A BRIEF NOTE ON NEW DATES FOR THE BAN CHIANG CULTURAL TRADITION

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ABSTRACT

New dates from Lake Kumphawapi and the archaeological site of Ban Chiang suggest that agricultural activities could have begun in northeast Thailand as early as the fifth millennium BC, and that bronze artefacts are in evidence by the early second millennium BC.

At the Indo-Pacific Prehistory Association Conference in Chiang Mai in January 1994, White announced that dates from two research programs were forthcoming that would shed light on the chronology of the Ban Chiang Cultural Tradition. The two University of Pennsylvania related research programs are 1) the Thailand Palaeoenvironment Project (TPP), and 2) the Ban Chiang AMS (Accelerator Mass Spectrometer) Dating Program. Results are now available from both projects. This note will briefly report on preliminary results relevant to two issues of interest: 1) dating for the settlement of the Sakon Nakon Basin by agricultural societies (= base of the Ban Chiang Cultural Tradition), and 2) dating for the appearance of bronze at Ban Chiang.

Table 1 presents the seven dates from the TPP core "3KUM" from Lake Kumphawapi in the Sakon Nakon Basin, located about 30 kilometres from Ban Chiang. This 6.18 metre core has provided the first continuous palaeovegetation record for lowland interior Southeast Asia dating from the terminal Pleistocene to the late Holocene. The full presentation of the pollen (Penny, in preparation) and phytolith evidence (Kealhofer 1996) for vegetation change in the Sakon Nakon Basin over the past 14,000 calibrated C14 years is forthcoming (Kealhofer and Penny 1996, see also Penny *et al.* 1996). The phytolith evidence (Kealhofer 1996) suggests anthropogenic landscape modification, including burning, possibly since the terminal Pleistocene. The pollen evidence indicates that by about 1 metre from the top of the core, a marked peak in carbon fragments coincides with substantial vegetation changes including decline and even temporary disappearance of several arboreal taxa (Penny, personal communication). Such evidence is consistent with anthropogenic land clearance, and its sudden and emphatic appearance in the pollen record strongly suggests colonisation, rather than gradual *in situ* development, by cultivating societies. This change falls between the two dates Beta-93027 and Beta-93028, placing the "event" in the fifth millennium BC (calibrated).

If this marked change in the palaeoenvironmental record signals the base of the Ban Chiang Cultural Tradition, the implications for fifth millennium BC timing are significant. This date is much earlier than archaeologists have previously considered for the appearance of agricultural settlements in this region. Higham's (1996) estimate of mid-third millennium BC for expansion of settled agricultural groups into this region appears to be young by two millennia. White's (1986) argument for the fourth millennium BC (based on four dates from basal Ban Chiang, and a fifth from basal Ban Tong) appears to be young by one millennium. On the other hand, the 3KUM dating and pollen evidence is broadly consistent with Blust's (1996) linguistic arguments for the expansion of rice-cultivating, Austroasiatic speaking societies down the Mekong from southwestern China beginning by the late sixth millennium BC

Concerning the dating of bronze in the Ban Chiang sequence, Table 2 and Figure 1 give pertinent results from the pottery dating program. Previous charcoal-based dating has been criticised due to ambiguity of association between the dated sample and cultural contexts (Higham 1996). The dates reported here derive directly from rice tempered burial pottery with impeccable provenience. The carbon from rice temper comes from short-lived plant remains incorporated into clay fabric shortly after

harvest during vessel manufacture and deposited into its archaeological context probably within a few years.

With the exception of two dramatically old dates which cannot be considered archaeologically meaningful (both from Early Period Phase III), five of the determinations are internally consistent both in terms of their relative phase assignments, and in terms of their position within superimposed sequences of graves. The earliest evidence of bronze at Ban Chiang appears by Early Period II/III in both burial and non-burial contexts. The calibrated AMS results, particularly AA-12538, indicate an early second millennium BC date for this part of the sequence.

This evidence supports White's previous (1986) estimate of the early second millennium BC for the appearance of bronze at Ban Chiang, and provides direct evidence of pre-1500 BC (calibrated) bronze in Southeast Asia (cf. Higham 1996). This dating is comparable to the current consensus on dating for the appearance of bronze in Central and East Asia (An 1993; discussed at the International Conference on the Bronze Age and Iron Age Peoples of Eastern Central Asia, Proceedings to be published in 1997 as a University of Pennsylvania Museum Monograph edited by Victor Mair, see also Mallory 1996). A possible implication raised at this conference was that the early Thai evidence for a developed bronze technology lacking experimental stages may relate to a rapid and broad spread of bronze technology in Asia east of the Urals dating from about 2000 BC or shortly thereafter.

The forthcoming first monograph on the Ban Chiang excavations undertaken by the University of Pennsylvania and the Fine Arts Department of Thailand in 1974 and 1975 will present the evidence for the full Ban Chiang sequence, including additional AMS dates. The above results and their implications are preliminary but exciting. At the very least they indicate that archaeologists have much work to do to fully document and understand the Ban Chiang Cultural Tradition and its manifold relationships during prehistory to the broader Asian context.

Additional Notes to Captions (printed at end):

Table 1:

The seven specimens were subjected to pretreatments of acid washes (HCl) to eliminate carbonates. The C14 ages listed have been adjusted for C13/C12 ratios (estimated in the case of Beta 72096). The northeast Thailand component of the project is headed by Joyce White (Principal Investigator) and Lisa Kealhofer (Co-Principal Investigator).

Table 2:

These seven Early Period samples received the pretreatment protocol of Hedges *et al.* (1989). Pretreatments were conducted by Dr. Donald Glusker at both the University of Pennsylvania Museum Applied Science Center (MASCA) and the Oxford Research Laboratory for Archaeology and the History of Art. Sherds from vessels with rice or other plant inclusions were crushed to roughly 2-3 mm particle size, subjected to successive extractions with acetone (to extract lipids), 0.2N HCl (to extract carbonates) and 0.5N NaOH (to extract humic acids), with multiple washings in between. The residue was further subjected to a mixture of 4N HF in 6M HCl or concentrated HF (49%) followed by multiple washings to constant pH, a procedure which concentrates the carbon and makes soluble a considerable quantity of clay-bound humic material.

Figure 1:

The graph presents the five stratigraphically consistent determinations in stratigraphic order and calibrated with the OxCal Program using the 1993 curve. The five dates have internal integrity with their relative placement in the cultural sequence as well as in sequences of burial superposition: the EPVa, EPVb, and EPII/III samples derive from a sequence of superimposed graves, and the EPIIc grave is superimposed over the EPIIb grave.

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REFERENCES

An Zhimin 1993. Shilun Zhongguo de Zaoqi [A tentative discussion on China's early copper/bronze implements]. *Kaogu* 12: 1110-1119.

Blust, R. 1996. Beyond the Austronesian homeland: the Austric hypothesis and its implications for archaeology. In W. Goodenough (ed.), *Prehistoric Settlement of the Pacific*, pp. 117-40. Philadelphia: Transactions of the American Philosophical Society, Vol. 86, part 5.

Hedges, R.E.M., I.A. Law, C.R. Bronk and R.A. Housley 1989. The Oxford Accelerator Mass Spectrometry Facility: technical developments in routine dating. *Archaeometry* 31: 99-113.

Higham, C.F.W. 1996. Review of archaeology in mainland Southeast Asia. *Journal of Archaeological Research* 4: 3-49.

Kealhofer, L. 1996. The human environment during the terminal Pleistocene and Holocene in northeastern Thailand: phytolith evidence from Lake Kumphawapi. *Asian Perspectives* 35: 229-54.

Kealhofer, L. and D. Penny 1996. 14,000+ years of vegetation change in northeastern Thailand. Submitted to the *Review of Paleobotany and Palynology.*

Mallory, J. 1996. Conference on the Bronze Age and Iron Age Peoples of Eastern Central Asia, University of Pennsylvania Museum of Anthropology and Archaeology, Philadelphia, April 19-21, 1996. *UCLA Friends and Alumni of Indo-European Studies Newsletter* 6(1): 8-9.

Penny, D. in prep. A Regional Palaeoenvironmental Analysis of the Sakon Nakon Basin, Khorat Plateau, Northeast Thailand. PhD. Dissertation, Department of Geography and Environmental Science, Monash University, Australia.

Penny, D., J. Grindrod and P. Bishop 1996. Holocene palaeoenvironmental reconstructions based on microfossil analysis of a lake sediment core, Nong Han Kumphawapi, Udon Thani, northeast Thailand. *Asian Perspectives* 35: 209-28.

White, J.C. 1986 A Revision of the Chronology of Ban Chiang and Its Implications for the Prehistory of Northeast Thailand. University Microfilms International, Ann Arbor.

Table 1: Radiocarbon dates from 3KUM, Lake Kumphawapi, Thailand

Lab no.	C14 age	Depth	C13/C12 ratio	Analysis	Material	Calibration (OxCal) 1993 curve 2 sigma
Beta-93027	5540±70 BP	80-86 cm	-28.5	radio. stand.	organic sed.	4520-4240 BC
Beta-93028	6080±60 BP	136-141 cm	-25.0	rad. stand., ext.	organic sed.	5140-4830 BC (0.94) 5210-5160 BC (0.06)
Beta-93029	6270±100 BP	152-157 cm	-23.4	rad. stand., ext.	organic sed.	5430-4950 BC
Beta-93030	8610±100 BP	255-268 cm	-22.4	rad. stand., ext.	organic sed.	7920-7480 BC
Beta-93031	8570±110 BP	355-363 cm	-22.1	rad. stand., ext.	organic sed.	7950-7300 BC
Beta-72096	9170±130 BP*	540 cm	-25.0*	rad. stand., ext.	organic sed.	8550-7950 BC
Beta-72097	12270±70 BP	580 cm	-15.9	AMS (CAMS-13135)	organic sed.	12750-12050 BC

* estimated

Table 2: AMS radiocarbon dates from Ban Chiang Early Period burial ceramics

Lab. no.	C14 age	C13/C12 ratio	Specimen	Phase	Calibration (OxCal) 1993 curve 2 sigma
AA-15581	2970±60 BP	-25.6	BCES B.56 Pot B 2215	EP Vb	1320-1000 BC (0.95) 1390-1340 BC (0.05)
AA-15582	3320±50 BP	-22.6	BCES B.59 Pot A 2318	EP Va	1740-1450 BC
AA-15583	5805±60 BP	-24.6	BCES B.63 Pot A 2356	EP III?	4800-4510 BC
OxA-6069	4810±90 BP	-21.6	BCES B.47 Pot B 2161	EP III	3770-3370 BC
AA-12538	3470±70 BP	NA	BCES B.72 Pot D 2835	EP II/III	1950-1600 BC (0.99) 1560-1530 BC (0.01)
AA-15578	3465±100 BP	-24.1	BC B.46 Pot A 1608	EP IIc	2050-1500 BC
AA-15579	3655±55 BP	-24.4	BC B.47 Pot A 1621	EP IIb	2190-1880 BC

Figure 1: Ban Chiang: calibration of stratified Early Period AMS dates