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1 *Introduction: Southeast Asian bioarchaeology past and present*

NANCY TAYLES

Otago School of Medical Sciences, University of Otago, Dunedin,
New Zealand

MARC OXENHAM

Australian National University, Canberra, Australia

When originally discussing and formulating the idea that eventually led to this volume we asked ourselves ‘is there a recognised need for a book on Southeast Asian bioarchaeology?’ ‘And does everyone know what bioarchaeology is anyway?’ We address the second question, ‘what is bioarchaeology?’, first. Human remains provide the only direct record of the biology of the people and the populations who created the ‘archaeological record’ and these are, therefore, central to any archaeological research. This is not to deny the fascination of the material culture, the environmental context, the settlement patterns and the mortuary practices of past peoples, it is nevertheless (and despite the reluctance of many archaeologists to admit it) axiomatic that human remains *are* the people who created the pots, the tools, the houses, the middens and the modified landscapes. As such they must, or ought to be, recognised as central to any research of past society that uses archaeology as the means of data recovery. This recognition of the value of human remains as a window into past peoples has gained momentum over recent decades (e.g. Larsen 1997, Cox and Mays 2000). With the development of appropriate means of interpreting the skeletal evidence beyond the simple description that the term ‘physical anthropology’ implies, those of us who are captured by the challenge are now seeing ourselves as human biologists. Having moved beyond taxonomy into the wider and richer world of biology, an appropriate epithet was sought.

The field of human osteology is one that has existed for rather longer than what is referred to as bioarchaeology, but it carries with it the impression that the objective of practitioners is simply to study human bones; it is not. It is to study the people represented by the bones, which is

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an important shift in emphasis. Hence the adoption of the term bioarchaeology, which indicates the biological component of such research. As Clark Larsen (1997) noted, although the term was first applied to archaeozoology, it is now only used in reference to humans. It is not universally adopted (hence the title of the excellent volume by Margaret Cox and Simon Mays (2000): *Human Osteology in Archaeology and Forensic Science*). Nevertheless, and despite its meaning not being immediately obvious, it seems to us the most appropriate term to apply to the study of past people through the medium of their skeletal remains recovered from archaeological sites. It is conventionally used to refer to *Homo sapiens*; study of fossils of earlier hominin species is palaeoanthropology.

Now to the issue of Southeast Asia and why it merits a book like this. There are multiple reasons why we deemed the time to be right for this exercise. Despite the fame, or even notoriety, of some of the earliest hominin specimens in Asia, Southeast Asia as a region has been relatively invisible in the broader sweep of world prehistory and in the centres of bioarchaeological research in Europe and North America. Beyond the Indonesian fossils, Southeast Asia and the southwest Pacific have unique characteristics which will mean that research on the area will not only clarify issues about regional prehistoric peoples but also contribute to an understanding of prehistoric human biology worldwide. These include a very long human settlement; geographic variation over time and space, including marked changes in sea level; a climate that varies from the hot, humid tropical equatorial region to a cooler subtropical climate away from the equator; and a current rice-based subsistence system with a deep antiquity in many areas. This suite of characteristics does not occur anywhere else in the world and justifies this effort to take the first step in what should be a long process synthesising research on human biology to address the issues of human evolution, variation and biocultural development in this unique environment. Its singularity is further enhanced by it being a crossroads between the major, influential and very different cultural and biological regions of China, India and Melanesia.

Beyond its geographical boundaries, the influence of Southeast Asia spreads far to the east as the biocultural origin of the eastern Pacific populations. Eastern Melanesia and Polynesia, designated Remote Oceania, in Roger Green's (1991) very appropriate definition, have had a very short human settlement but, for this very reason, have attracted large sums of money, and a considerable amount of polemic, in the search for the origins of their peoples. This origin is still unclear but inevitably includes a reference to 'Southeast Asia' as if this were a well-defined, homogeneous region. The reality, of course, is that it is anything but well

defined and certainly it is gloriously varied in its human biology (and in its cultures, but that seems to be an issue that people happily recognise).

Southeast Asia has been an area that has stimulated much discussion and some grand and interesting theories about human origins and migrations (e.g. Oppenheimer 1998). Nevertheless, despite the ongoing significance of, controversy about and research into the Indonesian *Homo erectus* remains, which have attracted international attention from the time of Dubois in the nineteenth century, it is almost as if the later human biological prehistory of the region is of no concern on the world stage. As an example, it does not figure in the comprehensive review by Mark Cohen and George Armelagos (1984) of the human biological response to the development of agriculture, despite at the time having been acknowledged to have adopted agriculture as early as the fifth or even sixth millennium BP (Higham and Bannanurag 1990). Nor does it appear in standard texts of biological or physical anthropology other than in the context of human evolution and the Javan *H. erectus* specimens.

There can be numerous explanations for this, not the least of which has been the political instability of a number of states over the last half century. The insecurity of the region and individual countries has worked against the development of a research ethos among the local scholarly communities that is secure enough to develop objectives in the field of prehistoric human biology beyond the ratification of the unity and duration of the peoples living in each country. Western scholars have only relatively recently begun working here and local archaeologists have joined them in research that transcends modern political boundaries. There is now a cohort of bioarchaeologists that has developed expertise in the area and has produced a corpus of literature which has prompted this first attempt to draw together a benchmark publication. This book is not a comprehensive treatise but a starting point showing the breadth of research in the area, which we hope will serve as a stimulus for further consolidation of the topic.

Southeast Asia and the southwest Pacific is for all these worthy reasons a place to be reckoned with in human bioarchaeology. It is overdue for attention on a broader scale. It is well past time to bring together a group of authors in an effort to 'mark a line in the sand' in bioarchaeological research and to encourage people away from their local specialities into a regional synthesis. In an ideal world, this book would include everyone who works in this topic as contributors and provide an integrated overview of the whole region. This, of course, was our initial aim. The reality is something different and we have collected here a selection of papers that cover the two themes of skeletal studies: one on the evolution and variation

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in morphology and relationships among groups (biodistance) and the second with contributions on the quality of life of the prehistoric inhabitants as represented by their health.

Beyond the consideration of the people themselves, it is also time to integrate the findings of bioarchaeology into the general archaeological literature on the region. Publications on prehistory in general are primarily focused on archaeology and linguistics, although some refer to human biology, for example Bellwood (1997) in his comprehensive review of Indo-Malaysia and Higham in his introductory chapter to Jin, Seielstad and Xiao's edited volume (2001). Others tend to skirt around the issue, although clearly desirous of including human variation in a triumvirate with linguistics and archaeological evidence in the search for clarification of the prehistory of the region. This lack of integration we see as probably a consequence of the lack of a summarising publication on human biology. We hope this volume will begin the process.

Where is Southeast Asia? Figure 1.1 shows the core, which is mainland Southeast Asia: Burma (Myanmar), Thailand, Laos, Cambodia, Vietnam and, ideally, southwest China (but the reality is that there is little or nothing available to us from this area) and island Southeast Asia: the Indo-Malaysian archipelago (Malaysia and Indonesia), the island of Borneo (East Malaysia, Sarawak and Sabah, Kalimantan and Brunei) and the Philippines. The authors of the first section of the book have also spread their nets to include samples from the wider east Asian and Pacific region (Fig. 1.2). Both maps identify locations referred to in the chapters. Buckley's samples (Ch. 13) are from the southwest Pacific and are located in Fig. 13.1 (p. 310).

Development and current state of bioarchaeology in Southeast Asia

The first bioarchaeological study of significance in Southeast Asia was carried out by the Belgian anatomist Eugene Dubois following his discovery of Pleistocene hominin specimens at Trinil, in the Solo Valley, Java in 1891. These finds, comprehensively described in his monograph (Dubois 1894), were subsequently paraded throughout Europe and promoted as a form of human forebear or missing link. The interest in what became known as *Pithecanthropus erectus* was such that at least 80 papers and books were published on these specimens by the turn of the twentieth century (Trinkaus and Shipman 1993; Shipman 2001).

From the beginnings of palaeoanthropological research, explanations for observed modern human diversity have been developed and debated.



Figure 1.1. Core Southeast Asian study area encompassed by this volume showing the location of the major sites referred to in the text.



Figure 1.2. Expanded study area including the location of those specimens examined in the population history studies. Refer to Fig. 13.1 for southwest Pacific sites.

Some early theories that were quite bizarre included the polygenetic model proposed by the German anatomist Hermann Klaatsch (1923) in which an early ancestral species was considered to give rise to a human-like form, which subsequently diverged into separate gorilla, Neandertal and Black African branches, and another form that diverged into separate Orang-utang and Asiatic/Aurignacian branches. Klaatsch's research

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took him to Australia, where he studied aboriginal peoples for several years, and for a brief visit to Trinil, where he contracted the malarial parasites that were to contribute to his premature death in 1916 (Heilborn 1923).

It was only the rapid accumulation of fossil specimens, particularly from China and Indonesia, in the 1930s and 1940s that led to the development of more sophisticated theories of human origins and diversity. Two molars discovered at the close of 1926 by the Austrian palaeontologist Otto Zdansky (1927) at Dragon Bone Hill, or Zhoukoudian, northeastern China saw the beginnings of the most spectacular period of hominin fossil discoveries ever to be seen in the region. Davidson Black, director of the Cenozoic Research Laboratory in China, christened one of the finds, a single lower permanent molar, *Sinanthropus*. This rather daring move paid off when in late 1929 a skull of *Sinanthropus pekinensis* (Peking man) was uncovered at Zhoukoudian by the Chinese palaeontologist Wenzhong Pei (1929). The following decade revealed the wealth of material at Zhoukoudian. Much is owed to Franz Weidenreich (e.g. 1936, 1943) for his thorough description of this material.

At the same time that the significance of the Chinese fossils was being debated, a Dutch geologist, Ter Haar, discovered terraces containing a group of individuals, now popularly known as Ngandong or Solo man, in Java. A Dutch engineer, W. F. F. Oppenoorth, described these fossils and named them *Homo 'javanthropus' soloensis*. A palaeontologist for the Geological Survey (Holland) in Java, G. H. R. von Koenigswald (1937, 1956), interpreted them as a Javanese Neandertaler. Others (e.g. Oppenoorth 1937) rejected this appellation and allied them with *Pithecanthropus*, a position generally accepted today (Santa Luca 1980). More than 40 years after the original Trinil discovery Dubois continued to engage in the debates surrounding the new Javan finds and was particularly opposed to suggestions that there was an ancestral relationship between *Pithecanthropus* and the Ngandong specimens (Dubois 1937) or even that newly discovered pithecanthropine specimens could be assigned to the genus (Dubois 1938a,b, 1940a,b). He even went to the extent of designating as incorrect the reconstructions of pithecanthropine material by von Koenigswald (Dubois 1938b) and Weidenreich (Dubois 1940a). Dubois delivered his last paper defending his views against Weidenreich and Koenigswald on 30 November 1940 (Dubois 1940b) and died two weeks later at the age of 82.

The combined Chinese and Javan finds led the most prolific writer on Asian hominin material of the time to formulate a model of human evolution that still reverberates today in one form or another. Weidenreich (1936) argued that mosaic evolution was the mechanism

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responsible for the levels of variation he perceived within each human type or stage (living and fossil). He noted that many scholars placed every new hominin into a dead-end side branch and justified this by citing particular specialisations that precluded these forms from direct human ancestry (Weidenreich 1936). He asked where one draws the line between irreversible specialisations and variability within a polymorphic form. In developing the idea of mosaic evolution, Weidenreich (1940) suggested that the high level of variation seen in modern populations was the same in fossil populations. This allowed him to argue that evolution was marked by general stages in development that were differentially represented both spatially and temporally (Weidenreich 1947). He thus rejected the single origin and dispersal model for human evolution and migration as articulated by Howells (1944, 1948) and argued for local continuity scenarios. In this way, the scene was set for modern palaeoanthropological debates centred around Multiple Origins/Regional Continuity (e.g. Thorne and Wolpoff 1992, Wolpoff *et al.* 2000) and Single Origin/Out-of-Africa (e.g. Wilson and Cann 1992; Stringer 2003) models of human origins and diversity. Over recent years, the Asian hominin sample has seen further increases in sample size in both Indonesia (see Wolpoff (1999, pp.453–465), for a useful overview) and China (see Wu and Poirier (1995) for an excellent review and detailed descriptions of the specimens and sites). These specimens continue to tax researchers in human evolution to this day with a diverse literature devoted to the subject (see Lewin 1999, Wolpoff 1999).

Leaving the deeper reaches of the Pleistocene and focusing on Southeast Asian bioarchaeological research on anatomically modern humans, by the early twentieth century, colonialism had inspired prehistoric research in the region, with bioarchaeology almost as a 'by-catch'. The Ecole Française d'Extrême Orient was established in Southeast Asia and this stimulated research and excavation in what was then French Indochina, now the modern political entities of Laos, Cambodia and Vietnam. Of the prehistorians who were working in the region and recovered human skeletal remains in the course of excavation, Henri Mansuy and Madelaine Colani are the best known in archaeological circles. The sites from which they reported skeletal remains included Pho Binh Gia, Dong Thùoc, Keophay, Khackiem, Hamrong and Lang Cuom in northern Vietnam (Mansuy 1924, 1925a,b, Mansuy and Colani 1925; see also Verneau 1909; Saurin 1939). Further, Patte (1932, 1965) reported on Da But period remains from northern Vietnam and on others from Minh-Cam in central Vietnam (Patte 1925). Two cave sites in northern Laos, Tam Hang and Tam Pong, had skeletal remains (Fromaget and Saurin 1936, Fromaget 1940,

Saurin 1966) and this material, or at least those with whole crania, has been included in numerous skeletal analyses since then (e.g. Pietrusewsky 1988; see also Chs. 2, 3 and 5).

In Malaya, now the states of Malaysia and Singapore, first the Dutch and later the English were also developing an interest in prehistory. Human remains were found at Gua Cha by de Sieveking (1954) and documented by Trevor and Brothwell (1962). The site was later revisited by Adi and Bellwood (Bellwood and Adi 1981, Adi 1985) while Bulbeck (1981) reported on aspects of the skeletons. Fragmentary remains were found at sites in Perak: at Gua Kerbau by van Stein Callenfels and Evans (van Stein Callenfels 1936a) and reported by Duckworth (1934), and at Gua Kajang by Evans (1918). Van Stein Callenfels (1936b) and Mijsberg (1940) also found fragmentary secondary burials in middens at Guar Kepah, Pulau Pinang, some of which were published by Mijsberg (1940). On the island of Borneo, in Sarawak, Niah Cave has been excavated over several decades beginning in the 1950s. This early excavation yielded the so-called 'deep skull' (Kennedy 1977) likely dating from *c.* 43,000–44,000 years BP (Barker *et al.* 2002a). From Palawan Island, Philippines, there are also remains from caves: cranial fragments from Tabon Cave (Fox 1970) and specimens from other caves with a report on dental morphology by Winters (1974). More recently, excavations led by Zuraina Majid of Universiti Sains Malaysia led to the discovery of Perak man (Zuraina 1994). Barker has recently undertaken extensive re-excavations of Niah Cave (Barker *et al.* 2000, 2001, 2002a,b, 2004) and reported on further significant human skeletal remains. Krigbaum (2001, 2003) has produced detailed analyses of isotopic evidence regarding diet at Niah Cave while Manser (2003) has begun a preliminary re-examination of skeletal remains from the West Mouth burials.

In Thailand, the one modern state with no history of colonisation, there was not such an early start, but Quaritch-Wales (1937, 1964) excavated a small skeletal sample in the 1920s. By the 1960s, the attention of non-colonialist western prehistorians turned to Southeast Asia. The Thai–Danish excavations in Kanchanaburi province led by van Heekeren and by Sørensen (Sørensen and Hatting 1967, van Heekeren and Knuth 1967) resulted in the first comprehensive documentation of a substantial sample of human skeletal remains (Sangvichien *et al.* 1969). Khok Charoen was excavated by Watson and Loofts-Wissowa (Higham 2002) but no report on the poorly preserved skeletal remains has been published. William Solheim II and Donn Bayard excavated at Non Nok Tha in the late 1960s, with publications of the skeletal material by Pietrusewsky (1974a,b) and a comprehensive analysis by Michele

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Toomay Douglas (1996; see also Ch. 8). Chester Gorman, with Pisit Charoenwongsa, excavated at the now famous Ban Chiang site in the mid 1970s, with skeletal evidence incorporated into demographic and morphometric studies by Pietrusewsky (e.g. 1978, 1981, 1982, 1984) in the succeeding decade and again in a comprehensive analysis by Douglas (1996). This site has now been fully documented in an exemplary publication by Pietrusewsky and Douglas (2002). King and Norr report on an isotopic study of diet at Ban Chiang in Ch. 10 of this volume.

Further excavations in northeast Thailand continued in the early 1980s with Ban Na Di by Charles Higham and Ampham Kijngam and skeletal reports by Warrachai Wiriyaromp (1984a,b) and Houghton and Wiriyaromp (1984). This collection was also reviewed by Domett (2001). In 1985, Higham turned his attention to the coast and excavated Khok Phanom Di with Rachanie Bannanurag (Thosarat) with skeletal remains analysed by Choosiri (1988, 1991), Tayles (1999) and Domett (2001). More recently, Bentley (2004) has analysed stable isotopes in search of evidence for migration at the site. In the 1990s, excavations in Thailand expanded exponentially. Higham and Thosarat excavated Nong Nor, near Khok Phanom Di, with the large but poorly preserved skeletal collection analysed by Tayles *et al.* (1998) and Domett (2001).

In central Thailand, the Thailand Archaeometallurgy Project led by Vince Pigott and Surapon Natapintu, with Roberto Ciarla and Fiorella Rispoli, recovered human remains from several sites in the Khao Wong Prachan Valley including Non Pa Wai, Non Mak La, Nil Kham Haeng and Ban Phu Noi. Natapintu, Ciarla and Rispoli also excavated human remains from Ban Phu Noi, north of Khao Wong Prachan; Ciarla and Rispoli found further burials at Ban Tha Kae (Higham 2002). Agnosti Agelarakis (1996, 1997) researched the human skeletal remains from Non Pa Wai.

In the mid 1990s, Higham and Thosarat again turned their attention to the northeast and the Origins of Angkor Project was born, resulting in excavations at a number of sites: Ban Lum Khao (skeletal report by Domett (2001)), Noen U-Loke and Ban Non Wat. The Noen U-Loke skeletal analysis is in preparation by Tayles but an overview is provided in a comparison with Ban Lum Khao in Ch. 9. At the time of writing, Ban Non Wat has three excavations completed in 2002–2004 and three more planned. Also in the 1990s, Jean-Pierre Pautreau and his team excavated the site of Ban Wang Hai in northern Thailand (Pautreau *et al.* 2004). In southern Thailand, the cave site of Moh Kiew (Pookajorn 1992, 1994) yielded a late Pleistocene skeleton documented by Choosiri (in Pookajorn 1994). Matsumura reports on the morphometry of this skeleton in Ch. 2. In addition, the Thai archaeological community has advanced greatly in