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Reviewed Article:

De Re Cervisia et Mulso, “on The Subject of Beer and Mulsum”

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Beer has a long and ubiquitous history. Today it is the most consumed alcoholic beverage in the world; it is also the most popular drink after water and tea (Swot, 2016). But little consideration is typically given to how beer developed with respect to taste, and even less is given to why beer is thought of in the way that it is. There have been developments in this regard: the craft beer movement, something particularly relevant in many Western countries today, has provided an opportunity to reconsider the way in which beer has been mass-

produced commercially, and has moved away from this model (Clapson, 2017; Weersink and von Massow, 2018).

> “There have been two central questions throughout this experiment: first, could we re-create alcoholic beverages from the Roman period in an authentic fashion; and second, what did they taste like?

Interestingly, the craft beer movement has driven research into historical methods of brewing and attempts have been made by both historians and breweries in recent times, with the collaboration between Dr Patrick McGovern, Scientific Director of the Biomolecular Archaeology Laboratory for Cuisine, Fermented Beverages, and Health at the University of Pennsylvania Museum, and Dogfish Head Brewery being an excellent case in point. Their Midas Touch, based on the sediment analysis from vessels discovered in the ‘Tomb of Midas’ at the site of ancient Gordium, is now commercially available in the US, and apparently is a concoction that resembles a combination of beer, mead, and wine: the beverage contains barley, white muscat grape must (basically juice), honey, and saffron which is used as the bittering agent (See McGovern, 2017, pp.25–51). Old, however, while perhaps inspirational or intriguing to contemporary brewers and certainly of interest to ancient historians, does not necessarily mean better. As Brian Westcott of Barn Hammer Brewing pointed out, the craft beer movement’s interest in historical beer-making has resulted in the rather romantic but entirely erroneous notion that very old brewing processes are somehow superior to those of the modern world (Gibbs, 2018).

Social Lubrications

Beer’s taste, the main interest of contemporary brewers, however, has not been its only benefit historically. From its earliest origins, even in its crudest forms, beer had practical applications: it was likely an important addition to an otherwise frequently limited diet. This is almost certainly because beer resembles the chemical composition of bread—still colloquially known in several places as “liquid bread”—in several ways (Schiefenhövel and Macbeth, 2011, xi). Most significantly, it was a convenient package of starches, sugars and other grain by-products that provided nutrition. Similarly, for those who were unable to store perishable foods for any serious length of time and who depended on the vagaries of nature for subsistence, beer could be an excellent (and at times, undoubtedly, vital) calorific source. Moreover, beer afforded an escape from the faeces-fouled drinking water that plagued people for millennia. Although until relatively recent times, pathogenic infection was not understood, water was still thought to provoke dangerous illnesses, even death, whereas fermented beverages were considered safe, as a result of sterilization by boiling or, perhaps more commonly in the ancient world, by carbonic acid and by alcohol (Schiefenhövel and Macbeth, 2011, p.1; Cantrell, 2000, pp.619–25).

Practical issues aside, there also are anthropological, biological, and chemical reasons for the use of beer in ancient and modern societies, primarily as a means to convey alcohol. Despite considerable research on the misuse of alcohol, few ever asked why it became universally adopted; the conventional view is that its only benefit was epicurean. But within the last few years, it has been suggested that alcohol consumption, at least of the modest sort, was adopted because it has social benefits that relate both to health and social bonding, and that it goes far beyond the simple hedonistic or anxiolytic effect (Dunbar *et al.*, 2017, pp.117–19, p.126). Alcohol is known to trigger the endorphin system and the social consumption of alcohol may well have the same effect as many other social activities. In fact, two potential social benefits have been identified. The first is that alcohol consumption enhances psychological wellbeing and directly (or indirectly) promotes the building of close personal bonds that underpin social networks. Put more simply, it functions very much like other behavioural mechanisms that trigger the endorphin system so as "to facilitate large-scale social bonding;" these are activities—for example, like laughter, storytelling or reminiscing, singing, and dancing—that serve as a means of reinforcing social bonds (Dunbar *et al.*, 2017, p.119). The evolutionary significance of this lies in the fact that human social networks offer the single most important buffer against mental and physical illness (Dunbar *et al.*, 2017, p.126). The second benefit is that alcohol affects social or cognitive skills in such a way as to allow human beings to perform more effectively in social situations, especially, perhaps, romantic situations (Abrams *et al.*, 2006, pp.628–36; Hopthrow *et a*l., 2007, pp.272–76; Sayette *et al.*, 2012, pp.194–200; Dunbar *et al.*, 2017, pp.122–26).

As soon as alcoholic beverages were discovered and readily available then, it is likely that the socialising functions of alcohol became apparent too, particularly in respect to communal gatherings and feasting. So some form of convivial drinking parties either as stand-alone activities or in the larger context of feasting likely occurred in many ancient societies, and there is evidence for this (Burkert, 1991, p.7). The consumption of alcohol played a significant role in socio-religious contexts in both Sumerian and Egyptian cultures, for example. This in itself is hardly surprising or new; the feelings evident in the earliest example of a drinking song (possibly a hymn to the goddess of beer, Ninkasi) from eighteenth-century BC Sumer frame the debate as to whether or not alcohol played a role in such activities quite nicely (Homan, 2004, p.84): "May Ninkasi live together with you! While I turn around the abundance of beer, while I feel wonderful, I feel wonderful, drinking beer, in a blissful mood… with a joy in the heart and a happy liver…" (ll. 66–75 abridged, in Civil, 1964, pp.67–89).

In ancient Egypt, beer was central to society. The myth concerning Ra's rescue of humankind, appearing on the chamber walls of several eighteenth and nineteenth dynasty pharaohs (Guilhou, 2010), has been retold many times, even humorously (See, for instance, Forsyth, 2017, pp.36–37), but the actions of Ra in saving humankind—tricking Hathor by mixing beer with red ochre and spreading it throughout Egypt so that she would believe it was blood and then drink it—clearly suggest that beer played an important role in humankind's survival. It is

clear that both beer and the consumption of alcohol played a major role in some ancient societies.

While scholars have also acknowledged the singular importance of eating and drinking in the context of communal feasting as activities and metaphors used to negotiate economic, political, and social dynamics (See Wilkins and Nadeau, 2015 generally; Schiefenhövel and Macbeth, 2011; Beer, 2010; Flandrin *et al.*, 2000; Nielsen and Nielsen, 1998), types of food, drink, and their consumption were also some of the most significant indicators of ethnicity and class (Garnsey, 1999, p.6). This is most clearly depicted in Graeco-Roman society where food and drink, and how they were consumed, were markers not only of ethnic and cultural distinction, but also identity. In ancient literature, that is, in the view of the elite literati, Greeks and Romans were differentiated from the *barbaroi*, city-dwellers from rural-dwellers, farmers from nomads, and so on, often in terms of the food that they ate, and in the liquids that they drank.

This is very clearly defined in terms of the ancient Graeco-Roman debate that surrounded those who drank wine and *mulsum*, and those who drank beer. Although the axiom "you are what you eat" is a fact in terms of physiology, the ancient Greeks and Romans also believed that "you are what you drink;" both statements can encompass a series of social, economic, and political implications, let alone issues of assumed or forced identity. These indicators—real or not—even exist today: the English drink tea, Americans drink coffee; Canadians drink rye, the Scottish drink Scotch.

This is perhaps most clearly shown by way of an example which neatly brings us to the Romans alone. In the fourth section of the *Greek Anthology*, a collection of epigrams and poetry that spans the classical and Byzantine periods of literature, we find a brief epigram allegedly composed by the Roman Emperor Julian, in the fourth century AD, entitled *On beer* (*Anth.* Gr. 9.368, trans. adapted from the LCL, cf. Nelson, 2005, pp.30–31; Nelson, 2003, p.105):

> *"Who and where are you from, Dionysus? For, by the true Bacchus, I do not know you; I know only the son of Zeus. He smells of nectar, but you smell like a billy-goat. Did the Celts make you out of corn because they lacked grapes? Then you should be called Demetrius, not Dionysus, being born from corn, rather than from the fire, and 'Bromus' rather than 'Bromius.'"*

The satire here is not only based on ethnic identity (that is, the perceived differences between Celts, Greeks, and Romans), but also on beer made from corn, and the final pun of the epigram, where the Greek word transliterated as *Bromus* (βρόμος, [oats]) is compared to an epithet, 'Bromius', of the Greek god of wine, Dionysus (Aesch. *Eum.* 24; Eur. *Cyc.* 123; *Phoen.* 649).

One may think that as a Roman Emperor, Julian's view was elitist rather than universal, but beer was derided by many others, and while there were Romans who attributed positive qualities to beer for various reasons, ranging from medicinal through to simple cost (Celsus *Med*. 2.18.11-12, 2.20–21; Athen. *Deipn*. 1.34b; Diosc., *Mat. med*. 2.70; Amm. Marc. 26.8.2), there are copious examples within the ancient evidence where the drinking of beer, and by simple association those who consumed it, were belittled and treated with a fair degree of scorn. Just by way of example, the character of Aristotle in the *Deipnosophistae* [The Dinner Sophists] by the late second/early third century AD author Atheneaeus, claimed that "for wine, on one hand, causes a headache, but beer is stupefying" (*Deipn*. 1.34b). Pliny the Elder claimed that in Egypt, where the people "make a similar drink from their own grains… in that part of the world, drunkenness never ceases" (*HN* 14.51 and cf. Dio Chrys. *Or*. 32.82).

But the issue is not as clear cut as some Roman authors would suggest. Tacitus, in his *Germania*, notes that while Germans drank a liquid fermented from barley or wheat, the tribes that lived near the banks of the Rhine also bought wine (Tac. *Germ*. 23), presumably for their own consumption. In his *Natural History*, Pliny the Elder claims that the Egyptians were also among a group of peoples—including those in Gaul and Spain—who produced their own indigenous wines (*HN* 14.22, 24). It is also worth noting that such issues of identity were complicated by events in AD 212 when the emperor Caracalla issued the *Constitutio Antoninana*, which gave every free person in the empire at that time Roman citizenship. By the late third century AD there were certainly large numbers of 'Romans' living in the Roman provinces of Gaul, Germania, Britannia, Further and Nearer Spain, and Egypt, who were all drinking beer.

Mulsum, in contrast, apparently made from honey, water, grapes, and on occasion grains, was entirely acceptable to the Romans' sensibilities. While technically not mead in the modern sense (which is referred to in the sources as *aqua mulsa*, literally 'honeyed-water'), for the Romans *mulsum*, or honeyed-wine, was not simply a beverage, but a sweetener for vegetables, a sacrificial libation for the gods, and also a medicinal ingredient. For the Romans, *mulsum* was served with the first course of a dinner or banquet, in the same way as one might now drink sherry before a meal as an aperitif; it was supposed to whet one's appetite, aid digestion and apparently promote long life (Sen. *Ep*. 122; Hor. *Sat*. 2.4.25; Cic. *ad Fam*. 9.16, 20; Varro, *Rust*. 3.16.1–2; Gowers 1993, 170; Cowell 1980, 89). In fact, as early as the end of the Second Punic War in 201 BC, the beverage also appears to have been offered to triumphant soldiers by their commanders (Plaut. *Bacch*. 4.9.149) and perhaps occasionally at high-status funerals, such as that of Publius Scipio (Livy, 33.55). It even travelled to the ends of the empire by the turn of the second century AD some 300 years later, appearing in a list of foodstuffs to be prepared on a tablet from Vindolanda, the fort at Hadrian's Wall on the northern-most border of Roman Britain (*Tab. Vindol*. 2.302). Found in such contexts, one might expect that the identity associated with *mulsum* was strongly Roman. And yet 'barbarians,' including the Celt-Iberians and the Gauls, and even the Greeks themselves were

also acknowledged by the Romans to have made and consumed *mulsum*: Diodorus Siculus (5.34.2–3) claimed that the usual beverage of the Celtiberians was a mixed drink of honey and wine (cf. Polyb. 12.1.7 where what appears to be a similar drink is called οἰνομέλιτος). Diodorus also notes (5.26.2–3) that the Gauls drank a beverage which may be mead obtained through "honeycombs, which were cleaned", alongside a type of beer, which he claims they called *zythos*. Plutarch (*Mor*. 672B) states that the ancient Greeks were accustomed to drinking a beverage made from wine and honey, perhaps *mulsum* (cf. Hom. *Il*. 4.346 and *Od*. 21.293), before the appearance of wine, and that it was also one of the favourite drinks of the indigenous peoples in his time. As such, this particular beverage offers an interesting comparable to ancient types of beer, not only in terms of its inevitably sweet taste (due to its ingredients), but also with respect to its acceptability to the Romans and the blurring of the lines of identity drawn between those who drank it and those who did not.

Re-creating Ancient Beer and *Mulsum* with Barn Hammer Brewing

What exactly were these alcoholic beverages? How were they made, and how did they taste? In order to answer these questions, I entered into a partnership with Barn Hammer Brewing in Winnipeg, in January 2018. For at least one of them, namely how were these beverages made, we are fairly well-served by the ancient evidence. At some point during the mid-first century AD, the Roman senator, Columella, added a recipe for *mulsum* to his *de re rustica* [On Country Matters] (*Rust*. 12.41):

> *"So this is how you make excellent mulsum. Immediately remove the (wine) must lixivum from the wine-vat: this will be that which has trickled down before the grape is trampled too much. But make it from that type of grape bound to trees, which are collected on a dry day. In an urna of must, you will throw in 10 lbs of the best honey, and having mixed it carefully, you will put it away in a lagoena (a large earthenware vessel with a neck and handles, OLD s.v. lagena), immediately seal it with plaster, and you will order it to be placed on the floor; if you wish to make more, you will add honey with the proportions that are above. After the 30th and one other day, it is necessary to open the lagoena, and to strain the must into another vessel, seal it, and to place it in smoke."*

The origin of the recipe itself is difficult to determine. Columella owned several estates near Rome, but also had first-hand knowledge of agriculture elsewhere in Italy and in several other provinces of the Empire, namely Cilicia, Syria, and southern Spain, where he was reputedly born (Columella, *Rust*. 8.16.9; 10.185; *CIL* 9.235 = *ILS* 2923, with Matthews, 2010, pp.89–90).

Three centuries later, Zosimus, an alchemist from Panopolis in Upper Roman Egypt, included a recipe for beer (called "*zythos*" here) in one of his works, the name of which—thanks to mishandling by Byzantine compilers—is now lost (Ps.-Zosim. 2.372, adapted from Nelson 2005, p.127 n.32):

> *"Having taken fine quality, clean, white barley, soak it in water for a day, and take it out and lay it out in a place without wind until early the following morning. Then soak it again for five hours. Throw it into a handled, strainer-like vessel, and soak it. Let it dry up until it becomes like a lump. And when that happens, dry it out in the sun until it falls apart. For the little hairs are bitter. Grind the rest and make it into loaves (of bread), adding leaven just as for bread. And bake it partially, and when they rise, break (them) up into fresh water and strain (the liquid) through a strainer or fine sieve. Others bake the loaves and throw (them) into a kiln with water, and they heat it slightly, so that it neither simmers, nor is lukewarm, then they pull up (the loaves from the water) and strain it. And they cover (the kiln), heat it, and lean it down."*

This recipe is the earliest literary evidence for the brewing of beer in Egypt, although this may well be the same drink that both Diodorus Siculus and Pliny the Elder call "*zythos*" (*HN* 22.81; Diod. Sic. 5.26.2–3). Earlier sources claim that beer was commonly consumed by the Egyptians long before Zosimus wrote his method down (for example, Hdt. 3.100; Theophr., *Hist. Pl.* 4.410; Diod. Sic. 2.36.3–4): a statement attributed to the sixth-century BC geographer Hecateus by Athenaeus claims that Egyptians used ground barley and turned it into a beverage (Athen., *Deipn*. 10.418e, 10.447c), and there is archaeological evidence for beer produced in a similar way during the earlier Pharaonic period (Tallet, 2015, p.321).

While both recipes are quite clear regarding ingredients, both contain difficulties with respect to their measurements, and in terms of processes. For instance, while the method for Columella's *mulsum* is similar to the way in which it has been brewed for millennia, the measurements are ancient and are by no means precise. Zosimus' recipe, however, is rather more troublesome: beer is typically made with wheat or grain (whole or sometimes partially ground), but Zosimus also suggests that loaves of malted bread should be used.

Our method then required consideration not only of the evidence itself, but also differences in ancient and modern methods of brewing, processing, fermentation, and storage. Much effort was made trying to re-create the conditions of an ancient brewery, although these were incredibly difficult to replicate in Winnipeg during the winter months. Given the obvious environmental difficulties (for instance, it is difficult to malt barley on a flat roof, in the sun, in -40oC), the decision was made to do as much of the preparation as possible in Barn Hammer's brewery as this would provide us with an environment in which yeast cultures were overly present. Why was this necessary? Rather unsurprisingly, commercially available yeast was not present in the ancient world. But while the Romans were not aware of yeast as such, they certainly knew of various types of leaven, and methods to promote both fermentation and leavening (See, for instance, Plin. *HN* 18.42). In fact, yeast itself was not first described as such until 1680 when Antonie van Leeuwenhoek did so using handmade wax globules; it was more than 150 years later, in 1838, when Charles Cagniard de la Tour stated that yeast was responsible for fermentation (Lodolo *et al.*, 2008, p.1018). Given this, we

decided to use a sourdough culture starter for our process as we surmised something similar was more likely used in the ancient context; this was procured from a local bakery in Winnipeg, Sleepy Owl Bread.

With respect to Zosimus' beer and our first batch, the most difficult issue revolved around the baking of the bread, which had to be done in a way that did not destroy the enzymes required to convert the polymers—starches—in the barley into sugars, or monomers. The first stage in considering the production process was to grind the two-barley grain into flour, by hand, using a frictionless grinder at the brewery (See Figure 1); five hours of grinding yielded 14 kg of flour. To create the loaves of bread, we took 1 kg of flour, added 24 fl. oz. (three cups) of water, and 30 g of the sourdough culture. Eight loaves were then worked, shaped prior to baking, and left to rest for 12 hours.

The re-creation of the baking process itself was particularly difficult: with the need to keep the temperature of the oven low (lower than 40oC so that the sourdough culture would remain alive and that the enzymatic process would begin), and the incapability of many modern ovens to go below 79.44oC (175oF), our method necessitated heating the oven to that minimum temperature, and switching it off as soon as the oven reached it. We then let the oven decrease in temperature for 30 minutes before raising the temperature to 79.44oC (175oF) again. The loaves were baked on baking sheets, their position on the racks was changed every hour, they were flipped over after the first eight hours, flipped again after 11 hours, and then flipped every two hours for another seven (See Figure 2). After 18 hours, at the end of the baking process, the bread was baked sufficiently; the enzymes, central to the fermentation process in the absence of yeast had already begun to do their work.

The eight loaves were broken up and placed into a nylon mesh bag, which was added to a 70-litre conical fermenter, along with 32 litres of filtered water, which measured 40 litres with displacement (See Figure 3). The temperature was monitored over the next two days: the starting temperature of the water was 65oC (149oF); within five minutes, the temperature had dipped to 59.1oC (138.38oF). The following day, the temperature stood at 23.3oC (73.94oF), and examination of the fermenter suggested that the sourdough culture had not survived; the decision was then made to add the remaining sourdough culture (150 ml/170.9 g), and after this addition, the temperature stood at 22.8oC.

The solution was left to ferment for ten days, and then to mature for a further 11 days; three weeks in all. Initial examination of the beer was made after this time: the beer was full-bodied and thick (See Figure 4). An additional four days resulted in further settling, and—given the problems with sourcing clay amphorae—the beer was transferred into six glass jugs (each 1.89 litres in capacity). Examination of the beer at this point revealed a clearer solution, although still cloudy (See Figure 5).

The *mulsum* recipe by Columella was far easier to re-create, although there was one significant issue: the wine must or *lixivum* that Columella mentions was unattainable. Wine grapes in Winnipeg during the Winter months are particularly difficult to come by, and so re-creating both the requisite (non-specified) amount and the type of grape was impossible. Our substitute came from a commercially available wine-making kit that contained a sterile Italian red-grape must. In an attempt to draw effective parallels between both *mulsum* and mead, however, we created two different versions (See Figure 6): the first was made with the red-grape must; the second was made using the yeast solution at the bottom of the fermentation tank of Barn Hammer's 7th Stab Red Ale (five days old, and at the end of its fermentation period), and bears a resemblance to an ancient Gallic wheat- or barley-beer with added honey, known as *korma*, *curmi*, or apparently *furta* (Athen. *Deipn*. 4.152c, citing Posedonius; Diosc., *Mat. med.* 2.70; Garnsey, 1999, p.118).

The basic form of Columella's recipe was retained, but changes were made to the volumes and measures he suggests; here it should be noted that we assumed Columella was referring to a measurement of liquid when he referred to an *urna* in his text, and that an *urna* was half an amphora, thus circa 13 litres or almost three imperial gallons (OLD s.v. *urna*). Our first batch—the *mulsum*—was doubled: 20 lbs (circa 6.4 litres) of raw, unfiltered honey (complete with honeycomb, wax, and bits of bee from Beeproject Apiaries (http://beeproject.ca/) were added to a 50-litre plastic container, followed by 23 litres of grape must. Then, we added five grams of wine yeast. This was necessary, although unfortunate, given the absence of the natural yeasts and sugars that would have been present from the first pressing of the grapes. Our second batch—the *korma*—began by adding 14.3 lbs of raw, unfiltered honey to a container, and to that we added 20 litres of the unfiltered Red Ale solution. Our most significant departure from Columella's methods (besides the use of plastic) concerns the smoking of the *mulsum*; presumably Columella means to have one store the vessels containing the liquid in a space near or above the hearth; instead, we placed the *mulsum* and *korma* in Barn Hammer's furnace room to replicate the heat given off by a Roman hearth. Both batches were left for Columella's requisite period of a calendar month, and were then decanted into two small 40 litre kegs, using a cheese cloth to replicate a rudimentary filter, as Columella (*Rust*. 12.41) suggested (See Figure 7). Both the *mulsum* and the *korma* resembled more viscous versions of the red wine and the Red Ale that was used to re-create them (See Figure 8).

Conclusions

There have been two central questions throughout this experiment: first, could we re-create alcoholic beverages from the Roman period in an authentic fashion; and second, what did they taste like? In answer to these questions, this experiment has allowed us to make some interesting observations from brewing both Zosimus' beer and Columella's *mulsum*. First, with respect to taste, it is certainly fair to say that if Zosimus' beer is even remotely authentic,

then the modern palette is now far removed from that of the average fourth century Roman-Egyptian. As expected, the beer was sour, in large part due to the character of the sourdough starter, although in preliminary taste tests it was described as “smoothly sour” although “not unpleasantly so;” after bottling, the beer retained its sourness and comments in a taste test at this point included “raisin-y,” and “almost like lime-lemonade.” In truth, this is hardly a surprising outcome, particularly given modern processing and the fact that taste generally is a complex matter, driven by social context and conditioned by one’s social environment (Livarda, 2018, p.179). But a great sideways leap takes us to the current fascination with sour beers and, in particular, the time that it takes to produce them. Commercial and small batch sour beers currently take months to ferment, and even years to mature: we managed to create one—and one with a generally acceptable taste to the modern palette—in 21 days. Our current conundrum then is whether a fast-acting sour process has been lost over time, and if so, whether we can reproduce it repeatedly. The mulsum, as expected, was very sweet, and was well-received; its more traditional mead-like partner less so. It smelled like a fortified wine due to presence of Fusel alcohols; it also had a distinct warming quality not unlike distilled spirits.

Second, appearance. To begin with the beer: Did this beer really look like a sourdough milkshake when it was produced 1800 years ago? The general feeling is that the clear and crisp beer is a modern ideal; it is worth bearing in mind that several modern commercial and craft beers—wheat beers, for example—are cloudy. We did test this aspect briefly in Barn Hammer’s taproom: some customers were put off by the appearance alone, but others certainly were not. The *mulsum* looked like a viscous red wine, almost certainly due to the additional honey and sugar content.

Third, with respect to the production processes, the *mulsum* was quite simple and was—at least in terms of labour—low-cost with only one person needed. Zosimus’ beer, however, is labour intensive. The baking of the bread alone at these low temperatures takes several days, and at least two people. As a result, one wonders whether ancient beer recipes like Zosimus’ simply used whatever bread was available (in a similar way to how a modern Kvass beer is made), but as tempting this conclusion might be there is no evidence for it. The question then may become whether the Roman provincial population deliberately set out to brew beer or whether beer was a by-product of the bread-making process. While there is enough archaeological evidence—with breweries next door to bakeries—dating to earlier periods of Egyptian history to suggest that there is a link between the two, it is difficult to say much more. But given the now widespread view among archaeologists that cereal cultivation was first started to brew beer rather than to bake bread, this experiment is perhaps telling (Liu *et al.*, 2018, p.783; Nelson, 2005, p.4; Katz and Voigt, 1986, pp.23–34).

As noted above, one of the major questions of this project has been whether we brewed ancient beer and *mulsum* authentically, as far as we were able; this in itself was incredibly

challenging given the nonchalant nature of the ancient recipes themselves and our conscious attempts—at least in respect to our first batches—not to test everything or to try and force modern brewing practices upon ancient ones. One inevitable question, however, is whether what we brewed, using Zosimus' text, can really be considered a beer by current standards? This is where things get a little more difficult in the absence of a full series of tests. A good place to start would perhaps be to consider if the beer fermented: the answer is yes, but to what degree we are unable to tell: what typically happens in the brewing process is that when sugar is fermented, the gravity drops as the ethanol (or alcohol) produced results in a lower density than sugars. With our beer, the opposite seems to have happened: the initial gravity reading we took when we added the bread to the water was only 10.2 Brix (percent sugar), but the reading ten days later was 22 Brix. Explaining this in terms of a brewing process is difficult, but what we believe happened was that the bread leached out more and more sugars: dextrins, longer and more complex chains of sugar. What is interesting is that dextrins cannot usually be broken down by ale or beer yeast, but it appears they can by the culture in our sourdough starter. This also means that while we were sure that the beer had a low ABV (Alcohol by Volume), likely around 3%, even after several months in a two-litre glass vessel, things were still happening: in May, three and a half months after it had been bottled, it was opened at Classical Association of Canada conference in early May 2018, and it had carbonated itself. While these results are confusing, another is not: the pH level was 4.3, which is exactly what one would expect from a beer after fermentation. Again, the mulsum was easier to work with: Columella provides us with a much simpler and clearer process and this in itself suggests that it is, in fact, more authentic in respect to its re-creation. With respect to its ABV, we suspected that it ran upwards of circa 12%, although this figure has been heatedly disputed even within our group with figures of closer to 18–19% suggested: keeping to the authentic line, in this case, has resulted in a lack of useable data to resolve this issue. Nevertheless, the upper figure is not without presumed parallels. Schnur's suggestion, (1957, p.123) following Pliny the Elder (*HN* 14.16.95, cf. Vell. Pat. 2.7.5), was that first the Elder Pliny was likely suggesting that the long-life (around 200 years old, according to *HN* 14.4.55) of Opimian wine was because it was mixed with honey to create a mulsum, and second that the mixing of Opimian wine with honey would result in an increase from 12–16% to a possible 22%, given that 80% of the weight of honey is sugar.

Finally, what has this re-creation told us about the Romans and their deprecation of beer and their appreciation of *mulsum*? This is a rather complex question that leads to several other interrelated issues ranging from Roman provincial identities through to Roman cultural (mis)perception and appropriation. But it is now widely accepted that, for the Romans at least, taste was the sense that, after touch, was most important (Totelin, 2018, p.66). The problem is that, as important as it may have been, the Latin gourmet's vocabulary was not particularly well defined. Like other pre-industrial Western civilizations, there seem to have been few characteristic tastes for the Romans beyond the four main flavours: sweet, sour, sharp, and salty (Gowers, 2018, p.93). Moreover, for the Romans, these tastes could all cause

the body to react in certain ways: in the mid-to-late fourth century AD, Oribasius, the personal physician of the Roman emperor Julian (whose alleged epigram can be found above) wrote a summary of Galen's *On the causes of symptoms* which, in part, considered flavours of medicinal treatments; therein, the sweet and oily have gentle, pleasant qualities, whereas all of the others bind, purge, shatter, stupefy, or even mortify (Totelin, 2018, p.66; Oribasius, *Coll. med*. 14.5, CMG VI.1.2, pp. 185–6 Raeder; Gal. *Caus.Symp*. 1.6). But the power of taste as a metaphor was not simply restricted to the physical senses and the body; the Romans also labelled their wider surroundings and experiences with sensory vocabulary, and in particular, taste (Gowers, 2018, p.95). Sweetness was generally prized above all, as the metaphorical extension into the sphere of pleasure and happiness may suggest: for instance, the most favoured type of kiss was a *suauium*, and its diminutive *suauiolum*, from the adjective suasis meaning 'sweet, agreeable, grateful' (*ibid*.); these terms, used by Catullus, Plautus, and Terence were terms of endearment and reflections of feelings not only of love, but also desire and physical intimacy (See, for example, Cic. *Att*. 16.11; Catull. 99.2, cf. 14; Ter. *Eun*. 456; Plaut. *As*. 225, 891, 940, Cas. *887*, *Poen*. 365–367, *Truc*. 355). If being truly 'Roman' meant to enjoy sweet things, and if the idea of what was 'Roman' was still developing and evolving—as identities almost always do (Heather, 1999, pp.234–258; Alston, 2008, pp.147–60; Rose 2008, 97–132; Revell, 2009, pp.5–8; Gruen, 2013, pp.1–7; Banducci, 2018, pp.136–137)—then one can not only see why mulsum was preferred over beer, but also why true Romans could be distinguished from those 'barbarians' who drank beer (even if they were legally 'Roman' after AD 212). In effect, the drinking of correct 'Roman' drinks became a way in which a distinctly Roman ethnic and emotional identity could be maintained after the juridical identity of 'Roman' was significantly diluted.

With the first part of this project complete, we can say that we have re-created a fairly authentic beer from the fourth century AD, and an authentic *mulsum* from the first century AD. Moreover, we know our next steps are in immediate future There are not only further research opportunities, but also possible commercial ones, should anyone prove brave enough to try. Rather surprisingly, our initial forays into this area of classical history have been met with an enthusiastic response, not only from classicists and ancient historians, but also unexpectedly from other breweries and the general public.

Nevertheless, the last word in any research project in classics should go to the ancient world. The Romans' notions of who would drink what are largely reflective of our own notions about beer: while from vastly different cultures, a Roman from the Italian homeland in the second century AD drinking *mulsum* would likely look at a Romano-Egyptian drinking beer in the same way as a craft-beer aficionado may today look at someone else drinking modern commercial beer. The fact is that both Roman society and our own have been formulated by an amalgam of several different ideologies that are millennia old; this project, at least so far, suggests not only that drinking cultures share particular issues in the expression and construction of identity, but also that the beer we drink—that some of us love so much—

today is still fundamentally that which evolved from the beer that existed in the ancient world (Nelson, 2005, p.8).

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FIG 1. GRINDING BARLEY FOR BREAD.

FIG 2. BAKING THE LOAVES.

FIG 3. ADDING THE NYLON MESH BAG CONTAINING THE BREAD TO WATER.

FIG 4. INITIAL EXAMINATION OF ZOSIMUS’ BEER.

FIG 5. SECOND EXAMINATION OF ZOSIMUS' BEER.

FIG 6. COLUMELLA'S MULSUM AND A COMPARABLE GALLIC KORMA (OR CURMI, OR FURTA).

FIG 7. DECANTING THE MULSUM AND THE KORMA.

FIG 8. EXAMINATION OF THE MULSUM DURING DECANTING.