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## The emergence of pottery in China: Recent dating of two early pottery cave sites in South China

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### ABSTRACT

The earliest pottery in East Asia, as is found in several cave sites in southern China, emerges in Upper Paleolithic contexts dating from the Last Glacial Maximum, ~20 Ka cal BP. The making of simple pottery vessels in Late Pleistocene East Asia also has been noted in eastern Siberia and Japan but not yet in the Central Plains of China. This paper summarizes the better-reported evidence for early pottery sites across the vast region of China south of the Yangtze River, providing details on two dating projects conducted in the cave sites of Xianrendong (Jiangxi Province) and Yuchanyan (Hunan Province). The excavated contexts in these two caves and a few others clearly indicate that this early pottery was the creation of hunter-gatherers who hunted available game and foraged a variety of plant foods. The nature of the cave occupations is ephemeral, and where the published animal and plant remains allow, we suggest that there were repeated, seasonal occupations. In sum, there is no basis yet to suggest that the making of early pottery in South China marked sedentary or plant-cultivating communities.

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### 1. Introduction

Research over the last several decades is making scholars increasingly aware that pottery manufacture by foragers was a common phenomenon in various regions of the Old World. In East Asia, in particular, pottery production now clearly can be seen to predate sedentism, cultivating cereals, and producing polished stone axes or adzes (Jordan and Zvelebil, 2009; Cohen, 2013). This recognition removes the production of pottery from the traits of the “Neolithic Revolution,” a term coined by G. Childe (1936) during the early part of the 20th century. Childe based his definition of the Neolithic on the then available archaeological evidence retrieved from sites across southwestern Asia (the Near East) and Europe, and this resulted in a widespread acceptance of certain cultural “markers” of the Neolithic, including pottery, ground stone tools, and cultivated plants; such traits later became termed the “Neolithic package” (Gibbs and Jordan, 2016).

Chinese archaeologists, arguably through Childe’s influence, long accepted the presence of pottery as indicative of a site being

“Neolithic” and thus also typically assumed the site likely represented a sedentary occupation of plant cultivators. The discovery of early pottery in Late Pleistocene cave sites in South China originally lead excavators to believe these sites represented occupations by early domesticators of rice, but further work and dating of these sites, as discussed here, however, have led to the realization that pottery in China and greater East Asia was first produced by hunter-gatherers millennia before what in China are called “Early Neolithic” (here meaning sedentary plant-cultivator) sites appear. In China, sites with pottery that date from the Late Glacial Maximum to the early Holocene are now often referred to as “early pottery” sites, and they stand in contrast to the “Early Neolithic” sedentary sites that appear in the early Holocene. Although pottery predates plant cultivation and sedentism, and we must thus remove the invention of pottery from Childe’s list of traits marking the Neolithic, Childe’s conceptualization of a “Neolithic Revolution”— meaning a fundamental socio-economic transition from foraging to farming and herding that occurs across various geographic regions of the world with concomitant changes in ideologies and belief systems (see Bellwood, 2005)— is still valid in China and elsewhere. In this paper, we discuss the excavations and dating of pottery at the two earliest pottery cave sites in the world,

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Xianrendong and Yuchanyan caves in South China, and place these caves and other sites in the greater context of Late and Terminal Pleistocene foragers in East Asia.

### 1.1. Early pottery across eastern Asia

With the onset of the application of radiocarbon dating, archaeologists realized that hunter-gatherers in Japan had been making pottery since the Terminal Pleistocene age. This appearance of pottery vessels within subsistence systems of hunting, fishing, and intensive collection of wild plants in the Late Pleistocene stood in immediate contradiction to Childe's understanding of the role of pottery as he saw it in the Near East and Europe. Recent dating of the earliest pottery in what is now termed the Incipient Jōmon culture in Japan ranges ~16.8–15.3 Ka cal BP (thousands of years, calibrated, before 1950 present) (e.g., Kudo, 2012; Craig, et al., 2013; Yoshida et al., 2013). The earliest pots in Japan and elsewhere in East Asia were handmade ceramic containers fired at moderate temperatures, and, as vessels for storing, preparing, or cooking food, were conceptually different from the earlier use of fired clay for shaping figurines or small objects known from the Central European Upper Paleolithic period, such as at Dolní Věstonice (Jordan and Zvelebil, 2009; Svoboda et al., 2015). In later phases of the Jōmon culture, “low level” plant food production, or what Crawford (2011) calls “resource production,” is recognized as pottery production becomes more and more highly elaborated (Kaner, 2009; Sato et al., 2011; Noshiro et al., 2016), demonstrating that the long tradition of making pots was a continuing activity by foragers that came to take on increasing socio-economic and ideological significance, together with the production of stone tools and objects of organic materials such as bone, antler, wood, and bamboo. Parallel situations, with the elaboration of pottery forms, decoration, functions, and meaning are witnessed as Early Neolithic societies emerge in North and South China ca. 10–9 Ka cal BP (Cohen, 2011).

Japan was not unique in the production of early pottery, as Late Pleistocene sites with pottery were also discovered in the Russian Far East and eastern Siberia, with a series of well-known sites indicating dates for the early pottery of ca. 14,000–15,940 cal BP (Buvit and Terry, 2011; Kuzmin, 2013, 2015; references therein; Tsydenova and Piezonka, 2015; Zhushchikhovskaya, 2009). This additional information from Russia made it fully acceptable that Terminal Pleistocene hunter-gatherers across a wide area of East Asia manufactured pottery, and so it was therefore not surprising that early, simple pottery began also to be found in Late and Terminal Pleistocene cave sites in southern China, as described below. At present, such early pottery, however, remains lacking from northern China, with the earliest pottery there dating to ca. post-12 Ka cal BP: these North China and Central Plains sites with pottery include Yujiagou, Nanzhuangtuo, Donghulin, Zhuannian, Lijiagou, and Lingjing (Cohen, 2013; Wang et al., 2015; Li et al., 2016). With earlier pottery known to the north and south of these sites in North China, it is yet unknown why there is no earlier pottery in this region that becomes a major center of early sedentary, plant-cultivating villages in the Early Neolithic of the Central Plains (middle and lower Yellow River basin) in the early Holocene (see Cohen, 2011). It is quite possible that future excavations of more sites that are still buried in the loess deposits in the river valleys of northern China will reveal early pottery in Upper (or “Late”) Paleolithic contexts there.

## 2. Early pottery in South China

In the following pages we describe the finds from two early pottery-producing cave sites in South China, focusing specifically on issues of radiocarbon dating. The acceptance of the dating of

early pottery-containing layers at these sites requires careful understanding of a number of inter-related issues that can impact the quality of the radiocarbon dates, including the selection of excavated areas, the digging techniques of the excavations, and the nature of the deposits in these South China sites. We define South China here as the broad region south of the Huai River and Qinling Mountains. Several cave sites in karst regions found south of the Yangtze River were excavated and published in one form or another, although final reports are still lacking for most. Sites include Xianrendong and Diaotonghuan in Jiangxi Province, Yuchanyan in Hunan Province, Qihedong in Fujian (Fujian Museum, 2013), and Miaoyan (Chen, 1999), Liuzui (Liuzhou Museum, 1983), Dayan, and Zengpiyan (Institute of Archaeology, Chinese Academy of Social Sciences, 2003) in Guangxi (Lu, 2010, Fig. 1), with the best-dated and earliest sites being Xianrendong and Yuchanyan, discussed here. These sites produced sufficient information to demonstrate that early pottery making occurred within the socio-economic contexts of hunter-gatherers and that they predate by some ten millennia or more sedentism and the emergence of farming during the early Holocene (Cohen, 2013).

### 2.1. Xianrendong Cave (Jiangxi Province)

Currently the site with the earliest known pottery vessels is Xianrendong Cave, with the earliest layers bearing pottery sherds exposed at the site dating to ~20 Ka cal BP (Wu et al., 2012, and references therein). Xianrendong Cave is located in Wannian County, northern Jiangxi Province, some 100 km south of the Yangtze River. The main cave consists of a large, dark hall with a small entrance, but the prehistoric occupations were in a roofed area at the front that resembles a rock shelter, in back of which is the dark main chamber. The frontal area can be divided by the entrance to the darker hall and an area of consolidated, unexcavated deposits into “Western” and “Eastern” areas. The first excavations were conducted in 1962 and 1964 by the Jiangxi Provincial Cultural Relics Administrative Committee, during which a major portion of the sediments was removed (Fig. 2). In 1993, 1995, a Sino-American expedition directed by Yan Wenming and S. MacNeish excavated a smaller portion of the deposits in order to derive a sequence for and date what was seen then as the emergence of rice cultivation at the site and the presence of early pottery. The field project was completed in 1999 by a team from the School of Archaeology and Museology of Peking University and the Institute of Archaeology and Cultural Relics of Jiangxi Province<sup>1</sup> (MacNeish et al., 1998; MacNeish, 1999; Zhang, 2002a; Sun and Zhan, 2004;

<sup>1</sup> The 1962 excavations, carried out by the Jiangxi Provincial Cultural Relics Administrative Committee, opened excavation squares T1, T2, and T3 (see Fig. 2). The 1964 excavations, by the same group, expanded the excavations to squares T4, T5, and T6. The Sino-American excavations in 1993 and 1995 were jointly carried out by the Peking University Department of Archaeology, the Jiangxi Provincial Archaeology and Cultural Relics Research Institute, and the Andover Foundation, with MacNeish being the Principal Investigator for the American team and the Chinese team lead by Prof. Yan Wenming. The 1993 excavations opened squares E0-3N4 (four units in a row of 1 m<sup>2</sup> each), with MacNeish in the field to supervise. The 1995 excavations continued work on these squares and opened three more 1 m<sup>2</sup> units in a row, E11N10-12, with MacNeish in the field to supervise. As there were concerns about the dating and stratigraphy, a Chinese-only team from Peking University and the Jiangxi Provincial Institute returned to excavate in 1999, opening squares E10N10-12 (total 3 m<sup>2</sup>) (Peking University School of Archaeology and Jiangxi, 2014, pp. 6–11). The 2009 dating project, by Peking University (Wu Xiaohong directing, Zhang Chi, Qu Tongli), Harvard University and Boston University (Bar-Yosef, Cohen, Goldberg), and the Jiangxi Provincial Institute, opened profiles in what was a baulk between the 1964 T4 and 1993 E0-3N4 excavation areas, and the remaining (west) profile of the 1999 E10N10-12 excavation area (Wu et al., 2012).

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