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# THE EARLY HUMAN OCCUPATION OF TRÀNG AN, VIETNAM: ARCHAEOLOGICAL AND PALAEO-ENVIRONMENTAL EVIDENCE

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## Introduction

The Tràng An Archaeological Project (TAAP) has focused on the excavation of three caves in the tower karstic landscape of the isolated Tràng An limestone massif – located on the south western edge of the Song Hong (Red River) delta, Ninh Bình,Vietnam. The massif forms the central part of a designated park – the Tràng An Landscape Complex – comprising 6,172 hectares and currently the subject of a World Heritage nomination bid and a showcase of the province's historical, cultural and ecological significance at national and international levels. The archaeological record of Tràng An forms a major part of the park's heritage value.

In late 2006 the McDonald Institute for Archaeological Research, University of Cambridge, was approached by the Xuan Truong Construction Company to conduct an independent archaeological investigation in this landscape. With the backing of the Ninh Bình People's Committee and the Vietnamese Ministry of Culture, Sports and Tourism, archaeological field work under the direction of author was began in Tràng An in May 2007 and has continued through a succession of field seasons on a yearly basis since that time, and is anticipated to continue until 2014.

TAAP excavations at three caves (Hang Boi, Hang Trống and Hang Moi) have together created a significant and almost unbroken archaeological record of early human activity spanning *c*. 20,000 years until 5500 years ago. This is one of the longest such sequences in Vietnam and includes one of the country's oldest archaeological sites: Hang Trống; the present base of excavations at which is dated to more than 24,800 calibrated years before present. The archaeological record of Tràng An, as revealed through the multi-disciplinary study of these sites, has the scientific distinction of providing invaluable information about how hunter-gatherer groups lived within the local karstic landscape; including how they adapted to the inundation of regional coastlines and the profound environmental and geographic changes this instigated towards the end of the last ice age. It has the social distinction of representing a highly successful and mutually beneficial initiative between the scientific inquiry, economic development and heritage management. In this brief communication is presented a summary of the results of our investigations to date.

## Excavations at Hang Boi

In May 2007 the TAAP began excavation of a shell midden in the mouth of Hang Boi (20.258889N, 105.888056E, *c*. 78 m asl.), a cave in the north-west of Tràng An. Our investigation here revealed >2 m of cultural deposits, covering a period from *c*. 13,700 to *c*.

10,500 calibrated radiocarbon years before present (cal. BP) (*see* Rabett *et al*., 2009a; 2011). Approximately 91% of the shells in the midden were estimated (based on a study sample) as belonging to two species of land snail: *Cyclophorus theodori* and *C. unicus*. Several lines of evidence demonstrated that these mollusca had been deliberately collected by forager groups, and were selected from a broad range of available land snails in the local environment (*see* Rabett, 2012: 236-237). Based on the greater availability of these species of land snail species during April–October (Nguyen Viet, 2004, 2008), and given the chronology from the site – i.e. the midden had accumulated over some thousands of years – we deduced that a significant proportion of site-use probably occurred during the wet season. The exact periodicity of site visits is harder to determine; however the recovery of skeletal elements belonging to fruit bats (known to be sensitive to human presence) from points within the midden, suggests that visits were at least sometimes separated by a hiatus of several years or even decades. Charcoal fragments were commonly found through-out the midden, and occasional 'ash dumps' – i.e. the combusted material from a fire that had been created elsewhere – were identified, but no stone-lined hearths were found, or any discrete series of hearth deposits. While we only excavated a comparatively small part of the total surface area of the midden at Hang Boi and cannot, therefore, discount the possibility that hearths might exist elsewhere in the cave mouth, the evidence available suggests that visits by hunter-gatherer groups may have been comparatively brief as well as episodic.

From our study of the faunal remains, land snails may have formed a 'food staple' – i.e. a reliable food resource – but the range of other taxa present (including freshwater crabs, turtles, fish, as well as terrestrial and arboreal game, most in low frequency) indicate that this was not the only resource taken. The low incidence of remains of terrestrial and arboreal vertebrate game in particular may indicate that these were hunted more opportunistically and formed a supplement to the consumption of this more reliable food source. The degree to which collected plant resources fitted into the subsistence economy of these early foraging communities is yet to be determined; however there are clear indications that nuts of the genus *Canarium* spp. (Family: Burseraceae) were being exploited. Although the recovery of burnt food remains does not necessarily mean they were cooked – e.g. they could have become burnt accidentally – their presence certainly raises the possibility of on-site plant processing as well as consumption.

During the Early Holocene, salt marsh and lagoon habitats began to encroach on the low-lying plains beyond Tràng An as a result of coastal inundation. Interestingly, though, no resources from these habitats were being brought to Hang Boi, even later when they lay just beyond the massif itself (*see* Tanabe *et al*., 2003, 2006). Based on changes in species composition and frequency in Early Holocene levels at the site, this period saw an intensification of existing subsistence strategies within the massif rather than the immediate incorporation of these new resources (Rabett, 2012). Nonetheless, cultural evidence from Hang Boi does include evidence of coastal contact, starting from well before the Pleistocene-Holocene transition (*c*. 11,700 cal. BP). This evidence exists in the form of pierced neritid shells and a fragment of cowrie that appears to have been worked and possibly pigmented. Taxonomically, the former shells are either *Neritina (Dostia) cornucopia* or *Neritina (Neripteron) violacea* (*after* Siong and Clements, 2008; Nguyen Ngoc Thach, 2005). Both are species of mangrove gastropod and their presence implies that groups camping at Hang Boi may not have confined their activities to the uplands and dolines of the massif; but instead may have ranged widely over the coastal plains beyond – or else participated in exchange networks with groups who did (*see* also Ciochon and Olsen, 1990; Nguyen Lan Cuong,

2007). The recovery of further almost identical pierced neritid shells from similarly-aged deposits at Hang Trống, a kilometre away, provided good evidence of cultural links between groups using these two sites and, given the contrasts in their respective locations, insights into site-function and landscape-use.

**Excavations at Hang Trống**

In November 2007, the TAAP undertook a short, two week, survey field-season to determine the likelihood of additional evidence of early settlement that might be comparable with that which we were uncovering at Hang Boi. Three sites were investigated (Rabett *et al*., 2009b). The top of the undisturbed culture-bearing deposits at Hang Trống (20.250444N, 105.890111E; *c*. 142.3 m asl.) one of these, was subsequently radiocarbon dated to *c*. 12,700 cal. BP. Access to this cave was tortuous, however, making any immediate excavation logistically too complex and leaving us to continue focusing on Hang Boi during the following year. By 2009, the park management board had very kindly established a path up to Hang Trống, making access much more viable and allowing us to begin systematic excavations at the cave. Full details of the cultural, subsistence and environmental data from this site are available in Rabett *et al*. (*in review*); a full geoarchaeological assessment of the cave is currently in preparation.

During two field seasons working at Hang Trống (2009 and 2010) we uncovered a cultural sequence that while bearing some similarities to that from Hang Boi also bore some notable differences. The upper *c*. 1.85 m of excavation in the centre of the cave (Trench 1) exposed a comparable land snail-dominated midden, but here this spanned a considerably longer period of time than at Hang Boi: from the first millennia after the end of the Last Glacial Maximum (LGM) (*c*. 19,000 cal. BP) until *c*. 12,700 cal. BP. Three species of cyclophorid (*Cyclophorus theodori*, *Cyclophorus unicus* and *Cyclophorus* cf. *cambodjiensis*) were found to account for *c*. 99% of identified shell through-out this period of the midden accumulation. These and most of the remaining molluscan taxa found on-site are known to live in and around trees – an indication for the long-term survival of an arboreal environment in the vicinity of the cave. This conclusion was corroborated by other independent lines of evidence including, palynology, macro-botanics, geochemical markers and vertebrate fauna. Occupation at Hang Trống appears to have been most intensive (from the highest diversity of species and largest quantities of remains) during the early part of the deglacial period, with smaller peaks and troughs in midden accumulation through the following millennia. At least one of these low-points we believe to be linked to a particularly arid climatic pulse that affected the region 15-16,000 years ago. This may have increased stress on the local forest environment and possibly prompted a partial abandonment of the cave. While plant gathering appears comparable to that observed at Hang Boi, hunting practices show some differences in species composition and frequency (e.g. there is a very low frequency of freshwater crabs or fish), with at least some of this variance explained by differences in altitude and position of the two sites, and immediately accessible habitats.

In contrast to Hang Boi, stratified hearth deposits were encountered in all three of the trenches that we ultimately opened at Hang Trống, with a particularly well-preserved series appearing near to the eastern wall of the cave (Trench 3); an area that is currently comparatively sheltered from the constant and sometimes strong air-flow through the cave. Excavations in that area also produced a small discrete collection of bones and tools (three stone pounders) beneath a single large mussel (*Unio* spp.) shell. Given the general paucity of vertebrate faunal remains from our excavations generally at the site, the recovery of this

material, which included Cercopithecidae (almost certainly *Macaca* sp.) long bone fragments and a single complete Sciuridae femur, from within a single nook between rocks, gives every impression of having been deliberately placed during the course of one of what were probably very brief visits to the cave.

One feature that is very apparent from the deep excavations in Trench 1 is a marked change in the depositional record prior to the onset of deglaciation. Distinctly stony, yellowish-brown (10YR 5/4) and silt-rich colluvial deposits were encountered here beneath the shell midden. Our observations about the character of these lower deposits correspond with descriptions of a similar formation at the Nguòm rock shelter where it was there linked to a distinct climatic shift and associated with faunal and technological changes (Hoáng Xuân Chinh, 1991). At Hang Trống excavation of these colluvial deposits continued to produce verifiable evidence of human activity back to at least as early as *c*. 24,800 cal. BP (the current base of excavations; bedrock has not yet been reached). Site use during the LGM is attested not only through the presence struck flakes and some discernible tool types (including a retouched scraper and several short-axe fragments), as well as faunal remains. Technological continuity into the shell midden suggests that the same population was probably responsible for both periods of site-use. The dramatic increase in terrestrial molluscs thereafter suggests that local habitats may have contained reduced tree-cover before the onset of deglaciation. Recovery within these LGM levels of the first instance of pangolin remains from any of the Tràng An sites might also hint at the kind of change in vertebrate faunal spectrum seen at Nguòm and elsewhere in northern Vietnam at around this time (e.g. Hoáng Xuân Chinh, 1991; Nguyen Gai Doi, 2005).

**Excavations at Hang Moi**

In November 2011 targeted excavation work was begun at a third cave, Hang Moi (20.254111N, 105.894889E, 23 m asl). This site had been previously surveyed by the TAAP at the end of the 2010 with the aim of helping to explore the cultural story at the other, more recent, end of the park's archaeological sequence. Publication on the material excavated during 2011 is forthcoming; here it is only possible to provide a brief commentary based on observations made in the field and the results of preliminary radiocarbon dating.

Settlement in the Red River delta region by the mid-Holocene (*c*. 7000 – 4500 years ago) is known to have been strongly oriented towards maritime subsistence economy and an emerging Neolithic. Preliminary field observations from our work at Hang Moi suggest that we are tracking both of these shifts. For our investigation we opened two trenches in different parts of the cave and in each we quickly uncovered evidence of pottery belonging to the Da But, a local early Neolithic culture of mid-Holocene age. Work in Trench 1 (located at the back of the cave, near to the western wall) revealed a complex sequence of hearths and evidence of a hearth structure – in the form of pseudo-forms of what appear to have been stakes driven into the area of the fire – potentially evidence of something like a cooking tripod. In Trench 2 (located adjacent to the northern cave wall) we uncovered many fish, mollusc and crab remains, some large mammal bones and once again many sherds of Da But pottery. Charcoal from the base of both trenches was dated to *c*. 5500 cal. BP. This suggests that these deposits possibly represent a midden that accumulated during the course of one period of cave use. Only eight Dabutian sites are known from Ninh Bình and surrounding provinces, making Hang Moi an important addition to this list and to our understanding of the way early communities were adapting to the heightened sea levels of the time (3-5 m above modern sea-level).

Detailed analysis of the faunal remains from Hang Moi – particularly its molluscan, crustracean and fish remains – is underway and is already taking on a distinctly different character to that seen at Hang Boi and Hang Trống. A pronounced emphasis on marine resources is testament to the economic importance of these to foragers around the time of the mid-Holocene sea high-stand, but also to the possibility that parts of the massif itself were inundated at around this time, something which may well have precipitated adoption of these resources into the subsistence economy of sites within Tràng An.

**Conclusion**

The archaeological and palaeo-environmental evidence amassed by the TAAP indicates that the Tràng An massif was wholly or partially forested throughout most of the last 20,000 years. This seems to have been a particular draw to early human groups, who came here to exploit a wide range of game and gathered resources, including reliable food staples. The forested setting here contrasted with more changeable open habitats beyond the massif, which shifted from grasslands to salt marsh and lagoons as the coastline advanced landwards during the deglacial period (Li *et al*., 2006; Tanabe *et al*., 2003, 2006). Although there is evidence that people were not immediately incorporating resources from beyond the massif into what they brought back to sites within Tràng An – indeed, there may have been an intensification of upland hunting and gathering at those sites first, if Hang Boi is representative – the material culture we have found points to the existence of links to the coast from as early as 14,000 years ago, when it was still many tens of kilometres away. While we cannot be certain that people visiting Tràng An were also visiting the coast, the seasonal nature of the occupational record were have uncovered does suggest that the massif was not the only locus of activity. Indeed the record of site use we have observed between Hang Boi and Hang Trống also supports the picture of highly mobile foraging groups, who positioned themselves at different points in the landscape at different times of the year according to the availability of local resources. We suspect that the record at Hang Moi will provide important clues about how that lifestyle was adapted and changed when the coastline finally reached the massif itself and when ceramic technology began to become an increasingly important part of material culture.

Despite our archaeological investigations over the last six years, and the recent and no less exciting results arising from work by our Vietnamese colleagues in the park, it is very apparent that we have only scratched the surface of the cultural story that exists here. Historic use of the caves and rock-shelters within the boundaries of the park appears to have been surprisingly slight, leaving the records of their ancient use largely and perhaps uniquely intact. In light of this and the fact that the majority of the park's numerous caves have yet to be investigated, the likelihood for extending the range and detail of this record is very high, and the value that can be attached to the archaeological significance of this landscape cannot be underestimated.

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