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THE URUK BEVEL-RIM BOWL: NEW INSIGHTS ON TECHNOLOGY, MULTI-FUNCTION AND DISPERSAL

By JILL GOULDER

Interpretation of the function and role of the Mesopotamian – and peri-Mesopotamian – bevel-rim bowl (BRB) is enriched by recent residue analysis methods. A promising theme of secondary and even alternative primary uses of the BRB in the Uruk periphery during the fourth millennium B.C. is emerging. I make the case for such uses hinging not on its general utility as a small rough bowl (where it would compete with a range of conical cups) but on its pivotal characteristics: a sophisticated system of rapid, low skilled, production line manufacture of containers with specific features (notably thick walls for heat retention), and with an elegant technology-transfer concept of a single BRB as a portable manufacturing template and mould, notably suited to mobile groups. The BRB's novel 'system' suggests it was initially devised for one specific purpose – as I argue, for large-scale baking of leavened bread, perhaps for commensal feasting events. But the renowned BRB discard stacks or stockpiles (perhaps from single-use commensality events or seasonal batch BRB manufacture) lent them readily to secondary use, notably in the Uruk periphery, where their original cultural resonance may have been diluted. The BRB's virtues of speed and ease of manufacture might well then have encouraged production for more general purposes and new needs, including culinary – an evolution potentially detectable through morphology. The residue analysis to date additionally suggests a specific functional factor in the adoption of BRBs for secondary and eventually primary use: their heat retentive capabilities, making them specifically valuable as 'thermal paint-pots' for meltable materials such as bitumen, beeswax and animal fats. These materials could be heated in a larger vessel and decanted into thermally efficient BRBs for use, perhaps with a form of paintbrush, for coating, in a wide range of industrial and other uses.

Introduction

Bevel-Rim Bowls (hereafter BRBs) – the coarse, thick walled, ceramic artefact that became the type-fossil of the Late Uruk period – first appeared in southern Mesopotamia in the early fourth millennium B.C. By the mid-fourth millennium B.C. they cluster in their thousands throughout Mesopotamia and the surrounding regions, declining to extinction in most areas by 3000 B.C.

The function and cultural implications of BRBs have frequently been debated, but interpretation has often been clouded by tenuous analogical links and circular arguments, as well as a lack of focus on their pivotal characteristics – why were they made in the way they were? In order to gain a better understanding of the function and significance of BRBs, and of their possible role in the Uruk system, in 2007/8 I manufactured 28 replica BRBs (Fig. 1) and employed them in various experiments to test some of the functional theories advanced over the years by commentators, including the making of bread, yoghurt, cheese and salt. Experimental archaeology has its pitfalls (for example, equifinality) and limitations, but it can form a reality check, reducing the options for interpretation.

An account of these experiments was published in in 2010[1], with descriptions of BRBs' lack of suitability for yoghurt, cheese and salt but their spectacular success as moulds for efficient mass-production of leavened bread. In the present article, I revisit and update these findings, expanding on the concept of leavened bread-making, mass production and the unique form of the BRB, and touching on the false (and true) parallels with later Egyptian bread-moulds and on the pivotal differentiation of the BRB from the wide range of conical cups/bowls prevalent during this period and afterwards. I also highlight valuable new work more recently being done on residue and fabric analysis of BRBs, including consideration of BRBs as serving containers for broths/stews and as 'thermal paint pots' for bitumen, beeswax, fat/grease and other coating products. I relate these

[1] Goulder 2010 and see further details in my MA dissertation from which this was derived: https://jgoulder.com/archaeology/J_Goulder_BRB_Dissertation_2008.pdf.

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Fig. 1. Replica BRBs made in a BRB (author's experiments 2007/8)

subjects to new models of transfer of the BRB concept outwards from the Uruk core region to the periphery via mobile pastoralist groups.

A Brief History of Proposed Functions of the BRB

The ration systems in the latter half of the third millennium B.C., as described in texts of the Ur III period[2], were the inspiration for the argument by Nissen[3], Johnson[4] and others for BRBs as containers for grain rations in the Uruk period a millennium earlier. The proponents of this theory observed that the Sumerian NINDA cuneiform sign for bread resembles a BRB[5] and might have derived from fourth millennium B.C. use of BRBs for distribution of grain rations. Calculations were then made as to the relationship of the volume of BRBs and the quantity of grain that might have been issued[6]. However, later commentators conducted further measuring exercises and cast doubt on the validity of these calculations[7], with Forest[8] concluding that the entire ration theory was largely based on induction, coincidences and selective evidence.

Ration theory sceptics also pose the question of why ration issuers would use each bowl as a measuring utensil, giving away an awkward and heavy container to the ration recipient each time. Beale[9], Nicholas[10] and others also ask why, if the bowls were taken home by the worker, BRBs are overwhelmingly found in central administrative locations rather than in private dwellings. The ration theory fits equally poorly with the regular discoveries in recent years of small quantities of BRBs at distant sites and of large quantities at Mesopotamian sites lacking evidence of major

[2] E.g., Gelb 1965.
[3] Nissen 1988.
[4] Johnson 1973.
[5] Van de Mieroop 2004: 27.
[6] Englund 1999: 181; Johnson 1973: 138.
[7] Beale 1978; Miller 1981: 128; Sürenhagen 1974/5: 73.
[8] Forest 1987: 4.
[9] Beale 1978: 302.
[10] Nicholas 1987: 64.

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Fig. 2. Emmer wheat bread with sourdough yeast, baked in a BRB (author's experiments 2007/8)

administered projects[11]. In excavations in the early 20th century A.D., which often focussed on administrative and religious centres in the core southern Mesopotamian Uruk region, the finds of BRBs in large quantities corresponded well with interpretations derived from later Egypt, involving semi-slave gangs carrying out huge building and irrigation projects. The newer profile of BRB finds, though, points more towards a link with cultural influence than with large construction projects.

In 2010, I suggested that the distribution and contexts of BRBs, particularly in the case of newer small-scale finds in early, late, and remote Uruk contexts, might bear closer connections to the presence of Uruk administrators than to the work gangs for whom it has traditionally been assumed that the BRBs were utilised to supply grain or other rations[12].

But publication of valuable recent residue and other research, on sites in the Uruk periphery in particular, has considerably enriched discussion of BRB primary and secondary use and the likely cultural and social entities associated with them. Andrew Sherratt, in an unpublished paper[13], suggests that what migrated from Uruk to other regions was "a model of culturally situated dietary practice" involving "accounting systems, beer and leavened bread". I discuss below the likely role of mobile pastoralists in this process.

Bread-moulds

My experiments in baking bread in replica BRBs (Goulder 2010) found that the shape and fabric of the BRB were ideally suited to speedy large-scale production of well-risen bread (Fig. 2), and I give further details here.

Millard[14] suggested a process of preheating BRBs before adding dough, supported by the stacks of BRBs found in ovens at Eridu and Tell Brak and endorsed by modern bakery experts. My experiments with preheating resulted in rapid pre-baking rising and significantly improved 'oven spring' (rising during baking, critically important for heavier flours) and speed of baking, given the heat-retention properties of the thick walls of the BRB. The volume increase with oven spring is significantly more marked for wheat bread compared with barley, though the texture and flavour are improved in both[15], and there is a long record, including Pliny's and Herodotus's accounts, of a persistent preference for (emmer) wheat bread over barley[16]. Barley has a much higher profile in third-millennium B.C. texts than the less tolerant and lower yielding crop

[11] Forest 1987: 5; Potts 2009: 10.
[12] Goulder 2010: 359.
[13] Sherratt 2006.
[14] Millard 1988: 52.
[15] Samuel 2000: 545.
[16] Hillman 1984/5: 22; Nesbitt and Samuel 1996: 78.

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emmer wheat[17]. In the few archaeobotanical studies done on fourth-millennium B.C. carbonised seeds, barley generally dominates[18], though emmer wheat is second only to barley in southern Mesopotamia[19] and appears to have featured more during the Uruk period than later[20]. Old Babylonian texts mention both barley and (spelt) wheat flour as destined for bread[21]; but it may be that the great Mesopotamian barley crops were largely destined for beer[22], animal fodder[23] or the many ethnographically attested other cereal-based foods.

Here, I do not address the size variation of BRBs; I take the view that size (within practical parameters) does not seem to be a critical element aside from practicalities of, for example, stacking. Shimabuku, to give one example, found BRB volumes at Chogha Mish ranging from 385ml to 2,580ml, clustering at 700+/−200ml. "Clearly, the exact holding capacity of any individual bowl was not a consideration in its manufacture."[24] Concerning bread, my experiments indicate that finished loaf volume is little affected by minor variations in BRB volume, with a classic BRB size range of 0.78–1.21 litres[25] allowing production of a loaf of 0.5–1 litre, small enough to manoeuvre in the oven and cook to the centre but large enough to provide good crumb and not burn. The varying size of BRBs may have been local 'drift' of size or a reflection of changes in the grain or flour allowed per ration, or the official size or weight of a loaf[26]. In Egypt, bread output was measured by grain volume input[27]; experiments confirm that very broadly a rounded measure of grain produces a heaped measure of flour which in turn produces a rounded measure of bread.[28] It is important to recognise that at the time leavened bread, particularly wheat-based, may have been a delicacy rather than a staple. With the ingredients of the time, also, a preheated baking container will have produced a strikingly different bread from the otherwise flattish leavened loaf.

The BRB is often used as an instance of a loss of interest in food vessel aesthetics in the Uruk period, a phenomenon evident in many other contemporary ceramics[29]. I argue that the BRB, as a vessel not destined for serving, does not qualify as such an example, and that the Uruk 'lifestyle package' contained, not a BRB, but delicious leavened conical bread.

My functional conclusion – that BRBs are primarily leavened bread moulds – was proposed some time ago by Baumgärtel[30] and later repeated by Schmidt[31], Millard[32], Chazan and Lehner[33], Potts[34] and Montero Fenollós[35].

Many of their arguments were based on visual and functional parallels with bread-making vessels in Egypt. Factors often cited by commentators linking Mesopotamian BRBs and Egyptian bread moulds are the bevelled rim featured in a few of the latter, the progression from a thick, open shape to a later tall narrow one (Fig. 3), a parallel between the resemblance of the Sumerian NINDA pictogram to a BRB and the bread mould shape of the Egyptian sign for a loaf[36], the administration-related contexts in which both BRBs and Egyptian moulds are found, and the apparent link between bread- and beer-making in both cultures[37]. I suggest, however, that too much emphasis is laid upon the resemblance of certain types of Egyptian 4th Dynasty bread moulds to the much earlier BRB and on the appearance in Mesopotamia, after the demise of the BRB, of a coarse narrow vessel not unlike the later Egyptian Middle Kingdom bread mould (Fig. 3). I share the view held by Joffe[38], Schmidt[39] and others that Mesopotamian and Egyptian breadmaking practices are parallel developments – an equifinality resulting from practicalities and cultural habits.

From the standpoint of the primary use of BRBs as bread moulds, I challenge interpretations based upon assumptions that BRB findspots indicate the location of consumption of their contents

[17] Algaze 2001: 212; Oates and Oates 1976: 116; Potts 1997: 59.
[18] Charles 198: 191.
[19] Nesbitt and Samuel 1996: 74; Wright 2001: 131.
[20] Colledge 2003: 415.
[21] Bottéro 2004: 112.
[22] Collins 2000: 47.
[23] Hillman 1984/5: 19/21.
[24] Shimabuku 2023: 12.
[25] Chazan and Lehner 1990: 31.
[26] Ellison 1984: 64; Scott 1998: 29; Sherratt 2006.
[27] Kemp 2006: 174.
[28] Johnson 1973: 38; Kemp 2006: 178.
[29] Frangipane 1997: 46; Wengrow 2006: 151.
[30] Baumgärtel 1947: 93.
[31] Schmidt 1982: 317.
[32] Millard 1988.
[33] Chazan and Lehner 1990.
[34] Potts 2009: 13.
[35] Montero Fenollós 2012: 182–183.
[36] Millard 1988: 54.
[37] Chazan and Lehner 1990: 21/31; Millard 1988: 49/51; Sherratt 2006.
[38] Joffe 1998: 299.
[39] Schmidt 1982: 318.

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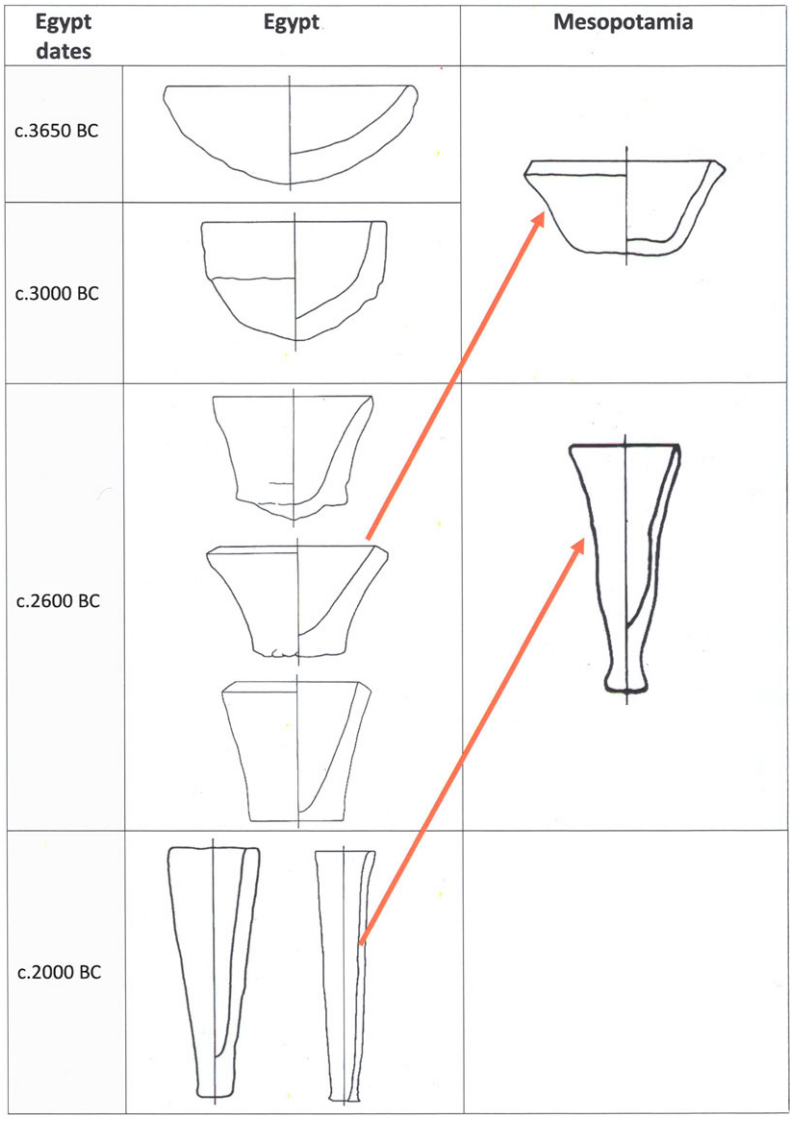


Fig. 3. Typological timelines: Examples of bread-moulds from Egypt and coarse vessels from Mesopotamia (not to same scale). After Chazan and Lehner 1990: 23; Jacquet-Gordon 1981: 13–17

(Goulder 2010). I also propose a new focus on the BRB as an early example of production line engineering, ingeniously combining not only mass production of ceramics but also industrial scale production of leavened bread. Finally, I underline the high probability that BRBs were adopted for a range of other uses[40], as supported by new analytical data, below.

Residue Analysis

In recent years there has been welcome new attention paid to BRBs in the form of residue analysis, enabled by advances in the techniques available, with work being done in particular in Mesopotamian regions beyond the core Uruk area. Sanjurjo-Sánchez *et al.* (2018), researching evidence for the use of BRBs as bread moulds, report testing of macromolecular organic residue in BRBs (some from surface collection) mainly from five sites in the Syrian Middle Euphrates valley,

[40] Goulder 2010: 355–356.

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using pyrolysis-gas chromatography–mass spectrometry (Py-GC–MS). Parallel testing was done on "experimental ware used for cooking barley bread and barley straw (used as organic aggregate in the BRB production) that was charred in a laboratory furnace, in order to test the hypothesis of a use related to bread dosage".[41] They conclude that "The unequivocal presence of lignocellulose residues (especially 4-vinylguaiacol and other guaiacols, which were also found in experimentally charred bread heated below 450 °C), is compatible with the proposed hypothesis of leavened bread cooking, but a source of incomplete burn off of organic temper cannot be discarded."[42]

Regarding other possible secondary uses, the well evidenced presence of bitumen in BRB interiors at Hacınebi[43], Jerablus Tahtani[44] and elsewhere might indicate waterproofing of the BRB or advantage taken of BRBs' heat-retaining properties[45] to keep bitumen in a liquid state for coating of boat planking etc. – effectively an insulated paint pot. The more recent detection of beeswax residue in BRBs in Iran[46] and possibly Iraqi Kurdistan[47] opens a related range of interpretations, as voiced by Mayyas *et al.* (2012: 21), including "body care (preparation of cosmetics or medical commodities), symbolic and artistic roles (in paintings, sculptures, rituals and embalming) and technological purposes (adhesive, sealing agent, shipbuilding, writing ground, lost wax casting and corrosion protection), in addition to its use as illuminant". Wax (largely paraffin-based currently) is to this day used widely as a coating to provide waterproofing, conservation, protection, and a glossy finish, and as a release agent for moulds, and a dilutant for concentrated materials such as colouring, on wood, textiles, fruit, cheese and more. Anne Johnakin of Dartmouth College, USA in 2021[48] experimented with using beeswax to liquid-proof a replica BRB during an experiment in making yoghurt. She found that the wax reduced soaking of the liquid into the BRB fabric and made pouring and cleaning easier; but she noted that warm liquids melted the beeswax, which spread out over the surface of the contents.

Lipid Analysis

Important new findings are also presented by Perruchini *et al.*[49] on analysis of lipid residue on ten BRBs from Shakhi Kora in the Kurdistan Region of Iraq, using gas chromatography–mass spectrometry (GC–MS) and gas chromatography combustion-isotope ratio mass spectrometry (GC-C-IRMS). These techniques enabled detection of animal products such as fat/grease and marrow residue, with a wealth of new interpretations. The authors suggest valuable implications: "The presence of meat-based foods in several of the analysed Shakhi Kora BRBs raises a number of questions regarding their preparation, and how a meat-based content articulates with traditional state-centred ration hypotheses for BRBs."[50] They draw attention to evidence suggesting "the serving and consumption of potentially liquid or semi-liquid foods, such as the broths or stews that the faunal remains and their method of butchery point towards."[51] Perruchini *et al.* (2023: 9) conclude, "the Shakhi Kora samples contribute to a growing body of evidence that supports multifunctional explanations of BRBs, and […] this in turn points to the appropriation and transformation of both meaning and function of BRBs among local communities over the course of the 4th millennium BCE that diverged from their uses at lowland Mesopotamian urbanising centres."

While the Shakhi Kora vessels display clearly the classic characteristics of BRBs, the absence of ketones in the examples tested[52], indicating that they were not used in heat-based food preparation, argues against their being recycled bread moulds. They could instead have been spares from a large batch of unused BRBs destined for bread-making[53], or made for an urgent purpose by an established useful method of producing vessels speedily and without need for skill – though in this case some

[41] Sanjurjo-Sánchez *et al.* 2018: 3.
[42] Sanjurjo-Sánchez *et al.* 2018: 3.
[43] Stein and Mısır 1996: 216.
[44] Peltenburg *et al.* 1996: 3.
[45] Goulder 2010: 356.
[46] Mayyas *et al.* 2012.
[47] Perruchini *et al.* 2023: 8.
[48] Anne Johnakin pers. comm. 2021.
[49] Perruchini *et al.* 2023.
[50] Perruchini *et al.* 2023: 8.
[51] Perruchini *et al.* 2023: 8.
[52] Perruchini *et al.* 2023: 8.
[53] See Goulder 2010: 357 for considerations on why so many BRBs were discarded intact, for example concerning seasonal batch making (see below).

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Fig. 4. BRBs made in a BRB; in BRB on R, demoulded on L (author's experiments 2007/8)

simple practical adjustments such as rounding of the rim and smoothing of the inner base might perhaps have been expected.

Definition of BRBs

BRBs are unmistakeable artefacts to Mesopotamian archaeologists, but the term 'bevel rim' does not do justice to their unique characteristics. Elsewhere, I have underlined that "[t]he two pivotal characteristics of BRBs are wall thickness (the essential differentiating factor for bread-moulds (Jacquet-Gordon 1981: 23; Lehner 1995: 10)) and production-line capabilities…. What differentiates the BRB, as signalled by its pivotal physical characteristics, and what forms an important factor in the BRB's success, is its neat dual achievement of function (efficiently producing leavened bread) and need (production-line manufacture)"[54].

These characteristics can be expanded to include: 1) Speed and simplicity of manufacture, allowing unskilled labour and probably a production-line technique, very probably moulding. In my experiments, even as a beginner, I could mould a BRB using another BRB as a mould in one minute (Fig. 4). 2) Specific characteristics tailored for an operation such as mass leavened bread baking, including heat retention (heavy organic temper, thick walls), stackability (for preheating in ovens), smooth slanting sides for easy bread extraction, rough internal base for the same purpose, and roughly standard size per batch (achieved perhaps by moulding within an existing BRB – this produces the characteristic flaring 'frill').

While occasional *ad hoc* examples made by other means (hand forming, ground moulding) occur, perhaps as 'top-ups', they otherwise conform to these key BRB characteristics. Meanwhile, the eponymous bevel could potentially be misleading: is it critical to manufacture or function? In my experiments I found myself quite unconsciously making the smoothing motion on the edge as I finished the BRBs that I made; it may be useful to prevent dough sticking to the rim. Henry Wright (pers. comm. 2008) too, in his experiments in ground moulding of BRBs at Tell Brak, found the bevel was formed naturally by his thumb while his fingers were forming the interior walls.

While I make a detailed case (Goulder 2010) for the original purpose of BRBs being bread baking, the well acknowledged widespread 'borrowing' of used BRBs for secondary purposes,

[54] Goulder 2010: 359-10

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particularly in the Uruk periphery, might naturally lead in due course to production for other primary purposes – though I argue that for full ancestry from 'bread BRBs' the vessels should conform to the twin parameters of heat retention and capability of speedy production line manufacture via moulding.

Johnny Baldi, in his valuable work on the Girdi Qala and Logardan sites west of the Qara Dagh range in Sulaymaniyah Province, Kurdistan Region of Iraq, broadens the definition of BRBs in the Uruk periphery. He includes in his definition "proto Bevelled-Rim Bowls (hereafter BRBs […]), with rims sometimes thinned, rounded, or loosely cut, and bevelled in various ways and with variable orientations" in the early Uruk/early Late Chalcolithic 2 period[55]. These are named proto-BRBs as he and his colleagues see them as evolving into mature BRB forms by the middle Uruk/early Late Chalcolithic 3[56]. They are noted as sometimes featuring mineral rather than organic temper[57].

Vallet. *et al.*[58] highlight that these (proto?) forms were not made in a production line style ("not serially produced"), but Baldi notes that "all the vessels serially produced by batches were shaped by the moulding technique"[59], indicating that this latter technique emerged in this region in the middle Uruk. He adds, though, that "during the middle Uruk [in this region], BRBs still were a remarkable example of technical mixtures: they were made by different foreign and local shaping methods (by moulding 2cm thick rounded coils and 3.5 thick flattened coils), and by different mineral and chaff-faced pastes"[60]. These therefore may lack pivotal characteristics of the classic BRB such as speedy manufacture, but they may represent a revision in manufacturing style as a practical adjustment for new primary uses.

Thermal Paint Pots and Containers for Meltable Materials

As described above, one of the key virtues of BRBs – not shared with most other contemporary bowls – is their good heat retention capability, assisting for example in the rising of bread dough before baking. This feature, as well as the inherent disposability of this low cost vessel, might well have led to their adoption (primary or secondary) as a useful thermal 'paint pot' for meltable products heated in a larger container, during application by hand or with a form of brush. Perruchini *et al.*[61] note at Shakhi Kora that, associated with the BRB concentration, "several small to medium jars recovered from floor surfaces show signs of secondary burning suggestive of their use as cooking vessels. Associated faunal assemblages bear witness to marrow and grease extraction".

Looking again at the various new analyses of BRB residue and lipids, what might we deduce about (primary or other) BRB function, from study of the discovered categories of (non-bread) residue – bitumen, animal fat/grease, beeswax? They are all valued for their characteristic of liquefying when gently heated but returning to a more solid state when cooled. All are widely used to this day, in industry and elsewhere, for a wide range of coating functions, as outlined earlier for beeswax by Mayyas *et al.* (2012). Animal/vegetable fat/grease has a similar usage range and more, including coating of fabrics and hides (and bodies) and cooking, while bitumen has roles for waterproofing and caulking of boats, roofs and ceramics and for decoration.

Perruchini *et al.*[62] also mention recent publications on "the general scarcity of fire installations at classic Uruk-related LC sites, the small size of Uruk cooking vessels, and their likely association with secondary products preparation, such as clarifying butter, rather than with the preparation of daily meals (Jauβ 2015; D'Anna and Jauβ 2015; Pollock 2012, 2015). This would mean that large-scale state-organised food distributions did not involve large amounts of cooked foods, but focused on foods prepared with other methods that did not involve much heat such as brewing, drying, and pickling (Pollock 2012)." Susan Pollock[63], as cited by Perruchini *et al.*[64], argues too that "the testimony of the texts and imagery points to the possibility that the emphasis in institutional contexts

[55] Baldi 2022: 135
[56] Vallet *et al.* 2017: 80
[57] Vallet *et al.* 2017: 80
[58] Vallet *et al.* 2017: 80
[59] Baldi 2022: 143
[60] Baldi 2022: 145
[61] Perruchini *et al.* 2023: 8.
[62] Perruchini et al. 2023: 8.
[63] Pollock 2012: 160.
[64] Perruchini *et al.* 2023: 8.

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was on brewing beer (Damerow 2011) and probably baking bread as well as to a more limited extent on fermenting, drying (fish, cheese – see Englund 1998: 128-142; Brunke 2011: 169), and preparations for storage that sometimes involved heat (dairy products, including clarified butter – see D'Anna, Jauß n.d.)."

Thus, clarified butter may join other meltable products in a reassessment of evolving BRB use. In an unpublished article on BRBs, Sherratt – while favouring the bread mould theory – discusses the importance in this period of milk products and suggests that while "the open shape and porous fabric argues against a role in the processing of liquids, … processed meat-products in animal-fat offer a better interpretation."[65] Further, he suggests that "The beginning of a pictographic record in Sumer and Elam … provides some insights into the kind of milk products that were used, and it is evident that the commodity most frequently transferred was *ghee* (clarified butterfat or "butter-oil"), which is produced by heating and straining churned butter… Along with beer, it became the principal liquid commodity of lowland farming, with its own characteristic container-type."[66]

My experiments with using liquids in replica BRBs confirmed Sherratt's view of their unsuitability. The fabric is porous and low fired, and my tests showed that these vessels may rapidly become friable and liable to break in association with liquids[67]. The rough bevelled rim, also, makes the BRB inconvenient to drink from, offering caveats to Pollock's[68] and Kennedy's[69] suggestions of BRBs as beer drinking vessels. Unlike liquids, meltable products would themselves coat the BRB interior, saving it from deterioration.

I have argued elsewhere that "[t]he wide variety of BRB contexts and applications can probably only be explained by the acceptance that BRBs, as easily-made and useful vessels, drifted over time from their primary activity into a range of domestic and light industry roles"[70]. However, I argue that these alternative roles always remained related to their intrinsic advantages, mainly speedy unskilled manufacture and thermal retention, and their drawbacks, including roughness and friability. I would particularly expect a proliferation of new uses in the Uruk periphery, distinct from and even overtaking the bread making that I argue was prevalent in the Uruk core region, as the friction of movement to new areas eroded the original cultural implications.

Mobile Pastoralists and the BRB Concept

The regional developments lead to consideration of how and why the BRB came to new regions beyond the Uruk core. Anne Porter (2012) has developed the important hypothesis that Uruk culture spread outwards not with sedentary colonisers but with mobile pastoral groups, carrying with them the concept of BRBs that could produce the iconic feasting bread with which they bonded with local communities. "[N]o matter the nature of interaction, be it colony, enclave, or outpost, [Uruk] contact is often first presaged by a phase in which beveled-rim bowls alone appear"[71]. She argues that "[m]obile pastoralism accounts for the particular nature of Uruk materials and especially for the volume of beveled-rim bowls, which has never been proportional to the limited architectural remains that can be attributed to resident southern populations."[72]

The later logogram for a banquet, KI.KAŠ.NINDA, translates as "the place of beer and bread"[73] (Michalowski 1994:29). Throughout history to modern times, cultural groups frequently identify themselves by the form of their bread, as a glance at European and Near Eastern bread types underlines. Porter suggests that local residents would host feasts to which new arrivals would bring "contributions that speak of their intrinsic identities and/or their perception of the identities of their hosts. In this case it would have been traditional southern bread, baked in beveled-rim bowls."[74]

Emberling and Minc, in reassessing the movement of ceramics outwards from the Uruk core, suggest "multiple mechanisms for sharing goods and ideas, ranging from itinerant potters (carrying some of their wares from place to place), to nomadic groups (carrying household goods from place

[65] Sherratt 2006: 1.
[66] Sherratt 2006: 5.
[67] Goulder 2010: 356
[68] Pollock 2012: 161.
[69] Kennedy 2022: 8.
[70] Goulder 2010: 356
[71] Porter 2012: 95.
[72] Porter 2012: 137.
[73] Michalowski 1994: 29.
[74] Porter 2012: 140.

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to place), to independent merchants."[75] Sturm *et al.* similarly examine the issues of use of ceramics by mobile pastoralists, describing various approaches to resolving the issues of manufacture and transportation. Transportation of pottery vessels could be avoided by "producing cheap pottery vessels when and where they were needed and discarding them after use and prior to moving… We consider low-investment pottery to be made from the nearest available clays, shaped with little care for the finished form, and fired for as short a period as will permit the vessel to fulfill its intended purpose."[76]

There is a question whether there were specialist itinerant potters in the nomadic group. But itinerant potters may not have been necessary for production of BRBs. The elegant concept of a BRB as a mould for a BRB[77] allows simple transmission of the BRB "codes for manufacture"[78]. A single BRB (with its bread-recipe) could be taken to a new location, in lieu of elaborate mould-making or instruction, and manufacture could start immediately. Once the concept was introduced, Butterlin argues that "Le BRB deviendrait alors le symbole d'une révolution identitaire, de l'assimilation volontaire d'une culture attractive. …Le point important ici est l'explication de l'attractivité de ces objets via l'introduction d'un modèle de commensalité, par la suite adopté par des élites locales soucieuses d'exhiber dans ses propres rituels et mises en scène l'objet exotique."[79]

It is very much possible that the consequent stacks of single-use bread moulds[80], lacking iconic or ritual connotations for the local community, could then attract attention for a range of further purposes and to a mingling of traditions. Vallet *et al.* report on interesting evidence of fourth millennium B.C. intercultural exchange at Girdi Qala in the southern Kurdistan Region of Iraq, in the form of a series of 'hybrid' ceramics produced over time, fired on site by "resident craftsmen"[81] belonging to southern Uruk groups. These hybrid ceramics are related to southern Mesopotamian Uruk types but display characteristics typical of local ceramic traditions. The Girdi Qala team has classified a range of ceramics found in surface collections there as "bevelled rim bowls"[82], going by the presence of a form of bevelled rim, though not by other classic indicators such as speedy mass production techniques. This association of differently made but broadly similar looking bowl types does indicate a converging of cultural traditions, with the true BRB still perhaps being made but possibly fired alongside locally inspired ware.

BRB Fabric and Production Line Technology

The limited work done earlier on BRB clay origins supported local fabrication; local clay has been reported at, for example, Tell Brak, Tell Rubeidheh and Jerablus Tahtani[83]. Beale[84] and Balfet[85] comment on the very varied clay and temper used for BRBs, which might indicate small-scale manufacture or simply usage of whatever materials came to hand, as a non-critical element.

A team from the Universidade da Coruña[86] has more recently conducted geochemical analyses of the fabric of 22 BRB sherds from several Syrian mid-Euphrates sites in the Uruk periphery. They found considerable uniformity, suggesting a central BRB production facility served these sites, though they note the marked uniformity of alluvial sediments in this Euphrates region and recognise that the fabric similarity may simply stem from use of the most suitable local raw materials[87]. The research team support the theory that BRBs were at least primarily used for baking bread; one possibility is that the central site is a feasting area from which discarded BRBs fanned out for secondary use.

The BRB's primary virtue is its suitability for rapid, low-cost mass production, probably through a wet-and-dry production line approach as described by Balfet[88]. This approach was successfully tried in my own experiments and indeed proved by far the neatest method, making the clay

[75] Emberling and Minc 2016: 821.
[76] Sturm *et al.* 2016: 351.
[77] Goulder 2010: 353.
[78] Sterling 2001: 147.
[79] Butterlin 2018: 76.
[80] Forest 1987: 1.
[81] Vallet *et al.* 2017: 60.
[82] Vallet *et al.* 2017: 80.
[83] McAdam and Mynors 1988: 39; Joan Oates pers. comm. 2007; Stephen and Peltenburg 2002: 178.
[84] Beale 1978: 300.
[85] Balfet 1980: 77.
[86] Montero Fenollós 2012.
[87] Montero Fenollós and Sanjurjo-Sánchez 2021.
[88] Balfet 1980: 78-79.

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'pancake', working it into the mould BRB using a wet cloth, lifting the bowl out and putting it to dry (Fig. 4). If BRBs were made in large batches when labour and raw materials were available, similar to the seasonal pottery workshops mentioned in Ur III texts[89], this would help to explain the large stashes of BRBs found at many sites. The great flexibility of the BRB is that it is easily mass produced but so simple in design that it can also be made individually, by non-potters, with no tools other than an existing BRB[90]. Potters in the fourth millennium B.C. were not necessarily full-time, but by this period they were likely to have been specialists, as indicated by the Uruk Profession Lists[91]. BRB manufacture, I suggest, was largely outside this specialist group, a de-skilled process based on quantity rather than quality of workers.

Rough ceramics are often associated with domestic manufacture[92], and the coarse appearance of BRBs can lead to misclassification. Some small-scale manufacture is a likelihood at the sites with only a few BRB sherds and also may have been engaged if a 'top-up' was needed. Mass-made examples might be more uniform in fabric and firing[93], but the BRB, due to its mould method, is unmistakeable, with local variations but a similar set of parameters and characteristics wherever made and in whatever quantity.

Comparison with Conical Cups/Bowls

BRBs differ from other mass produced bowls of this period in various significant physical ways, but commentators habitually link them in a timeline with a range of handmade and wheel made bowls, spread over more than a millennium. These bowls are all identified as 'rough' and are traditionally therefore assumed to have the same purpose.

Connections are made in particular with conical bowls and cups, which appear in south and central Mesopotamian sites in the late fourth millennium B.C. and then in large quantities throughout the third millennium B.C.[94] In their original definition, these bowls are "characterized by a wheel-made conical shape, rounded rim and, in most cases, a flat string-cut base"[95], evolving to become smaller and shallower over time. Many ceramic assemblages of all periods in many regions are likely to have included bowls of a volume approximating to the range of the BRB. Henrickson and McDonald[96], in an ethnographic and archaeological cross-cultural survey of ceramics, note that serving bowls for individual consumers range from 10-23 centimetres in diameter, with an approximate mean of 14 centimetres. These figures are consistent with those of the BRB. However, traditional categorisation of pottery persistently ignores likely function (and to some extent context) in favour of form/typology.

Further confusion is added by the frequent conflation of earlier tapered-rim bowls with BRBs, as precursors to a role as ration-bowls, as at Susiana, Tepe Gawra and Arslantepe[97]. The function of a vessel is affected by its form, which is driven by the maker's or commissioner's aim[98]. Form is still often our only evidence of aim, and a focus on BRBs' pivotal characteristics may clear them from categorisation as conical cups/bowls and so enlighten us to their primary intended function. There is a further refinement needed; as Forest[99] remarks, we tend to blend the concept of 'function' (of an object) with 'need' (of maker or user); see above on the definition of BRBs.

With these issues in mind, we can start to classify bowls as featuring one or more of the two characteristics of speed and capacity for bread making and align them with or distance them from the BRB accordingly. BRBs are of course famously variable in form, but I argue that BRBs vary within "an overall fit-for-purpose similarity, with the variations largely concerning non-critical features"[100] rather than "strategic components which cannot be modified without jeopardizing the entire chain"[101].

[89] Gaimster and Freestone 1997: 15.
[90] Goulder 2010: 355.
[91] Crawford 2004: 166-167.
[92] Crawford 2004: 164.
[93] McAdam and Mynors 1988: 42; Potts 1997: 153.
[94] Gruber 2015: 129.
[95] Gruber 2015: 129.
[96] Henrickson and McDonald 1983: 632.
[97] Algaze 2001: 212; Johnson 1976: 213.
[98] Sterling 2001: 158.
[99] Forest 1987: 6.
[100] Goulder 2010: 360
[101] Van der Leeuw 1993: 240.

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BRBs might thus appear to be "functionally redundant shapes"[102] in a culture well able to provide itself with small serving-bowls. But they fail as serving bowls on many fronts; they are difficult to eat from with their rough inner bases, friable if liquid-containing, and have an awkward edge if used for drinking. I underline my previous argument that BRBs should be "divorced from the entire body of serving vessels and recognised as an active utensil, not a passive container, whose pivotal characteristics enable another large-scale rapid throughput operation to be carried out."[103]

Conclusions

The challenging paradox, in understanding the role and impact of the BRB, is that while its unmistakeable characteristics point to a driving initial purpose for its development, spread and persistence, those same characteristics - notably, heat retention and speed and ease of production– lend the BRB to its evolving adoption for a range of additional or eventually primary functions. In the technological developments of the Uruk period, innovatory understanding of the science of fermentation (emerging in tandem with other advanced food processing techniques for feeding urbanising populations) manifested itself in the ceramic assemblage. The baking of leavened bread, in huge quantities, required a technological reinvention equal to the introduction 6000 years later of 'aerated bread', a technique of raising bread through forcing carbon dioxide into dough, without yeast, and which provides much bread in the Western world today. The elegant concept of the BRB is, I argue, an example of this sophistication and has been under-appreciated archaeologically due to the BRB's ungainliness and a focus on typology rather than technical aims. These throw-away mass produced containers, probably batch-made seasonally or for a specific occasion and commonly discarded after one use or no use, were perfectly suited to mobile groups, as a uniquely portable ceramic technology, requiring only a single BRB as mould and 'code for manufacture'.

The journey of the BRB was geographical and perceptual. Secondary and eventually even alternative primary use of an easily made container became inevitable, particularly in new peripheral regions of influence, where the dilution of consciousness of the initial primary function and cultural associations occurred. The BRB's pivotal characteristics, however, comprising its positive speed of manufacture using unskilled labour and its heat-retentive characteristics, and its negative roughness and friability, formed guiding elements, differentiating BRBs from the similar sized but differently intentioned conical cups of the period.

New residue analyses published recently are inconclusive on BRBs' use for baking bread but suggest a promising theme of possible initial secondary use for meltable contents, including bitumen, beeswax, and animal fat/grease. This use is related to the specifically heat-retaining nature of BRBs, which suits them admirably for example as 'thermal paint pots' for holding warmed products during coating/sealing work. The role of artefacts as industrial tools rather than consumer utensils is often under-discussed. Meanwhile, evidence such as meat/fat residue in BRBs at Shakhi Kora, perhaps for serving of "broths or stews"[104], and which do not appear to have been pre-used for baking bread, suggest BRBs were adopted and specifically made by reason of their speedy mass production capability by unskilled labour, to fill an urgent need for low cost containers.

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[102] Badler 2002: 84.
[103] Goulder 2010: 360
[104] Perruchini *et al.* 2023: 8.

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وعاء أوروك المشطوف الحواف: رؤى جديدة حول التكنولوجيا والوظائف المتعددة والتوزيع

جل جولدر

تم إثراء تفسير وظيفة ودور الوعاء المشطوف الحواف (BRB) في بلاد ما بين النهرين وحواليها من خلال طرق حديثة الظهورفي تحليل البقايا تبشر بنتائج جيدة في الاستخدامات الثانوية وحتى البديلة لـ BRB في محيط أوروك خلال الألفية الرابعة قبل الميلاد. إنني أدافع عن مثل هذه الاستخدامات نظرا لخصائصها الجوهرية: فهي تمثل نظام متطور لتصنيع خطوط إنتاج سريعة ومنخفضة المهارة لحاويات ذات ميزات محددة (لا سيما الجدران السميكة للاحتفاظ بالحرارة)، وتمثل مفهوم أنيق لنقل التكنولوجيا حيث يمكن استخدام وعاء واحد مشطوف الحواف BRB بمثابة قالب تصنيع متنقل ومناسب يستخدم من قبل مجموعات عمل متنقلة. ويشير "النظام" الجديد لـ BRB إلى أنه قد تم تصميمه في البداية لغرض واحد محدد - كما اعتقد، وهو لخبز الخبز المخمر على نطاق واسع ربما لمناسبات الولائم الجماعية. لكن أكوام BRB المهملة أو أكوام من BRB بعد الاستخدام الجماعي في مناسبة موسمية جعلتها سهلة للاستخدام الثانوي او انها قد صنعت بالجملة لمثل هذه المناسبات ، لا سيما في المنطق المحيطة بأوروك، حيث ربما قد خفّ صداها الثقافي الأصلي. ربما كانت مزايا السرعة وسهولة التصنيع التي يتمتع بها BRB قد شجعت الإنتاج لأغراض أكثر عمومية واحتياجات جديدة، بما في ذلك الطهي - وهو تطور يمكن اكتشافه من خلال الشكل. بالإضافة إلى ذلك، يشير تحليل البقايا حتى الآن إلى وجود عامل وظيفي محدد في اعتماد BRBs للاستخدام الثانوي والأولي في نهاية المطاف: مثلا قدراتها على الاحتفاظ بالحرارة مما يجعلها ذات قيمة على وجه التحديد باعتبارها "أوعية طلاء حرارية" للمواد القابلة للذوبان مثل البيتومين وشمع العسل والدهون الحيوانية. يمكن تسخين هذه المواد في وعاء أكبر وصبها في BRBs ذات الكفاءة الحرارية لاستخدامها، ربما مع شكل من أشكال فرشاة الرسم، في مجموعة واسعة من الاستخدامات الصناعية وغيرها.

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