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The open-air site of Huai Hin (Northwestern Thailand): Chronological perspectives for the Hoabinhian

Le site de plein-air de Huai Hin (Nord-Ouest de la Thaïlande) : perspectives chronologiques pour le Hoabinhien

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ABSTRACT

The Hoabinhian is well known in Southeast Asian prehistoric studies, where it has been considered both a chronological period and a cultural entity. However, recent work suggests it should more appropriately be considered a functional technocomplex. Although most often described from sites in Vietnam and Thailand, it has also been recognized in northern Sumatra and Cambodia. Here, we present a series of Hoabinhian stone tools discovered during fieldwork carried out by the Thai-French Paleosurvey at the Huai Hin site found on the eastern bank of the Salaween River near the Thai-Burmese border. Although the technological analysis of this material supplies new evidence for Hoabinhian regional variability, new dates from this open-air site also provide a useful reference point for constructing a regional chrono-cultural sequence for Southeast Asian prehistory.

RÉSUMÉ

La préhistoire du Sud-Est asiatique est connue pour le Hoabinhien qui, au cours du temps, a été considéré comme une période chronologique ou une culture technique et nécessite désormais d'être davantage considéré comme un complexe technofonctionnel lithique. Plus couramment décrit au Vietnam et en Thaïlande, il est également reconnu au Nord de Sumatra et au Cambodge. Lors d'une recherche de terrain menée par le *Thai-French Paleosurvey* sur la rive orientale de la rivière Salawen à la frontière thaïe-birmane, des outils lithiques ont été mis au jour dans la localité de Huai Hin. L'étude technologique du matériel conduit à mettre en avant des particularismes régionaux et la datation réalisée sur ce site de plein-air contribue à la construction d'un référentiel chronoculturel régional très utile pour la préhistoire du Sud-est asiatique.

1. Introduction

The Thai-French Palaeosurvey has been involved in the detection and documentation of new prehistoric sites

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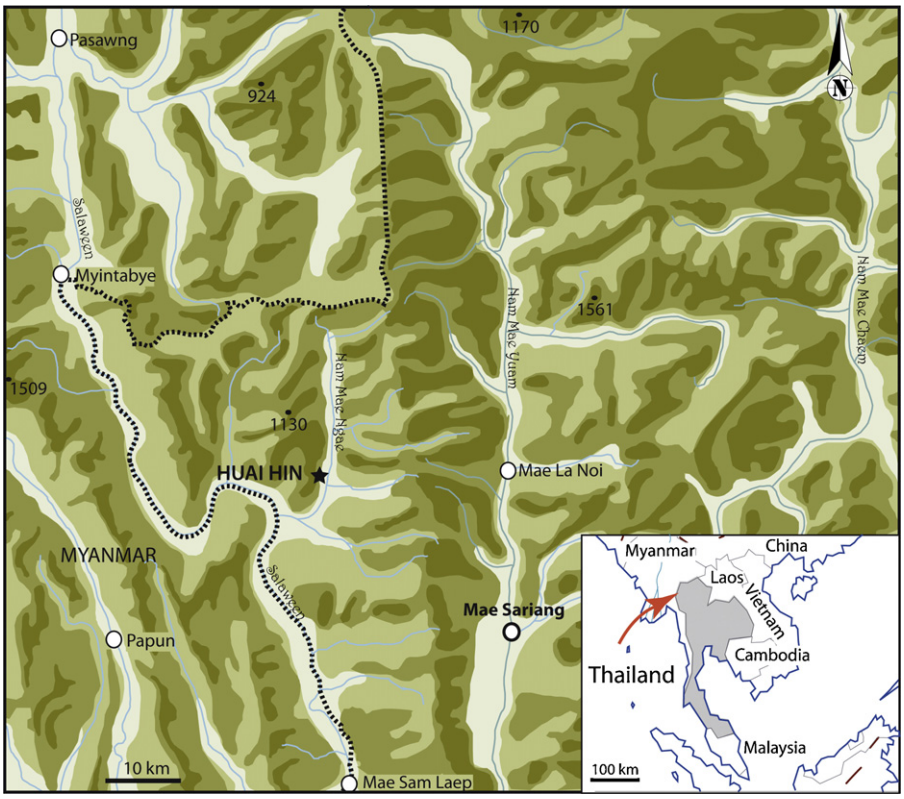


Fig. 1. Location of the site of Huai Hin.
Fig. 1. Situation géographique du site de Huai Hin.

in northern Thailand since 2002. Recent survey work in the region has recovered 181 stone tools from two neighbouring localities at the open-air site of Huai Hin (Fig. 1). After briefly introducing the site's context and presenting the technological analysis of the Hoabinhian stone tools, their wider relevance for Southeast Asian prehistory is discussed. The various lithic industries associated with Southeast Asian prehistoric 'cultures' (*Anyathian*, *Lannathian*, *Nguomian*, *Sonviian* etc.) have no real analytical value or any strong typo-technological justification. In fact, uncertain and ambiguous terminologies have resulted in the gradual abandonment of all but one cultural designation: the Hoabinhian (Zeitoun et al., 2008), whose geographic distribution has been suggested to extend from Northeast India (Sharma, 2010) to Australia (Bowdler, 1994; McCarthy, 1941). This remains the case despite its unclear chrono-stratigraphic context and the fact that the original definition of the Hoabinhian developed by Madeleine Colani in the 1920s was based on a large collection of stone tools from almost sixty caves uniquely in northern Vietnam (Colani, 1927, 1929). Regional studies (Matthews, 1964; Moser, 2001; Reynolds, 1993) continued to employ the term 'Hoabinhian' despite it variously describing a chronological period, a form of subsistence economy, as well as a type of stone tool assemblage commonly associated with regional hunter–gatherer groups.

Gorman (1969, 1971, 1972) was perhaps one of the first to employ 'technological criteria' in his analysis of Hoabinhian artefacts, leading him to propose that the absence of any significant changes in lithic technology could probably be correlated with an apparent continuity in environmental and ecological conditions throughout the terminal Pleistocene into the Holocene. Pookajorn (1996) assessment of the reality of the Hoabinhian 'technocomplex' based on material from the Krabi province in southern Thailand and Reynolds (1989, 1990, 1992) typo-technological approach notwithstanding, the Hoabinhian still lacks a clear definition (Forestier et al., 2005b). It is therefore necessary to first define this technocomplex and describe the manufacturing methods and techniques evident in associated stone tool assemblages in order to obtain more detailed information concerning tool use than is provided by typology alone (Inizan et al., 1999).

2. The site of Huai Hin

The sedimentary cover of northern Thailand is principally composed of hilly formations from north to south connected to tectonic activity between the Thaï-Shan and Sino-Indochinese plates resulting in the formation of high limestone plateaus containing numerous polygonal karsts (Dunkley, 1995). The general physiography of northern Thailand therefore has high potential for preserving archaeological material, especially in caves found in the region's hills and low limestone mountains (Sidisunthorn et al., 2006). Moreover, the region is cut by north-south

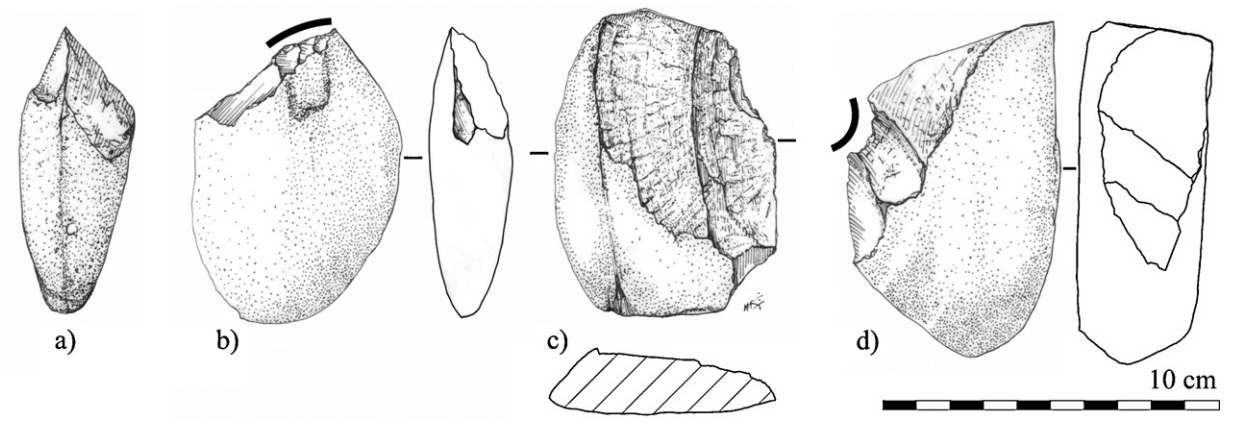


Fig. 2. Sample of lithic material from the Pho So area: a: chopping tool; b: lateral side chopper; c: lateral side chopper; d: lateral side chopper.
Fig. 2. Exemple de matériel lithique recueilli au sud du village de Pho So : a : chopping tool; b : chopper latéral ; c : chopper latéral ; d : chopper latéral.

flowing rivers representing natural passageways probably favouring the demographic expansion of Pleistocene and Holocene populations.

We undertook surveys near the banks of the Salaween River not far from the Thai-Burmese border around the village of Pho So where Permian limestone formations are indicated on geological maps. The village is situated in the Salaween Wildlife Sanctuary, 30 kilometres west of Mae Sariang at the southern end of the Nam Mae Yuan Valley, a tributary of the Salaween River (Fig. 1). The junction of these two large rivers forms a natural corridor potentially representing an area propitious to human settlement. Several caves containing long boat coffins in the area of Pa Pao and an open-air site (Pha Daeng) near the banks of the Salaween river were documented during recent field surveys (Zeitoun et al., 2008). Two localities from the open-air site of Huai Hin were informative for better documenting the variability and chronology of South-East Asian lithic technocomplexes.

Five choppers and chopping-tools were recovered during an initial survey in the forested area around the village of Pho So (Fig. 2), while the site of Huai Hin was discovered during systematic surveys along the banks of the river and on the tops of nearby hills some three kilometres from village. A careful survey of the area documented several stone tools on the surface of two main localities. The first site lies 200 m above sea level on a hill near the mouth of a stream that empties into the Salaween River (Huai Hin locus 1: HH1) with a second slightly higher site (240 m asl) found approximately 200 m to the west (Huai

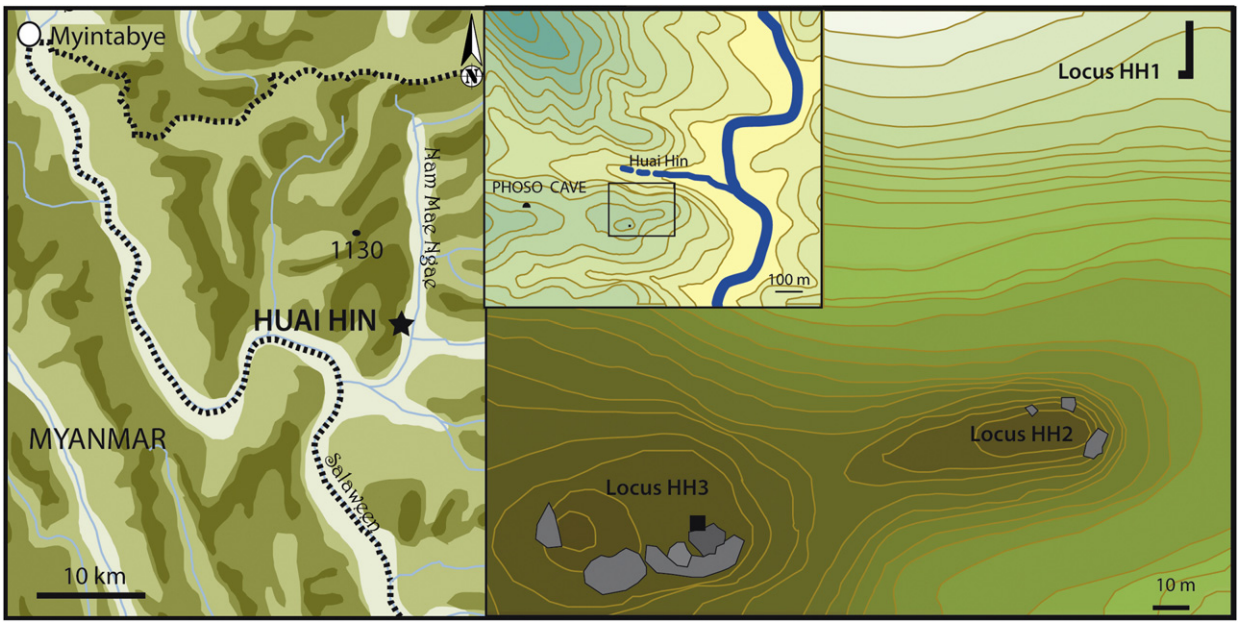


Fig. 3. Detailed location of locus HH1 and HH3.
Fig. 3. Situation détaillée des locus HH1 et HH3.

Fig. 4. Sample of 'splash-creep' processes affecting the surface position of unifacial stone tools.
Fig. 4. Exemple de formation d'une micro-cheminée-de-fée sous l'effet de la pluie.

Hin locus 3: HH3) (Fig. 3). The archaeological material was exposed by localised soil erosion connected to current agricultural practices – cycles of burning vegetation leaving the soil exposed during the rainy season. 'Splash-creep' processes and rain preferentially removed finer deposits while coarser sediments remained in position (Fig. 4). These processes contributed, in varies degrees depending on the gradient of the slope, to the redistribution of the archaeological material. Three test pits were sunk in order to establish the initial stratigraphic position of the material and obtain information allowing us to date the sites. Eleven lithic artefacts collected from the surface of HH1 and the 137 pieces from HH3 provide clear evidence of a human presence in the area (Figs. 5 and 6

). Excavations recovered 30 additional pieces from the locus HH1, but only three from the second locus (HH3). This latter site provides stratigraphic and chrono-cultural information that can be generalised to all the localities and may be useful for understanding other open-air sites in the region. One small adze was found in the upper part of the top level containing potsherds, while two other stone tools similar to those collected on the surface were found at the base of the sequence.

3. Stratigraphy and chronology

Excavations near a group of grey-blue limestone blocks at the top of the hill (HH3) provided stratigraphic information and allowed the depositional history of the artefacts to be investigated. The archaeological sequence was observable in a test trench (Fig. 7) from which a small adze made from calcareous rock was recovered at the summit. While erosion connected to the subtropical environment has generally made it impossible to date several other open-air sites in the area, the underlying layer containing potsherds and charcoal did provide a radiocarbon date of 3700 ± 30 years cal BP (Poz-10063). Finally, a cobble and a typical uniface (or 'sumatralith' in the Hoabinhian typology) were recovered from the base of the sequence (Fig. 8).

4. Ceramics from the Huai Hin localities

Potsherds from Huai Hin include neck fragments, shoulders and rims with rounded lips, some of which bear traces of a cord-wrapped beater. Some aspects (surface colours) of the potsherds show evidence of firing by oxidation or reduction (Fig. 9). The preservation of the ceramic material varies; the walls are often altered and roughened, making it impossible to determine the thermal treatments used for their production. Overall, the material is very fragmentary, severely limiting the amount of information that can be

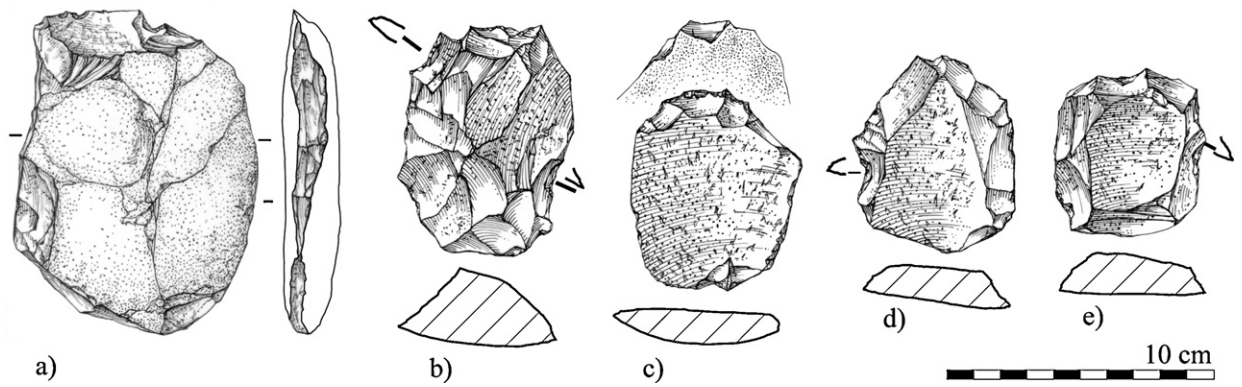
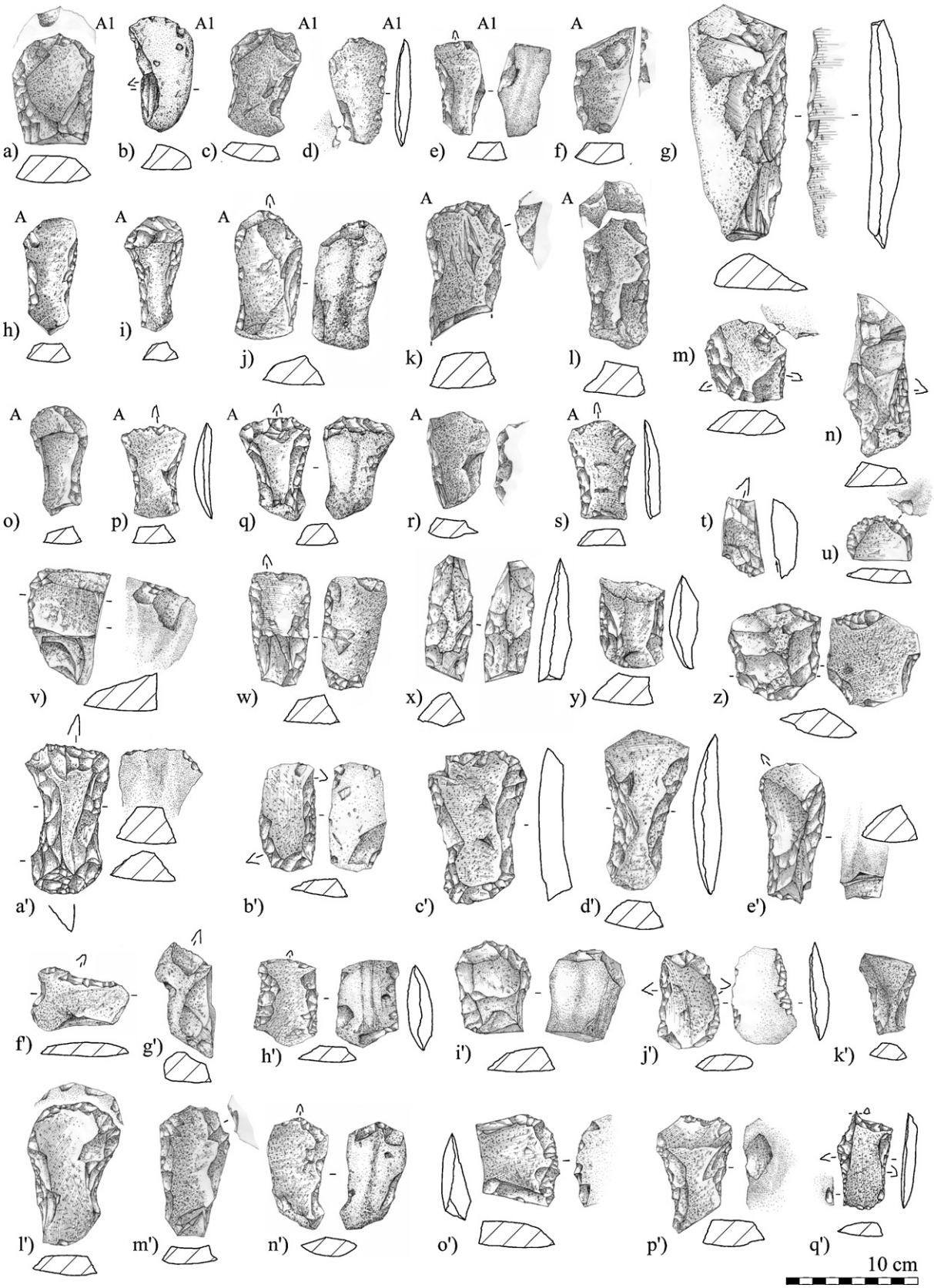


Fig. 5. Stone tools collected from the surface of locus Huai Hin 1: a: cobble shapped by unifacial retouch; b–e: retouched split cobble.
Fig. 5. Outils recueillis en surface sur le locus Huai Hin 1 : a : façonnage unifacial sur galet ; b–e : outil sur hémi-galet.


A1
A
a)
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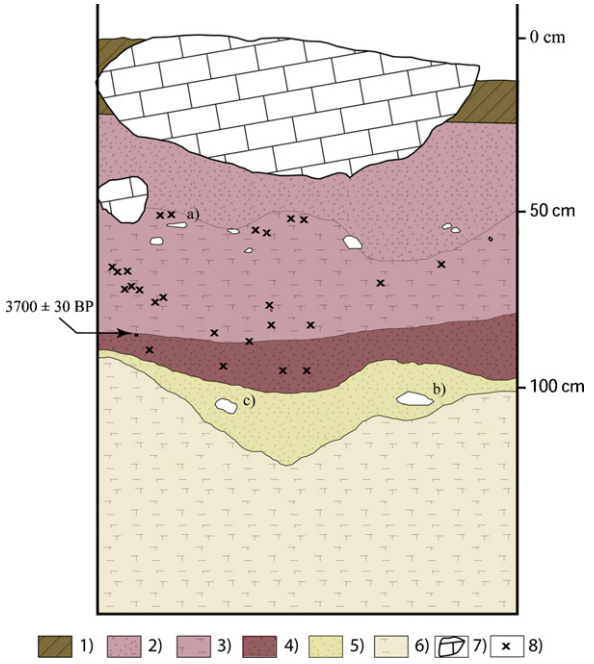

Fig. 7. Test pit at locus Huai Hin 3: Profile and dating: 1: humic soil; 2: reddish clay with calcareous and shaly gravel; 3: aggregated reddish clay; 4: agregated brownish clay; 5: aggregated yellow clay; 6: compact yellow cream clay; 7: calcareous rock; 8: sherds; a: adze; b: sumatralith; c: cobble. With location of the charcoal used for dating.
Fig. 7. Coupe synthétique avec datation de la localité HH3 : 1 : sol humique; 2 : argile rouge avec graviers calcaires et argileux ; 3 : argile rouge agrégée ; 4 : argile brune agrégée ; 5 : argile jaune agrégée ; 6 : argile jaune-crème compacte ; 7 : calcaire ; 8 : fragment de céramique ; a : herminette ; b : sumatralithe ; c : galet. Indication de la position du charbon daté par radiocarbone.

drawn. The ceramic vessels were probably manufactured by hand using coiling with a beater used to bind the coils together. The clay contains a very high percentage of rough temper (quartz, feldspars, muscovite, etc.). The fact that the manufacturing method associated with these types of ceramics was very common in the Neolithic and still used in recent periods (Van Tan, 1985; Prisanchit, 2008), combined with the lack of a well-established seriation for ceramics typical of Southeast Asia, precludes a more precise categorisation of the ceramic material.

5. Techno-typological analysis of the stone tools

The stone tools collected in the vicinity of Pho So were made following a *chaîne opératoire* (Inizan et al., 1999) involving a relatively simple shaping method applied to thick cobbles. The sharp edges carry a fine retouch mostly on the lateral, rather than distal edge of the tool. The series of tools recovered from the HH1 locality include 11 basalt, andesite or sandstone pieces (Fig. 10) and, apart from flakes and flake fragments ($n = 4$), the tools represent unifacially worked half-cobbles. A more detailed examination of the *chaîne opératoire* suggests that these tools nevertheless differ from 'sumatraliths' (choppers and chopping-tools) made on long or large thick cobbles (Forestier, 2000; Moser, 2001). The tools and blanks recovered from Huai Hin were produced according to a *chaîne opératoire* composed of two different methods: a combination of debitage and shaping (*façonnage*) (Fig. 11) producing classic unifacially shaped pieces (sumatraliths) and a second *chaîne opératoire* employing cobbles for the production of choppers. The stone tools from Huai Hin were made on half-cobble blanks belonging to the 'A/A1′ techno-type characterised by the systematic shaping of their lateral and working edges (transverse and/or lateral sharpened edge). This *chaîne opératoire* involves relatively flat and short cobbles. The assemblage also contains two hard hammers, one in basalt and the other in sandstone, as well as three cobbles with scar negatives. Although it is difficult to interpret whether or not these broken hammers and tested cobbles are actually tools, they are made from raw materials unavailable in the local substratum and were thus likely imported to the site at the same time as cobbles from the nearby river.

Atop the hill at the HH3 locality, field surveys collected 137 pieces among which 81 are unifaces or fragments of unifacial pieces. The raw material is mainly basalt cobbles, andesite, quartzite, shale and sandstone, all of which are available in the local riverbeds. Tool standardisation is clearer than in the first locality both in terms of raw material selection and the combination of shaping and debitage methods applied to half-cobbles (Figs. 5 and 6). As a result, the majority of the tools fall within the 'A/A1′ type (40% of which are type A).

The significant presence of elements belonging to the 'A/A1′ technotype lends further detail to the associated reduction patterns and the technofunctional aspect of the production processes for the manufacture of tools on cobbles. The homogeneity of the material collected from the surface of the site is an unexpected aspect of the collection. An analysis of the diacritic schemas for a significant number of pieces from the assemblage allowed us to isolate the active cutting edge and different technofunctional units. The majority of tools carry a single transverse technofunctional unit (or cutting edge) perpendicular to the morphological axis of the half-cobble.

Fig. 6. Stone tools collected from the surface of locus Huai Hin 3: a–c: retouched split cobble; d–f: lateral retouched split cobble; g: scrapper on lateral side of thick cobble fragment; h–k: retouched split cobble with transversal cutting edge; l–n: double side scrapper on split cobble; o–q: retouched split cobble with transversal cutting edge; r, s: side scrapper on split cobble; t: fragment of split cobble; u: circular end scrapper on split cobble; v–z: retouched split cobble; a′, c′: unifacial tool; b′, d′, e′, h′, j′, k′, m′, p′: double side scrapper on split cobble; f′, g′: retouched fragment of split cobble; i′, l′: unifacial split cobble; n′: retouched split cobble with transversal cutting edge; o′: fragment of unifacial cobble; q′: bor on retouched split cobble.
Fig. 6. Exemple d'outils lithiques recueillis en surface sur le locus Huai Hin 3 : a–c : hémi-galet retouché ; d–f : hémi-galet retouché latéralement ; g : fragment épais de galet repris en racloir latéral ; h–k : outil sur hémi-galet à tranchant transversal ; l–n : hémi-galet retouché en racloir latéral double ; o–q : outil sur hémi-galet à tranchant transversal ; r, s : hémi-galet retouché en racloir latéral ; t : fragment d'hémi-galet ; u : grattoir circulaire sur hémi-galet ; v–z : hémi-galet retouché ; a′, c′ : uniface ; b′, d′, e′, h′, j′, k′, m′, p′ : hémi-galet retouché en racloir latéral double ; f′, g′ : fragment d'hémi-galet retouché ; i′, l′ : uniface sur hémi-galet ; n′ : outil sur hémi-galet à tranchant transversal ; o′ : fragment de galet uniface; q′ : bec sur hémi-galet retouché.

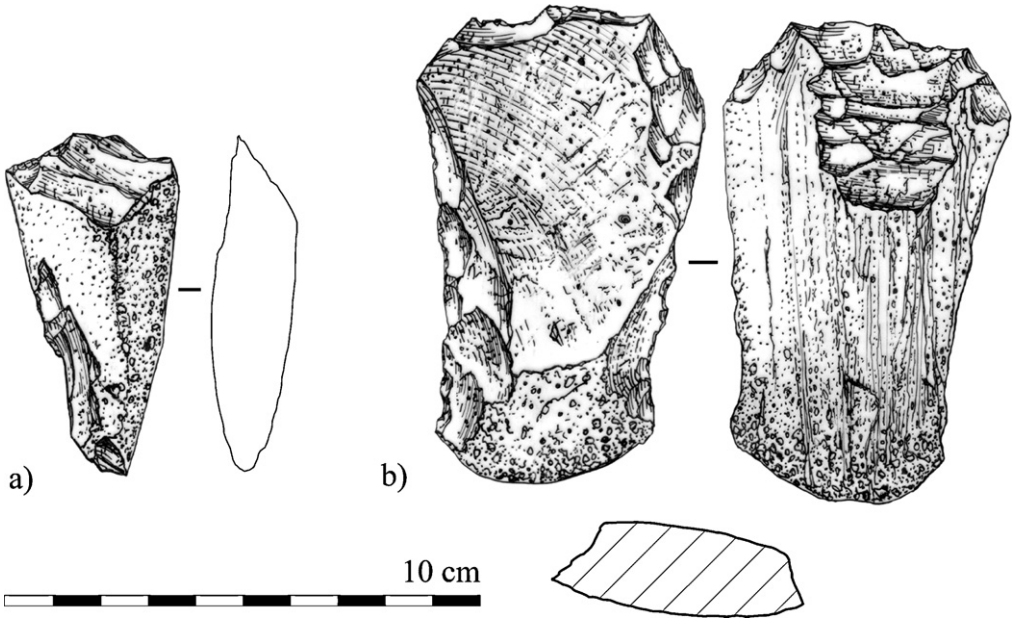

Fig. 8. Stone tools collected from the excavation of the locus Huai Hin 3: a: adze; b: retouched split cobble with transversal cutting edge.
Fig. 8. Outils lithiques recueillis à la fouille sur la locaité de Huai Hin 3 : a : herminette ; b : hémi-galet retouché à tranchant transversal.

6. Discussion

The absence of extinct fauna associated with Hoabinhian assemblages initially led Colani (1927, 1929) to assume a Holocene age for these occurrences. The advent of radiocarbon dating and work at Lang Rongrien in southern Thailand (Anderson, 1990) eventually pushed the oldest dates for the Hoabinhian to no earlier than about 18,500 to 23,000 BP (non-calibrated). Gorman (1971) re-evaluation of extant fauna and available radiocarbon dates suggested that the Hoabinhian was not strictly limited to the Holocene, but could in fact be found in contexts dating well into the Pleistocene. Excavations at Spirit Cave in northern Thailand provided the first chrono-cultural reference sequence for the Hoabinhian with five distinct layers and two chrono-cultural phases present: prepottery Hoabinhian layers dated to between 11,690 ± 280 and 8760 ± 135 BP (non-calibrated) overlain by a level containing cord-impressed pottery between 8806 ± 200 and 7622 ± 300 BP (non-calibrated) (Gorman, 1972). Also found in Mae Hong Son province in northern Thailand, Tham Phaa Chan was reported to contain cultural levels dated from 7500 BP to 5100 BP (non-calibrated) (White and Gorman, 2004), however more recent excavations in the region produced an older series of dates for the Hoabinhian material at Ban Rai (eight radiocarbon dates spanning 10,600 to 7250 BP non-calibrated) and at Tham Lod (four radiocarbon and two TL dates ranging from 32,400 to 12,100 BP non-calibrated, Shoocongdej, 2004, 2006). Early dates (30–28,000 BP non-calibrated) are also available for the Hoabinhian at the site of Tham Khuong (Nguyen, 1991).

Fig. 9. Potsherds from the locus Huai Hin 3.
Fig. 9. Tessons de céramique du locus Huai Hin 3.

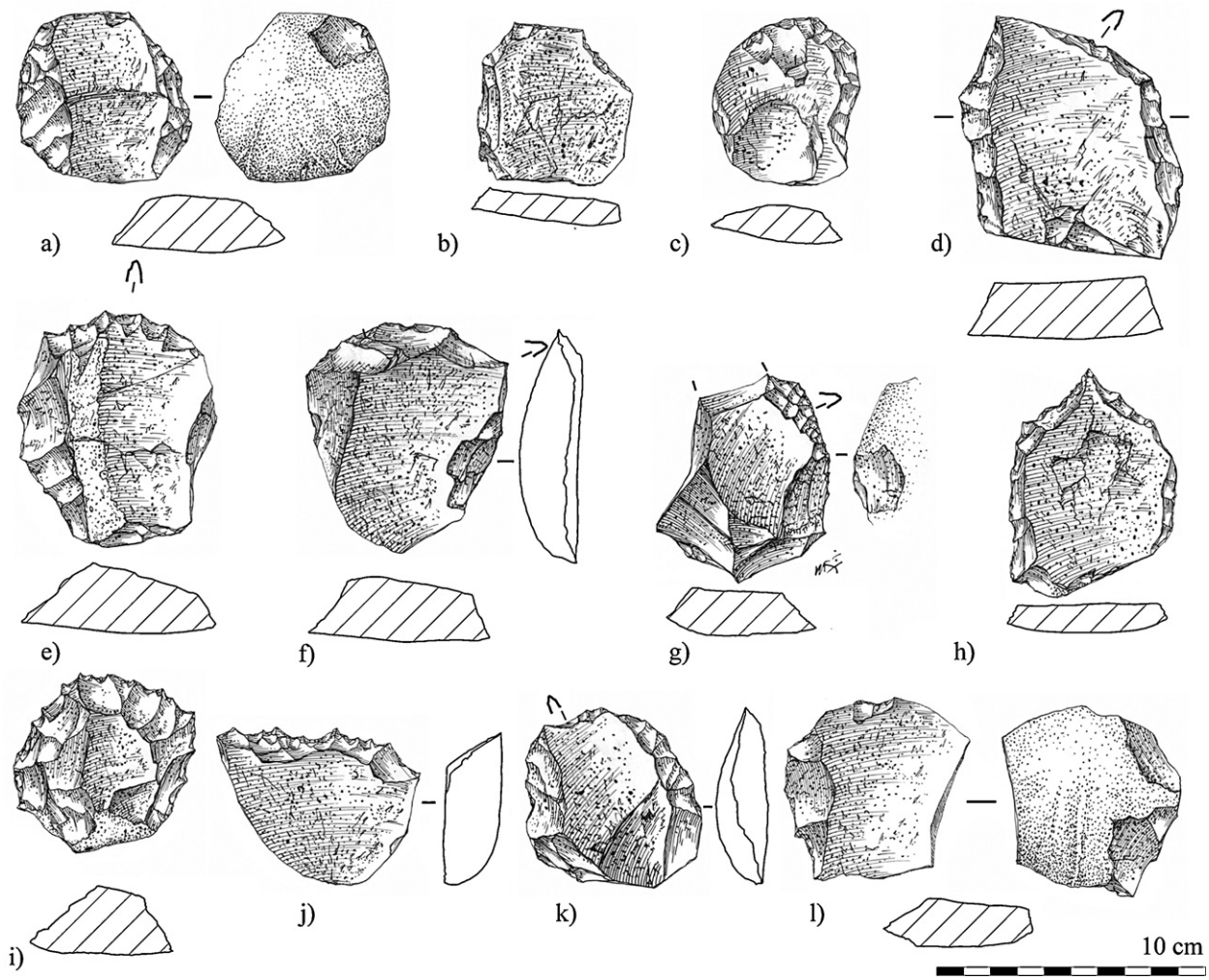

Fig. 10. Stone tools collected from the excavation of locus Huai Hin 1: a–d, k, l: double side scrapper on split cobble; e, f: simple side scrapper associated with transversal cutting edge on split cobble; j: retouched split cobble with transversal cutting edge; g: simple side scrapper on split cobble; h: convergent cobble tool: retouched split cobble as bor; i: unifacial split cobble.

Fig. 10. Outils lithiques recueillis à la fouille dans la localité Huai Hin 1 : a–d, k, l : hémi-galet retouché en racloir latéral double ; e, f : hémi-galet retouché en racloir latéral et tranchant transversal ; j : outil sur hémi-galet à tranchant transversal ; g : hémi-galet retouché en racloir latéral simple ; h : outil convergent : bec sur hémi-galet ; i : uniface sur hémi-galet.

In southern Thailand, three distinct cultural layers at the cave sites of Khao Talu, Ment and Heap were all dated to between 11,000 and 2000 BP (non-calibrated) (Pookajorn, 1990). The oldest level containing archaeological material that has been attributed to the Early Hoabinhian with large worked cobbles and flakes, while the second Late Hoabinhian level (4500–2000 BP) sees the introduction of pottery. A third artefact bearing level has been described as containing a 'transitional' Neolithic-Bronze Age (2500–1000 BP) industry composed of ground stone artefacts, new kinds of potsherds, beads, as well as other material typical of the underlying levels (Pookajorn, 1990), suggesting a common cultural tradition in the use of cobbles for tool manufacture with the progressive addition of other artefact types through time.

Pookajorn (1991, 1994, 2001) had originally described a chrono-cultural sequence with Hoabinhian material at Moh Khiew dated to between 25,800 ± 600 cal BP to 8420 ± 90 cal BP being overlain by layers containing mainly dark coloured potsherds, pottery with cord impressions and some polished stone adzes and axes with dates ranging from 7060 ± 100 cal BP to 4250 ± 150 cal BP. Tham Khao Khi Chan in the Surat Thani province of southern Thailand provided four radiocarbon dates spanning 6100 BP to 4700 BP (non-calibrated) (Reynolds, 1989) with terminal dates for Hoabinhian occupations also available from Gua Kechil in Malaysia where archaeological material is associated with a date of 4800 BP produced from bone collagen (non-calibrated) (Dunn, 1966). Hoabinhian tools from the Cambodian site of Laang Spean were overlain by layers containing cord-impressed ceramics and dated to 6240 ± 70 B.P (non-calibrated) (Mourer et al., 1970; Mourer, 1994). While both very old and extremely young dates are available from sites in the Luang Prabang province

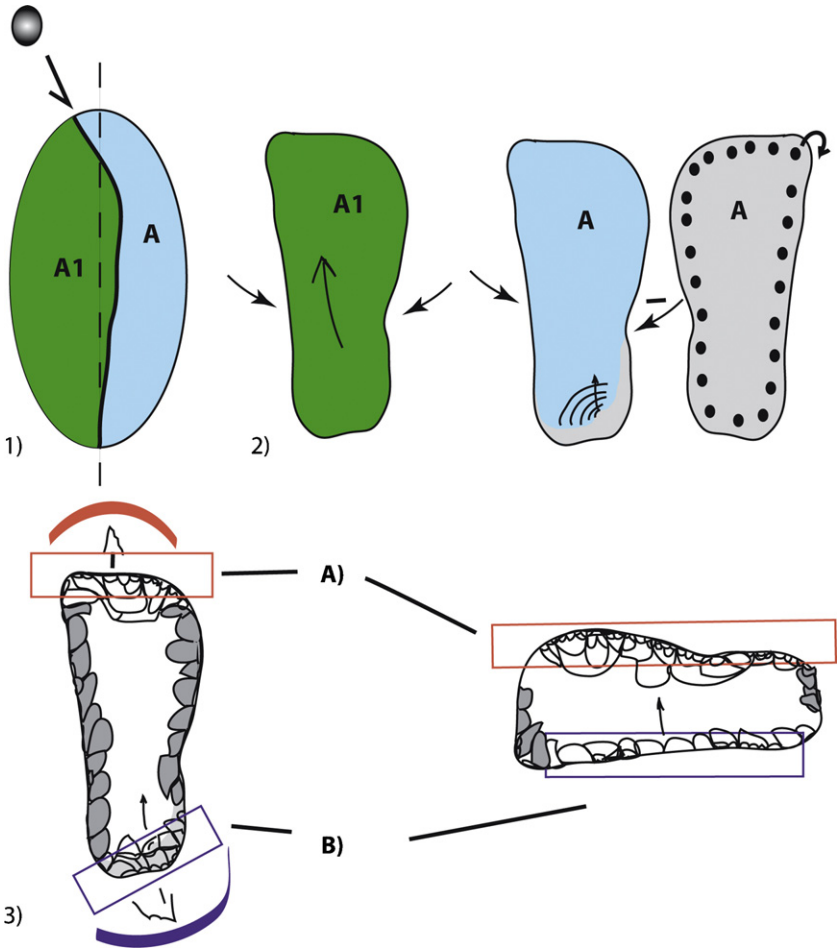

Fig. 11. Outline for a technological definition of the Hoabinhian in northwestern Thailand: 1: first step: splitting by direct percussion with hard hammer to produce two half-cobbles with cortical surface; 2: second step: shaping of the edges by façonnage on A or A1; 3: third step: making off of the tool to produce a sharp transversal edge or side by unifacial or bifacial removals. A. Active part of the tool. B. Prehensive part of the tool.
Fig. 11. Synthèse pour une définition du Hoabinhien du Nord-Ouest de la Thaïlande : 1 : première étape : production de deux hémi-galets à surface corticale par percussion directe au percuteur dur ; 2 : deuxième étape : façonnage des bords des hémi-galets A ou A1 ; 3 : troisième étape : fabrication de l'outil par la retouche de la partie latérale ou distale par enlévements unifaciaux ou bifaciaux. A. Partie active de l'outil. B. Partie préhensive de l'outil.

of northwestern Laos, the site of Tam Hua Pu has yielded dates of 1340 ± 70 BP to 32,500 ± 900 BP (non-calibrated) produced on charcoal and shell (Sayavongkhamdy et al., 2000) suggesting to the authors that Hoabinhian assemblage can be dated to 4000 to 3500 BP. However, there is no clear link between the series of dates and the archaeological material. The Hoabinhian industry from Tham Vang Ta Leow in the same province was found to date to no earlier than 9770 ± 50 cal BP (White et al., 2009). Hoabinhian artefacts are also present in northern Sumatra during a similar time period. At Tögi Ndrawa on Nias Island north of Sumatra, charcoal and shell directly associated with archaeological levels containing Hoabinhian material have been radiocarbon dated to 12,170 ± 400 BP to 5540 ±110 BP (non-calibrated) (Forestier et al., 2005a).

Although still commonly cited, Higham and Higham (2009) have recently suggested that radiocarbon dates produced some time ago cannot be considered as reliable. Auetrakulvit et al. (2012) have recently re-dated the sequence originally reported by Pookajorn (op. cit.) for Moh Khiew with new dates for level 3 which contains the Hoabinhian material ranging between 10,540 ± 420 to 11,220 ± 510 cal BP instead of 7060 ± 100 to 11,020 ± 150 cal BP. However, neither set of dates incorporates direct dates on skeletal material from the burials, a fact rendered even more significant given that the recently excavated area is found but 1 metre from the older excavations.

Although fieldwork carried out by Yi et al. (2008) involved only small-scale test pits in Hang Cho Cave, 16 distinct Hoabinhian levels ranging between ca. 19,500 and 8400 BP were documented providing finer chronometric resolution for North Vietnamese Hoabinhian assemblages. A further sequence with Hoabinhian material was also documented below the previously identified levels and has produced a date of 29,140 ± 200 BP. Finally, although recent radiocarbon dating methods and techniques considered in conjunction with thermoluminescence dating have resulted in the same chronology as 'old-fashion' dating methods, improved accuracy has provided a more secure

archaeological framework for the Hoabinhian technocomplex.

7. Conclusion

Stone tools from the open-air site of Huai Hin provide new insights concerning similar artefacts from the final Palaeolithic of Southeast Asia and open the way for new discussions regarding the technological identity of the Hoabinhian. Following the technological analysis of the stone tools recovered from Huai Hin, new questions have emerged concerning the variability of production methods within the larger Hoabinhian technocomplex. Was the Hoabinhian really an isolated culture characterised solely by unifacial cobble tools? Our results suggest that the situation is considerably more complicated than previously thought (Colani, 1930; Higham and Kijngam, 1982; Pope et al., 1981; Sarasin, 1933). Finally, the tools described here are more diverse and variable than is often the case for the Hoabinhian. They were produced using hard-hammer percussion according to three distinct *chaînes opératoires*:

- a *chaîne opératoire* composed of classic unifacial shaping (*façonnage*) on long cobbles to produce sumatraliths;
- a quite short *chaîne opératoire* also involving the shaping (*façonnage*) of thick ovoid cobbles for the production of choppers or chopping-tools;
- a novel *chaîne opératoire* that integrates debitage to produce half-cobbles *('split'* A/A1) that are then shaped (*façonnage)* into tools. This process can be seen with scrapers bearing bifacial retouch or pieces with transverse cutting edges.

These three *chaînes opératoires* provide important information relevant to the different methods used for knapping cobbles in northern Thailand throughout the Hoabinhian. The presence of the same three *chaînes opératoires* at Oblouang rockshelter excavated some 25 years earlier (Santoni et al., 1986) is attested to by stone tools with transverse cutting edges manufacture from cobbles (A/A1) and the combined presence of unifaces (sumatraliths) and choppers. Here we have discussed a technological approach investigating the dynamics and functional biography of Hoabinhian artefacts from Huai Hin, the next logical step is a reappraisal of the entire corpus of Southeast Asian lithic industries including those from the Sumatran coast (Forestier et al., 2005a). To this end, our analysis contributes a re-evaluation of the technological definition of the Hoabinhian as a first step towards resolving questions that still surround the persistence of the Hoabinhian technocomplex from the end of Pleistocene until some 3700 years ago in Southeast Asia as originally noted by Gorman (1971, 1972). Our approach is also a first step on the way to able to discuss about the emergence of cultural diversity in mainland Souhteast Asia from a technological point of view (White, 2011).

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