

1 **Archaeology**

2 **Pottery spread in ancient foragers**

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6 *Although we have been able to track how cultural innovations spread among farming populations in*  
7 *prehistoric Europe, we know relatively little about this among European hunter-gatherers. Dolbunova*  
8 *et al. use a range of techniques to shed light on how the making and use of pottery spread among*  
9 *early-mid Holocene hunter-gatherers west of the Urals.*

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11 Fig 1: Hunter-gatherer pottery from the east Baltic region<sup>1</sup>

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13 Understanding how innovations appeared and dispersed in prehistory has long been a challenge for  
14 archaeologists. In recent years enormous progress has been made in understanding the origin of  
15 domesticated animals and plants in western Eurasia and their spread via population expansion<sup>2</sup>. Far  
16 less is known about innovations among ancient hunter-gatherers. The study just published by  
17 Dolbunova and an international team of colleagues<sup>3</sup> uses a range of techniques to shed light on how  
18 the making and use of pottery spread among Holocene hunter-gatherers west of the Urals in the  
19 sixth millennium BCE.

20 It is worth putting this work in long-term perspective. When grand schemes of social evolution were  
21 being created by theorists such as L.H. Morgan and Sir John Lubbock in the 19<sup>th</sup> century, key  
22 indicators of human progress were the origin of farming and the first use of pottery vessels, believed  
23 to be connected to one another and to define the beginning of the Neolithic Age. A western  
24 tradition has always emphasised the presence of farming as the key feature of the Neolithic, but in  
25 the Soviet Union, Engels's idea that pottery developed first was taken up and led to the 'Neolithic'  
26 being defined by the appearance of pottery alone<sup>4</sup>. This has continued and been a source of  
27 confusion ever since, because pottery did not radically change human societies and economies as  
28 agriculture did.

29 As studies of the first farmers in SW Asia developed, it became apparent in the mid-20<sup>th</sup> century that  
30 pottery was a later innovation, and a significant 'pre-pottery' farming phase was recognised.  
31 Conversely, it was already clear that there were hunter-gatherer communities in Scandinavia that  
32 did make and use pottery, but it was assumed, in keeping with negative perceptions of hunter-  
33 gatherers' ability to innovate, that they must have acquired these skills from nearby farmers. Such  
34 assumptions have only been finally over-turned in the 21<sup>st</sup> century. The increasingly widespread  
35 application of radiocarbon dating has shown that the earliest pottery in Eurasia is to be found on  
36 hunter-gatherer sites in China and Japan, dating back to perhaps 20,000 years ago, long before the  
37 first appearance of farming anywhere in the world<sup>5</sup>. Most probably it gradually spread west from  
38 there among the hunter-gatherer groups of the Eurasia steppe-forest zone, though multiple centres  
39 of innovation in this zone cannot be excluded<sup>6</sup>.

40 Additionally, in the last 20 years the development of methods to extract ancient organic residues  
41 from early pottery and to chemically characterise their sources in terms of whether they come from

42 marine or freshwater resources, plants or terrestrial animal carcass or milk fats<sup>7</sup> has made it possible  
43 to identify what was cooked in ancient pots. It seems that a major use was the cooking of aquatic  
44 resources, which have long been recognised as an important basis for increased sedentism in  
45 hunter-gather societies.

46 In the present study the authors use radiocarbon dating and organic residue analysis in combination  
47 with a range of other techniques to ask whether or not the spread of pottery in the region had  
48 multiple origins, whether it was the result of a population expansion like the spread of farming in  
49 Europe, and what functions it fulfilled that would account for its uptake. To achieve this, they carried  
50 out residue analyses of pottery from 156 eastern European hunter-gatherer sites and used  
51 descriptive attribute data on shape, size, decoration and methods of vessel construction from 1226  
52 pottery vessels, together with associated radiocarbon dates, to make inferences about cultural  
53 transmission processes. They found that the dates were consistent with a single origin in western  
54 Siberia and indicate a diffusion rate of 6-10 km/year. This is extremely fast for a non-maritime  
55 expansion, comparable with the 7.5-10.6 km/year that has recently been estimated for the demic  
56 expansion of farmers along the north coast of the Mediterranean, which modelling suggests involved  
57 coastal jumps by boat of 240-427 km at a time<sup>8</sup>. In the present case the authors argue that it is too  
58 fast to have taken place through demic expansion, though this remains to be confirmed by aDNA  
59 analyses.

60 The ceramic residue analyses indicate that the pottery was mainly used for cooking. However, in  
61 contrast to the areas in East Asia where pottery first appeared and was used for cooking freshwater  
62 and marine organisms, among European hunter-gatherers it was used to cook plants and terrestrial  
63 animals as well as aquatic resources, as it was in western Siberia<sup>9</sup>.

64 Of particular interest in Dolbunova et al.'s study is the attempt to address the processes of cultural  
65 transmission of pottery making and use, given that demic expansion is unlikely to account for it in  
66 this case. Quantitative analyses of the similarities between pottery assemblages at different sites, in  
67 terms of their decoration, shape and technology, and the sites' geographic locations, showed that  
68 similarity in all these features was strongly affected by the sites' distance from one another and their  
69 riverine connections, indicating that they were transmitted together as a package. This pattern was  
70 not nearly so marked in variation in vessel use, due to the ecological homogeneity of the region.  
71 Similarity between sites in terms of pottery morphology was correlated with between-site distance  
72 up to a range of 250-500 km, suggesting that this might correspond to the range of hunter-gatherer  
73 contact networks. The advantage pottery offered over cooking in organic containers remains unclear  
74 but elsewhere it has been noted that it is a labour-saver compared with heating up water in baskets  
75 by adding hot stones and removing them as they cool down<sup>10</sup>, and in the case considered here,  
76 reduced mobility leading to less breakage of fragile and heavy pots might have tipped the balance.

77 There is much more work to be done along the lines of Dolbunova et al.'s paper to understand the  
78 spread of pottery and other aspects of the prehistoric societies and economies of the northern half  
79 of Eurasia, which until recently have seen little modern scientific archaeological work. The paper  
80 under discussion is representative of a recent major expansion of international collaboration with  
81 regional scholars that has been transforming our knowledge of these societies. Sadly, it seems likely  
82 that in the immediate future such research will grind to a halt as one more example of the collateral  
83 damage associated with Russia's invasion of Ukraine.

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#### 108 **Competing interests**

109 The author declares no competing interests

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