

ARCHAEOLOGY

CON MOONG CAVE - A PROMINENT PREHISTORIC CULTURAL HERITAGE IN VIETNAM

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Abstract

Con Moong Cave is located in Mo Village, Thanh Yen Commune, Thach Thanh District, Thanh Hoa Province, with coordinates: 20°15'55.19" north latitude and 105°37'19.80" east longitude. It is 150.7m above sea level. This paper details the results of two excavations conducted in 1976 and in 2008 - 2014 and outlines the residential history of successive prehistoric communities from 74,000 BP to 7,000 BP through a 10.14 m thick stratum. This insight serves to underscore the outstanding cultural and historical significance of Con Moong Cave in a broader context, emphasizing the need for safeguarding practices and promotion of this heritage in modern time.

Keywords: *Con Moong, Palaeolithic, Neolithic, Sonvian, Hoabinhian*

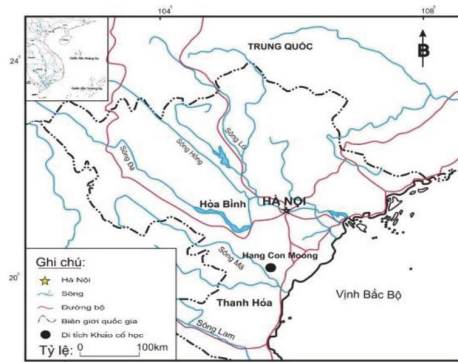
1. Introduction

1.1. Location of Con Moong cave

Con Moong Cave is located in Mo Village, Thanh Yen Commune, Thach Thanh District, Thanh Hoa Province, with coordinates: 20°15'55.19" north latitude and 105°37'19.80" east longitude, 150.7m above sea level, 35.5m above the stream bed in front of the cave. The cave nests in a limestone mountain, with the Upper Triassic age of the Dong Giao Formation (T2adg),

about 240 million years ago (Pham Van Quang 2009: 7-13) (Figure 1). The cave was discovered in 1974 (Dang Thinh Mien 1974), surveyed in 1975 (Nguyen Khac Su 1975:113-115), and excavated for the first time in 1976. The result of the first excavation was published in a volume of the Journal of Archeology, No. 2-1977 (Institute of Archeology, 1977) and presented at the International Prehistory Conference (Pham Huy Thong 1980:7-21).

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**Figure 1. Location of Con Moong Cave
(Nguyen Khac Su, 2014)**

Con Moong Cave has drum-barrel form with two entrances connecting with one another; it is 40m long and 9m wide (maximum width). The Southwest entrance is 5.0m high and 5.2m wide while the Southeast one is 6.2m high and 5.2m wide. The cave is 10m high on average, with arched ceiling, high in the middle with the north wall almost flat, and the south wall concave. The cave takes up an expanse of 250m², high at both ends, low in the middle. It is dry and airy, brighter near the entrances.

1.2. Range of excavation cavities

The cave is divided into 3 zones (Figure 2).

- At the Northwest entrance, Zone A has an area of 24m² and is the main excavation site of the Con Moong cave, in which, in 1976, four cavities were excavated with an area of 16m² and a depth of 3.6m from the surface; 8m² was reserved for visitors. In the years 2010-2014, Vietnamese and Russian archaeologists excavated 14m² (2m x 7m), with a depth range from 3.6m to 10.14m.
- Zone B is 55m² wide and is the lowest among the three. In 2008, a

1.5m x 1.5m exploring cavity was dug with quadrilateral axes and the Da But-styled potteries found at a depth of 30cm, but beneath that, no vestiges were found. On the surface of Zone B, 226 stone tools have been collected (with 44 of which belonging to the Son Vi Culture, 89 to the Hoa Binh Culture, and the remainders coming from other eras; specifically, there are 43 flake tools, 17 pestles, 18 tapping tools, 4 grinding tools, 19 crushing boards, a quadrilateral axe and a grinding board). There are also 235 stone flakes, 316 pieces of pottery (68 pieces of Da But culture, 20 pieces of the Dong Son Culture and 238 pieces of others).

– Zone C, mostly disturbed, is 64m² wide. In 2010, 4m² was excavated, with a 2.3m thick stratum, composed of lime clay, 46cm upper layer mixed with small limestone fragments (1 x 2cm). 16 stone tools, 7 pieces of the Da But pottery, and some animal bones were found. The lower layer is 158cm thick, containing 6 x 10cm pieces of stones, with no cultural remains.

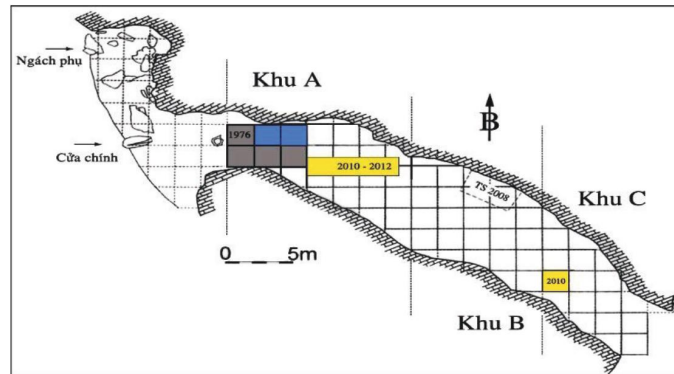


Figure 2. Cave plan and location of excavation holes (Source: Nguyen Khac Su 2014)

This article presents the results of two excavations and studies of Con Moong Cave, in 1976 and in 2008 - 2014. It also outlines the residential history of successive prehistoric communities from 74,000 BP to 7,000 BP through a 10.14m thick stratum. It thereby underscores the prominent cultural and historical significance of Con Moong Cave in a broader context, emphasizing the need for safeguarding practices and promotion of this heritage in modern time.

2. Findings

2.1. First excavation

The first excavation was in 1976, with an area of 16m², in a 3.6m thick stratum, including 9 layers, with 3 cultural layers (Nguyen Khac Su 1977: 26-35; Pham Huy Thong et al. 1990: 17-21; 2022:27-32), classified in stratum 1 and 2 (Doan, Dinh Lam & Nguyen, Khac Su 2014: 957-964).

In cultural layer I (Earliest), including layer 9 at a depth of 2.5m to

3.6m, there were graves and pebble chopping tools, typical of the Son Vi Culture which date back to 11,090±185, 11,900±70, 12,020±70, 13,110±180, 11,755±55, 11,840±75, 12,170±100, 12,350±70, 13,980±200, 16,560±40 and 19,120±50 BP. Thus, the 19,000 BP is the earliest representative of the first cultural layer of the Con Moong Cave.

Cultural layer II (Second latest) includes layers 6 and 7 at a depth of 1m to 2.5m. In addition to some Son Vi tools, most tools found belong to Hoa Binh Culture, including almond-shaped axes, disc-shaped tools, short axes, bone tools, shell tools, dating back to 9,110±60, 9,200±70, 9,380±60, 9,905±150, 10,330±70, 10,990±210, 11,240±205 and 11,830±70 BP.

Cultural layer III (Latest) includes layers 2, 3, and 4 at a depth of 1.0m down from the surface. Grinding tools and axes with ground blades of the Son Culture were unearthed, dating back to

10,660±145, 9,840 ± 175, 9,510±60 and 8,500±60 BP.

In these cultural layers, stone tools made up an overwhelming majority whereas bone tools and mussel shells only constituted a tiny minority. The stone tools were all made from cobblestone in situ, with a selective choice of shapes and materials to serve some particular functions (Nguyen Ngoc Truong & Nguyen Khac Su 2009: 60-71). Technically, the stone tools in the cultural layer I often retain most of their natural pebble shells, which act as natural "sharpeners", suitable for making choppers and cutting tools or making bamboo and wooden wares. In culture layers II and III, the bifacial flaking technique appeared, with small and regular flaking marks, creating shaping tools such as almond axes, short axes, and disc-shaped scrapers and notably was the technique of sharpening the blade of ax-shaped tools. The stone tool-making technique in these two layers was found to depend less on the original shape of the pebble; rather they showcased more highly specified functions of tools and a better focus on bifacial flaking and blade sharpening techniques compared to the previous era.

Traces of kitchens were in all 3 cultural layers, with one found in cultural layer I, 5 in cultural layer 2, and 7 in cultural layer 3, having an average diameter of 3-4m, 2m and 1m respectively. The increase in the

number of kitchens of increasingly smaller size indicates a shift from large to smaller families of the same bloodline in the community structure.

In culture layer II, a depth of 2,2m, a tomb was discovered, located close to the rock cave wall, the dead person was buried in a lying position on one side, legs bent to the chest. Funeral items placed near the skull are pestle, grinding table and mussel shell; another clam shell with an ocher stain inside was placed near the limb bone. In cultural layer I, depth of 3.6m, found graves of 3 individuals. All 3 individuals are buried on their side, legs bent to the chest and covered with ocher. Burial items are the pestle and grinding table. The human remains in this grave are all broken, making it difficult to determine race, gender and age. This ethnic composition may be *Australoid* or *Melanesien* (Nguyen Lan Cuong 2009: 32-39).

Inhabitants in the cultural layers I and II hunted animals such as monkeys, squirrels, mice, badgers, dogs, cockles, rhinoceroses, wild boars, deer, roe deer, cows, deer goose, pheasant, baba, turtle, crab, fish; collected species such as mountain snails, stream snails, mussels, conifers, or nuts such as black fillings (*Canarium nigrum* Engler), tea fruits (*Thea* sp.) (Vu The Long 1977: 19-23). Analysis of the pollen spores showed that in the cultural layer I, there were spores from plants of the ferns and needles families, while in

layers II and III, the majority came from the pollen of tall wooden plants with a wide canopy, ones the thrived in cool and humid weather, herbaceous plants, or shrubs. This indicates an airy landscape of the Con Moong Cave back then. Notably found in cultural layer III was pollen from plants of the legume family (Leguminosae), salted vegetables (Chenopodiaceae), coffee (Rubiaceae), chrysanthemum (Compositae), grass (Poaceae) and rice (*Oryza sativa*), serving as evidence for the genesis of crop farming (Hoang Van Du & Nguyen Duc Tung 1977: 17-18; Nguyen Thi Mai Huong & Pham Van Hai, 2009: 24-31).

The analysis of 132 Magnetic Susceptibility samples in the 3.6m

Heavy rain, increased humidity, and expanded rainforest enabled the mountain snails (*Cyclophorus* sp.), stream snails (*Antimelania costula*), and bivalves to grow rapidly. These were also the food source brought to the cave by Hoa Binh people who then left the shells piling up in a depth of 3-5m in Con Moong Cave as well as other caves with alternating layers of shells from mountain and stream snails, suggesting seasonal habitation. The cold climate with heavy rains was among the reasons why most Hoa Binh people in Vietnam and Southeast Asia in the Early Holocene period settled in caves and exploited seasonal mollusks (Nguyen Khac Su 2016: 64-73).

thick stratum indicated that from 19,000 to 7,000 BP, there were 3 alternating climate patterns: hot, cold and cool; There was a sudden cold period from 12,900 to 11,500 BP (Luu Thi Phuong Lan et al. 2009: 51-52), nearly in tandem with the Younger Dryas phenomenon (Younger Dryas) on a global scale from 12,900 to 11,700 BP) (Walker et al. 2009: 3-17). During the period from 11,400 to 8,800 BP, there was sedimentary deposition in some other caves in Northern Vietnam with the volume 10 times more than that in the preceding and following periods; this suggested a prolonged rain season with much higher frequency during this period (Luu Thi Phuong Lan et al. 2009: 410-417).

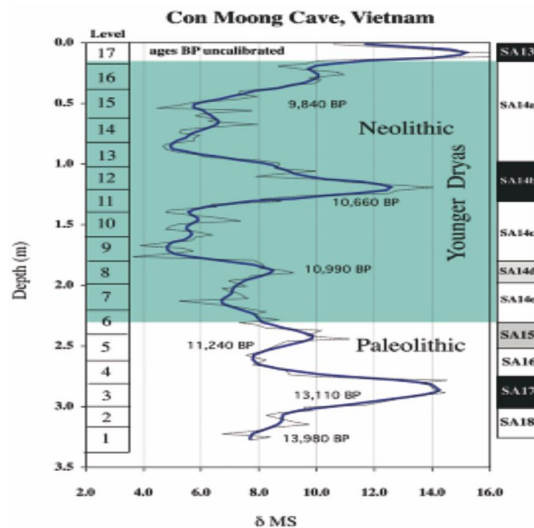


Figure 5. Sectional division of Con Moong Cave (Source: Luu Thi Phuong Lan et al. 2009)

2.2. The second excavation

The second excavation (from 2008 to 2014) surveyed zones B and C, excavating the 2nd cavity spanning an area of 14m², at a depth of 3.6m to 10.14m. The stratigraphy of this excavation cavity has been confirmed with 3 stratigraphic sets, namely 3, 4 and 5, with 20 samples dated by C14 Radiocarbon and Optically Stimulated Luminescence (OSL) methods which yielded dates ranging from 74,000 BP to 20,000 BP (Conor McAdams et al. 2019:1-26) (Figure 3). Basically, these dates are consistent with the sequence of early and late evolution of the stratigraphic sets (Doan Dinh Lam & Nguyen Khac Su 2014:957-964) and the palaeomagnetic variation from 3.6m to 10.14m (Luu Thi Phuong Lan 2013). More specifically:

The analysis of the Magnetic Susceptibility shows shifts in climate patterns from cold to hot, or hot to cold or to humid weather.

The stratigraphic set 4, including layers 5 and 6 (depth 5.05m - 6.8m), has OSL ages of $42,000 \pm 2,600$ BP, $42,200 \pm 3,300$, $45,400 \pm 3,700$ and $51,300 \pm 5,200$ BP. The analysis of the Magnetic Susceptibility shows that this period experienced warmer climate but there was a shift from cold to hot and back to cool pattern. In addition to animal bones, mountain snails only appeared from layer 5, and were all in crumbs. This depth witnessed a near absence of

The 3rd stratigraphic set, including layers 3 and 4, at a depth of 3.6m to 5.05m has C14 dates of 21,050 - 20,610 BP from charcoal, 20,500 - 20,100 BP from mollusk shells; has charcoal dates of 22,030 - 21,550 BP; and has OSL dates of $24,700 \pm 1,600$ BP, $30,800 \pm 1,700$, $36,000 \pm 1,900$ BP and $40,300 \pm 3,300$ BP. In this stratum, there were 61 stone tools, most of them small in size, made from andesite, diabase, a little quartz, quartzite and limestone (limestone) and identified as choppers, chopping tools, axe-shaped chopping tools, pestles, grinding tables, flake tools such as scrapers, burins, and pointed tips. There were not many bone tools, and the tools often had sharp points; knives were often made from bone fragments, or deer horns. This cultural period dates back further than Pre-Hoainhian and Pre-Sonvinian.

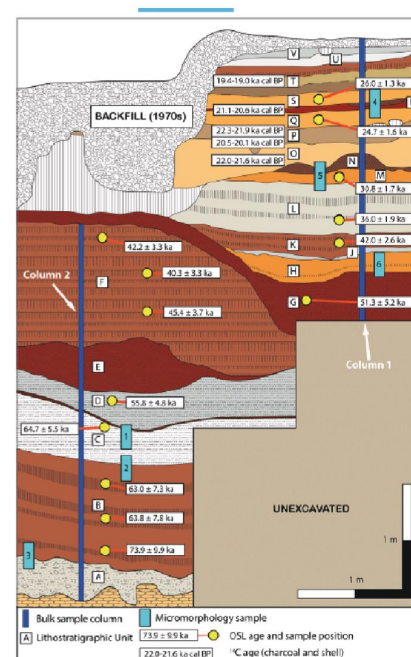


Figure 3. Stratigraphic dating of Con Moong Cave from 3.6 to 10.14m

cobblestone tools and a dominating presence of flake tools, made from quartz or from andesite, diabase, or basalt. The flake tools include peelers, scrapers, carving knives (burin) and amorphous pointed tips. Notably, there were peeling and cutting tools made from bones of rhinoceros.

10.14m (Source: Conor McAdams et al. 2019)

The 5th stratigraphic set, at a depth of 6.8m - 10.14m, including layers 7, 8, 9 and 10 have OSL dates of $55,800 \pm 4,800$, $64,700 \pm 5,500$, $63,000 \pm 7,300$, $63,800 \pm 7,800$ and $73,900 \pm 9,900$ BP. The Magnetic Susceptibility analysis shows that this was a cold period, with peaks found in layers 8 and 9 with no relics found, while in the warmer layers 7 and 10, there were stone tools, all made of quartz and small in size; they included scrapers, pointed tips, and carving knives (Nguyen Khac Su 2014; Kandyba A.V. et al 2020: 45–56; Nguyen Khac Su 2019: 78-88). This is also consistent with the results of geochemical analysis of cave sediments which showed that in cultural layers in the age range from $51,300 \pm 5,200$ to $73,900 \pm 9,900$ BP, sediments were subject to extensive physical deformation and magnetic changes under very humid conditions, leading to less frequent habitation, but after $51,300 \pm 5,200$ BP when the cave environment was drier, human habitation was more frequent (Conor McAdams et al., 2019).

3. New insights

3.1. A glimpse into prehistoric habitation

The Con Moong Cave archeological site is a stark example of cave-dwelling and traditions of, using land and karst forest from 74,000 to 7,000 BP.

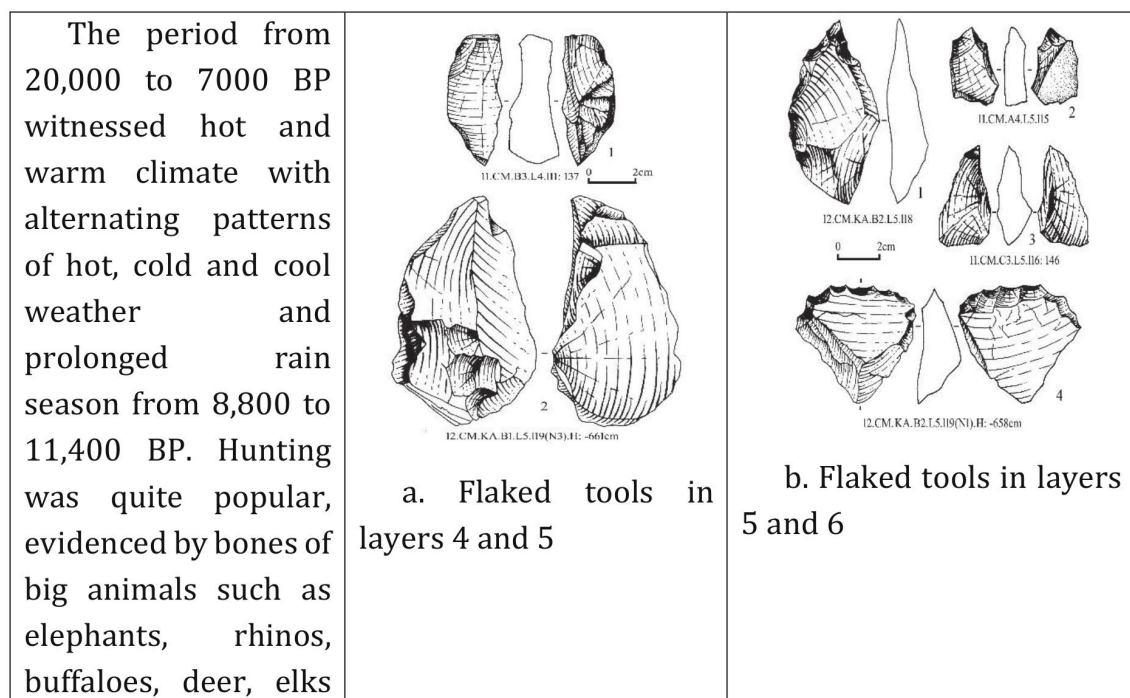
Manifested in the cultural relics at Con Moong Cave are the traditions of cave-dwelling, of making and using stone tools with a change in form and technique, from flake tools to pebbles tools and changes in human cultural behavior during the fluctuations in the paleoclimatology and surrounding natural environment, from the Pleistocene to the Holocene, especially from the last Ice Age (25,000 BP) to the Middle Holocene (7,000 BP).

The humans' presence in Con Moong Cave was as early as 74,000 BP. From then until 51,000 BP, their habitation was less frequent. In the strata of this period, traces of animal bones and mollusk shells were nowhere to be found, and there were only very few quartz tools. This is the period when the cave sediments were

still wet; the climate was cold and extremely cold. In Tham Om Cave (Nghe An) dating from 70,000 - 60,000 BP, fossil fauna and fragmented quartz tools were found (Nguyen Khac Su 2015: 3-17).

From 51,000 to 40,000 BP, when it got warmer, the cave floor was dry, and people began to reside regularly in the cave. A new tool-making technique came into being with most tools made from quartz or from andersite, and a handful made from limestone (limestone) to create shapes such as scrapers, bruins, and pointed bits. The inhabitants of this time began to hunt animals; even rhinos were brought to the cave for food, and their bones were made into tools. However, catching snails was not a practice at this time possibly because mountain snails and stream snails had not appeared in the area.

From 40,000 to 20,000 BP, the climate was hot and warm, and the inhabitants of Con Moong cave clustered in the northwest of the cave. In addition to hunting animals, in around 30,000 BP, inhabitants of Con Moong began to collect mountain snails (*Cycloporus* sp.), and around 20,000 BP there were stream snails (*Melania* sp.), mussels, conifers, whose shells piled up to a thickness of over 3.0 m. Due to frequent habitation of humans and their constant trampling, the mollusk shells were often crushed. During this period, people began to collect and make tools from pebbles taken from rivers and streams. The cobblestone tools were often small in size and less refined than Nguom flaking tools (Thai Nguyen) (Ha Van Tan 1986: 3-10).



and wild boars being found. Frequent rainfall and high humidity helped molluscs thrive, making them the major food source of people. In the stratum, there were alternating layers of mountain snails and stream snails, indicating humans' inhabitation and exploitation of seasonal molluscs.		
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At this time, there were mainly pebble tools, pebble choppers, and large-sized flake tools, larger than those of the previous period. There was a shift in the form of tools from Sonvian and Pre-Hoabinhian to Hoabinhian and post-Hoabinhian tools. Especially notable was the appearance of full-size axes and rope pottery of the Da But Culture.

After 7,000 BP, the rain decreased markedly; the sea level began to rise, and a coastal plain was formed. New resources from the delta and the sea began to attract people to leave the cave, migrating to the lowland, occupying the coastal delta and establishing Middle Neolithic cultures such as - Cai Beo (Quang Ninh and Hai Phong Provinces), Da But (Thanh Hoa

and Ninh Binh Provinces), Quynh Van (Nghe An and Ha Tinh Provinces). These are the first prehistoric marine cultures in Vietnam.

Da But people occupied the Ma river delta when it was still in formation. At first, they went to the foot of the mountain, exploiting freshwater mollusks in the estuary, piling them into mussel dunes in Vinh Loc District around 7,000 BP. They then spread to other sites such as Con Co Ngua (5,500), Lang Cong, Ban Thuy (5,000 - 4,500 BP), and Go Trung (4,500 - 4,000 BP). In the Tam Diep area (Ninh Binh Province), Da But people dwelled in caves such as Sao Cave, Oc Cave, Mo Cave, Co Cave, or outdoor site like Dong Vuon (Ninh Binh Province).

It is safe to say that the Da But people made a great revolution by abandoning caves, and karst forests to settle in the open areas, exploring plains still in formation and exploiting the sea soon afterwards. Here, they had the conditions to develop agriculture, make pottery, and make contact with

equivalent communities. The closeness between pottery and blade axes between the upper layer of Con Moong Cave and the Da But Cultural relics is indicative of the role ancient inhabitants in the Cuc Phuong National Park played in the establishment of the Da But Culture.

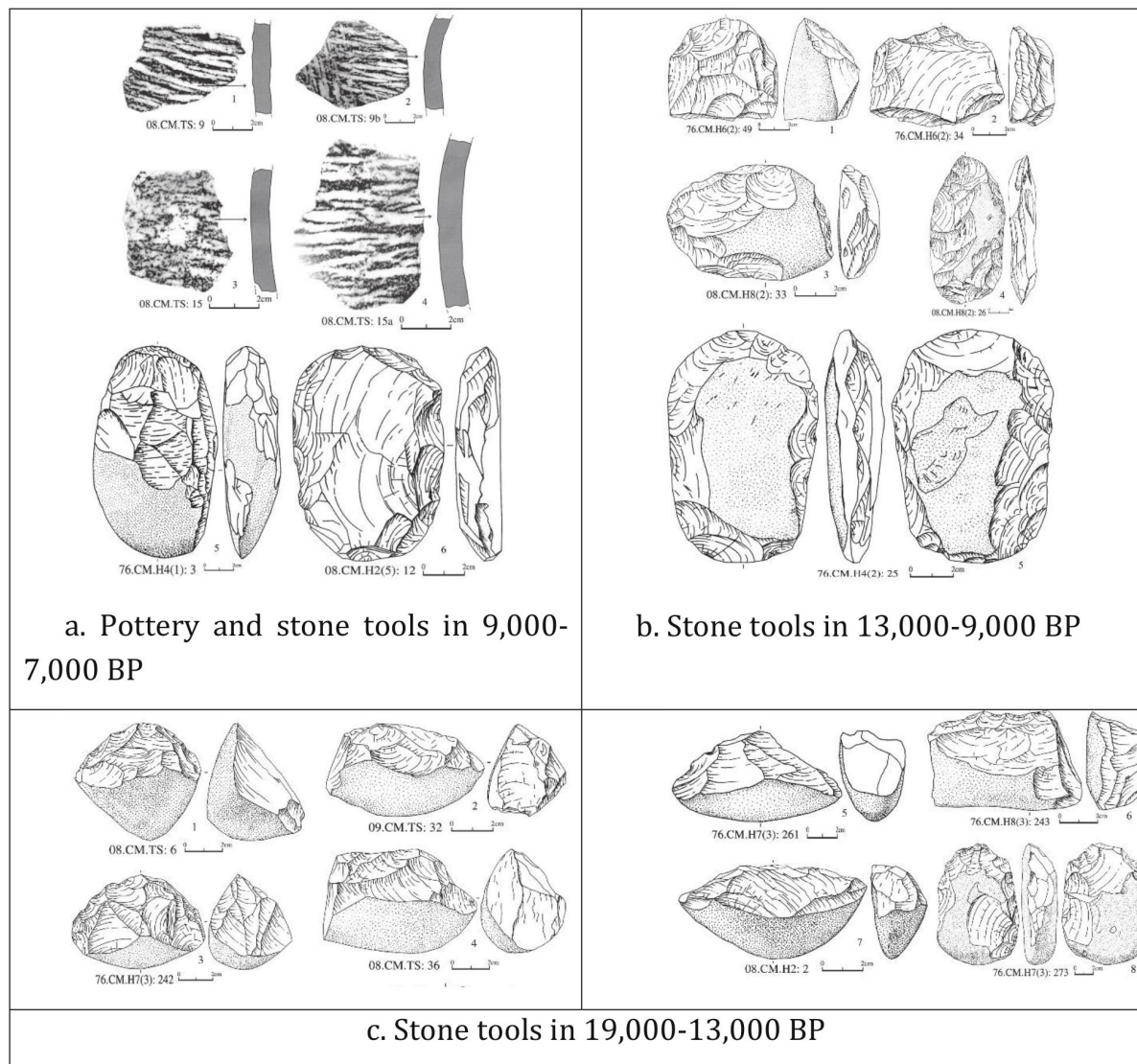


Figure 5. Pottery and stone tools of Con Moong Cave (Source: Nguyen Khac Su 2014)


3.2. Con Moong Cave in the context of Vietnamese and regional prehistory

3.2.1. In the context of the Prehistoric Cuc Phuong National Park

Excavation materials of Con Moong Cave and its strata are key to the understanding of the historical and cultural development of Cuc Phuong National Park, as well as Vietnam and Southeast Asia.

Cuc Phuong National Park covers an area of 23,000 hectares, a conservation area for diverse flora and fauna genetic resources of Vietnam. There are 2,234 plant species belonging to 931 genera, and 231

families, including 118 rare species, 11 endemic species, 443 species with medicinal properties, 229 edible species, 240 species for dyes, and 137 for tannin. The diversity of fauna here is made up of 669 vertebrate species, belonging to 120 families, and 35 orders; 138 mammal species, 337 bird species, 80 reptile species, 48 amphibians, and 66 species of fish. Among the notable invertebrates with their shells found in colossal amounts were mountain snails and stream snails which have been the food source for residents since 30,000 BP.

<p>Cuc Phuong National Park is home to prehistoric sites such as: Con Moong, Mang Chieng, Diem Cave, Lai Cave, Moc Long Cave, Moc Long Rockshelter, Dang Cave and Bo Giao Cave. Con Moong Cave emerges as the most ancient relic, being the “central village” with some satellite villages in close contact; together,</p>	 <p>Figure 6. Archaeological sites: 1. Con Moong, 2. Lai Cave, 3. Moc Long cave, 4. Moc Long Rockshelter, 5. Dang Cave, 6. Ly Chun Cave, 7. Bo Giao Cave, 8. Mang Chieng Cave, 9. Diem Cave. Scenic caves: 10. Nui Thanh Cave, 11. Chuong Bo Cave, 12. Chua Cave, 13. Nuoc Cave, 14. Tinh Yeu Cave, 15. Rop Cave, 16. Vui Xuan Cave, 17. Doi Cave, 18. Moc Long Cave (Source: Nguyen Khac Su 2014)</p>
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they formed a prehistoric community (Nguyen Khac Su 2014) (Figure 6).	
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The first inhabitants deviated from Con Moong Cave between 20,000 and 13,000 BP with relics found in the oldest cultural layer in Mang Chieng Cave. At this site, structural sediments from soil strata were in lateritization; mountain snail shells were found carbonated, animal bones were almost fossilized. Also common at this site were coarse pebble tools, small in size, typical of Sonvinian and Pre-Hoabinhian cultures. (Nguyen Gia Doi et al. 2016: 9-21).

Cultural vestiges of the period 13,000 to 9,000 BP were found in the lower layer of Doi Cave (Le Hai Dang et al. 2015: 39-47), the lower layer of Lai Cave (Phan Thanh Toan 2009: 53-59) and the middle layer of Mang Chiêng Cave, where traditional pebble tools and typical Hoabinhian tools such as almond-shaped axes, disc-shaped tools, short axes, and bone tools deposited. In Doi Cave, the dead were buried at the residence, curled up on one side, dating 11,240 BP.

In the period of 9,000 - 7,000 BP, along with the upper layer of Con Moong Cave are Mang Chiêng (upper layer), Lai Cave (upper layer), Doi Cave (upper layer) with other relics such as Moc Long Cave, Moc Long Rockshelter

and Dang Cave. Some prehistoric inhabitants continued to reside here such as Dang Cave dating 6,500 BP. In addition to a few Hoabinhian tools, these inhabitants invented edge-ground polished axes, body polished axes or wholly polished axes, bone tools, mussel shell tools, and rope pottery. At sites such as Moc Long Cave, the graves were encircled by stones, lined with coal or shells underneath, sprinkled with ocher; there were also graves with the dead buried curled up on one side like at Lai Cave, and at a few others, bones were crushed and coned into near-circular piles.

Con Moong Cave and surrounding archaeological sites are in the biodiversity area of Cuc Phuong National Park (Truong Van Bich et al., 2009:14-23); they were closely related in terms of economic development and social structuring (Nguyen Khac Su 1983: 8-21). This complex of relics deserves to be a unique cultural heritage of Vietnam (Nguyen Khac Su 2008: 69-72; 2009:40-53).

3.2.2. In the context of the Prehistoric techniques in Vietnam and region

In Vietnam as well as some Southeast Asian and South China countries, there were pebble tool and

flake tool techniques. The evolution of stone processing techniques on the strata of Con Moong Cave will shed light on the cultural process of Vietnam in particular and of the region in general.

With respect to flake tool technique, the refined flake tool technique in the Late Neolithic was found in maritime Southeast Asia, mainland Southeast Asia, and South China. The small flake tool technique with marks of refinement in mainland Southeast Asia was found in Vietnam with the Nguom technique, dating from 40,000 to 23,000 BP (Ha Van Tan 1986: 3-10), in Thailand with the Lang Rongrien Rockshelter, 37,000 - 27,000 BP (Anderson 1990: 67-73), in Guangxi, China as Bailian Cave, 37,000 - 28,000 BP (Bai Lien 1978: 143-160) and Gia Khoai Tung, dating from 30,000 years - 13,000 years BP. Typically in maritime Southeast Asia there was Tabon Cave (Philippines) with an age from 30,500±1,000 to 23,200±1,000 BP (Fox, 1970).

The Con Moong flake tool technique is different and dates back further than the aforementioned. It is made up of scraping tools with pointed pits and carving knives made of quartz between 74,000 and 51,000 BP; and later, of andesite, diabaz, and limestone between 51,000 and 40,000 BP.

Referring to Vietnam and Southeast Asia's pebble tool technique, it is usually thought to Sonvian (Ha Van Tan

et al. 1998) and Hoabinhian (Colani 1927; *Praehistorica Asiae Orientalis* 1932 : 3-15, W.G.Solheim II 1972: 34-41; Hoang Xuan Chinh 1989; Nguyen Khac Su 2012: 21-37). The imprints of these two cultures in Con Moong Cave were the most noticeable from 20,000 to 7,000 BP, witnessing the transition from the Late Pleistocene to the Early Holocene, and a move away from the unifacial flaking technique with end - chopper, side - chopper, quarter pebble, and retouched flakes and towards bifacial flaking technique with the advent of trimmed tools such as almond-shaped axes, long axes, short axes, dish-shaped tools and sharpening axes edge-ground polished axes; a transition from hunter-gatherer activities to primitive farming could also be found.

The change is also transparent in the cluster of relics in Trang An (Ninh Binh Province) before the sea, from 32,000 to 9,000 BP, including the relics of Trong Cave, Boi Cave, Moi Cave (Lower layer), Ong Hay Rockshelter, Thung Binh Cave 1 and 3, and Vang Rockshelter (Lower layer) with inhabitants residing in mainland. From 9,000 to 4,000 BP, this group of inhabitants lived in the marine environment, such as in the relics of Oc Cave, Vang Rock Rockshelter (upper layer), Moi Cave (upper layer), and Thung Binh Cave 2 and 4; they exploited food on land and at sea. On the surface layer of Con Moong Cave and Doi Cave, dating back to 7,000 BP,

only sea clam shells (*Meretrix*) could be found (Dang Ngoc Thanh 1977:18).

Thick, coarse potteries were hand-formed with a stone board typically in the shape of a vertical crucible; the outer coat has wide smooth overlapping grooves, and they were found in Con Moong Cave, in the Da But culture and some early Trang An relics. In Trang An, coarse Da But-styled pottery found in layer 6A of Moi Cave is dated to 7,381 BC, in the Vang Rochshelter is 8720±235BP and in Oc Cave is 8,732 BC (Nguyen Khac Su 2012: 21-37). In Sao Cave, a site of Da But Culture, potteries dating from 9,060±125 BP and 9,170±105 BP (Nguyen Quang Mien & Trinh Hoang Hiep 2008: 136-137) were also found.

Pottery making here came into being in tandem with the exploitation of sea mollusks and has the earliest date in Southeast Asia. Pottery in Con Moong - Da But - Trang An area has high consistency in materials, techniques, types, and decorative patterns. There stands a chance that this is an independent pottery making center, dating back furthest in Southeast Asia.

The pebble tool technique outside Vietnam is also found in Moh Khiew Cave (Thailand), a relic dating back 35,000 BP, after the flake tool technique (Pookajorn, 1991), or in the Great Niah Cave (Indonesia) excavated in 1967 (Harrison 1967: 70-96), including 6 levels with 4 lower levels

comparable to the Con Moong Cave. Level I (oldest) at a depth of less than 2.54m, flake tools in Soanian Paleolithic (India) were unearthed; level II at a depth of 2.44-2.54m, was the presence of chopper, chopping, some flakes and bone tools. At the bottom of this level lies *Homo sapiens* skulls dated 41,500 ± 1,000 BP and 39,100 ± 1,000 BP. Level III at a depth of 1.07-2.44m, dated 32,630±700 BP, there were flakes, pebble tools, and bone spikes, and graves with kneeling burial styles, dated 19,500±190 BP. Level IV at a depth of 0.61-1.07 had Sumatralith tools and edge - ground polished axes dated 11,030±280 BP and 10,110±300 BP, equivalent to the Hoabinhian period. Levels V and VI belong to the Holocene period. The Niah Cave stratigraphy also shows that the Pre-Hoabinhian and Hoabinhian belonged to the pebble tool technique, which was after the flake tool technique of the Late Pleistocene.

Variations in the Hoa Binh Culture can be found in mainland Southeast Asia, such as in Northern Thailand, Upper Burma, and Upper Laos, where while mollusk shells were rare in caves, thick Sumatralith tools, and disc tools, axes and short, rough chopping tools were quite common. As for the Hoa Binh relics in maritime Southeast Asia such as in West Malaysia and in Northeastern Sumatra, the most commonly found were coastal shells, thin Sumatralith tools and bifacial tools

whereas short axes and rough tools were rarely spotted.

Among the Neolithic relics in South China, Tang Bi Nham cave (Guilin, Guangxi Province) is considered an early and typical Neolithic site in the South China region, dating from 12,000-7,000 BC (Guangxi Zhuang Autonomous Region Cultural Affairs Team, 1976:175-179). The cave has a 3m thick stratum with fire stoves, graves, animal remains, and other types of stones, bones, and mussel shells. The grave here was found with the dead buried either in sitting posture with knees curled up or curling up on side; some skulls were pierced and stained with ocher; burial utensils include cutting shell tools. These skulls belong to Mongoloids and also have Australo-Negroid elements. Animal composition and mollusks characterize the Early Holocene. From 12,000 to 7,000 BP, there are 5 levels of development here: the replacement of pebble tools by trimmed tools, full body grinding axes, the improvement of pottery and a shift from hunter-gatherer activities to primitive agriculture.

In summary, Con Moong Cave is representative of the development from flaking tool technique to small-sized pebble tool technique. The most notable issue is the change from mono-facial to bifacial tool grinding technique, from a few rough strokes on one edge of the cobblestone, creating a

large angle of the blade to multiple smaller strokes all around the cobblestone, with stable ridges and small blades. There were also fewer incomplete tools and more multi-functional and specialized tools as well as a shift from grinding to sharpening ax-shaped chopping tools. The tendency to perfect the pebbles themselves, maintain whole pebble tools, and move away from flake tools after the Holocene is a developmental characteristic of the Vietnamese pebble technique that thrives in the Con Moong Cave.

4. Conclusion

The excavation of Con Moong Cave has yielded a benchmark stratigraphy of prehistoric cultural processes, of the compatibility between humans and the environment, of the structural system of the community from Paleolithic to Neolithic with the migration process from Con Moong Cave to a system of surrounding caves, such as Lai Cave, Mang Chieng Cave, Moc Long Cave, Moc Long rockshelter, Diem Cave, and Dang Cave, one that is closely associated with the landscape of the karst area and the biodiversity of Cuc Phuong National Park. This is a crucial source of historical material to compile the primitive history of Vietnam in the pivotal period from Paleolithic to the Neolithic, from monopolistic hunter-gatherers to primitive agriculture.

The results of the excavation and studies of Con Moong Cave and

surrounding relics has yielded a wealth of knowledge, contributing to understanding the habitation patterns, food exploitation strategies, and cultural behaviors of people through tool making techniques, exploring the culture and behavior of people through their graves and other activities. The geo-archaeological approach yields more credible evidence about human activities associated with the fluctuations of the regional environment, which provides a view of the past structural change, the changes in the local landscape, changes in flora and fauna over time, and cultural relationships between human communities over the expanse of space and time in prehistory.

The archaeological evidence at Con Moong Cave has provided us with important information about lost environments, evolutionary history, and diversity, as well as how humans adapted from 74,000 to 7,000 BP, especially during the last period of the most severe Ice age in the Old Continent. Such unambiguous findings of ancient flora and fauna and close associations with archeological and ancient environmental evidence are uncommon in Vietnam and Southeast Asia. And, in this case, Con Moong Cave is a prominent cultural heritage that should be recognized from a scientific perspective as a typical chain in North Vietnam and Southeast Asia.

The limestone mountain area of the Cuc Phuong National Park is also one of the few places where the heritages still have many of their original features intact (in situ), almost unaffected by humans, animals, and the environment and other factors. Con Moong Cave and the system of relics in the biodiverse Cuc Phuong area merit filing for UNESCO recognition.

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