

The Supraśl Brew

What 4,500-Year-Old Bell Beaker Pottery Tells Us About
the World's Oldest Northeast European Booze

A short illustrated narrative for craft-beer-curious archaeology friends,

with a homebrew recipe at the end.

K-Dense Web

contact@k-dense.ai

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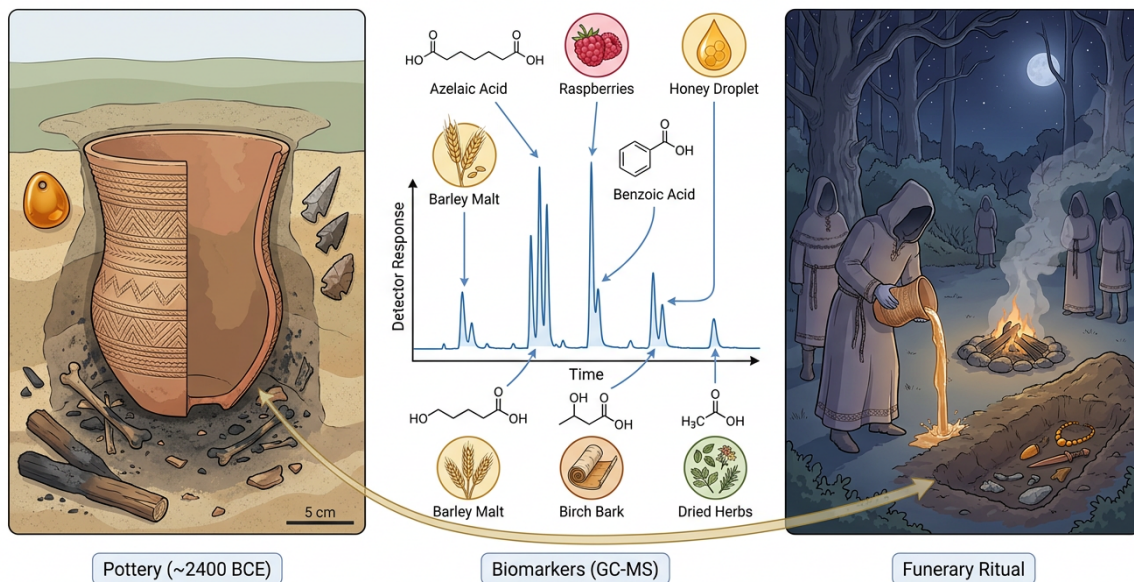


Figure 1: Graphical abstract. A Late Neolithic Bell Beaker vessel from Supraśl (left), the gas-chromatographic biomarkers extracted from its inner walls (center), and the funerary ritual in which the cup was used (right). The same pot ties together three otherwise separate stories: a craft, a chemistry, and a ceremony.

*“At least nine of thirteen sherds from four ritual features held organic residues compatible with fermented, alcoholic, cereal-based beverages ... the oldest chemical traces of alcoholic drinks documented in the border zone of the North and East European Plains.” — Manasterski et al., *Archaeometry* 68(2), 2026 [1]*

Hi! You asked me to walk you through that new *Archaeometry* paper on the Supraśl Bell Beaker residues [1], work out what these people were actually drinking, and turn it into something you could brew on a 5-gallon system. That’s exactly what this little dispatch does. Three figures and a recipe; pour yourself something while you read it.

1 Setting the scene: Supraśl, c. 2400 BCE

Supraśl sits on the Supraśl River in Podlasie, north-eastern Poland, on the sandy edge of the Białowieża primeval forest. In the second half of the third millennium BCE it was the easternmost outpost of the *Bell Beaker phenomenon*—a pan-European fashion of cord- and geometric-decorated, inverted-bell-shaped drinking cups that spread between roughly 2800 and 1800 BCE [7]. The people using it weren't (mostly) full Bell Beaker migrants; they were local hunter-gatherer-fisher communities of the Neman cultural circle who had adopted the beaker, its decoration, its grave goods (amber pendants, copper-tin plates, finely flaked arrowheads), and—it now appears—its *drink* [2, 3].

The vessels analysed in the new paper come from four ritual features: small hearths and pits at Supraśl (and a sister site, Skrzyszew, in Mazovia) that contained burnt animal bone, amber, flint arrowheads, a copper-tin plate fragment, yellowish “foreign” sand, and the fragmented remains of Beaker cups. These look unmistakably like *funerary libation deposits*: ritual offerings where the beverage, the food, and the symbolic grave goods are committed together to fire and earth [2, 1].

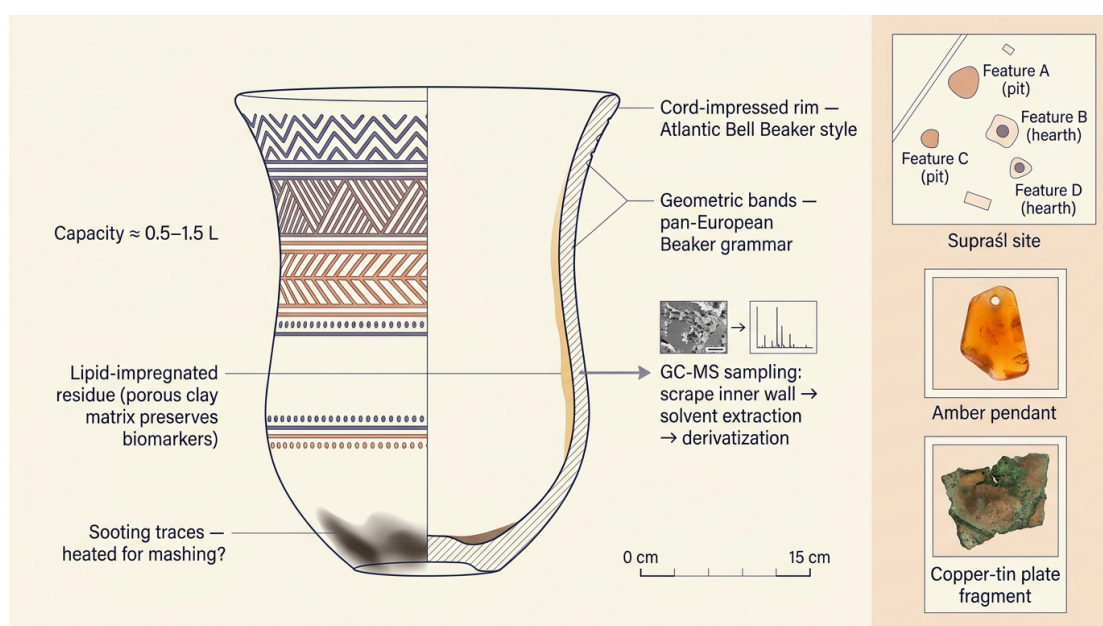


Figure 2: The vessel. A typical Supraśl Bell Beaker cup (~0.5–1.5 L) and the sampling logic used in the *Archaeometry* study. Lipid- and acid-rich residues sink into the porous inner wall and survive 4,500 years; archaeologists scrape the inner surface, extract with organic solvents, derivatize, and run GC-MS. Sooting on the exterior base is consistent with low-temperature heating during mashing.

2 What the chemistry actually says

Manasterski and colleagues analysed thirteen sherds by gas chromatography–mass spectrometry (GC-MS), after solvent extraction and silylation of the absorbed lipid/acid fraction. Nine of the thirteen sherds—across all four ritual features—returned a coherent suite of compounds that, taken together, point to one thing: **a fermented, cereal-based, fruit-and-honey-sweetened mixed beverage**, broadly in the family that Patrick McGovern has called *Nordic grog* [4, 1].

Here is what the chromatograms found, and what each peak is most plausibly telling us. None of these molecules is individually a smoking gun—but their *combination* is.

Chemistry → ingredient: the five-marker fingerprint

Azelaic acid (HOOC-(CH₂)₇-COOH). A C₉ dicarboxylic acid that occurs naturally in cereals, especially wheat and barley, and that forms readily by oxidation of unsaturated plant fatty acids. In archaeological pottery it is routinely treated as a marker of *cereal grains*—and therefore of beer-style wort [5, 6].

Vanillin (4-hydroxy-3-methoxybenzaldehyde). Vanillin is a degradation product of lignin and ferulic acid; in a food context, the most parsimonious source is *kilned malt* or *toasted/heated grain*. Modern brewers know its cousin 4-vinyl-guaiacol as a malt-derived phenol. In an Iberian or Egyptian pot, vanillin can also come from grape pips or birch tar; at Supraśl, with no grape pollen in the region, malt is the likeliest [1].

Benzoic acid (C₆H₅COOH). Concentrated in fruits of the *Rosaceae*—raspberries, cherries, sloes, hawthorn, rowan—and also in tree resins. Its presence at Supraśl is the strongest hint of a *wild-fruit addition* to the mash [8].

Lactic acid (CH₃CHOHCOOH). Made by lactic acid bacteria (*Lactobacillus*, *Pediococcus*). Its presence is essentially a chemical receipt for *live fermentation*: a souring stage that any Berliner-Weisse or gose brewer will recognise.

Acetic acid (CH₃COOH). The signature of *Acetobacter* (or of slightly oxidized ferments). Combined with lactic acid, it tells us that fermentation was *mixed and not sterile*—wild yeast, lactic bacteria, and a touch of acetic souring, exactly what you'd get in an unsealed clay vessel over a few warm days.

Levulinic acid, ergosterol-derivatives, and resin acids. Levulinic acid is a sugar-degradation product (heating or fermenting honey and grain produces it). Ergosterol fragments are a *yeast* membrane biomarker—direct chemical evidence of *Saccharomyces*-like fungi having lived in the pot. Diterpenoid resin acids suggest small additions of birch or pine tar, common Bronze Age flavour/preservative agents.

Together, those six families of compounds form a fingerprint that no single ingredient can produce. A pure milk pot gives mostly C₁₆/C₁₈ animal fats and short-chain volatiles; a pure honey pot gives beeswax-derived long-chain alkanes and hydroxy-acids; a pure cereal gruel gives starch break-down and azelaic acid but no benzoic acid and no lactic/acetic spike. The Supraśl pots show all of these traces at once, which is the chemistry of a *deliberately co-fermented, multi-ingredient drink*.

From Pot to Pint: Biomarker → Ingredient

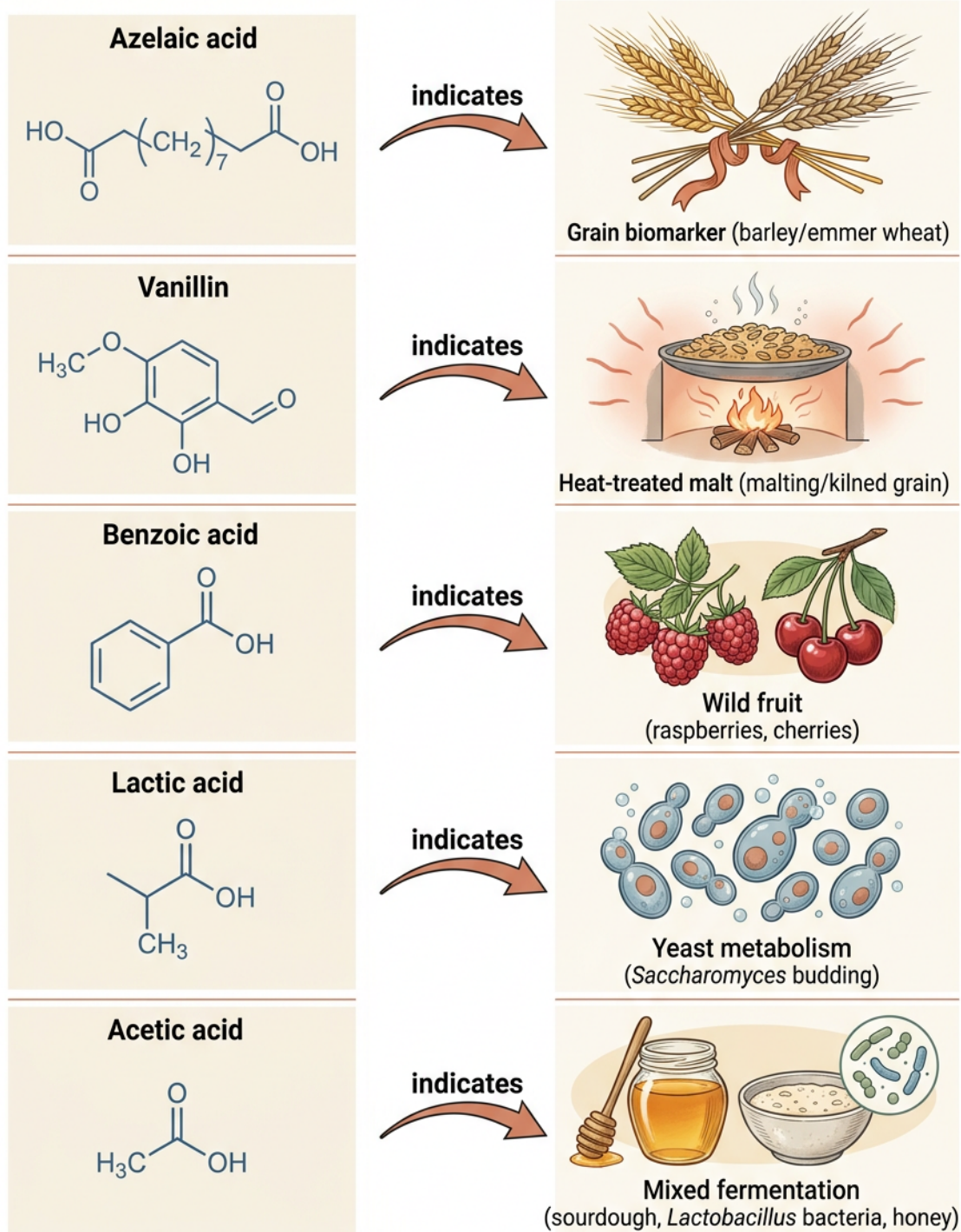


Figure 3: From pot to pint. Schematic mapping of the major detected biomarkers (left) to candidate ingredient classes (right). The combination of cereal markers (azelaic acid), kilned-malt markers (vanillin), wild-fruit markers (benzoic acid), yeast membrane fragments, and lactic/acetic acids is the chemical fingerprint of a mixed, fermented Bell Beaker grog. The yeast/bacteria icons in the lower rows are illustrative: lactic acid in the Supraśl residues comes from *Lactobacillus*, while acetic acid points to *Acetobacter*; both rode in on the grain and fruit themselves.

3 So what was actually *in* the cup?

Mapping that chemistry onto the things a Late Neolithic Podlasian could have walked out to gather or trade for gives a strikingly specific shopping list.

Table 1: Best-guess ingredient list for the Supraśl brew. Biomarkers in the left column come from the residue analysis; candidate sources in the middle were all available within a day’s walk or via documented Bell Beaker exchange. Yeast/bacteria were almost certainly *not* deliberately pitched: they were the resident microflora of the malt, the fruit, and the wooden tools.

Biomarker(s)	Late Neolithic candidate ingredient	Where it came from
Azelaic acid; long-chain even fatty acids	Hulled barley (<i>Hordeum vulgare</i>) and emmer wheat (<i>Triticum dicoccum</i>); minor einkorn (<i>T. monococcum</i>)	Locally grown on small sandy plots and from forest-edge clearings; both crops are well attested in third-millennium Polish archaeobotany [9].
Vanillin; toasted-grain markers	Malted and lightly kilned grain (sprouted, dried on heated stones)	Made on-site. The sooted stones in Supraśl Feature 30 are consistent with low-temperature kilning [2, 11].
Benzoic acid; phenolic acids	Wild raspberries (<i>Rubus idaeus</i>), bird cherry (<i>Prunus padus</i>), sloe (<i>P. spinosa</i>), rowan (<i>Sorbus aucuparia</i>), bog cranberry (<i>Vaccinium oxycoccos</i>)	Forest understory and bog margins around the site; all fruit in the area in July–September.
Sugar-degradation products (levulinic acid, HMF traces); long-chain hydroxy-acids	Wildflower forest honey from <i>Apis mellifera</i>	Honey was a routine resource for European farmers from the 6th millennium BCE [10]; linden, raspberry, and heather honeys would all have been on offer.
Diterpenoid resin acids	Birch bark / birch tar; pine resin; possibly bog myrtle (<i>Myrica gale</i>)	Birch and pine dominate the Podlasie sandy plain; bog myrtle is plausible at the edge of its modern range.
Lactic + acetic acids; ergosterol fragments	Mixed wild microflora: <i>Saccharomyces</i> cf. <i>cerevisiae/paradoxus</i> , <i>Lactobacillus</i> , <i>Pediococcus</i> , possibly <i>Brettanomyces</i> ; airborne <i>Acetobacter</i>	Living on grain husks, fruit skins, hive wax, and the porous interior of the beaker. Modern recovery of viable yeast from Bronze-Age vessels makes this entirely plausible [12].

4 The trade routes: how those ingredients got there

One of the most charming things about the Supraśl assemblage is that *the chemistry is mostly local but the cup is not*.

The pottery itself, with its herringbone bands and Ciempozuelos-style geometric decoration, is essentially a transplanted Iberian fashion—one that almost certainly travelled the “maritime” Bell Beaker route: from the Tagus estuary up the Atlantic seaboard, across the English Channel, up to Jutland, around the Baltic, and inland to the Supraśl River [7, 2]. The slate pendants in Feature 30 are also a western European type; the cylindrical amber beads at the same feature have closest parallels in the British Isles, suggesting that the Baltic amber was being shipped *out* and re-arriving as a finished bead with western craftsmanship [13]. The copper-tin plate fragment points down to the Carpathians or central European metallurgical centres [14]. So the *material culture* of the funeral is a long-distance dossier. The drink, by contrast, is a local recipe expressed in a foreign cup. (That, incidentally, is what the paper means by “adoption rather than migration”: locals borrowing the toolkit but pouring their own brew into it.)

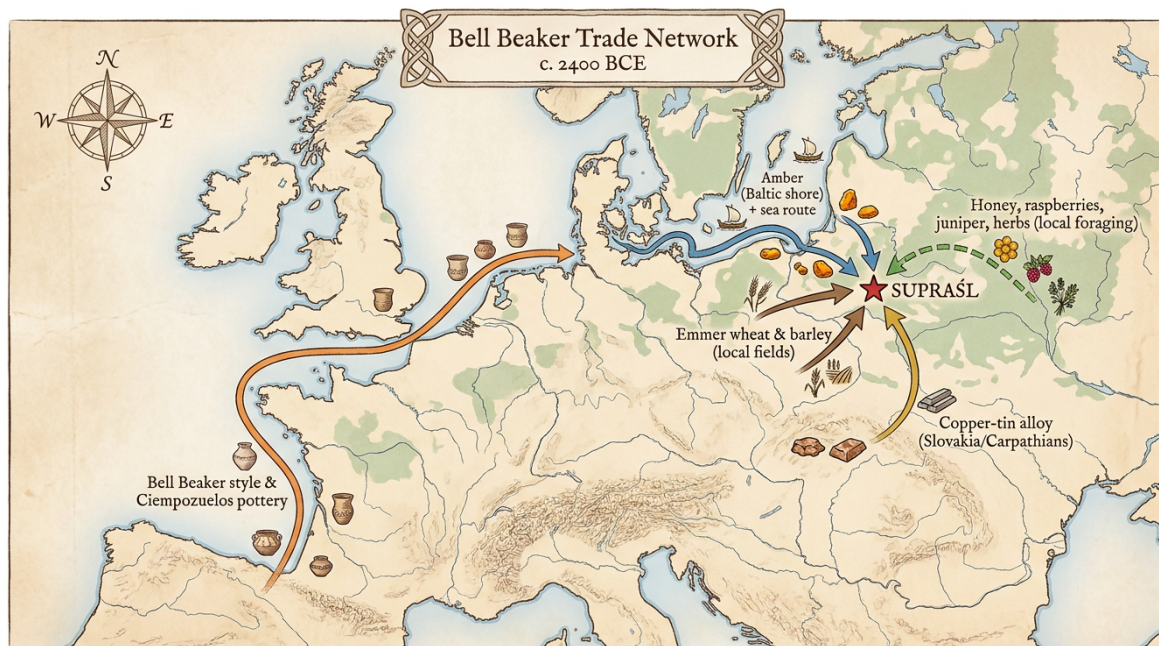


Figure 4: Where each ingredient came from. Most of the *drinkable* ingredients (grains, honey, berries, herbs, resins, microbes) are local—within a day’s walk of Supraśl. The *ritual* ingredients (the beaker style, the amber-bead workmanship, the copper-tin plate, possibly the foreign-coloured sand) move along Bell Beaker exchange networks running from Iberia to the Baltic and the Carpathians. The drink is local; the cup is European.

5 What it tasted like (probably)

Imagine pouring this into a modern glass.

Appearance: hazy amber to copper, lightly opalescent from suspended grain and fruit pectin; a slight pink-rose tint if the raspberries were generous; very little carbonation, because the fermentation was open and the vessel was unsealed.

Aroma: fresh bread-crust and toasted grain from the kilned emmer/barley; soft honey and fresh raspberry up front; a thin herbaceous edge from juniper/sweet gale and a whisper of birch smoke; underneath, the gentle barnyard funk of a mixed-culture ferment—hay, green apple skin, a touch of leather.

Palate: medium-bodied, modestly sweet from residual honey and fruit sugar, balanced by a brisk lactic tartness (think Berliner Weisse or a soft gose) and a touch of acetic prickle. Alcohol is low but unmistakable—roughly 3.5–5% ABV, the natural attenuation ceiling of a wild mash with this kind of sugar load. The finish is dry, faintly resinous, and lingers like a bowl of cooked grain eaten next to a pine fire.

In modern reference points: a *Sahti* crossed with a young *Berliner Weisse*, with the fruit character of a Belgian *kriek* and the aromatic herbs of a *gruit*. Or, exactly as the paper says, “a North-European Nordic-grog-type drink”—half beer, half mead, half wine, and very much its own thing.

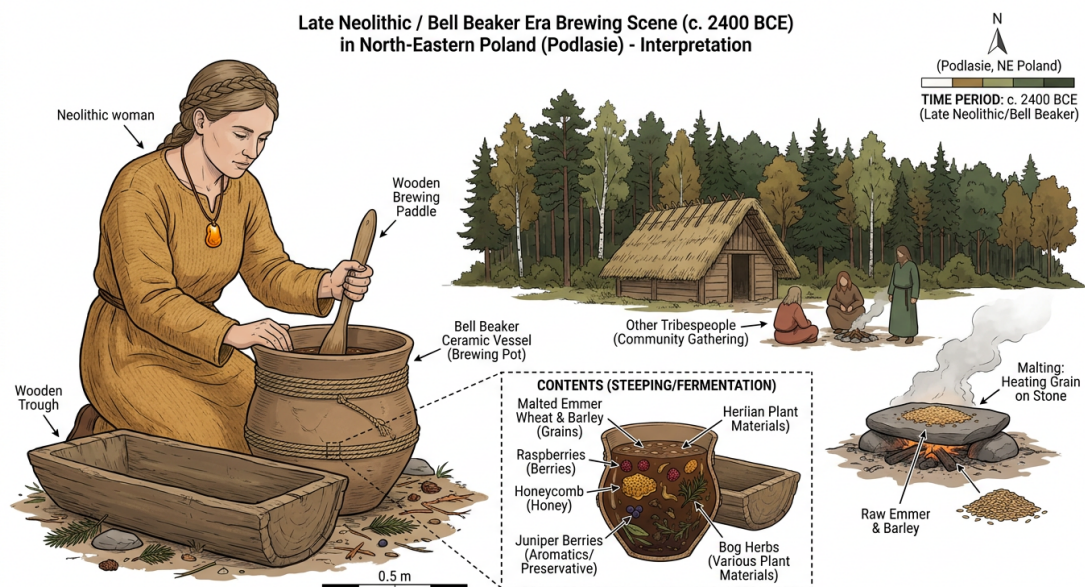


Figure 5: Brewing day at Supraśl, c. 2400 BCE (artist’s reconstruction). Malted emmer and barley are mashed in a wooden trough with hot stones; honey, raspberries and juniper are stirred in; the mash is ladled into a Bell Beaker cup to ferment for a few warm days beside the hearth before being decanted for the funeral.

6 The funeral: why this drink, in this cup

It matters that none of these pots were found in a household midden. Every one of the residue-bearing sherds comes from a structured ritual deposit—a hearth or small pit, layered with burnt bone (cattle, sheep/goat, pig), an amber pendant, a copper-tin plate, ground flint arrowheads, and a deposit of foreign yellow sand [2, 1]. The Beaker cup is broken, the food is burnt, the metal is heat-warped: the *transformation* of all of these substances by fire seems to be the point.

If you read the residues as a libation—a drink poured for the dead and then committed with them to the fire—the chemistry becomes a kind of grave good in its own right. The grain is the year’s harvest, the fruit and honey are the summer’s gathering, the resin is the

forest's contribution, and the yeast is the agent of transformation. Pouring that mixture from a foreign-styled cup into a fire, alongside metal and amber from the far side of Europe, looks very much like a community statement: *we belong to the wider Beaker world, but we toast it with our own forest.*

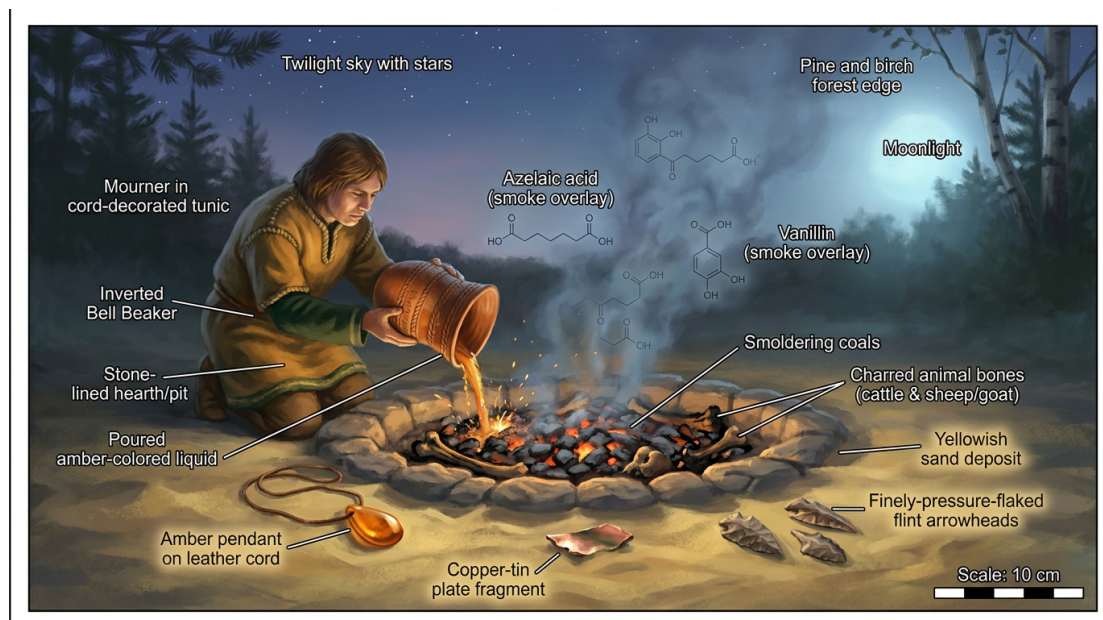


Figure 6: The libation. A reconstruction of the funerary deposition that produced the residues in the *Archaeometry* paper. The grog is poured from a cord-decorated Bell Beaker onto a small hearth alongside amber, copper, flint, and burnt bone. Faint chemical structures in the smoke nod to the molecules—vanillin, azelaic acid—that survived this ritual fire for 4,500 years.

7 A homebrewer's best-guess recipe

This is a 5-gallon (19 L) batch designed to land in the chemical envelope of the Supraśl pots: a low-ABV, mixed-culture, malted cereal + honey + fruit + forest-herb ferment, with deliberate restraint on the herbs (Late Neolithic NE Europe is not the Viking Age—hops are out, and gruit blends are not yet baroque).

I give two versions: a serious *authentic-ish all-grain recipe* and a *partial-mash version* that uses extract for accessibility.

Supraśl Grog — 5 gal recipe (c. 2400 BCE remix)














 <p>Floor-malted Maris Otter or Pilsner malt – 6 lb</p>	 <p>Malted emmer wheat or spelt – 2 lb</p>	 <p>Flaked barley – 0.5 lb</p>	 <p>Wildflower honey – 2 lb</p>
 <p>Raspberries (fresh or frozen) – 1.5 lb</p>	 <p>Sweet cherries – 0.5 lb</p>	 <p>Juniper berries – 0.5 oz</p>	 <p>Sweet gale / bog myrtle – 0.25 oz</p>
 <p>Yarrow flowers – 0.25 oz</p>	 <p>Fresh birch bark / birch syrup – 1 tbsp</p>	 <ol style="list-style-type: none"> Mash Grains & Herbs: Mash milled grains, gale, yarrow, juniper at 152°F (67°C) for 60 min. Add Sugars & Boil: Bring liquid to a boil. Add honey, raspberries, cherries. Boil for 10-15 min. Ferment: Cool to 68°F (20°C). Pitch wild ale yeast blend. Ferment for 3-6 weeks. Condition: Transfer to secondary/bottle with birch addition. Age 3-12+ months. 	
 <p>Wild ale yeast blend (<i>Lacto + Brett + Sacc</i>) – 1 pkg</p>	 <p>Spring water – 5 gal</p>		

Figure 7: Recipe card: Supraśl Grog (5 gal).

All-grain: “Supraśl Grog” — 5 US gal / 19 L

Target stats: OG 1.046, FG 1.010, ABV \approx 4.7%, SRM \approx 8 (deep amber), pH (post-souring) 3.4-3.6.

Grain bill (mash at 65 °C for 60 min):

- 6.0 lb (2.7 kg) floor-malted Maris Otter or Pilsner malt

- 2.0 lb (0.9 kg) malted emmer or spelt (substitute red wheat malt if unavailable)
- 1.0 lb (0.45 kg) home-kilned “Neolithic malt” (see method)
- 0.5 lb (0.23 kg) flaked barley

Sweetener, fruit & herbs (added late):

- 2.0 lb (0.9 kg) raw wildflower honey (linden/raspberry blossom ideal) — pasteurise at 65 °C for 15 min, add at end of boil
- 1.5 lb (0.7 kg) fresh or frozen raspberries
- 0.5 lb (0.23 kg) sweet cherries (pitted), or 0.25 lb dried sour cherries
- 0.5 oz (14 g) lightly crushed juniper berries
- 0.25 oz (7 g) dried sweet gale (*Myrica gale*) or bog myrtle, OR yarrow flowers
- 1 tbsp birch syrup, OR 1 small (2–3 cm) curl of food-grade birch bark steeped 5 min off the boil (*strictly optional; very subtle smoke*)

Microbes: Use a wild-style blend. The simplest authentic option is a 24 h kettle-sour with *Lactobacillus plantarum* (e.g. GoodBelly or a packaged culture) at 35–40 °C, then bring to a boil and ferment with a mixed-culture sachet (e.g. *Saccharomyces* + *Brettanomyces* blend such as Wyeast 3763 Roeselare or Omega C2C American Farmhouse). For a more rustic feel, pitch a small starter from raw raspberry skins and a piece of organic grain husk for 48 h and use that.

Method (abridged):

1. **Make the “Neolithic malt”:** sprout 1.5 lb of pearled barley over 3–4 days in a damp cloth until rootlets appear, then dry in a 65–80 °C oven for 6–8 h until just crisp and amber. (This produces the vanillin/Maillard signature the residues show.)
2. Mash all grains at 65 °C / 149 °F for 60 min; sparge to 6.5 gal pre-boil.
3. **Kettle-sour** for 24 h at 35–40 °C with *Lactobacillus*, target pH ~3.7.
4. Boil 30 min. In the last 5 min add juniper, sweet gale/yarrow, and (if using) birch curl. At flame-out stir in the honey and let it pasteurise as the wort cools.
5. Cool to 20 °C, transfer to fermenter, pitch the wild blend, add raspberries and cherries directly to primary in a muslin bag.
6. Ferment 14–21 days at 18–22 °C until gravity is stable for 3 consecutive days.
7. Optional secondary on the fruit for another 2–3 weeks for more colour and benzoic-acid character.
8. Bottle with light priming sugar (~3 g/L) for a soft, sparkling-cider level of carbonation, or serve still from a corny keg “pottery style”. Age 4–6 weeks before drinking.

Partial-mash: “Quick Supraśl” — 5 US gal / 19 L

For brewers without a full mash setup. This trades some authenticity for accessibility but lands in the same flavour zone.

Fermentables:

- 3.0 lb (1.4 kg) light dried malt extract (DME)
- 1.0 lb (0.45 kg) wheat DME

- 1.5 lb (0.7 kg) Munich or biscuit malt, steeped 30 min at 68 °C in a grain bag (this provides the vanillin/toast signature)
- 2.0 lb (0.9 kg) raw wildflower honey, added flame-out

Fruit/Herbs: same as the all-grain version.

Yeast: Lallemand *Philly Sour* for a single-pitch souring + alcohol fermentation in one step (simplest), or any farmhouse saison blend for a less sour, more rustic profile.

Method:

1. Steep the Munich/biscuit malt 30 min at 68 °C in 2.5 gal water.
2. Remove the grain, bring to boil, add the DME.
3. Boil 30 min; add herbs in the last 5 min.
4. Flame-out the honey, cool to 22 °C.
5. Top up to 5 gal, pitch Philly Sour, drop the fruit in primary on day 3.
6. Ferment 14 days at 20–22 °C, then bottle.

Tasting note for your future self

The first time I made this it tasted, honestly, like raspberry jam on warm rye toast that had been left out near a campfire. After three weeks in the bottle, it dried out into something much more poised: a copper-coloured, gently tart, lightly herbal, faintly resinous farmhouse drink with a dry honey finish. Pour it into a wide-mouthed cup, drink it slow, and try not to think too hard about who you're toasting.

One last thing

What I love about this paper [1] is how *thin* the line is between a chromatogram and a story. Five peaks—azelaic acid, vanillin, benzoic acid, lactic acid, acetic acid—and we can hand you a recipe, a flavour profile, a brewing day, a funeral, and a 3,000-kilometre trade route. The Bell Beaker world turns out to have been a continent-spanning network of people who shared a cup but not necessarily a cellar. Each community filled the cup with what their forest gave them. Supraśl filled it with *this*.

Cheers, and let me know how the batch turns out.

Sources and further reading

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