

Health and the Experience of Childhood in Late Neolithic Viet Nam



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INTRODUCTION

KAMP (2001:1) ASKED “where have all the children gone?” in reference to a lack of archaeological studies that focused on children in the past. From a bioarchaeological perspective, the children have always been there and have formed an important, and highly visible, portion of the data set globally (Cohen and Armelagos 1984) and in Southeast Asia (Oxenham and Tayles 2006). Despite a recent increase in the number of volumes focusing on the archaeology of children (e.g., Sofaer Derevenski 2000; Wileman 2005; Ardren and Hutson 2006), the emphasis on mortuary studies in Southeast Asia has remained fixed on aspects of social organization (e.g., Higham and Kijngam 1984; Higham and Thosarat 1998, 2004; Talbot 2002). Bacus’ (2007) analysis of gender in prehistoric Thailand, and this examination of childhood in Viet Nam offer alternative approaches to the study of human society in ancient Southeast Asia. Much is known of adult health and disease in Vietnamese antiquity (Oxenham 2006; Oxenham et al. 2005, 2006), but little is known of childhood health and well-being during this period of time. Excavations of a late Neolithic cemetery in northern Viet Nam provide the opportunity to learn more about a poorly sampled period of Vietnamese prehistory in the context of childhood behavior, attitudes toward children, and child health and well-being.

The aim of this paper is to: (1) examine aspects of mortuary behavior, particularly in terms of what this can tell us of the role of children and adult attitudes toward children in late Neolithic Man Bac, Viet Nam; and (2) discuss biological characteristics of the human sample, again focusing on the children, in order to explore aspects of childhood palaeohealth.

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Fig. 1. View of the 2004–2005 excavation (open pit in right foreground), looking south. Man Bac is situated within a natural amphitheater of limestone outcrops. During occupation a river flowed past the opening to this cul-de-sac in the south. Since 1999 excavations have moved progressively westward (to the right in the photograph).

BIO-CULTURAL CONTEXT

Man Bac is located next to Bach Lien Village, Yen Thanh Commune, Yen Mo District, $20^{\circ}08'00''$ North and $109^{\circ}59'017''$ East (Dung 2005). Man Bac was identified by Colani in 1916 (see Trinh 2004) and the approximately 2-m deep deposit was excavated by a Vietnamese archaeological team in 1999 (25 m², 6 burials), 2001 (30 m², 12 burials), and then 2004–2005 (36 m², 30 burials; see Fig. 1) with a consortium of Vietnamese, Japanese, and Australians. It is difficult to determine the extent of the site, primarily due to subsequent terracing and the development of a Catholic cemetery to the east of the site in the historic period, but it likely approximates 200–300 m². Preliminary analyses suggest that two distinct cultural phases are associated with three stratigraphic levels, the upper two units being occupation phases and the third (bottom) layer being almost exclusively burials in otherwise sterile silt. Material cultural similarities between the occupation layers and grave inclusions in the third level suggest the burials are associated with the occupation level(s).

If the Hoabinhian, extending from the late Pleistocene into the mid-Holocene, can be considered the early Neolithic, this was followed by the development of riverine-, estuarine-, and later, marine-oriented foraging communities in the mid-Holocene of northern Viet Nam, most notably the Da But culture dated to between 6500 and 4700 B.P. (Nguyen et al. 2004). There is some tantalizing

evidence for Da But material culture underlying the deepest layers at Man Bac (Trinh Hoang Hiep pers. comm.), but whether this suggests some form of cultural continuity is unclear at present. The late Neolithic in northern Viet Nam is characterized by a range of regional complexes with shared and unique material cultural assemblages, dated to between 5000 and 4000 B.P. (Nguyen et al. 2004). Some of these sites, such as the Ha Giang culture, include items such as T-cross-sectioned nephrite bracelets; items also seen at Man Bac.

Man Bac itself formally belongs to the early Bronze Age or Phung Nguyen culture, dated to between 3800 and 3400 B.P. (Nguyen et al. 2004), although bronze is rare in these sites and absent at Man Bac. A series of ^{14}C dates on charcoal (2 sigma range calibrations [INTCAL04] after Reimer et al. 2004) for the occupation and burial layers are consistent with this: $3,341 \pm 38$ B.P. (1,736–1,524 B.C.); $3,393 \pm 36$ B.P. (1,867–1,540 B.C.); $3,530 \pm 60$ B.P. (2,025–1,694 B.C.). A series of succeeding local Bronze cultures (Dong Dau 3400–3000 B.P., Go Mun 3000–2700 B.P., Dong Son 2700–2000 B.P.) bring us to the annexation of the region by the Han in the first century A.D. (Nguyen et al. 2004). Nguyen et al. (2004) relate that 50 Phung Nguyen sites are known, many skirting the edges of the Red River Delta and some as large as 2000 m². Before Man Bac, the largest Phung Nguyen burial assemblage was Lung Hoa, containing 12 burials, with other sites producing one or two burials at most. Pottery styles and motifs have been interpreted as indicating Phung Nguyen peoples maintained connections with surrounding coastal cultures such as the Ha Long and Hoa Loc groups; nephrite knives also suggest links to Shang Dynasty China (Higham 1996:87).

In Phung Nguyen sites in general, and Man Bac specifically, an enormous array and variety of objects have been excavated including adzes, axes, chisels, blades, grinding stones, net sinkers, nephrite beads, bangles, rings, and ceramics. Numerous pottery anvils attest to the importance of local pottery manufacture, while the lithic ornaments and associated waste products support evidence for considerable skill in the manufacture of stone jewelry seen at other Phung Nguyen sites, such as Trang Kenh (Higham 1996). Work on the faunal remains indicates a subsistence base rich in terrestrial and aquatic resources and the presence of domestic pigs (Sawada and Vu 2005). Presumably some form of horticulture or agriculture was practiced at Man Bac, although the direct floral evidence for this is currently lacking. Long grain rice has been preserved in other Phung Nguyen sites (Nguyen et al. 2004).

As this is the first Phung Nguyen culture site with a large sample of burials to be excavated, our knowledge of other aspects of human behaviour, including social organization, is limited. However, recent work by Huffer (2005) suggests Man Bac was characterized by limited social differentiation and was more heterarchical in structure, as opposed to hierarchical or ranked. Social differentiation was more strongly expressed in terms of age, rather than sex or gender. The current paper will add further social and behavioral dimensions to our understanding of the Phung Nguyen period.

METHODS

Given the aims of this article, the mortuary analysis focused on both the spatial distribution of graves and the type and relative frequency of preserved grave

inclusions by age. With respect to biological variables, adult sex and age-at-death was determined using standard osteological methods (Buikstra and Ubelaker 1994), while subadults were aged predominantly through observations of the dentition (Buikstra and Ubelaker 1994; White 2000). Following age estimation three palaeodemographic measures of mortality/fertility (which have important health and population behavior implications) were calculated for the complete sample: juvenile/adult ratio (JA: ratio children aged 5 to 15 years to adults 20+ years old); mean childhood mortality (MCM); and D20+/D5 ratio (proportion of those living beyond 20 years to all those that made it to at least 5 years).

In order to gain insights into the health of the subadult sample three commonly employed health indicators were assessed (e.g., see Larsen 1997; Steckel and Rose 2002). Oral health, with respect to caries, was examined as it is sensitive to cultural (e.g., diet) and environmental (e.g., natural fluoride) variables. Moreover, poor levels of oral health may contribute to reduced overall health. Caries recording protocols followed Hillson (2001). Two measures of physiological well-being were also employed, the frequency of cribra orbitalia and enamel hypoplasia, following standard recording protocols (see Oxenham et al. 2006). The aetiology of both conditions is unclear with enamel hypoplasia, defined as pit or linear enamel deficiencies (often manifesting as grooves in the visible surfaces of the front teeth) potentially being caused by any childhood metabolic disruption during enamel formation (Larsen 1997). Traditionally cribra orbitalia, which manifests as either resorptive or prolific lesions in the thin bone of the upper eye orbits in childhood, has been associated with various forms of anaemia (Stuart-Macadam 1985). It is perhaps best to see both enamel hypoplasia and

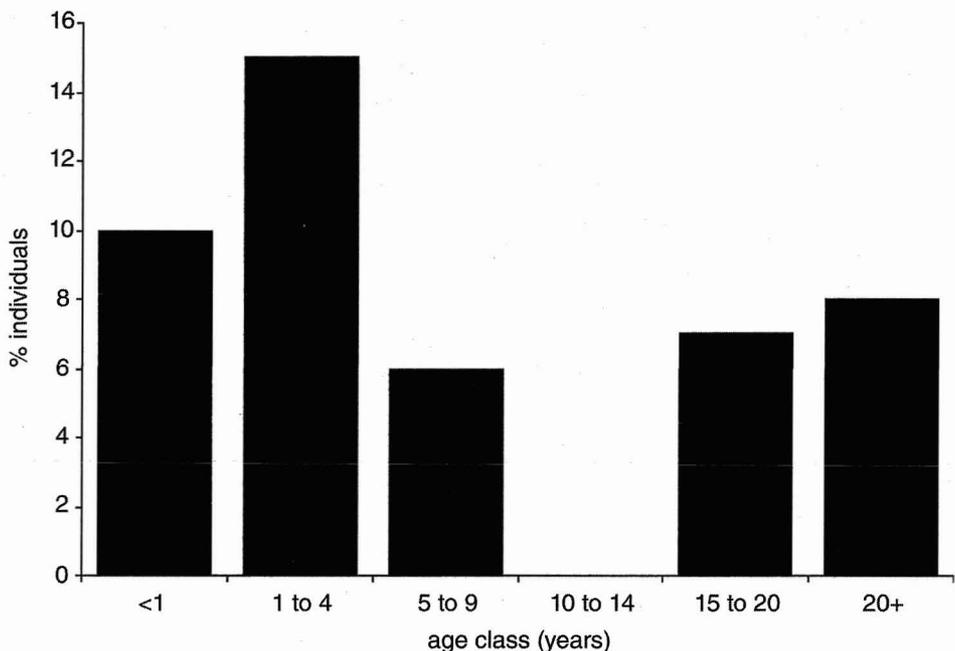


Fig. 2. Age-specific mortality at Man Bac (all excavation seasons, $n = 46$).

TABLE 1. DEMOGRAPHIC ATTRIBUTES OF SEVERAL SOUTHEAST ASIAN SKELETAL ASSEMBLAGES

	DATE (YEARS BP) ¹	SUBSISTENCE ²	<5 ³	5-9.9	10-14.9	15-19.9	20+	JA RATIO	D ₂₀₊ / D ₅₊	MCM	DR
Man Bac	3500-4000	A?/F	54.3	13.0	0.0	15.2	17.4	0.78	0.500	0.417	4.48
Khok Phanom Di	3500-4000	A/F	48.1	4.5	3.2	5.2	39.0	0.20	0.750	0.091	1.30
Early Non Nok Tha	4800-3400	M	27.7	4.8	2.4	2.4	62.6	0.12	0.867	0.047	1.27
Early Ban Chiang	4100-2900	M	20.6	5.4	2.2	7.9	64.5	0.12	0.851	0.052	0.52
Late Non Nok Tha	3400-2200	M	5.0	5.0	2.5	1.3	86.3	0.09	0.908	0.032	0.30
Ban Lum Khao	3000-2500	M	32.7	10.3	4.7	4.7	47.6	0.30	0.708	0.108	1.38
Late Ban Chiang	2900-1800	M	17.4	6.5	0.0	10.9	65.3	0.10	0.842	0.055	0.48
Noen U-Loke	2300-1700	A/H	43.0	2.8	2.8	3.7	47.7	0.11	0.709	0.058	1.45

¹Adapted from Oxenham et al. (2006)

²A: agriculture; H: horticulture; M: mixed; F: foraging/hunting

cribra orbitalia as generalized and for the most part nonspecific indicators of childhood health.

RESULTS

Health Analysis

Palaeodemography — Figure 2 summarizes the age-specific mortality distribution of Man Bac. Over 54 percent of the sample is younger than 5 years at death while 33 percent are adult (>15 years). The absence of individuals aged 10–14 years reflects the very low risk of death in this age category (Chamberlain 2006:62). A comparison with other skeletal assemblages in the region (Table 1) indicates that Man Bac has an elevated level of sub-five-year-old mortality and an exceptionally high rate of fertility as indicated by a low D20+/D5+ ratio, and relatively high juvenile: adult (JA) and mean childhood mortality (MCM) ratios (see Jackes 1992 for a discussion of these demographic measures). A further demographic indicator, the dependency ratio, indicates a “hard life” at Man Bac with a high number of children per adult.

Oral Health — Table 2 indicates that Early Childhood Caries (ECC) is elevated at Man Bac and only these children display carious lesions that cause massive crown destruction. The two children with the most severe form of ECC had antemortem staining of the teeth as illustrated in Figure 3.

Physiological Health: Cribra Orbitalia and LEH — Table 3 summarizes the evidence for cribra orbitalia in the sample. The frequency of cribra orbitalia is similar to that seen in other samples from the region. At Khok Phanom Di, 75 percent (10/14 individuals) of subadults aged 1–14 years displayed cribrotic lesions, while most (7/8 individuals) aged 6–14 years had lesions. However, no (0/63) infants younger than one year old displayed lesions (Tayles 1999). At Ban Chiang, the overall frequency of cribra orbitalia was 40 percent (6/15 individuals) in children 7 years of age or younger, while no children (0/4) younger than 2 had lesions (Pietrusewsky and Douglas 2002).

None of the nine individuals (78 deciduous teeth) displayed enamel hypoplasia. Observations in the deciduous dentition would coincide with events during the last five months *in utero* through to one year of age (Goodman et al. 1984). Like-

TABLE 2. EARLY CHILDHOOD CARIES (≤ 3 YEARS) EXPERIENCE IN PREHISTORIC SOUTHEAST ASIA

SITE	DECIDUOUS TEETH			INDIVIDUALS		
	n	OBS ³	%	n	OBS	%
Man Bac	71	6(5)	8.5	6	3	50.0
Ban Na Di ¹	46	9(7)	19.6	4	1	25.0
Ban Lum Khao ¹	133	3(3)	2.3	12	2	16.7
Khok Phanom Di ²	62	3(2)	4.8	6	2	33.3

¹Domett (2001, & unpublished data); ²Tayles (1999), Sian Halcrow pers. comm. ³Number of affected incisors/canines in parentheses

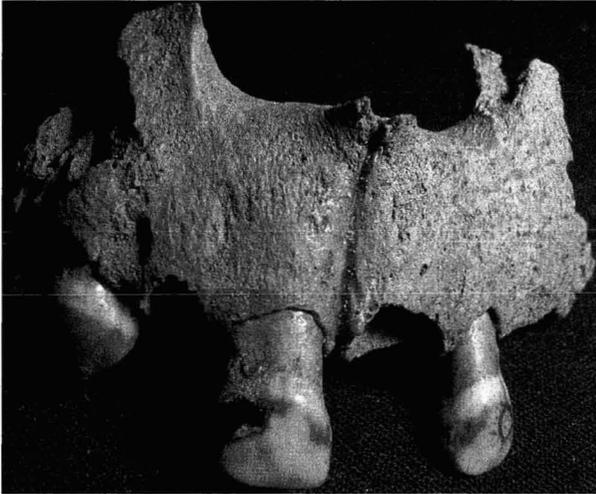


Fig. 3. Massive carious lesion to right di¹ and note also focal demineralization of left di² (MB05 B18, 18-month-old infant).

wise, no signs of enamel hypoplasia were found at Nong Nor, Ban Lum Khao, and Ban Na Di (deciduous tooth sample sizes: 86, 182, and 69, respectively; Domett 2001). While linear defects were not seen at Khok Phanom Di, Tayles (1999) recorded 7 percent, 14/200 deciduous teeth, with hypoplastic defects.

Mortuary Analysis

Burial Distribution and Orientation — Figure 4 shows the distribution of all burials for each of the three excavation seasons. The squares represent putative clusters, defined by way of spatial proximity to other burials. Such clusters may represent groups of related individuals that were interred beneath elevated structures. All clusters include an adult and younger individuals. The majority of burials (95%, 40/42), where position could be assessed, were extended with arms at sides. Two burials (an adult male older than 40 and a young adult aged 15, likely male) were flexed, and one child (possibly two) was interred in a ceramic pot. For those burials where an axis of orientation could be determined, 88 percent (37/42) were placed in an east (head) to west (feet) direction while the remaining burials were oriented approximately north (head) to south (feet).

General Mortuary Treatment — Of the 46 individuals examined, 34 (74%) possessed some form of grave good and 91 percent (31/34) of those had at least one ceramic

TABLE 3. FREQUENCY OF CRIBRA ORBITALIA IN MAN BAC CHILDREN ≤ 10 YEARS OLD AT DEATH

AGE	n	SLIGHT/MILD	SEVERE	ACTIVE	REMODELED	TOTAL%
<1 year	4	1	0	1	0	25.0
1 to <3 years	4	2	1	3	0	75.0
3 to 10 years	3	0	1	1	0	33.3
total	11	3	2	5	0	45.5

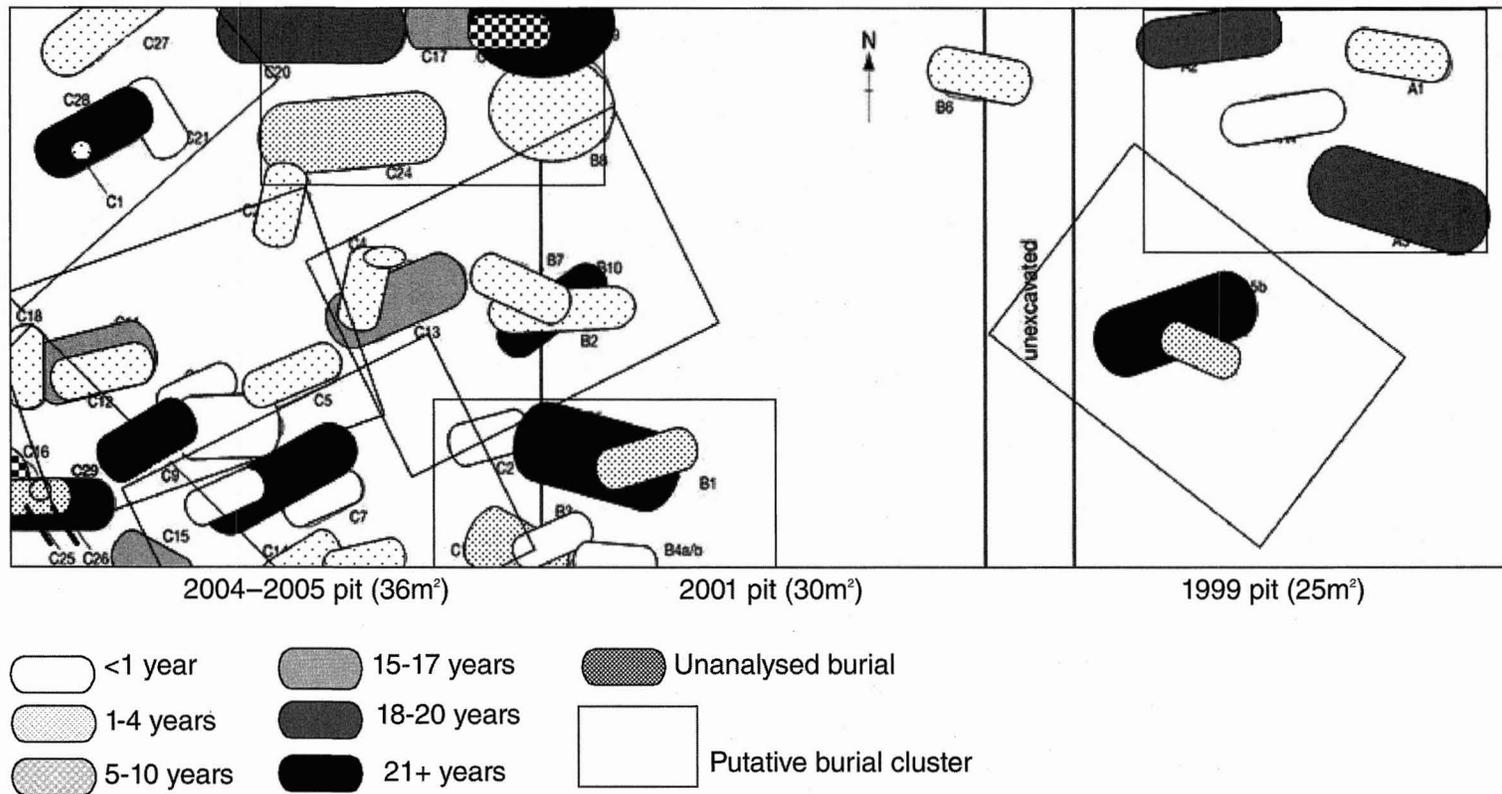


Fig. 4. Distribution of burials by age for all excavation seasons at Man Bac.

TABLE 4. DISTRIBUTION OF MAN BAC GRAVE GOODS BY AGE-AT-DEATH

AGE	n	INDIVIDUALS WITH GRAVE GOODS ¹	INDIVIDUALS WITH CERAMICS	INDIVIDUALS WITH NONCERAMICS	NON-CERAMIC GRAVE GOODS BY TYPE				
					SHELL	STONE TOOL	BONE TOOL	PELLET	BEAD
<1	10	6/10 (60)	6/6 (100)	3/6 (50)	2/10 (20)			1/10 (10)	
1 to 4	15	8/15 (53)	6/8 (75)	3/8 (38)	1/15 (7)	1/15 (7)		1/15 (7)	1/7 (15)
5 to 9	6	6/6 (100)	6/6 (100)	3/6 (50)	2/6 (33)	1/6 (17)	1/6 (17)		
10 to 14	0	0/0 (0)	0/0 (0)	0/0 (0)					
15 to 20	7	7/7 (100)	7/7 (100)	1/7 (14)		1/7 (14)	1/7 (14)		
20+	8	7/8 (88)	6/7 (86)	4/7 (57)	2/8 (25)	1/8 (13)		1/8 (13)	1/8 (13)
Total	46	34/46 (74)	31/34 (91)	14/31 (45)	7/46 (15)	4/46 (9)	2/46 (4)	3/46 (7)	2/46 (4)

¹ observed/n (%); shell refers to ornaments and/or implements; pellets are clay (projectile?) balls; beads are worked nephrite

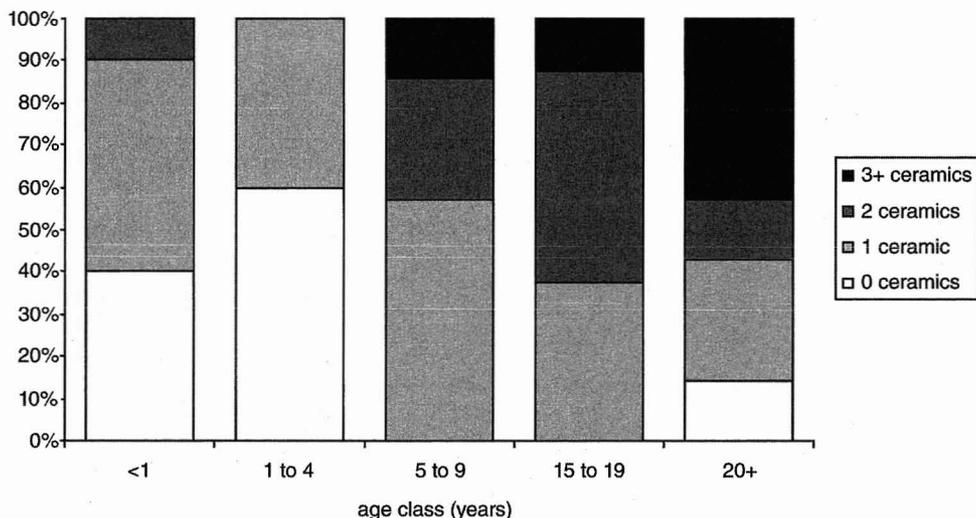


Fig. 5. Frequency of ceramics per grave by age class.

object. Of all burials with ceramics, 90 percent (28/31) had at least one redware vessel. The positioning of ceramic goods did not vary by age or sex with placement by the head (55.6%); torso (28.9%); between the legs (8.9%); and at the feet (6.7%). Of all individuals with grave goods, 41 percent (14/34) were interred with at least one nonceramic object and 37.5 percent of these had shell, 25 percent had stone artifacts, and 12.5 percent had bone artifacts, clay pellets, or stone beads.

Mortuary Treatment by Age — With one exception, all individuals ≥ 5 years have some form of grave good (Table 4). Children younger than 5 had a 50:50 chance of receiving a grave good. The number of ceramics placed in graves increases with increasing age-at-death (Fig. 5). An exception to this trend is seen in burial 3 (six-month-old infant, Fig. 6) that was interred with two small redware pots and a clay pellet. Three other children, aged between 7 and 10 years, also possessed two ceramics.

Shell was found in all age classes except one (15–20 years), tools (bone and stone) were not found with very young children, and only children younger than 5 years and a single adult male aged approximately 20 years had clay pellets (Table 4). Nephrite beads were only found with young children and mature adults. An 8-year-old child is unique (Fig. 7) in being the only individual to have what may be “shell knives” (large elongated bivalve shells) and be actively engaging with a grave good (grasping these “knives”). With the exception of two mature adults, this child has the “richest” grave in terms of the number and variety of material culture.

Only children received some form of obvious encasement or grave demarcation and this was rare: one clear stone circle (18-month-old infant), one probable deliberate multiple stone placement (less than 12-month-old infant), and one pot burial (approximately 2-year-old child).

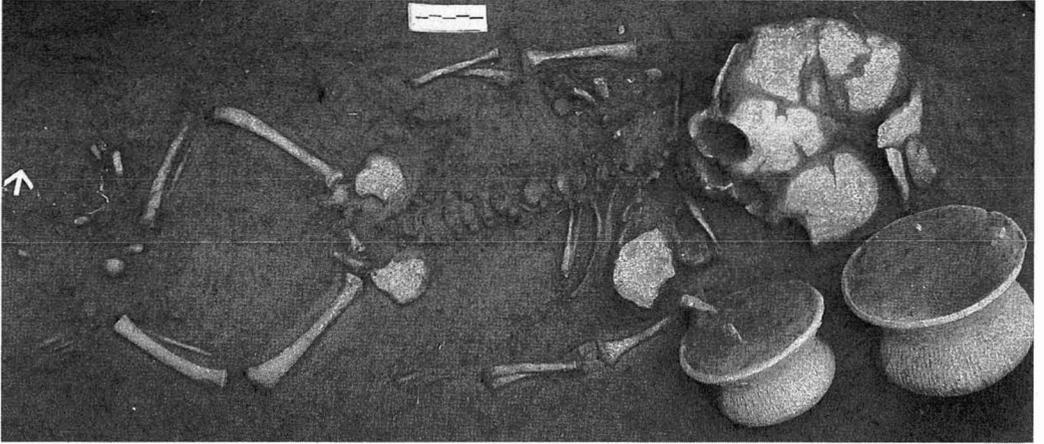


Fig. 6. Six-month-old infant (MB05 B05) with two small pots. (Photo courtesy of Lorna Tilley)



Fig. 7. The eight- to nine-year-old "shell child" (MB05 B25) grasping large bivalve shells. (Photo courtesy of Lorna Tilley)

DISCUSSION

Health

Early childhood caries (ECC), referred to as nursing-bottle or baby-bottle caries, rampant caries, and labial caries (Slavkin 1999), was an important health issue at Man Bac. The risk of developing ECC is greatly increased with increased levels of mutans streptococci (Milgrom et al. 2000; Thorild et al. 2002). While cariogenic bacteria can readily be transmitted from mother to child (Caufield et al. 1993), the successful transmission and subsequent colonization of the child's oral cavity by these organisms is complex and ultimately related to a number of factors reliant on diet (Boggess and Edelstein 2006). A recent study in Myanmar found an increased risk of ECC associated with children that had been fed pre-masticated rice by their mothers (van Palenstein Hilderman et al. 2006).

Fluoride is a well-known caries prophylactic (Leverett 1982) and high rates of caries have been associated with low levels of fluoride in the groundwater (e.g., Sealy et al. 1992). The ground water fluoride levels are not known for Man Bac and neither is it known if this community relied on groundwater or rainwater, as is common in modern rural communities in Thailand (Vachirarojpisan et al. 2004). Other studies of prehistoric populations (Kelley et al. 1991; Larsen et al. 1991) have reported the cariostatic nature of marine diets. However, Man Bac infants as young as two years old may not have consumed the portions of a marine diet that contain stored fluoride (the bones of fish).

Breast-feeding may increase the risk of ECC, although a recent review of the literature disputes this (Ribeiro and Ribeiro 2004). While human breast milk has a very low cariogenicity, prolonged breast-feeding, in conjunction with night-time feeding, has been linked to an increased risk of developing ECC in one Burmese study (van Palenstein Helderman et al. 2006).

Levels of oral hygiene also have an effect on the risk of developing ECC, but are difficult to isolate from other factors such as feeding habits and development of the child's immune system (Seow 1998). The staining of the teeth of the most severely affected children resembles the effects of Vietnamese betel nut (*Areca catechu*) use (Oxenham et al. 2002). Betel nut was used for a vast range of medical conditions (Perry 1980:302), which may have included feeding infants with extremely painful massive carious lesions the juice of pre-masticated *Areca catechu*.

A further factor is increased risk of ECC through predisposing conditions such as deciduous tooth enamel hypoplasia or hypocalcifications (Cook and Buikstra 1979). In the case of the two infants with severe lesions, the massive crown destruction may have disguised the presence of hypoplastic lesions.

The rates of cribra orbitalia in children are similar to those seen in children at Ban Chiang and Khok Phanom Di and suggest the nonsurviving children in Southeast Asia were under considerable physiological stress at the time of death. Cribra orbitalia is often associated with anaemia (e.g., Stuart-Macadam 1985), a range of inflammatory conditions (e.g., Wapler et al. 2004), or scurvy (e.g., Ortner et al. 1999). The two most severe cases of cribra orbitalia were associated with the two infants with the most severe carious lesions. The synergistic effects of the disease conditions responsible for ECC and cribra orbitalia in these two children may have played a role in their eventual deaths.

The high proportion of subadults in the sample influences the palaeodemographic indicators in suggesting very high levels of fertility at Man Bac. Competing reasons for apparently high subadult mortality include sampling bias, an epidemic or disease that targeted children at Man Bac, or a culturally mediated form of infant mortality such as infanticide. Sampling bias seems unlikely given that children, even the very young, do not appear to have been buried in separate locations and skeletal preservation was excellent at the site. Epidemics and increased childhood mortality due to some unknown disease factor cannot be tested at present. An epidemic scenario, at least, does not appear to be consistent with the time and energy spent on child burials. However, the observation that approximately half of the burials of children 5 years of age or younger do not possess grave goods could be interpreted as lowered mortuary investment in a high risk-of-death age class.

Infanticide is more often the rule, rather than the exception (Williamson 1978:61). Scrimshaw (1984) distinguishes between more overt forms of infanticide (deliberate killing) and more passive forms (including a range of infant neglect strategies that can take years to reach a conclusion). While the latter would be very difficult to observe archaeologically, the more overt type “almost always occurs at birth or very shortly thereafter” (Scrimshaw 1984:449). Given that only a single neonate has been recovered from Man Bac, the overt form of infanticide is unlikely.

High rates of infant mortality at Man Bac say more about fertility than sampling error, epidemics, or infanticide. Increasing levels of fertility are seen in many sites around the globe with the adoption of agricultural subsistence economies (e.g., Bocquet-Appel and Naji 2006). While there is no direct evidence for rice agriculture at Man Bac, long-grain rice has been recovered from other Phung Nguyen sites (Nguyen et al. 2004). The high rate of fertility at Man Bac was perhaps tempered by an extremely high dependency ratio, which suggests a rather difficult life. However, in many agricultural societies children are cared for by other children (Zeller 1987), thus freeing the time of parents and other adult caregivers for other tasks. The costs associated with more children may not have been that great at Man Bac, and the benefits in terms of the economic contribution of the children may have tipped the balance in favor of higher fertility. “In such a young population children could be raised in a world of children, take care of other children and contribute to society through child labour” (Lillehammer 2000:23).

Mortuary

Carr (1995:165) found intracemetery grave location is often reflective of kin relations. The apparent clustering of inhumations as well as the observation that at least one adult and a range of younger age categories form these clusters, suggests family groupings, perhaps beneath domestic, mortuary, or other structures. Three basic aspects of mortuary treatment at Man Bac include: (1) the orientation of the body (generally head to the east and feet to the west); (2) supine burials with arms at sides for the most part; and (3) the inclusion of the default grave good, a ceramic that was often in the form of a redware pot. Body orientation and positioning are often associated with philosophical and/or religious beliefs

(Carr 1995). The ubiquity of pottery may also have a more fundamental eschatological meaning as well.

The number of ceramic objects and other, nonceramic, material culture were perhaps used to denote aspects of identity. Some females and some children were interred with similar types of objects, particularly shell ornaments and apparent implements (nephrite adzes and bone tools for instance), while nephrite beads and clay pellets are found in the graves of children and an apparently high-status male. If it is accepted that modes of production are generally passed on along gender lines in small-scale societies (Goody 1989; Grimm 2000), it may be that females controlled both the economic activities, and the reproduction or transmission of associated skill sets, associated with nephrite adzes, bone implements, and shell ornaments (and perhaps shell implements) at Man Bac.

The association between clay pellets and a high-status male and two children is ambiguous. The small (approximately 1-cm diameter) spherical clay pellets were ubiquitous in the upper layers and have been excavated in many other sites in prehistoric Thailand and are used as projectiles in a bamboo bow for hunting (Higham and Kijngam 1984, I:197). The jar burial child was too disturbed to determine exactly how the pellet related to the rest of the material culture. With the other child, aged 18 months, the pellet was associated with broken pottery. Crawford (2000) has recounted several Anglo-Saxon examples of possible rattles where children were interred with pots containing nails or stones. It is worth considering the types of objects children may collect or use in play and Crawford (2000:174) notes "that where Anglo-Saxon children do use material objects as the focus of play, these items are requisitioned from their environment or from the adult world."

One of the most interesting burials is the shell child. Carr (1995:174) notes there is a shift from personal identity to social categories in mortuary treatment with increases in sociopolitical complexity. The mortuary treatment of the shell-child may be more an expression of important aspects of the child's identity than anything else. No other interment displayed active engagement with a piece of material culture. Without exception, material culture was positioned by or on the body in a passive manner (adze placed on the chest or pot placed between the legs for instance).

Why was this child singled out for such treatment? What is this staged engagement with these "knives" supposed to represent? Minimally, the shell child was an active social and perhaps economic agent in this community. Children clearly participate "in social and economic life" (Sofaer Derevenski 2000:11) and are not simply passive and dependent consumers. Substantive economic contributions can begin as early as 3 years of age, although the period between 6 and 10 years appears to be more common (Zeller 1987). An 8- to 9-year-old child might conceivably be seen as an accomplished craftsperson, if aspects of his/her economic prowess are being observed here.

Both gender and vertical social position can be signified by the type of grave furnishing (see Carr 1995:169), although artifact type and quantity are weakly associated with vertical rank (Carr 1995). That this interment is unique may be reason enough to see the child as having some form of exceptional status in the community, or within her/his family at least, while the presence of so much shell suggests the child may have been female. Whether such an individual was still a

child is difficult to assess. In seventh-century Anglo-Saxon Britain, for instance, children were legally adult at 10 years old (Crawford 1991).

Children's graves are characterized by the exclusion and inclusion of a range of objects, some shared with adult females. The lack of non-perishable grave goods with many children aged younger than 2 suggests an important threshold or social milestone once a child turns 2 years of age. Nonetheless, very young infants could be afforded potentially specially produced miniaturized ceramics as grave furnishings and only young children, albeit rarely, received any clear form of grave boundaries. Such children could be interpreted in the context of ascribed status, but this seems unlikely as the only reasonably clear form of vertical differentiation seen at Man Bac is age-based. Overcompensated parental grief is often the competing alternative (e.g., see Parker Pearson 1999:77–78), but is impossible to verify. Both social and philosophical/religious factors are commonly associated with formal grave demarcation (Carr 1995). In lieu of any other evidence suggesting the presence of anything other than age-based vertical differentiation, formal grave demarcation may be speaking to aspects of the eschatology of the Man Bac community.

The reasons for the increased energy expenditure in some children's graves and minimal mortuary treatment in others are unclear. Nonetheless, it is clear that children of all ages were recognized as worthy of mortuary ritual and thus arguably recognized as individuals, people, or at least members of the community. In what is otherwise a relatively egalitarian community, differential mortuary behavior may be indicative of choice in individual mortuary treatment open to parents and/or carers of deceased children. As long as certain conventions were maintained, relatives of dead children may have had considerable flexibility in what was interred, if anything at all, with their young.

CONCLUSIONS

The aim of this article was to explore aspects of how children were perceived some 3500 years ago in Viet Nam and also to examine facets of the health of these same children. Interpretations of the health of the children must be tempered by the observation that we are looking at the children who didn't make it into adulthood. Physiological insult manifesting as cribra orbitalia was a serious health risk associated with childhood at all ages, while the lack of deciduous enamel hypoplasia perhaps indicates some forms of physiological insult were not occurring until after the first year of life. One of the greatest specific health risks was in the form of early childhood caries. While aetiologically complex, in some individual cases extreme forms of ECC and active cribra orbitalia no doubt contributed to poor health, and perhaps even early death. Many of the children of Man Bac seem to have experienced suboptimal levels of well-being.

The large number of children at Man Bac has been interpreted as suggesting high levels of fertility, which is consistent with a community either transitioning into an agricultural mode of subsistence or intensifying their agricultural base. The costs associated with caring for the extra number of children alive at any given time in this community was likely offset by the economic contributions of these children. It is likely that children at Man Bac were raised in a community of many other children who both cared for and took care of each other.

In terms of attitudes toward children, everyone received some form of basic mortuary treatment regardless of age. That everyone buried at Man Bac had access to such rights, and that some children (as young as six months old) received special treatment suggests that children had value or at least were worthy of recognition: in other words, children were also people. While all children received some form of mortuary treatment, by their second year they all received some form of nonperishable material culture. This may be indicative of a special social and/or developmental milestone in childhood.

In terms of gender, adult females and some children could share certain forms of material culture, especially shell. Whether this means that children were seen as having gender is difficult to determine. Some children may have received "female" grave inclusions because they were themselves female, or simply because they were not perceived of as having gender and could thus be buried with a range of otherwise adult gender-specific material culture. Perhaps more important is that some of the artifacts interred with children have economic connotations and suggest that children had an economic role in the community. The case of the shell child is also suggestive of both economic value and a further social and/or developmental stage: it may well be that childhood finished rather early at Man Bac.

In summary, many of the nonsurviving children of Man Bac had demonstrably suboptimal health prior to their eventual death. The high level of fertility suggests many children were alive in the community at any given time. Many of these children were likely economic and certainly social contributors to the community. Mortuary treatment of children reflects the esteem in which they were held and also, in some cases, certain life stages through which they passed.

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ABSTRACT

The article aims to examine aspects of mortuary behavior in late Neolithic/early Bronze Age (Phung Nguyen phase) populations represented at the site of Man Bac in Viet Nam, specifically how mortuary behavior illuminates the role of children, and adult attitudes toward children. In addition, the authors discuss biological characteristics of the human sample, focusing particularly on the child burials, in order to explore aspects of childhood palaeohealth. The methodology includes combining various measures of health—including palaeodemography (childhood mortality), analysis of oral health (Early Childhood Caries or ECC), and analysis of physiological health (*Cribra Orbitalia* and LEH)—with studies of culturally defined mortuary practices to suggest that, while children clearly had significant health deficiencies and many suffered early deaths, their treatment in mortuary rites shows significant economic value and social esteem placed on children. **KEYWORDS:** Viet Nam, Neolithic, childhood, health, mortuary behavior, palaeodemography, bioarchaeology.