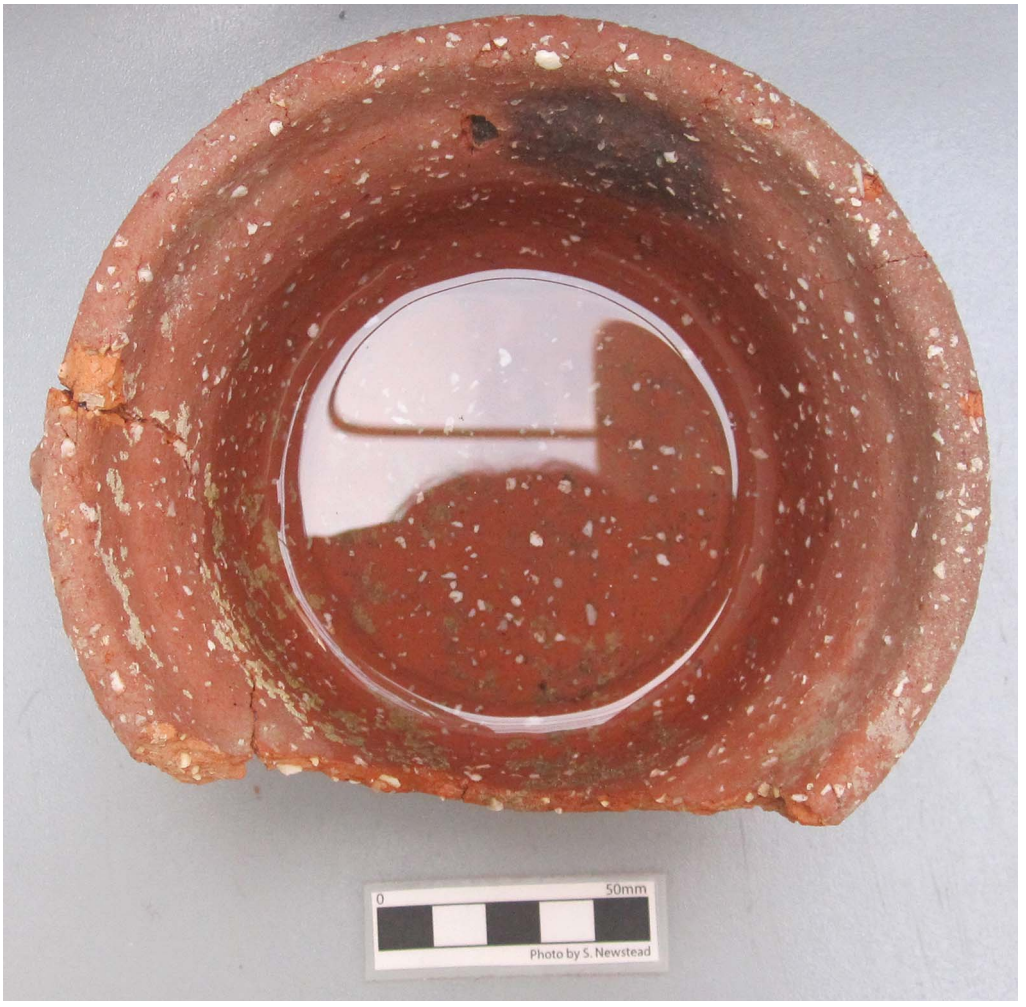

Figure 3. Seventeenth-century earthenware vessel from Montemor-o-Novo, Portugal. Stored in the Lisbon Archaeological Centre (photograph by S. Newstead).

was undesirable to our modern palates (it has a strong earthy quality), the smell and taste imparted to the water by these types of vessels and their older counterparts may have been able to mask less palatable qualities of untreated water, such as organic contaminants and salinity, for example. This, combined with the water-cooling evaporative qualities of the unglazed earthenware, underpinned why these vessels were so popular at the tables of upper-class households in early modern Portugal.

Recognition and recording

If we accept that a major artefact type such as unglazed earthenware has the potential for extant smell attributes, the next step is to develop a strategy wherein these attributes can

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press

be recorded and incorporated into our interpretation of such material. As argued above, we do not need to develop these strategies from scratch. In industry research, smells are categorised under a number of established parameters, including odour threshold, physical and chemical properties (the molecular makeup of a particular smell), intensity, tenacity and hedonic tone (i.e. whether it is a 'good' or 'bad' smell, which is culturally informed). The current standard technique for such analysis is gas chromatography/mass spectrometry (GC/MS) with the addition of olfactometric detection (Mahattanatawee & Rouseff 2011: 69–90). While these techniques require analyst training, it is not beyond the training required for the petrographic or elemental analysis of pottery, for example. All of these methods have been well tested and standardised.

GC/MS analysis allows for the very precise description of the composition and qualities of a smell. It can also address how vessels such as unglazed earthenware influenced the taste of their contents on a molecular level, as smell and taste are closely interlinked (Breslin 2001: 439). The acquisition of olfactory data will build upon conventional scientific methods of archaeological analyses in order to broaden the range of chemical data recorded from materials. Industry-focused scent analysis utilises a semi-standardised olfactory descriptor vocabulary that can be modified to account for the smell components present in archaeological materials (Sell 2014: 199–202). This will allow us to develop a fundamentally new vocabulary for describing archaeological object smell akin to the specialised terminology that we have developed for the description of visual attributes, such as ceramic vessel forms. Applying standard olfactory analysis techniques will help to alleviate potential problems of inconsistent scent descriptors, as well as terminological variation between researchers: each individual has their own culturally influenced reactions to smells. For consistency, it will be important to develop the vocabulary in conjunction with previously established scent measuring parameters and methods, rather than a more vernacular approach based on the cultural biases inherent for all humans.

There will, of course, be teething problems in applying industry-standard techniques to archaeological materials. Chemical analysis of archaeological objects is often challenging due to unknown aspects related to taphonomy and the general variability in human manufacturing techniques (Pollard *et al.* 2017: 16). Chemical analyses can also generate data of very fine resolution that are beyond human sensory limits. It is therefore important to begin testing these techniques on archaeological materials, such as the púcaros, that are well contexualised with documentary evidence. The contextual information will facilitate the establishment of recording parameters for archaeological samples, without having to take major interpretative leaps. In short, it is best to develop these techniques on objects where smell was a recognised and integral part of their materiality to the people who used them. From there, standards can be established for what might be recognisable and culturally significant smells persisting into the present for other types of archaeological objects. Developing an appropriate descriptive vocabulary for these potential smells will allow archaeologists actively to recognise them in assemblages and to record them accurately. Refining the analytical techniques could also allow archaeologists to run exploratory analyses on materials that may not have extant smells, but that could still contain molecules that caused scent in the past.

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press

Smells and materiality

Relating smell and material culture is an uncomfortable topic, as it directly challenges analytical methods that archaeologists have developed over the past century, and the ways in which we have critiqued these methods. It also increases the likelihood that we have been subconsciously ignoring a potentially huge dataset. We reiterate that the appropriate gateway artefact variety for this type of study is unglazed earthenware. This material has played a fundamental role in people's lives for millennia and is one of the most common artefact types found archaeologically. The study of artefact smells will easily move from this narrow early modern case study to a much broader periodisation and geographic distribution, from unglazed Roman amphorae through to eighteenth-century olive jars.

Engaging with artefact smells will add another layer to the theories and debates around materiality. Smell intimately connects the object to the perceiver, and can be a crucial way in which an artefact influences its environment, sometimes quite persuasively. The colour of an object, for example, generally will not cause physical illness, but the smell and taste of an object certainly can. As archaeologists develop new theories and interpretations concerning human-object relationships, smell should not be discounted merely because it does not play the same role in our modern lives as it did in the past.

Acknowledgements

Our thanks to Ana Caessa and António Marques (Centro de Arqueologia de Lisboa), Luis Barros (Museu de Arqueologia e História, Almada) and João Sequeira for tasting the smelly *hidrocerâmica* water and wine for the team (to no ill effect).

References

Almagor, U. 1990. Odors and private language: observations on the phenomenology of scent. *Human Studies* 13: 253–74. https://doi.org/10.1007/BF00142757

Bartosiewicz, L. 2003. There's something rotten in the state…: bad smells in antiquity. *European Journal of Archaeology* 6: 175–95. https://doi.org/10.1177/146195710362004

Bradley, M. 2015. Introduction: smell and the ancient senses, in M. Bradley (ed.) *Smell and the ancient senses*: 1–16. New York: Routledge. https://doi.org/10.4324/9781315736051

Breslin, P. 2001. Human gustation and flavour. *Flavour and Fragrance Journal* 16: 439–56. https://doi.org/10.1002/ffj.1054

Casimiro, T.M. & S. Newstead. 2019. Portuguese coarseware in North Atlantic trade (sixteenth to eighteenth century). *American Ceramic Circle Journal* 10: 59–81.

Casimiro, T.M., J.P. Henriques, V. Filipe & D. Neves. 2019. Pottery use and social inequality in mid-18th century Lisbon: an initial approach, in K. Matejkova & G. Blazkova (ed.) *Europa post-medievalis*: 1–18. Oxford: Archaeopress. https://doi.org/10.2307/j.ctvndv5gp.4

Classen, C., D. Howes & A. Synnott. 1994. *Aroma: the cultural history of smell*. New York: Routledge.

Corbin, A. 1986. *The foul & the fragrant: odour and the social imagination*. Cambridge: Berg.

Direcção Geral do Comércio e Industria. 1906. *Boletim do trabalho industrial*. Lisbon: Lisboa Imprensa Nacional.

Evershed, R., R. Berstan, F. Grew, M. Copley, A. Charmant, E. Barham, H. Mottram & G. Brown. 2004. Archaeology: formulation of a Roman cosmetic. *Nature* 432: 35–36. https://doi.org/10.1038/432035a

Gomes, M.V. & T.M. Casimiro. 2018. Montemor-o-Novo pottery production: characteristics and distribution. *Medieval Ceramics* 37: 11–20.

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press

Goodner, K. & R. Rouseff (ed.). 2011. *Practical analysis of flavor and fragrance materials*. Hoboken (NJ): Wiley Blackwell. https://doi.org/10.1002/9781444343137

Leão, D. 2002. *Descrição do Reino de Portugal (1610)*. Lisbon: Centro de História da Universidade de Lisboa.

Magalotti, L. 1695. *Lettre sopra i buccheri, con l'aggiunta di letter contro l'ateismo, scientifiche ed erudite, e di relazioni varie*. Florence: Felice le Monnier.

Malnic, B., J. Hirono, T. Sato & L. Buck. 1999. Combinatorial receptor codes for odors. *Cell* 96: 713–23. https://doi.org/10.1016/S0092-8674(00)80581-4

Mahattanatawee, K. & R. Rouseff. 2011. Gas chromatography/olfactometry (GC/O), in K. Goodner & R. Rouseff (ed.) *Practical analysis of flavor and fragrance materials*: 69–90. Hoboken (NJ): Wiley-Blackwell. https://doi.org/10.1002/9781444343137.ch4

Murphy, J.M. 2013. The scent of status: prestige and perfume at the Bronze Age palace at Pylos, Greece, in J. Day (ed.) *Making senses of the past: towards a sensory archaeology*: 243–65. Carbondale: Southern Illinois University Press.

Newstead, S. & T. Casimiro. 2018. Strange adventures in a city made of marble: exploring pottery production in Estremoz, Portugal. *Medieval Ceramics* 37: 37–45.

Pollard, M.A., C. Heron & R. Armitage. 2017. *Archaeological chemistry* (3rd edition). Cambridge: Royal Society of Chemistry.

Sell, C. 2014. *Chemistry and the sense of smell*. Hoboken (NJ): Wiley. https://doi.org/10.1002/9781118522981

Serafim, J.C.G. 2011. *Um Diálogo Epistolar. D: Vicente Nogueira e o Marquês de Niza*. Porto: Edições Afrontamento.

Vasconcellos, C.M. 1921. *Algumas Palavras a Respeito de Púcaros de Portugal*. Coimbra: Imprensa da Universidade.

https://doi.org/10.15184/aqy.2020.156 Published online by Cambridge University Press