

The AMS ^{14}C dating of Iron Age rice chaff ceramic temper from Ban Non Wat, Thailand: First results and its interpretation

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ABSTRACT

Pottery tempered with rice chaff from the early Iron Age cemetery of Ban Non Wat site, northeast Thailand, has been subjected to direct AMS ^{14}C dating, using low temperature combustion with oxygen as originally developed by authors. The carbon yield (0.2–0.5%) testifies the suitability of this pottery for dating. However, not all the results are in agreement with expected archaeological ages and other ^{14}C dates from the studied site and neighboring site of Noen U-Loke. This calls for a thorough analysis and interpretation of pottery temper dates from the region.

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1. Introduction

Dating the prehistoric sequence in Thailand has been controversial and contradictory. Only very rarely has charcoal been identified to species, and since some trees live for centuries, radiocarbon determinations may well be far earlier than the event being dated. Mixed samples have been submitted (see [1]), as well as small samples that have no defined relationship to the context for which a date is sought. Usually, too few determinations have been obtained for reliable results. Consequently, claims have been made for remarkably early agricultural innovation, as well as for bronze and iron metallurgy that would rank among the earliest in the world (e.g. [2–4]). Resolving the chronological framework is a vital first step to a better understanding of the cultural development of later Southeast Asian prehistory [5], which comprises a sequence that began with coastal and inland hunter–gatherers, and proceeded to the arrival, probably from southern China, of the first rice farmers. These settled agricultural communities then adopted copper-base metallurgy, followed by the adoption of iron working and finally, a rapid transition to the foundation of early states.

Ban Non Wat is a site located in the upper reaches of the Mun River valley in northeast Thailand (15°16'N, 102°17'E) (Fig. 1).

Excavations over the past 6 years have revealed a cultural sequence that covers much of the later prehistoric period. In addition to a wealth of evidence for technological and economic change, 637 inhumation graves have been uncovered. These fall into 10 phases that began with the flexed burials of possible local hunters and gatherers, and then incorporated two Neolithic, five Bronze Age and two Iron Age phases.

In order to avoid the pitfalls described above, the bivalve shells that were ritually placed with the dead have been submitted for AMS ^{14}C determinations, and these, in association with a set of charcoal dates, have been analyzed by OxCal 4.0 [6]. The results indicate that for this site at least, the time span for the Neolithic and Bronze Ages is significantly later than the current literature would suggest. Initial Neolithic settlement took place in the seveneenth century BC, while the first evidence for bronze has been dated to the late eleventh century BC. The first Iron Age burials date from about 420 BC [7].

There are two difficulties with the final Iron Age phase at this site. The first is its contemporaneity with the Hallstatt Plateau (ca. 800–400 cal BC), wherein the calibration of determinations is not as precise as one would wish (e.g. [8, p. 1057]). The second is that the few Iron Age burials from this important phase were not associated with bivalve shells, thus ruling out the submission of samples with little if any inbuilt age. Unfortunately, it has not proven possible to obtain radiocarbon determinations from human bone at this site because no collagen has survived.

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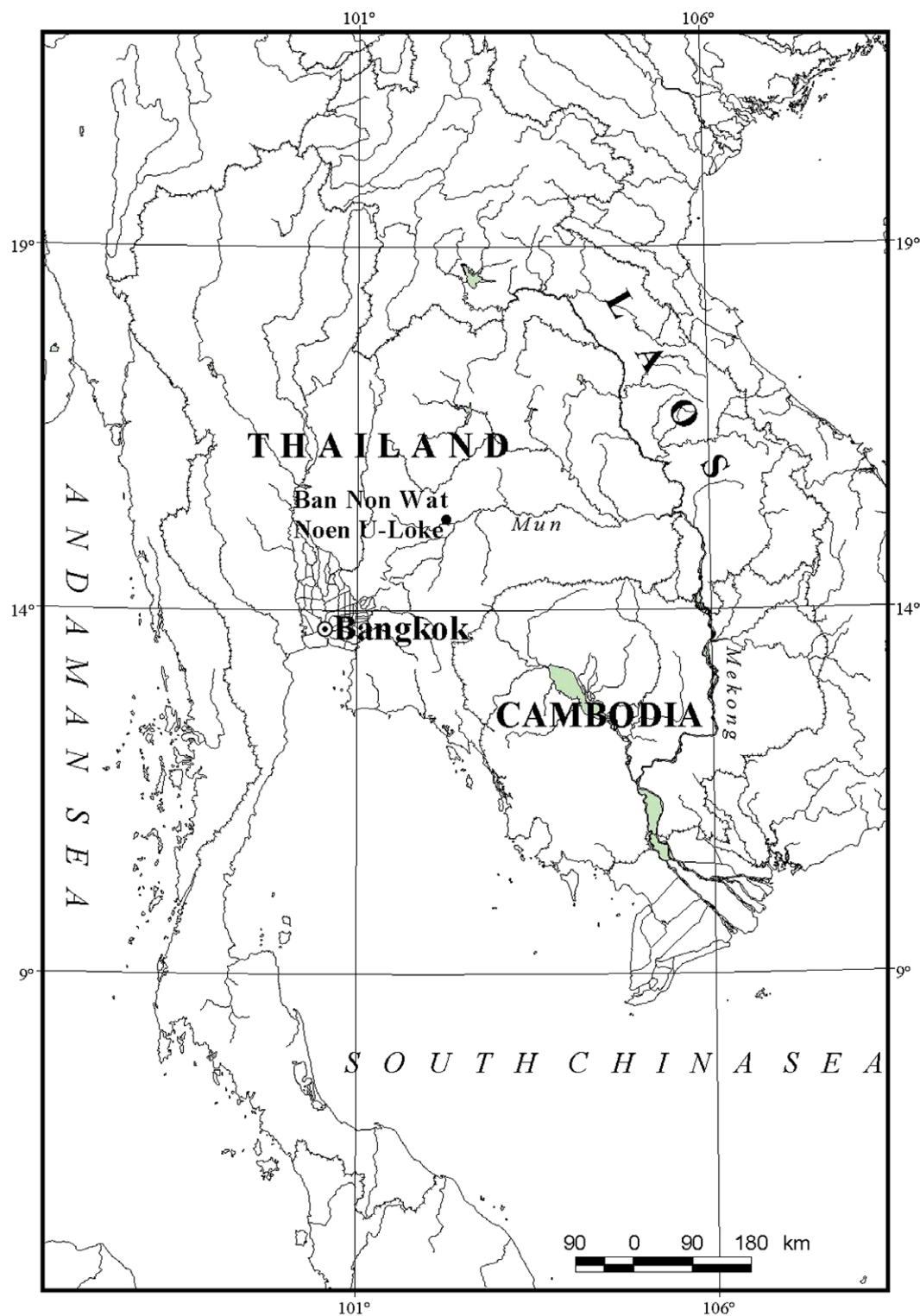


Fig. 1. The map of Thailand with position of sites discussed in the paper.

2. Materials and methods

In response to the problem described above, we decided to experiment further with the ^{14}C dating of rice chaff that was employed for this period, as a ceramic temper. The dead throughout the cultural sequence were interred with pottery vessels, and it was during the late Iron Age that large quantities of rice were

mixed with potting clay. Three infant jar burials were selected for this purpose. Burial 95 comprises a lidded mortuary vessel containing the skeleton of a newly-born infant. Grave goods included a further small ceramic vessel, iron anklets and an iron bangle. Burial 100 contained a 6-month-old within a mortuary vessel. Burial 102, that of an infant, involved the placement of two pots mouth to mouth. Grave goods comprised four bimetallic

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