



Case report

Ru Diep and the Quynh Van culture of central Vietnam[☆]

Lam Thi My Dzung^{a,*}, Nguyen Thi Thuy^b, Tran Thi Kim Quy^c, Peter Bellwood^d, Charles Higham^e, Fiona Petchey^{f,g}, Elle Grono^d, Nguyen Chieu^a, Philip J. Piper^{d,*}

^a Department of Archaeology, VNU, University of Social Sciences and Humanities, Hanoi, Viet Nam

^b Vietnamese Institute of Archaeology, Hanoi, Viet Nam

^c ROCEEH: Role of Culture in Early Expansions of Humans, Senckenberg Forschungsinstitut, Frankfurt, Germany

^d School of Archaeology and Anthropology, Australian National University, Canberra, Australia

^e Department of Anthropology and Archaeology, University of Otago, New Zealand

^f Faculty of Science and Technology, University of Waikato, Hamilton, New Zealand

^g ARC Centre of Excellence for Australian Biodiversity and Heritage, College of Arts, Society and Education, JamesCook University, Cairns, QLD, Australia

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ABSTRACT

Excavations in 2015 at the site of Ru Diep in north-central Vietnam (Ha Tinh Province) raise significant questions about the transition into the Neolithic in this region, more than 5000 years ago. The material culture from the site reveals a mixture of both pre-Neolithic (Quynh Van culture) and Neolithic elements, in a shell mound context. The C14 dates for the site suggest that the surviving layers were deposited between outer limits of 3200 and 2900 cal. BC, but Bayesian analysis indicates a likely accumulation in less than 50 years. This date is almost one millennium older than expected for Neolithic-related materials in north-central Vietnam.

1. Introduction

In the 1930s, French archaeologist Madeleine Colani first excavated the archaeological shell mound of Quynh Van (Quynh Luu District, Nghe An Province), type site for the pre-Neolithic Quynh Van culture, of late Hoabinhian and Da But affinity (Nguyen, 2004: 182; Bellwood, 2017). Further investigations by Hoang, X. C in 1963 and 1964 demonstrated that the site comprised a 5 m high shell mound of predominantly window-pane oyster (*Placuna placenta*) shells, and concentrations of ash, charcoal, and the characteristic paddle-impressed Quynh Van pottery with a pointed base (Nguyen, 1978). The site also produced 31 flexed or crouched burials, without grave goods (Hoang, 1966).

At least 21 other Quynh Van sites exist on the coastal plains of Nghe An and Ha Tinh provinces, with many on the Quynh Luu coastal plain, like Quynh Van itself (Nguyen, 2004: 182; Fig. 1a,b). These include Con Dat and Go Lap Bac, two sites just 600 m apart in Quynh Luu District,

and Phai Nam in Thach Ha District, Ha Tinh Province. These sites are all *Placuna* shell mounds of various remaining heights (Nguyen and Ha, 1963; Bui, 1979: 93; Nguyen, 1979: 60–61; Nguyen, 1984).

Quynh Van chronology remains unclear. There are lithic artefact affinities with the mid-Holocene Da But culture of Thanh Hoa Province to the north (Nguyen, 1979; Nguyen, 1998: 213), but the pottery is different. C14 dates run in the 1960s and 1970s on shell and charcoal produced imprecise date ranges between 3000 and 1 cal. BCE (Nguyen, 2004: 182), considerably younger than the best dated of the Da But culture sites.

The shell mound of Ru Diep was first excavated in 2014 by a Vietnamese team from the Department of Archaeology, University of Social Sciences and Humanities, Hanoi, and the Ha Tinh Provincial Museum. This test excavation demonstrated that the site did indeed possess intact shell mound layers, albeit truncated by shell mining (see Supplementary Information A). In 2015, an opportunity arose for our team to expand the 2014 test excavation, to verify the nature and

[☆] Ru Diep is one of numerous large shell mounds located in the neighbouring Ha Tinh and Nghe An Provinces of north-central Vietnam. Our long-term research project in these sites aims to investigate 'period 3000–2000 BCE' in the archaeology of Mainland Southeast Asia. This marks a significant gap in our understanding of the arrival of food producing populations into northern Vietnam during the third millennium BCE, before their expansions across the rest of Mainland Southeast Asia. Previous research has indicated that some of these shell mound sites possibly date to around 3000 BCE, within the target chronology of this project, but they remain weakly characterised and poorly understood. In this contribution, we provide details of our excavations at Ru Diep and demonstrate how our investigations have been successful in addressing outstanding questions about the behaviour and economic strategies of the mound-builders

* Corresponding authors.

E-mail addresses: bebimkch@gmail.com (T.M.D. Lam), peter.bellwood@anu.edu.au (P. Bellwood), Charles.higham@otago.ac.nz (C. Higham), fpetchey@waikato.ac.nz (F. Petchey), elle.grono@anu.edu.au (E. Grono), Philip.piper@anu.edu.au (P.J. Piper).

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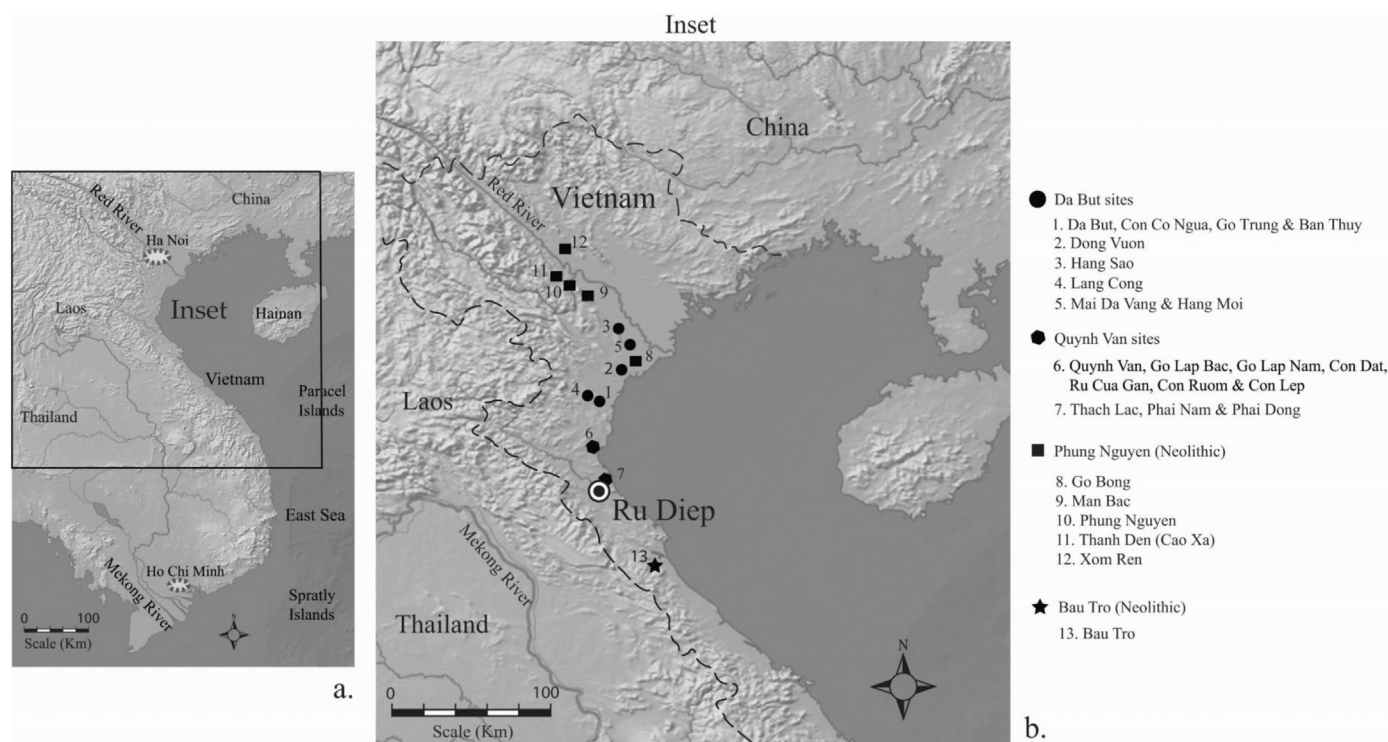


Fig. 1. a. Geographic map showing the study area in Southeast Asia; b. Enlarged map of the study area showing the location of Ru Diep and other Da But, Quynh Van and Neolithic sites discussed in the text.

chronology of Ru Diep, and to place the Quynh Van culture of Ha Tinh Province more accurately within the broader framework of Vietnamese prehistory.

2. Ru Diep shell mound

The Ru Diep shell mound is located in Thach Dai Commune, Thach Ha District, about 16 km inland in a straight line from the modern coast of Ha Tinh Province at coordinates E105°51'25.21"/N18°18'58.46". The surviving mound is 60 m in diameter and 2 m high (Figs. 1a,b & 2), but according to local residents it was up to 7 m high in the 1960s, before being quarried for shell to burn for lime and to be used as agricultural fertilizer. A number of modern graves have also been dug into the outer edge of the site.

Our 2015 excavations consisted of a single trench (H1) that measured 2m² and incorporated the eastern two squares of the 2014 test pit (Fig. 2). The excavations confirmed a number of archaeological features common to other Quynh Van shell mounds, and some that varied from generally accepted practices (see Supplementary Information B).

The investigations at Ru Diep revealed 1.8 m of well-stratified and *in situ* archaeological deposit that formed the base of the original Ru Diep mound (Fig. 3). The basal layer produced burnt features and pottery lying directly on top of the pre-human alluvial silty clay beneath the site. The archaeological sequence above comprised relatively thick layers of shell that alternated with thin deposits of silt, sand and loam. The shell layers consisted almost entirely of inter-bedded intact *Placuna placenta* valves (99.7% of all shell recovered), laid flat in compact layers with little sediment between (Tran et al., 2019). These shell layers, often more than 0.1 m thick, probably accounted for more than 99% of the volume of the surviving Ru Diep mound (Fig. 3, contexts numbered 101–111).

The thin deposits of silt, sand and loam between the thick shell deposits contained relatively large amounts of fragmented shell, much in burnt concentrations (Fig. 3 prefix F numbers). These horizons varied considerably in their thicknesses and spatial distributions, with some a

few centimetres thick and traceable across the entire trench, whilst others were relatively ephemeral and patchy. These were the occupation horizons from which posts had been driven into underlying shell deposits, and on which combustion features had been constructed.

Postholes were generally circular or oval in shape and inserted vertically or at slight angles into the underlying substrate. The variations in size between small stake holes no more than 0.05 m in diameter and a few centimetres deep, and posts with diameters greater than 0.2 m and depths of up to 0.5 m, suggest a variety of functions. Some of the larger posts were potentially used in the construction of shelters. Hearths also varied in their shapes, sizes and likely functions. They were constructed from heavily burnt clayey loam sediments and shell, associated with considerable amounts of ash and charcoal. Such hearths could be clearly identified *in situ* as the resultant heat had scorched the valves in the thick underlying *Placuna* layers to colours from black through blue-white.

All the animal bones, bone artefacts and sherds recovered from the site were heavily fragmented. Several refitting sherds and pieces of bone artefact were recovered from within a few centimetres of each other, suggesting that they belonged to items that had been trampled, crushed and pressed into the accumulating sediments. It is possible that the inhabitants removed larger debris, perhaps dumping it elsewhere.

Three and possibly four burials were recorded in 2015. Although the grave pits for three penetrated the natural alluvium beneath the mound, it was clear from the grave cuts that interment had occurred after the initial stages of mound construction had begun (Fig. 4). The only burial excavated in full (F.68), appears to have been an exception to the Quynh Van flexed or crouched burial practice. It was interred on its back in a fully extended supine position, approximately northeast-southwest, and orientated with the head to the northeast (Fig. 4b). Both radiocarbon dating and aDNA extraction from the Burial F.68 petrous bone failed, but the burial cut was extremely clear and its stratigraphic associations secure within the well-dated basal layers of the shell mound (Fig. 4a).

Grave cut F.87 (truncated by F.68), and the exposed skull and

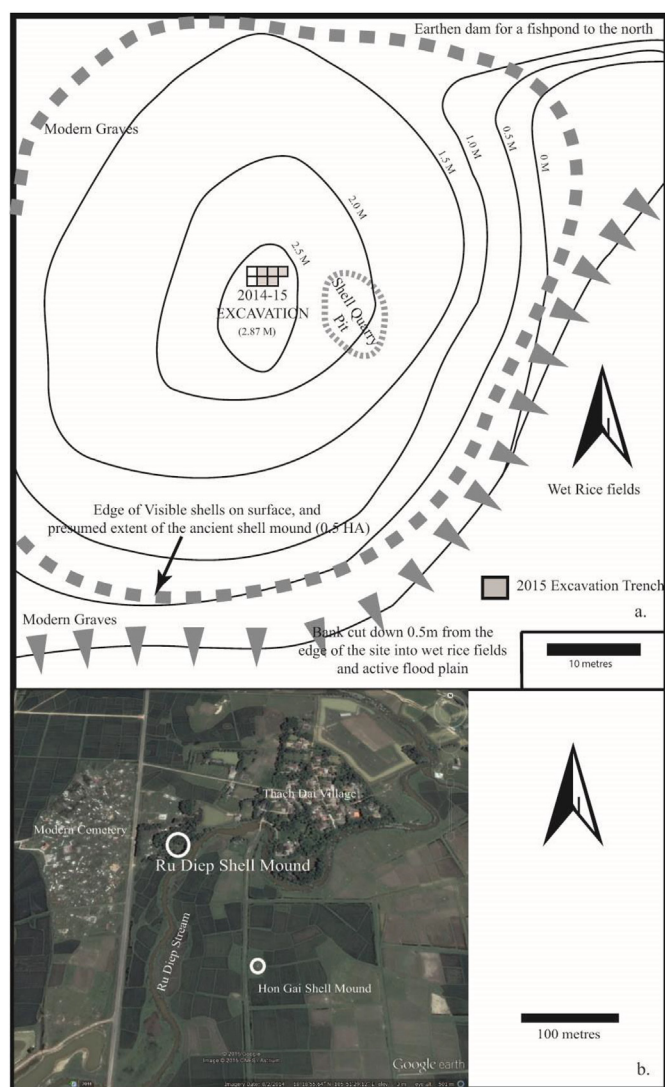


Fig. 2. a. Contour map of the extant shell mound at Ru Diep (contours in metres on the plan measure the height of the mound above the surrounding landscape; the absolute height of the top of the mound is c. 10 m above modern sea level); b. a modified Google Earth 7.1 (2015) screen shot showing the location of the Ru Diep close to Thach Dai village (below).

humerus of Burial F.90 in the south wall of the trench (Fig. 3) suggest similar orientations to Burial F.68, and a possibility that both these incompletely-exposed inhumations were also fully extended.

Twenty-seven radiocarbon samples from the 2015 excavation were sent to the Waikato C14 Laboratory for dating, of which 22 produced results (Table 1; see Supplementary Information C). The Bayesian model applied to these 22 dates (Fig. 5) indicates that deposition began around 3270–3090 cal. BCE (3290–3090 cal. BCE, 95.4% prob.) and ended around 3260–3080 cal. BCE. (3270–3070 cal. BCE, 95.4% prob.). These results indicate that the basal 1.5 m (from C.106 downwards) of shell mound at Ru Diep was deposited over a very short period of time, possibly less than 50 years (95.4% prob.), sometime in the later 4th millennium BCE.

3. Material culture at Ru Diep

The material culture from Ru Diep is especially interesting because of the apparent mixture, within a short 50-year time frame, of both Quynh Van and Neolithic pottery and stone implements. A similar co-occurrence was also noted in our 2015 excavations at Thach Lac (c.

17 km from Ru Diep), where the basal layer, with an identical C14 chronology to Ru Diep, shows the same juxtaposition of these two kinds of material culture. A report on Thach Lac is currently in preparation.

The pottery from previously excavated Quynh Van sites (Nguyen, T.C. 1998: 206–207) contains vessels with both round and pointed bases, globular bodies with restricted necks and everted rims, and combed/ribbed or cord-marked decoration made with a wrapped paddle, sometimes on both interior and exterior surfaces. Vessel bodies are generally quite thick. However, no detailed profile drawings of complete Quynh Van pots exist, and available collections in the Institute of Archaeology in Hanoi are difficult to rely upon because they have no stratigraphic provenance, and there is a strong possibility of chronological mixing of materials.

Pottery is relatively rare in what are considered early sites such as Quynh Van itself (only 193 sherds), but is more common in what are thought to be younger shell mounds, such as Go Lap Bac (6013 sherds), Con Dat (5139) and Phai Nam (5512).

Of the 3916 fragments of pottery recovered from Ru Diep, 95% were sand tempered and 5% had traces of fibre mixed with the sand, but in quantities insufficient to determine whether they were deliberately tempered. 57% of the sherds have cord-marking or parallel combed/ribbed impressions on the exterior, or on both the interior and exterior surfaces (Supplementary Table 1), similar to the other Quynh Van assemblages.

The 131 rim sherds from Ru Diep fall into two major categories (following Shepard, 1964: 224–48) – independent restricted/unrestricted vessels with everted rims, and simple unrestricted vessels with concave rims.

In addition, three typical Quynh Van-style pointed bases were recovered from contexts 110 ($N = 2$) and 111 ($N = 1$) (Figs. 6, 1). Round-bottomed pots were also relatively common in the assemblage (Figs. 6, 2–3). It is assumed that the round and pointed bottoms belonged to different functional categories of vessel, but in the absence of complete profiles it is difficult to assess this further.

Bone artefacts are a relatively common feature in Quynh Van sites, though there are no detailed descriptions available. Nguyen (1998: 206) reported 13 bone artefacts from undisclosed Quynh Van sites, including “nine pointed tools, three chisels and 1 knife”. At Ru Diep, 12 bone artefacts were recovered (Supplementary Table 2). They include an exquisitely carved bone spear point, three points from a large fishing leister, two large mammal ribs, each ground into a point at one end, and at least two deer ulnae modified into pointed implements (Figs. 6, 4–7).

The lithic assemblages from Quynh Van sites generally consist of flaked stone, with rare instances of edge grinding. The hammer-dressed and sometimes fully ground pebble axes found at Da But sites in Thanh Hoa Province, such as Con Co Ngua (Bellwood, 2015: Fig. 3.2; Oxenham et al., 2018: Fig. 3), have not so far been convincingly recorded in Quynh Van contexts in Nghe An Province. Two fully ground stone adzes were recorded in the surface deposits at Phai Nam and Go Lap Bac (Nguyen, 1998: 205), but their stratigraphic relationships with the Quynh Van deposits in these sites are unclear.

The stone artefact assemblage ($N = 17$) from Ru Diep consisted predominantly of grinders, pounders and hammerstones (Figs. 6, 9; Supplementary Table 3). One pounder was clearly coated in a red colorant, and a large piece of haematite was also recovered. In addition, a bevel fragment of a fully polished stone axe was identified in C.110 near the base of the mound, indicating that ground and polished stone technology was present in the site (Figs. 6, 8). Another possible polished adze/axe fragment was recovered from F.35 within C.108 in the middle of the depositional sequence. A single unground shouldered adze/axe preform was discovered in the upper disturbed layer F.1 of Ru Diep, but it could be of Neolithic provenance.

Very few zooarchaeological remains, beyond the vast amounts of *Placuna placenta* and other mangrove mollusca eaten by Quynh Van communities, were recovered. The inhabitants of Ru Diep did catch a variety of inshore fishes such as Sparidae, Lethrinidae and Haemulidae,

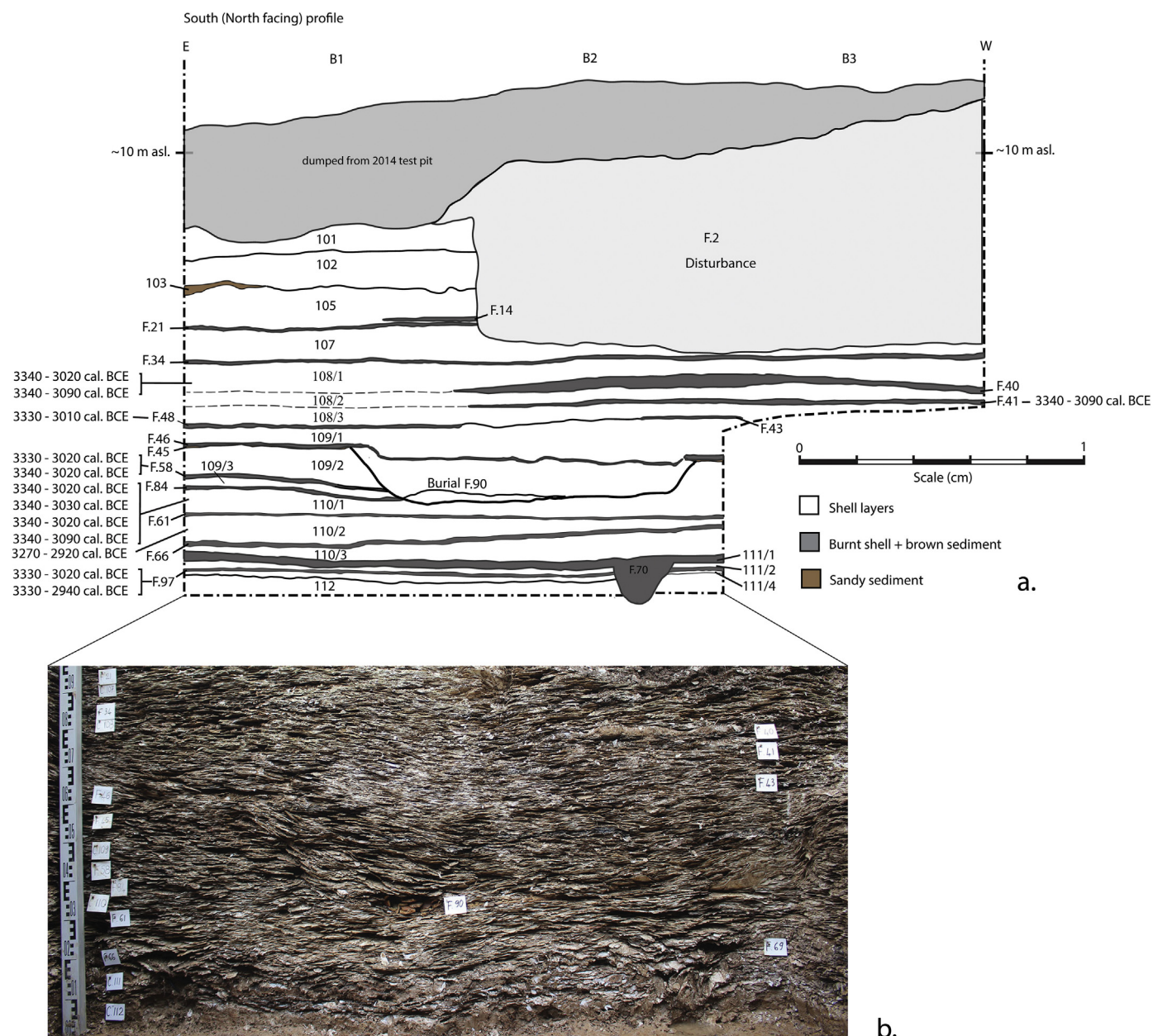


Fig. 3. a. Illustration of the south (north-facing) wall of the Ru Diep excavation trench showing the many *Placuna placenta* midden layers (Context 100 numbers) and features (F numbers), along with the Burial F.90 grave cut and the calibrated radiocarbon dates; b. image of the basal deposits from F.34 downwards. Note that the shallow cut for Burial F.90 is clearly visible in the profile, filled with and overlain by dense layers of *Placuna placenta*.

and hunted turtles and deer (Supplementary Table 4). There is currently no convincing evidence for the presence of domestic pigs or dogs within the small bone assemblage.

To summarise the main observations about Ru Diep material culture, both the pottery and the stone artefacts have overlapping Quynh Van and Neolithic characteristics. The former includes the pointed pottery bases and possibly some of the stone artefacts. The latter include the supine burial posture, quite different from the flexed and/or seated Quynh Van postures recorded at other sites, and possibly the adzes. The pebble tools and flakes of Hoabinhian affinity that occur in some Quynh Van sites were absent in Ru Diep. The round-bottomed and cord-marked pottery from Ru Diep resemble similar pottery recovered from the Quynh Van layer recorded at Thach Lac. This pottery has some characteristics that overlap with ceramics identified from the Thach Lac phase of the same site (Piper et al. in prep.).

4. The Quynh Van and da but cultures

The final hunter-gatherer populations in the Red River basin of northern Vietnam are generally associated with the Da But culture, named after the archaeological site of Da But, in Thanh Hoa Province, first excavated by Étienne Patte in 1926–27 (Patte, 1932). The Da But culture proper, as defined from sites such as Da But and Con Co Ngua, appears to be limited to the northern and southern fringes of the Tam Diep limestone massif in Thanh Hoa and Ninh Binh provinces, located to the north of Nghe An and Ha Tinh Provinces where the Quynh Van sites are situated. Da But settlements appear to have been located close to former estuaries, extending to the coast. Excavations at Con Co Ngua and Da But have produced considerable quantities of the fresh and brackish water bivalve species *Corbicula*.

Da But archaeological sites vary in age from c. 7000 BCE to 2000 BCE. However, the best dated, typical sites of Da But itself and Con Co



Fig. 4. a. Illustration of the grave cut for Burial F.68. The red arrow indicates the uppermost margins of the north edge of the grave cut through the base of the shell mound (the femora and a patella of the skeleton are visible in the bottom right of the image); b. the completely uncovered fully extended Burial F.68 orientated northeast-southwest. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Ngua were occupied around 5000–4500 cal. BCE (see Supplementary Information D).

At Con Co Ngua, the inhabitants exploited a variety of large terrestrial game, such as wild water buffalo and deer, freshwater turtles and a diversity of coastal fish, and molluscs (Oxenham et al., 2018). Domestic dog has been claimed from Con Co Ngua (Bui, 1991) and Da But (Patte, 1932), but a recent study of materials excavated from Con Co Ngua has shown that both these identifications are more likely to be the Asiatic wild dog *Cuon alpinus* (Oxenham et al., 2018). Scott et al. (2019) have recently argued that high ratios of arm, leg and spine trauma observed in the human burial population from Con Co Ngua, in combination with a predominance of bovine remains in the archaeological record, could potentially reflect early stages of buffalo herding or even management. In the absence of any zooarchaeological support for domestication we consider this scenario unlikely, and suspect that the alternative suggested explanation of close encounter hunting as the more likely cause of the pathologies.

The Da But stone implement repertoire is relatively diverse, with flaked pebble tools, edge-ground and even fully ground pebble axes (Oxenham et al., 2018: Fig. 3), mortars, pounders, and a variety of net sinkers. In later phases, pebble axes/adzes are stated to have become more extensively polished (Nguyen, 2005).

These communities produced coarse sand- and quartz-tempered pottery, which was often covered externally with shallow parallel grooves made by lightly rolling a vine-wrapped paddle down the side of

the pot (Bellwood, 2015: Fig. 2; Bellwood, 2017: Fig. 5.3). Some ribbing might also have been applied using a comb-like tool (Oxenham et al., 2018). Some Quynh Van pottery is similarly ribbed, but there are also cord-marked sherds, a type apparently absent in Da But assemblages. Da But pottery consists primarily of vessels with round bases and slightly flaring rims, without basal supports such as ring feet (Nguyen, 2004: 181). None of the Da But or Con Co Ngua pottery possesses the distinctive Quynh Van pointed bases.

Both the Da But and Quynh Van communities buried their dead in squatting or side-flexed positions without grave goods. For example, at Con Co Ngua, where more than 200 inhumations dating to c. 5000–4500 BCE have been recorded, the earlier burials were interred squatting, and later side-flexed (Oxenham et al., 2018). The burial from Ru Diep is an interesting exception since it was fully extended on its back. This represents a burial posture that became common in northern Vietnam after c.2500 cal. BCE, with the arrival of agricultural populations in the region (Hung, 2019).

On current evidence, although similarities between the Da But and Quynh Van exist, they appear to be distinct cultures, separated both geographically, and probably chronologically (Nguyen, 1998: 213–214). Dates for what are considered by Vietnamese archaeologists to be the earliest of the Quynh Van sites in Nghe An Province are unreliable. Our excavations at Ru Diep and Thach Lac (Ha Tinh Province) provide the best dates for the Quynh Van culture and these are more than 1000 years younger than Da But and Con Co Ngua (Supplementary Information E).

5. Quynh Van and the Neolithic

The Neolithic shift in northern Vietnam led to a dramatic change in the archaeological record. There was a reshaping of economic and settlement strategies, from hunter-gatherer occupation in caves and on shell mounds to sedentary settlement, located in riverine situations with access to good alluvial farmland, and along the coast. Significant differences also existed between the material cultures of the indigenous Da But and Quynh Van foragers, which consisted of flaked stone tools, hammer-dressed edge-ground and fully ground pebble axes (rather than uni-bevelled adzes) and coarse impressed pottery, and those brought by the incoming farmers, which included new forms of incised and impressed pottery with thinner walls and greater shape variation, nephrite ornaments, quadrangular-sectioned flaked and ground stone adzes, supine burial postures, and domesticated rice, millets, pigs and dogs (Piper et al. in press).

It has long been the Phung Nguyen culture of the Red River Valley that has been considered to represent the earliest agricultural communities to arrive in northern Vietnam from southern China, and to succeed the Da But final facies of the Hoabinhian. The Phung Nguyen is commonly split into two phases, Early and Late. So far, only sites considered to be associated with the later phase of Phung Nguyen, such as Xom Ren (upper horizons) and Man Bac, have been radiocarbon dated with any confidence, in both cases to shortly after c. 2000 cal. BCE (Piper et al. in press; Fig. 1b). Other sites considered to belong to the early Phung Nguyen culture, such as Go Bong and Thanh Den (Cao Xa, Phu Tho Province), all remain undated, but are probably not substantially older. Thus, a gap of at least 2000 years potentially exists between the archaeological records of the respective late hunter-gatherer and early farmer cultures in Thanh Hoa, between the Da But culture at c.5000–4500 BCE (Con Co Ngua) and the Phung Nguyen at c.2000 BCE. It is difficult to argue that the latter be considered the direct context for the arrival of agricultural communities in northern Vietnam.

The comprehensive dating programme undertaken at Ru Diep has demonstrated that the basal shell mound there accumulated during the final centuries of the 4th millennium BCE, much closer in time to the arrival of agricultural communities into northern Vietnam than the Da But. There is still no evidence of any food production at this relatively

Table 1

Charcoal radiocarbon dates from Ru Diep listed in chronological order by context, sample code, Waikato code, and uncalibrated and unmodelled calibrated dates: $\delta d^{13}C$ measured but not reported.

Context and feature numbers	Sample code	Waikato Code (WK)	Uncalibrated date	Calibrated date (BCE)	
				68.2% prob.	95.4% prob.
C.106	SA-15	42334	4433 $\pm$ 20 BP	3100–3020	3320–2930
C.106	SA-14	42336	4468 $\pm$ 20 BP	3330–3090	3340–3020
C.106	SA-86	42337	4463 $\pm$ 22 BP	3330–3030	3340–3020
F.23/C.108	SA-19	42343	4419 $\pm$ 20 BP	3100–3020	3270–2920
F.21/C.107/2	SA-18	42340	Abandoned		
C.108/1	SA-90	42341	4469 $\pm$ 20 BP	3330–3090	3340–3020
C.108/1	SA-91	42342	4485 $\pm$ 20 BP	3330–3100	3340–3090
F.41	SA-31	42345	4496 $\pm$ 20 BP	3240–3100	3340–3090
F.43	SA-34	42346	4444 $\pm$ 20 BP	3270–3020	3330–3010
F.48	SA-99	42350	4441 $\pm$ 20 BP	3270–3020	3330–3010
F.48	SA-98	42349	Abandoned		
C.109	SA-105	42347	4493 $\pm$ 20 BP	3340–3100	3340–3090
F.44	SA-45	42351	4524 $\pm$ 20 BP	3350–3120	3360–3100
F.58	SA-50	42353	4466 $\pm$ 20 BP	3330–3090	3340–3020
F.58	SA-106	42354	4456 $\pm$ 20 BP	3320–3020	3330–3020
F.85	SA-113	42355	4424 $\pm$ 20 BP	3100–3020	3270–2920
C.110/1	SA-54	42356	4466 $\pm$ 20 BP	3330–3090	3340–3020
C.110/1	SA-55	42357	4477 $\pm$ 20 BP	3330–3090	3340–3030
C.110/1	SA-58	42358	4465 $\pm$ 20 BP	3330–3090	3340–3020
C.110/1	SA-63	42359	4485 $\pm$ 20 BP	3330–3100	3340–3090
C.110/2	SA-71	42,361	4416 $\pm$ 20 BP	3100–3010	3270–2920
F.68	SA-168	42364	Abandoned		
C.111	SA-82	42366	Abandoned		
F.97	SA-148	42367	4456 $\pm$ 20 BP	3320–3020	3330–3020
F.97	SA-150	42368	4438 $\pm$ 22 BP	3270–3020	3330–2940
F.102	SA-154	42369	Abandoned		
F.102	SA-153	42370	4444 $\pm$ 20 BP	3270–3020	3330–3010

recent date, but, despite the destruction of the upper layers of the site, there is evidence at Ru Diep for potential cultural overlap between pre-Neolithic and Neolithic cultural contexts, especially in pottery design and burial tradition. The dating of Thach Lac, just a few kilometres to the east of Ru Diep, also suggests that the Quynh Van shell mounds, at least in Ha Tinh Province, represent relatively short-lived, intensive activity that perhaps lasted no more than a few hundred years either

side of c. 3100 cal. BCE. The consistency and conformity in pottery manufacture and modes of living on shell mounds close to coastal mangroves and the sea suggests a relatively coherent community with shared social and cultural identity.

Future research will be aimed at attempting to further bridge the missing millennium that still exists in our knowledge of the prehistory of northern Mainland Southeast Asia, associated with the arrival of the

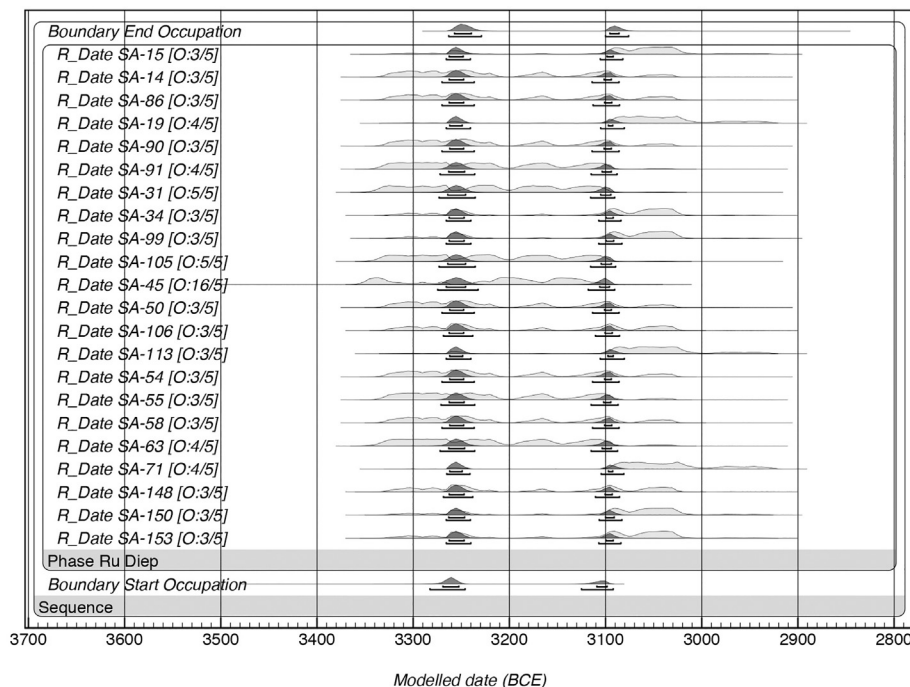


Fig. 5. Bayesian age model for Ru Diep produced using OxCal 4.2. The lighter shaded distributions represent the unmodelled calibrated dates, and the darker outlines represent the results after Bayesian modelling.

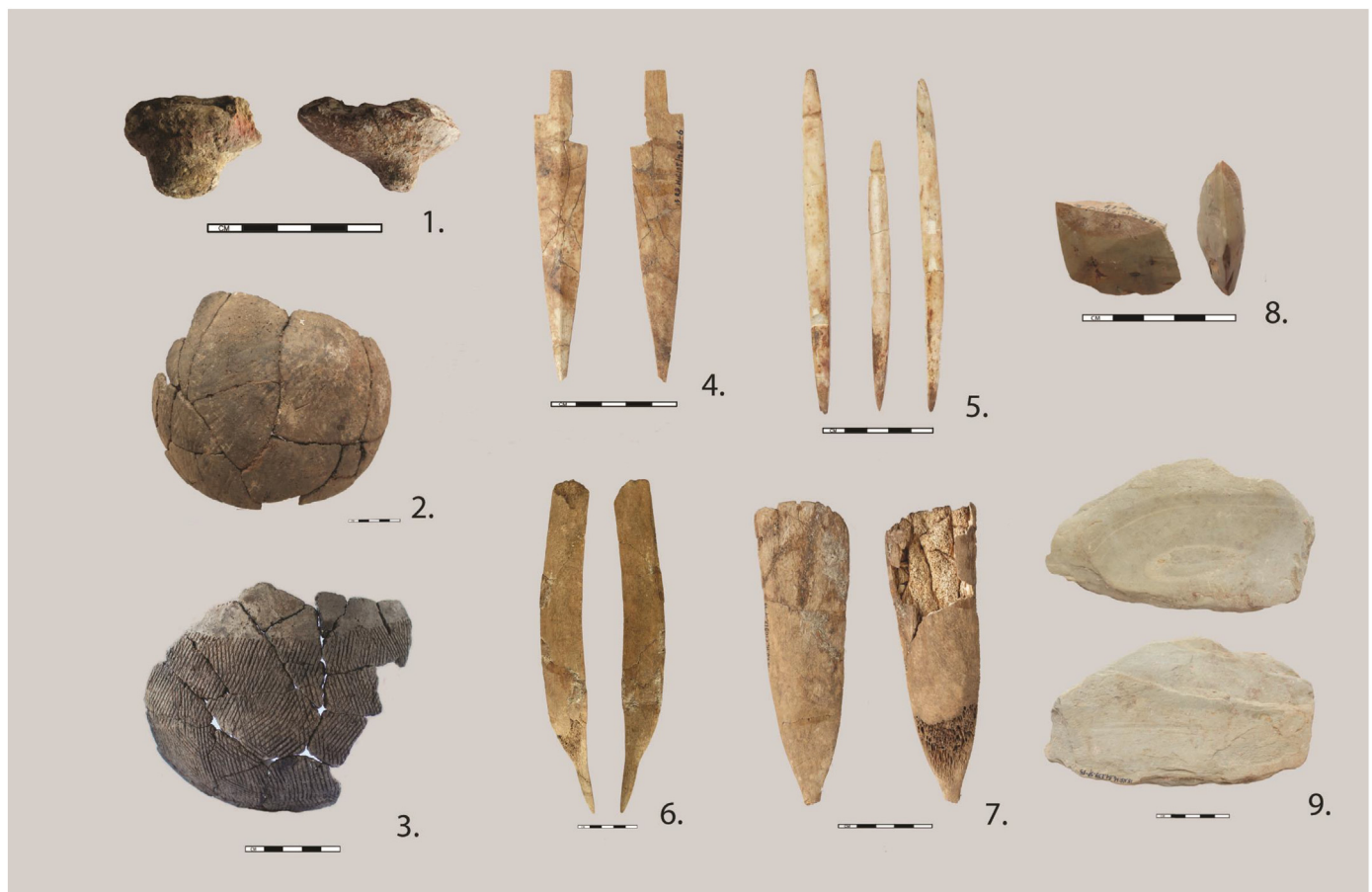


Fig. 6. Ru Diep pottery. 1. Typical pointed bases of the Quynh Van culture; 2. Round-bottomed vessel body with ribbed decoration; 3. Round-bottomed vessel body with cord-marked decoration; 4. Bone spear point; 5. Three bone points from a fishing leister found clustered together; 6. and 7. Pointed implements manufactured from large mammal ribs; 8. Bevel fragment of a ground and polished stone axe; 9. Grinding stone with surface pigmentation from a colorant.

first agricultural populations between 3000 and 2000 cal. BCE.

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Declaration of Competing Interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ara.2020.100190>.

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