Domestic Animals in Prehistoric Thailand

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ABSTRACT

Thailand has an area of 513,000 square kilometers. The geography of Thailand has been divided into six principal regions: North, West, Central, Northeast, Peninsular and the East Coast. The archaeological evidence from these areas has revealed five prehistoric periods: Palaeolithic, Mesolithic, Neolithic, Bronze Age and Iron Age, covering the time from c. 40,000 BP. to 1,500 BP. The analysis of animal bones from various archaeological sites by comparison from the modern specimens has suggested that many species were hunted and collected during the Palaeolithic and Mesolithic periods, while some were domesticated from the Neolithic period at the sites of Ban Chiang and Ban Non Wat, Northeast Thailand. The domestic animals in question are cattle, water buffalo, pig, dog and chicken.

Keywords : Thailand, domestication, Ban Chiang, Ban Non Wat, cattle, water buffalo, dog, pig, chicken

INTRODUCTION

Thailand has an area of 513,000 square kilometers. The geography of Thailand has been divided into six principal regions (Pongsabutra 1991) (Figure 1). These are:

1. North Thailand is geographically defined by the area drained by the upper courses of the rivers, Ping, Wang, Yom and Nan, which are tributaries of the Chao Praya River. The area is partly mountainous and is covered by dense forests. The principal prehistoric sites in this region comprise rock shelters containing evidence for Hoabinhian occupation. These date between 35,000 BC and 800 AD. Animal bones from these contexts come from a wide variety of hunted species, while the plant remains evidence use as stimulants, gums for the manufacture of composite hunting tools, and for subsistence. The rice remains from Banyan Valley cave have been shown to come from a wild species.

2. West Thailand is characterized by ranges of hills and mountains from the north to peninsular. Archaeological research has identified sites such as Sai Yok, Ban Kao and Ongbah that cover all five periods.

3. Central Thailand is characterized by the Chao Phraya Plain ; a wide river valley, covering some 10,000 square kilometers. Two famous ancient kingdoms, Sukhothai in the north and Ayudhaya in the South, predecessor of Bangkok, were established in the plain. Lopburi, which was also once a capital of the Khmer, was founded in the middle of central Thailand. In addition prehistoric sites from Neolithic have been found in Lopburi area such as Tha Kae and Non Pa Wai, and more recent archaeological research projects in the upper tributary basin of Lopburi have identified the remains of Neolithic, Bronze and Iron age occupation dating between 2,000 B.C. – 200 A.D.

4. Northeast Thailand is by far the largest of the regions, and the least favourable to agriculture. Although the mean rainfall is similar to that in the other regions, the soil does not hold water long enough to sustain certain staple food plants. The region has, however, become of great interest to international field archaeologists following the recovery of early agricultural and domesticated animals from sites of Non Nok Tha in Khon Kaen province and more Ban Chiang in Udorn Thani Province. Current dating of these sites strongly suggests that northeast Thailand developed an early agriculture and domestication by 1700 B.C. The more recently site, Ban Non Wat in Nakhon Ratchasima province, has been excavated and revealed the same evidence as Non Nok Tha and Ban Chiang.

5. Peninsular Thailand is characterized by ranges of hills and mountains. The west coast consists of narrow terraces and plains; only on the east coast are the terraces and plains wide enough to permit agricultural use and provide harbour facilities. A number of historical towns and communities were located on ancient shorelines in the provinces of Nakhon Si Thammarat, Suratthani (Chaiya) and Songkhla. Nevertheless, some Palaeolithic and Mesolithic sites have been found such as Lang Rongrien rockshelter and Mor Khiew Cave.

6. The East coast of Thailand is comparatively less known archaeologically, except for a few chance finds such as prehistoric cord-marked pottery and polished stone axes. One extensive excavation at Khok Phanom Di in Chonburi province, a prehistoric site dating to between 2000 – 0 B.C. has thus far been carried out in this region.

From the investigations and excavations on the areas mentioned above, all the archaeological evidence reveals the following chronological framework employing European technology (Anderson 1990,1997 ; Bayard 1971 ; Gorman 1971 ; Gorman and Charoenvongsa 1976; Higham and Thosarat 1998; Pookajorn 1992, 1994; Shoocondej 2004, 2008).

1. Palaeolithic, characterized by crude stone tools dating 40,000 – 10,000 BP.
2. Mesolithic, with bifacial core or Hoabinhian tools dating 10,000 –4,000 BP.
3. Neolithic characterized by polished stone axes dating 4,000 – 3,000 BP.
4. Bronze Age characterized by bronze artifacts dating 3,000 – 2,500 BP.
5. Iron Age characterized by iron artifacts dating 2,500 – 1,500 BP.

A new terminology in Thai prehistory has been suggested, based on economic change, which is generally accepted by Thai archeologists, as follows: (Kijngam 2010)

1. Hunting and food gathering society

1.1 First Period or Palaeolithic dating 40,000 – 10,000 years ago.

Small communities, temporarily living in caves or rockshelters, hunting and food gathering were the basis of subsistene. Flaked and crudely fashioned tools were used.

1.2 Second Period or Mesolithic dating 10,000 – 4,000 years ago.

Small communities, temporarily living in cave or rockshelters, food gathering and hunting were undertaken. Stone tools dominated by unifacial discoids (Hoabinhian culture). Between 7,000 – 4,000 years ago, polished stone axes and pottery were probably used in some communities.

2. Agricultural Society

2.1 First Period or Neolithic dating 4,000 – 3,000 years ago.

Small communities (about 100 – 150 persons), living on plains near the streams, growing rice, domestication of pigs, dogs and cattle, hunting and fishing continued. Polished stone tools were used. There is much evidence for long distance trade. The burial rites involved extended inhumation with a variety of mortuary offerings.

2.2 Second Period or Bronze Age dating 3,000 – 2,500 years ago.

Population expansion (about 250 persons/ 1 site), growing rice, maintaining domestic stock, hunting and fishing continued. Bronze tools were used. There was increased trade and evidence for some very rich burials in term of grave goods.

2.3 Third Period or Iron Age dating 2,500 – 1,500 BP years ago.

More population expansion (about 500-2,000 persons/ 1 site) on different locations, (plains and highlands), growing rice, domestication and hunting were found. Fishing decreased. Iron tools were used. Expanded external trade links with India and China brought precious stone and glass beads to Thailand. Salt was a major resource. A more formal burial rite developed and we find evidence for elite leaders.

In Thailand the most interesting area is the Khorat Plateau of Northeast Thailand, which is divided into two regions: the Sakon Nakorn basin in the north and Khorat basin in the south. Research has thus far concentrated on both basins. Palaeolithic and Mesolithic assemblages have found along the banks of Mekong River. Habitation sites have not been discovered in either of the northeast regions. However, there is evidence of a Neolithic, bronze and iron assemblage at Udonthani province in Sakon Nakorn basin and at Khon Kaen and Nakornrachasima province in Khorat basin. A number of these sites are located on low land plain in both areas. The well-known sites are Non Nok Tha and Ban Chiang (Bayard 1984 ; White 1982). Both sites have produced evidence of Neolithic culture with early domestic animals. The recent extensive excavation at Ban Non Wat, at the upper Mun River

in Khorat basin, have produced evidence of Neolithic culture at least 1700 B.C. together with evidence for domestic cattle, pig, dog, water buffalo and chicken as well as rice cultivation dating from the same period as at Non Nok Tha and Ban Chiang (Higham and Kijngam 2010) (Figure 2).

The initial objective of this paper was to represent the domestic animals in the prehistoric Thailand. Thus the bones from the excavations of Ban Chiang and Ban Non Wat in Northeast Thailand have been studied due to the extensive excavations in AD 1974-1975 and 2002 – 2008, respectively.

MATERIALS AND METHODS

All bone fragments from the sites of Ban Chiang and Ban Non Wat came from occupation layers and burial contexts. They were initially cleaned and labeled according to provenance by square and layer. They were then assigned to genus and where possible, species. In some cases, ascription was only feasible at the family level.

With the identification of all possible bone fragments, the analysis continued by calculating the number of individual animals per species in each of the excavated layers in each square. The results of this analysis form the basis of the faunal spectrum which is used to interpret the economy and environment at the site. It was then decided to pool all bones of the same species and anatomical type, so that measuring of particular bones allowed a comparison with other sites. Mortality frequences were also estimated on the basis of tooth eruption and wear patterns (Kijngam 1979, 2008)

RESULTS

The two sites, Ban Chiang and Ban Non Wat, provided considerable numbers of fragmentary bones which were designated to genus, species or family. The preliminary results of the domestic animals found are described below.

BOVIDAE; (*Bibos* sp. , *Bubalus bubalis*)

The basic problem of distinguishing between the bones of water buffalo (*Bubalus bubalis*) and cattle (*Bibos* sp.) has largely been resolved (Kijngam 1979). For several anatomical bones, differences in the morphology have been identified which marks separation such as 1st fore phalanx, 2nd fore phalanx, magnum, metacarpal, metatarsal, etc. There remains the problem of distinguishing between wild and domestic cattle.

Bibos sp.

There are three species of indigenous bibos in Thailand. Their habitations are slightly different (Lekakul and McNeely 1977). The analysis of the Ban Chiang and Ban Non Wat *Bibos* remains relied upon size differences. The absence of comparative samples for the three indigenous cattle (*Bibos gaurus*, *Bibos javanicus* and *Novibos sauveli*) rules out distinctions between them on the basis of prehistoric of bone samples. Nevertheless from the measuring of bone sizes in each anatomical types suggested that the smallest were probably domestic and the largest, wild (Figure 3). In addition, the mortality frequences were made on the basis of tooth eruption and wear patterns, although it is at present impossible to distinguish between the teeth of cattle (*Bibos*) and water buffalo (*Bubalus*), or between wild and domestic animals unless the whole adult mandibles or crania are available. When the bovid teeth from Ban Chiang and Ban Non Wat were analysed, it was found that the great majority of bovids were

of adult body size at death. This may suggest that the bovid teeth come from both domestic and wild animals.

Bubalus bubalis

The wild water buffalo is indigenous to Southeast Asia, though it is now very rare. Lekagul and Mc Neely (1977) report a small herd survives in Uthai Thani province. A large bull can stand nearly two metres in height and weight 1,200 kg. It inhabits low-lying well watered terrain. Kijngam (1979) has described the principal distinctions between the bones of water buffalo and cattle. Water buffalo bones are found in the initial occupation at the site of Ban Chiang and Ban Non Wat. Measurable buffalo bones at both sites come from and animals matching in size with the present domestic stock, while some were similar to wild animals (Figure 4). The evidence of burnt bones suggests that the meat was removed for consumption.

SUIDAE: *Sus scrofa*

The basic problem in considering pig bones from the sites in Northeast Thai prehistoric contexts, is that separating wild and domestic animals on the basis of immature bones is impossible. Moreover, the lower size range for bones from *Sus scrofa jubatus*, the indigenous wild pig, is not known. Nevertheless, the presence of a prehistoric domestic breed in Northeast Thailand has been demonstrated from the complete pig crania from burials contexts of Non Nok Tha, the prehistoric site in Khon Kaen province, Northeast Thailand. In discussing the Non Nok Tha pig bones, Higham (1975) describes two almost complete mandibles. They display considerable shortening relative to mandibles from wild pig. Thus, Higham concluded that these short mandibles probably derived from domestic stock.

When we turn to the prehistoric pig mandibles found at Ban Chiang and Ban Non Wat, some are similar to the pig mandibles from prehistoric site at Non Nok Tha. This suggests that the prehistoric pig mandibles at both Ban Chiang and Ban Non Wat are also domestic. The mortality frequences of pig dentitions from both sites suggest that most of the pig teeth came from young or immature animals, but some came from adults (Figure 5). Thus we can conclude that the prehistoric pigs in both sites could come from both domestic and wild animals.

CANIDAE: *Canis Familiaris*

A detailed consideration of the Ban Chiang canid bones has been undertaken, in conjunction with specimens from related Northeast Thai sites and wild species of wolf, jackal and cuon (Higham, Kingam and Manly 1980). Both multivariate analysis of cranial measurements and distinct morphological differences revealed that the Ban Chiang dogs were domestic, and descended from the wolf. Since there are no native wolves in Thailand, the dog must have been introduced. The size of the Ban Non Wat dog bones match those from Ban Chiang as does their butchering treatment. They were smashed and charred in the same manner as cattle, pig and deer bones. The age at death of pattern of tooth eruption and wear from Ban Non Wat teeth are as followings.

The main age stages of tooth eruption and wear are:

1. Very young dogs, with unworn deciduous teeth.
2. Young dogs, with erupting permanent teeth.
3. Sub adult dogs, with permanent teeth erupted, but unworn.
4. Adult dogs, with permanent erupted and slightly worn.
5. Old dogs, with well-worn permanent teeth.
6. Mandibles without teeth in place, but which are at least subadult and possibly older.

The mortality data are as follows:

	Ban Non Wat
Very young	2
Young	2
Sub adult	4
Adult	6
Old	1
At least ubadult	6

There are 21 dog mandibles from Ban Non Wat, 17 of which are at least subadult. This result suggested that the dogs from Ban Non Wat were killed when they were full body size at death (Figure 6).

From the reasons above, it is concluded that Ban Non Wat dogs were domestic, descended from the wolf and were raised at least for food, as were the Ban Chiang Dogs.

Gallus sp.

Chicken bones were commonly rare at Ban Chiang and Ban Non Wat but appeared from the initial occupation to uppermost layers, Neolithic to Iron Age. The identification even to family is ruled out due to the lack of the modern comparative samples. Nevertheless the chicken bones identified were carefully measured and found usually larger than the comparative specimen, a wild jungle fowl from Northern Thailand (Figure 7). The following dimensions of the tarsometatarsal and tibiotarsus bones were obtained.

Bone	No.	GGL	BBD	SSC	Bp
tarsometatarsal	1	-	-	-	14.30 mm
"	2	-	-	-	15.10 mm
"	3	-	-	-	13.90 mm
"	Wild specimen	-	-	-	12.20 mm

Bone	No.	Dip	GL	Bd
tibiotarsus	1	-	-	13.40 mm
"	2	-	-	12.80 mm
"	3	-	-	12.90 mm
"	4	-	-	11.90 mm
"	5	-	-	12.10 mm
"	Wild specimen	-	-	10.05 mm

DISCUSSION

The animal remains from the sites of Ban Chiang and Ban Non Wat contrast markedly with those from Palaeolithic and Mesolithic sites in Thailand which have been ascribed to hunting and gathering society (Gorman 1971; Higham 1977, Anderson 1990). Ban Chiang and Ban Non Wat, the cemetery sites, are situated on the agricultural plains under dipterocarp forest. Most of the animal bones from both sites came from occupation layers and burial contexts. The analysis of bone size suggested that cattle, water buffalo and pig were smaller than wild specimens, while dog and chicken bones are bigger. The mortality frequences for cattle, pig and dog show that most come subadult and young animals. Thus the animal bones from Ban Chiang and Ban Non Wat represent domesticated cattle, water buffalo, pig, dog and chicken, although some bones might have been wild one. The study of DNA in tracking the origins and the spread of these domestic animals is now work in progress.

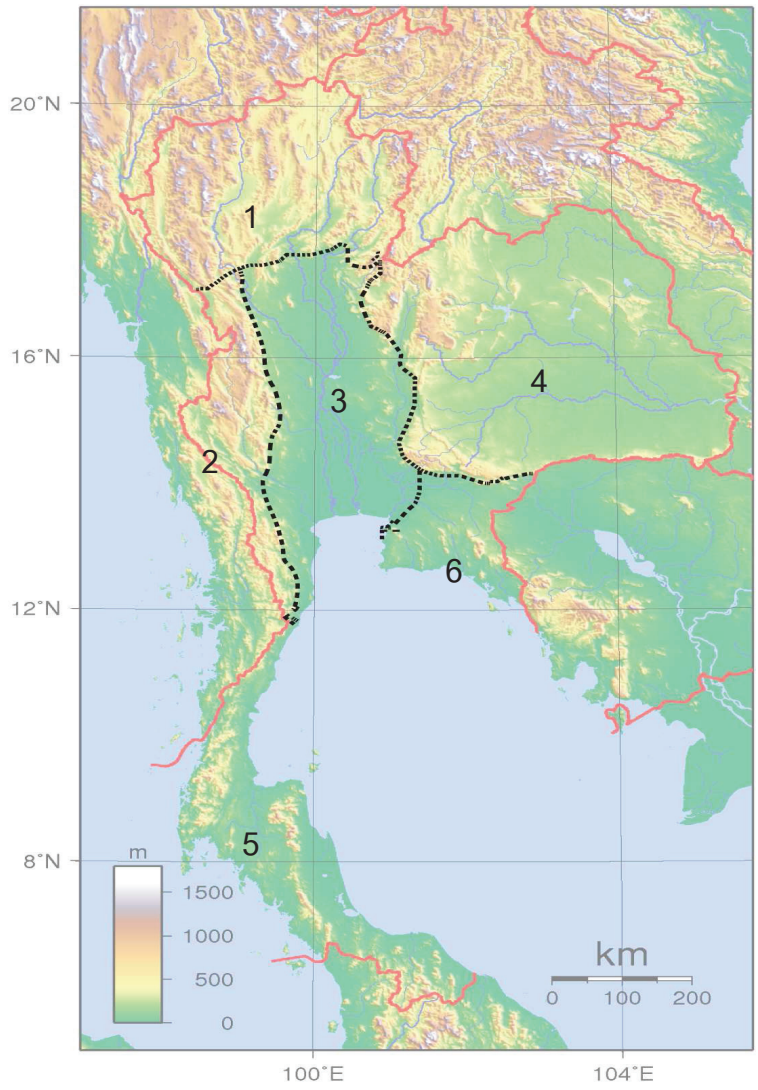


Figure 1: The six principal regions of Thailand

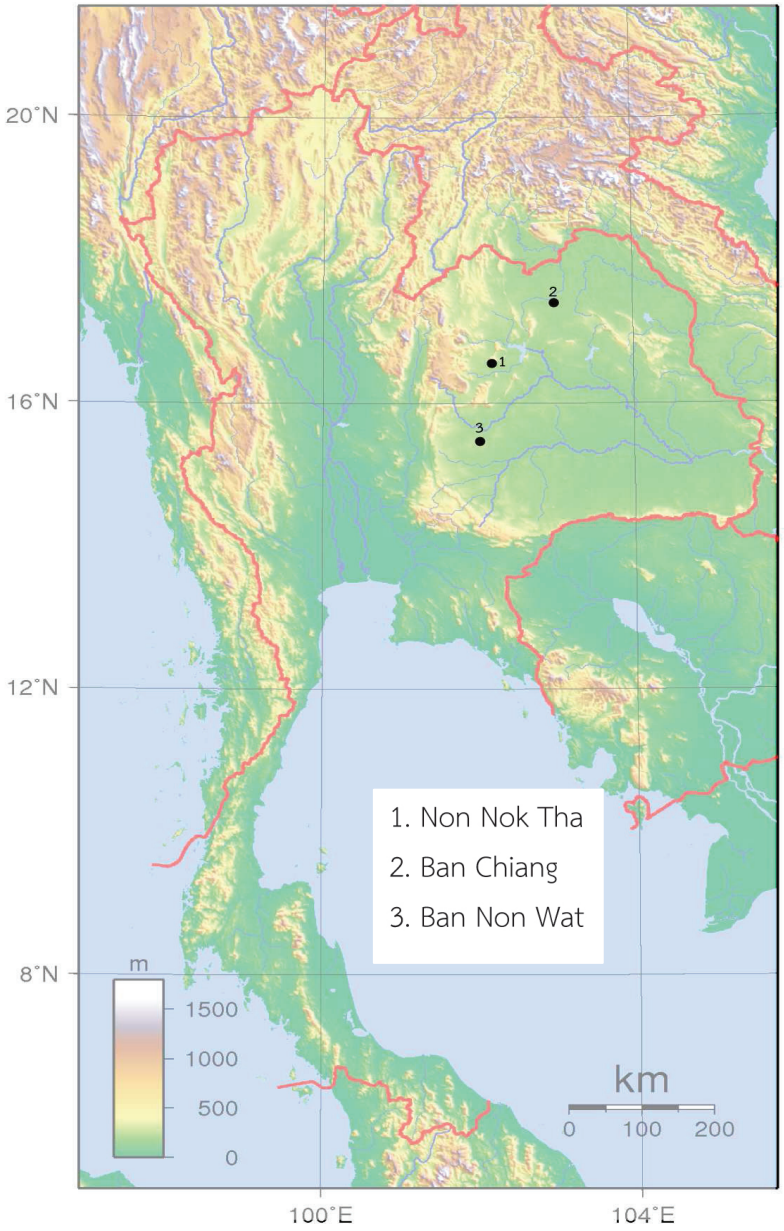
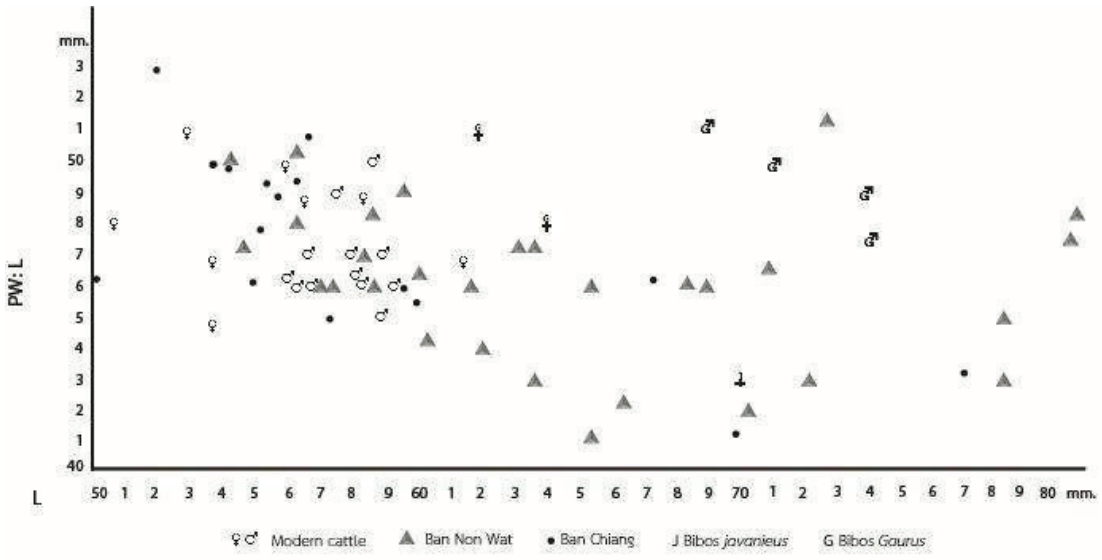


Figure 2: The location of the prehistoric sites in Northeast Thailand



Figture 3 : The dimensions of the first phalanges of cattle from Ban Chiang Ban Non Wat, wild cattle (Jand G) and modern domestic animals (Length/pw : L)

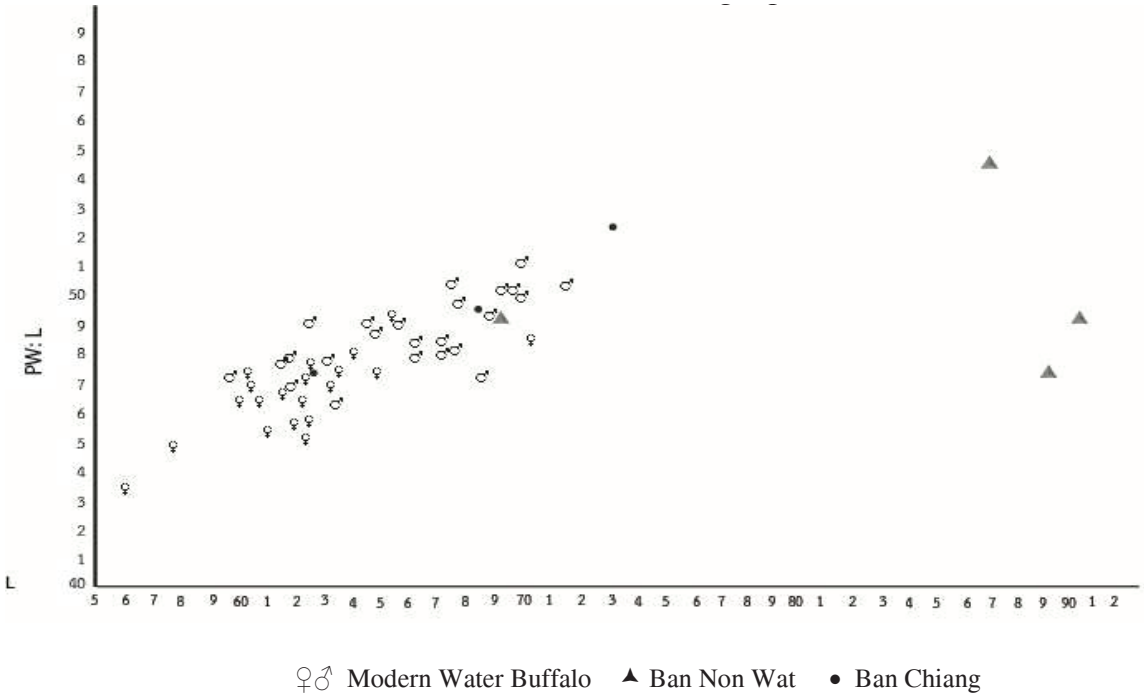


Figure 4: The dimensions of the first phalanges of water buffalo from Ban Chiang, Ban Non Wat and the modern domestic animals (Length/PW :)

Figure 5: The prehistoric pig manibles showing the tooth eruption.

Figure 6: Dog mandibles at Ban Non Wat showing tooth eruption and wear pattern

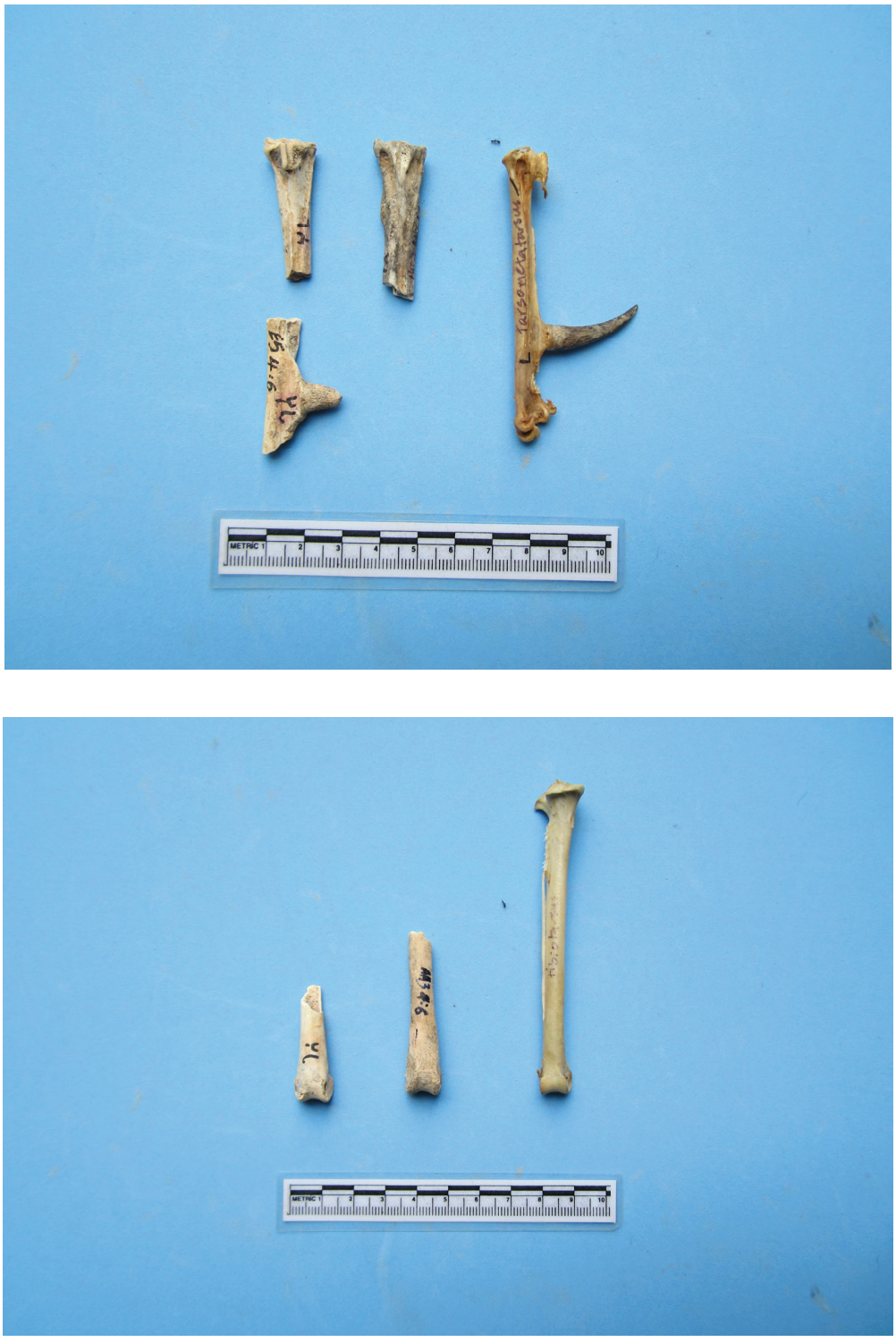


Figure 7: The chicken bones, tarsometatarsal (above) and tibiotarsus (below), Compare with the modern wild chicken.

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