Bắc Sơn Culture: New Research Findings

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Abstract: The research and analysis of the Bacsonian (the Bắc Sơn culture) sites and artefacts in the northeast mountainous regions, as well as other different sub-regions, show that there are particular features relating to specific locations and periods, in addition to the general and key characteristics of the Bắc Sơn culture. The Bắc Sơn culture is determined to date back to a period from 12,000 to 5,000 BP. A majority of the Bacsonian sites belong to the Early Neolithic, while the rest belong to the Middle Neolithic. The Bắc Sơn culture was created independently and has different origins to the Hòa Bình culture. Owners of the Bắc Sơn culture resided in and exploited the northeast mountainous region before the Hoabinhian people moved there. However, this is just a hypothesis that should be proved by more evidence, especially results of absolute dating.

Keywords: New research findings, Bắc Sơn culture, Hòa Bình culture.

Subject classification: Archaeology

1. Introduction

The most outstanding culture of the northeast mountainous region of Vietnam is known as the Bắc Sơn culture, of which 51 archaeological sites were discovered before 2000. These are mainly in the Bắc Sơn bow-shaped limestone areas in Lạng Sơn and Thái Nguyên Provinces (Hà Hữu Nga, 2001, pp.183-197). 23 other Bacsonian sites, including two in Hà Giang Province, seven in Cao Bằng Province, nine in Thái Nguyên Province, two in Lạng Sơn Province, two in Bắc Kạn Province, and one in Tuyên Quang Province, have been discovered since 2000 (Map 1). All the Bắc Sơn culture archaeological sites are located in caves; none are open-air sites. Of the above-mentioned 23 sites, six were excavated in Pắc Tà and Nà Chảo Caves (Hà Giang Province), Ốc Cave (Thái Nguyên Province), Ngườm Vài Cave (Cao Bằng Province), Nà Mò Cave (Bắc Kạn Province), and Thẩm Vài Cave (Tuyên Quang Province). Pilot excavations were carried out in 11 sites, including Ngườm Càng, Ngườm Bốc, Thần, and Ngườm Cắng Caves (Cao Bằng Province), Kim Sơn, Đán Mèo, Con Hổ, Thần, and Thủng Caves (Thái Nguyên Province), Thẩm Cave (Bắc Kạn

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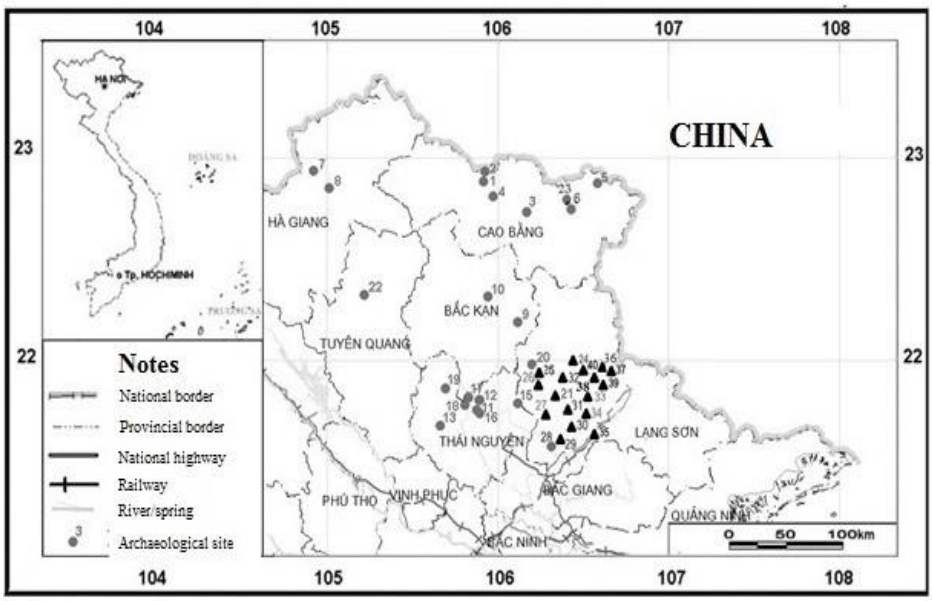
Province), and Nà Khuyên Cave (Lạng Sơn Province). The remaining six caves have only had surface surveys carried out. Based on the research works carried out since 2000, this paper presents findings on the Bắc Sơn culture.

Map 1: Map of Major Sites of Bắc Sơn Culture (2018)



NOTES: ▲The sites discovered before 2000 ; ● The sites discovered from 2000 to 2017

1. Ngườm Vài Cave;	11. Ốc Cave;	21. Vô Mường;	31. Lôi Village;
2. Ngườm Càng Cave;	12. Kim Sơn Cave;	22. Thẩm Vài Cave;	32. Chúc Quán;
3. Ngườm Bốc Cave;	13. Nà Vật Cave;	23. Sa Bóng Cave;	33. Ràng Village;
4. Thần Cave;	14. Đán Mèo Cave;	24. Thẩm Khoách;	34. Bằng Mạc;
5. Ngườm Cắng Cave;	15. Phượng Hoàng Cave;	25; Tráng Village;	35. Đồng Lầy;
6. Ngườm Chiêu Cave;	16. Con Hổ (Tiger) Cave;	26. Dơi (Bat) Cave;	36. Mòn Village;
7. Pắc Tà Cave;	17. Chùa (Pagoda) Cave;	27. Nà Chè;	37. Kéo Phầy;
8. Nà Chảo Cave;	18. Thần Cave;	28. Ốc Cave;	38. Cườm Village;
9. Thẩm Cave;	19. Thùng Cave;	29. Đồng Thuộc;	39. Ngườm Bẻ Cave;
10. Nà Mò Cave;	20. Nà Khuyên Cave;	30. Minh Lê;	40. Bình Gia.

Source: Made by Nguyễn Quang Miên.

2. Characteristics of Bacsonian sites

2.1. In respect of the distribution

Since 2000, 23 Bacsonian sites have been found in the northeast mountainous region. The terrain is fairly complicated with many separate areas, mountains, and multi-layered

forests. A large number of big and small valleys together with rivers and streams nestle between limestone mountains. For the ancient people, the actual rivers and streams were sources of water, as well as plants and animals for food, aquatic species, and they yielded pebbles which were used as tools. The valleys are surrounded by limestone mountains interspersed with low hills. These were the habitats of primitive peoples.

Observing the distribution of Bacsonian sites on the map, one can realise that Bacsonian people in the northeast mountainous region had only one type of habitat which was the cave-dwelling. Statistical data shows that newly discovered Bacsonian sites are mainly located in Thái Nguyên and Cao Bằng Provinces, of which there are nine sites in each location, particularly concentrated in Võ Nhai District of Thái Nguyên Province. Some sites are found in other provinces, including Bắc Kạn (two sites), Lạng Sơn (two sites), and Tuyên Quang (one site).

Regarding the distribution of Bacsonian archaeological sites in Võ Nhai District, one should pay attention to the limestone mountain range located due southwest of the Bắc Sơn arc. This is a very inaccessible area full of obstacles with fields of rugged rock, karst valleys, and funnel-shaped "karst ponds". This was the principal area where most Bacsonian people resided.

The fieldwork survey of the terrain and the hydrographical system in the above areas shows that quite vast karst fields are found in the centre of the limestone mountains. Located along the edge of the karst fields, there are ranges of limestone mountains containing large and airy caves, where people could live comfortably. However, there are very few rivers and streams running seasonally, although the area of Thần Sa has more rivers and streams that flow more frequently.

The Bacsonian sites discovered in Cao Bằng and Bắc Kạn Provinces are mainly located in Bảo Lạc - Nguyên Bình and Ngân Sơn - Thạch An high mountains. Many rivers and streams flow through these areas, which were very important for the habitation of the Bacsonian people. The Bacsonian people in Hà Giang and Tuyên Quang Provinces mostly lived in the caves of the arched range of limestone mountains around the Gâm River, where the Hoabinhian people also lived along both sides.

The above-mentioned Bacsonian sites can be considered as the habitats of "a peripheral group of Bacsonian people", for they were located outside the Bắc Sơn mountainous range, which was the Bacsonian core area.

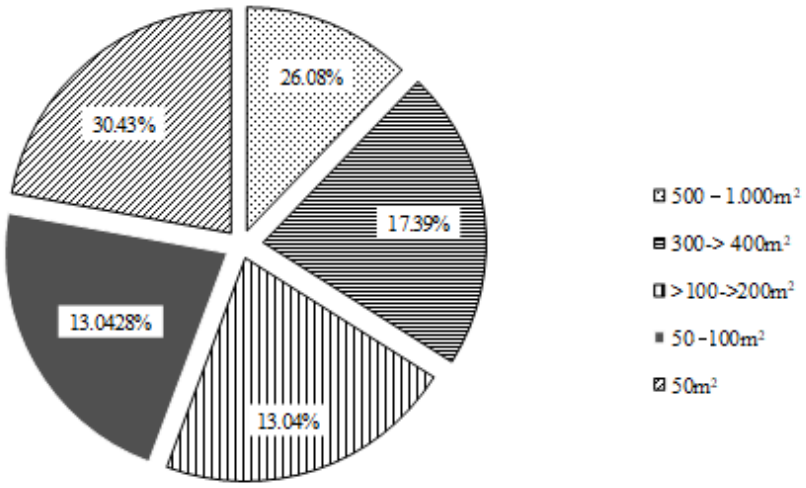
2.2. In respect of habitat

The Bacsonian people in the northeast mountainous region mostly resided in caves.

Based on the statistical data of 23 newly discovered sites, one can see that caves (where Bacsonian people lived) were medium or fairly large in size. The number of caves with

sizes ranging from 500m^2 to 1,000m^2, is six (making up 17.39%); the corresponding number of caves with sizes ranging from 100m^2 to 200m^2 is three (13.04%). Meanwhile, three (13.04%) caves range from 50m2 to 100m2 in size, and the corresponding number of caves from 15m^2 to 50m^2 is seven (30.43%) (Figure 1). This coincides with the opinion of Hà Hữu Nga, who argues that the majority of Bacsonian caves were less than 50m^2 in size (Hà Hữu Nga, 2001, p.33).

Figure 1: Size of Bacsonian Caves



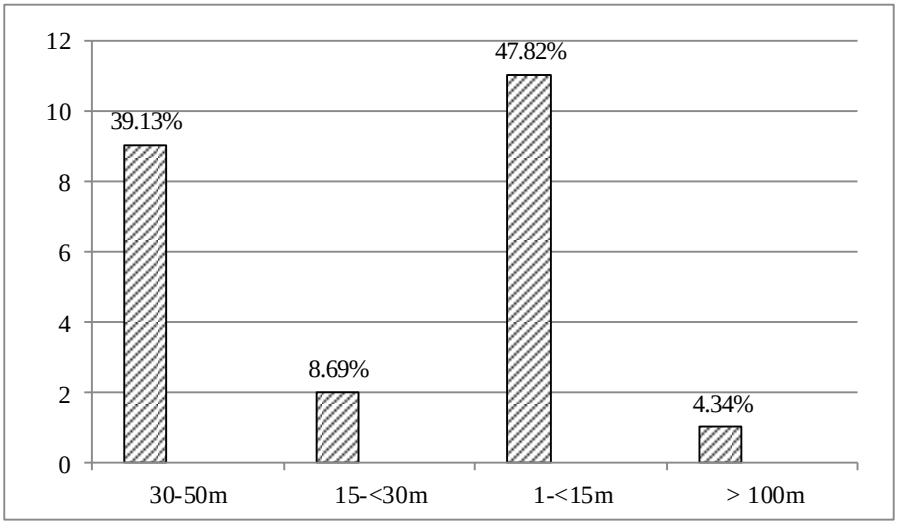
Source: Author.

The altitude of Bacsonian caves is seen as an important factor. While studying the height at which Bacsonian caves were located, Nguyễn Ngọc Mên classified them into the following height-based groups: The first: 3-7m; the second: 10-15m; the third: 20-25m; the fourth: 30-40m; and the fifth: 55-90m. He argued that most Bacsonian caves belonged to the first group (Nguyễn Ngọc Mên, 1982, pp.54-56).

According to the author's statistics, Bacsonian caves in the northeast mountainous region are at various heights[1]. 11 caves, making up 47.82%, are at a height ranging from 1m to 15m, nine (39.13%) are at a height ranging from 30m to 50m, two caves (8.69%) are at heights ranging from 15m to 30m, while only one cave (4.34%) which is Phượng Hoàng Cave, is at a height of 195m calculated from the surface of the field below (Figure 2).

[1] In the authors' research, the height of the 23 newly discovered Bacsonian sites is measured from the surface of the valley in the mountain base to the foundation of the caves.

Figure 2: Altitudes of Bacsonian Caves



Source: Author.

According to the data released by the Vietnam National Museum of History, of the 32 Bacsonian sites discovered before 1945, 16 have been described in terms of information about their height from nearby fields or valleys, 12 (making up 75%) were found at heights ranging from 1m to 15m, and the remaining four (25%) were at heights ranging from 15m to 30m (Vietnam National Museum of History, 1969, pp. 16-92). These figures are relatively similar to the authors' new research findings. Most Bacsonian caves are located in limestone mountains ranges surrounding one another. Thus, the Bacsonian people depended little on the direction the cave entrances faced. According to the author's statistics, there are four caves facing west, four facing southwest, and four caves facing northwest, while three caves facing north. Regarding those caves facing east, southeast, northeast, and south, there are two caves relating to each direction (Table 1).

Table 1: Statistics of Size, Altitude, and Direction of Bacsonian Caves (discovered since 2000 to 2020s)

No.	Site	Size	Height above ground	Entrance's direction
1	Ngườm Vài Cave (Cao Bằng Province - CB)	$400m^2$	45m	Westwards, slanted northwards at an angle of 15^0
2	Ngườm Càng Cave (CB)	$40m^2$	3m	Due west

No.	Site	Size	Height above ground	Entrance's direction
3	Ngườm Bốc Cave (CB)	300m^2	25m	Due west
4	Thần Cave (CB)	50m^2	7m	Due east
5	Ngườm Cắng Cave (CB)	400m^2	3m	Due north
6	Ngườm Chiêu Stone Roof (CB)	400m^2	50m	Due southwest
7	Sa Bỏng Cave (CB)	200m^2	30m	Northwards, slanted slightly westwards
8	Pắc Tà Cave (Hà Giang Province - HG)	> 1,000m^2	50m	Eastwards, slanted southwards at an angle of 18^0
9	Nà Chảo Cave (HG)	> 1,000m^2	3m	Due west
10	Thắm Cave (Bắc Kạn Province - BK)	400m^2	10m	Due south
11	Nà Mò Cave (BK)	500m^2	8m	Westwards, slanted northwards at an angle of 15^0
12	Ốc Cave (Thái Nguyên Province - TN)	800m^2	25m	Due north
13	Kim Sơn Cave (TN)	50m^2	3m	Due west
14	Nà Vật Cave (TN)	25m^2	2m	Westwards, slanted southwards at an angle of 15^0
15	Đán Mèo Cave (TN)	40 m^2	40m	Due east
16	Phượng Hoàng (*Phoenix*) Cave (TN)	> 1,000m^2	195m	Due southeast
17	Con Hổ (*Tiger*) Cave (TN)	160m^2	1m	Due southwest
18	Chùa (*Pagoda*) Cave (TN)	40m^2	50m	Due northeast
19	Thần (*Deity)* Cave (TN)	15m^2	1m	Due northeast
20	Thùng (*Holed)* Cave (TN)	20m^2	50m	Due northwest
21	Nà Khuyên Cave (Lạng Sơn Province - LS)	40m^2	5m	Due north
22	Ngườm Bẻ Cave (LS)	50m^2	50m	Due south
23	Thẩm Vài (Tuyên Quang Province)	1,000m^2	40m	Southwards, slanted westwards at an angle of 10^0

Source: Author.

In general, the Bacsonian people often resided in caves that appropriately faced the surrounding landscape. Perhaps the choice of cave direction was influenced by the specific terrain. In the region, a majority of rivers and streams flow in a northwest to southeast direction. Most caves facing the rivers or streams were therefore used as dwellings by the Bacsonian people.

Studying the Bacsonian sites in the Bắc Sơn limestone mountainous area, Hà Hữu Nga surmised that a particular feature of the habitation distribution of the Bacsonian people is as follows: they mainly resided in the Bắc Sơn limestone mountains; they lived in small-sized caves found at a low altitude near sources of water; the caves might face any direction, and the sites were not closely linked with one another. These features might relate to the community gathering way of life of the ancient Bacsonian people (Hà Hữu Nga, 2001, p.33).

2.3. In respect of cultural layers

Each of the Bacsonian sites has its own stratigraphic structure. The surface usually consists of loose clay-limestone soil, sometimes fully ground stone tools have been found in this layer. The subsoil usually consists of yellowish alluvial clay, which is not very solid. In some sites, the subsoil is bedrock. Most researchers maintain the subsoil dates back to the Late Pleistocene.

Based on the stratigraphic structure of the Bacsonian sites, one can see that most of them consisted merely of one cultural layer. Very few sites have yielded two or more cultural layers. There are just four sites, including Nà Vật, Cắng, Ngườm Vài, and Pắc Tà, with an additional cultural layer dating back to the Late Neolithic, or an additional cultural layer dating back to a historical period in the above layer.

The cultural layer of the Bacsonian sites is not very thick. It has a loose composition and the upper parts are often mixed together. In 10 sites, which have been excavated or surveyed with pilot bores, the thickness of the cultural layer ranges from 0.5m to 0.6m. The site with the thickest cultural layer (1.80m) is Ngườm Vài followed by Nà Mò (from 1.10m to 1.20m). The corresponding thickness of the remaining sites ranges from 0.4m to 0.7m, while some, such as Ngườm Cắng, have a thin cultural layer of only 0.2m to 0.3m in thickness. The cultural layer usually consists of clay-limestone soil mixed with freshwater mollusc shells, bones of animals, ash, and archaeological artefacts. In the Bacsonian sites, the shells of stream snails account for a large proportion, while the shells of mountainous snails make up a smaller quantity. In some sites, crab pincers, clamshells, shells of lanceolaria fruhstorferi and river mussels have been found.

Based on the Vietnam National Museum of History publication, of the 32 Bacsonian sites, eight have a cultural layer more than 2m thick and the cultural layers of four are less than 0.5m thick. Among all Bacsonian sites, however, Làng Cườm (Cườm Village) is the only one with a cultural layer ranging from 3m to 4m in thickness (Vietnam National Museum of History, 1969). This is a noticeable feature. The thickness of this cultural layer

might be related to the time of habitation, to the materials, and the impacts caused by nature and human beings.

The authors' new findings demonstrate that the Bacsonian sites in the core area of the Bắc Sơn culture have a far thicker cultural layer than those on the periphery.

2.4. In respect of kitchen relics

The statistics obtained from seven sites which have been excavated or surveyed with pilot bores reveal around 14 kitchen relics. From these one can learn about the size and the structure of the kitchens and also how the Bacsonian people used these kitchen facilities.

Often these newly discovered kitchen traces have been unearthed in a dark grey ash stratum in the cultural layers. In some sites, there are traces of one kitchen, while many traces have been found in other sites. Although the kitchen ash is not found in a big pile, it would have been scattered around in the centre or sometimes near the cave entrance. Where the kitchens have been located, snail shells, stone flakes, animal bones, including pieces of burnt bone and stone have been uncovered.

In Nà Mò Cave, the first kitchen was found at a depth of 35cm from the surface. It is an oval brick-red area 50cm x 60cm in size, firmer than the surrounding areas. Stone flakes, pebbles, mollusc shells, and some burnt bone pieces have been found. The second kitchen was discovered at a depth of 70cm, and the ash has been tightly compressed. This is an oval brick-red area, 70cm x 80cm in size with four flat-top rocks placed around the kitchen. These probably would have been used as seats by the prehistoric people. The third kitchen was found at a depth of 70cm. Here, there are no ash remains and it is a shapeless brick-red area of 50-60cm and 90-110cm in size with firmer foundations than the surrounding areas. Pieces of ceramics and mollusc shells were also discovered.

2.5. Relics of plants and animals

2.5.1. Relics of animals

Many pieces of animal bones and mollusc shells have been found in the cultural layers of some Bacsonian sites in the northeast mountains. In 1925, Mansuy found bones of pigs, buffaloes, cows, deer, rhinoceroses, and elephants. They are bones of the following species: *Tryonis; Tryonis Peguensis* grey, *Eubalus indicus; Rhynoceros of Sondaicus* courier - *Elephas* indicus*; Sus* cristatus Wadner - *Hystrix* acanthon*; Cervus* Rusa *Aristolilis* Suberistata Swhinhoe*; Cerulus* - *Ursus* tibetanus Cu*; Bos* aff B Bilos*; Macacus* menstrinus Indicus linner*;* and *Hylobatis* (Mansuy, H., 1925, p.35).

During an excavation in 1985 in Dơi (*Bat*) Cave, a typical site of the Bắc Sơn culture in Lạng Sơn Province, archaeologists found bones of *Hylobates* of concolor, *Macaca*

assamensis, *Macaca* munlata, *Macaca* nenmestrna, *Arctonyx* collaris (hog badger), *Rhinoceros, Sus scrofa* (wild boar), *Cervus, Rusa* unicolour, *Gallus* (*red junglefowl*). According to the analysis of the bone composition of these animal remains, the authors suppose that the animals found in Dơi Cave were similar to those found in the Hoabinhian and Bacsonian archaeological sites, as well as those found today in the Bắc Sơn mountainous region. The relics do not include any bones at all of the domesticated animals (Lê Văn Thuế & Vũ Thế Long, 1985, pp.48-50).

The cultural layer of an archaeological site excavated in Pắc Tà Cave in 2017 yielded teeth of 23 species of animals living in different environments, including fish, birds, snakes, turtles; large animals such as rhinoceroses, deer, boars; and small animals such as porcupines, squirrels, and Asiatic brush-tailed porcupines. There was a rich diversity of carnivorans in terms of both size and species, including the bear, the Felidae, the Mustelidae, and the Viverridae. Regarding primates, there were representatives of all families such as monkeys and Phayre's langur. Remarkably, the proportions of bone pieces found are fairly equal among the species and they do not differ greatly, unlike those found in other prehistoric archaeological sites. There were tools fashioned from limb bones and ribs of large-sized animals as well as limb bones of small-sized animals (Nguyễn Anh Tuấn et al., 2017, pp. 59-62).

The analysis of these animal bones revealed the existence of unfossilised bones of modern animal species in the Bacsonian areas. On the whole, the remains were broken and the bones would have been discarded after the meat and bone marrow had been eaten. This is evidence of hunting activity. Of the bones found, the authors did not find any domesticated animal bones. Regarding the bones discovered at the Bacsonian sites, most belonged to animals that still exist today. However, some of the animal species are probably now extinct or are in extremely scarce numbers in the Bắc Sơn limestone region such as the *Rhinoceros, Elephas* indicus, and *Bos*.

In the cultural layer of the Bacsonian sites, a common find is mollusc shells, of which most belonged to aquatic species living in rivers or streams; very few species of land animals were present. According to Mansuy, the bones found in Kéo Phầy Cave belonged to the following species: *Vivipara Mekania, Cyclophorus, Hylocistis, Hylix, Unio* and *Anodonta Corbicula* (Mansuy, H., 1925). In other Bacsonian sites, shells of *Cycylophorus fulguratus*, *Hybocystis crossei*, and *Antimelania* were also unearthed. This illustrates that the exploitation of molluscs in rivers and streams played an important role in the economic activity of the Bacsonian people (Lê Văn Thuế & Vũ Thế Long, 1985, pp.48-50; Nguyễn Anh Tuấn et al., 2017, p.59).

2.5.2. Plant relics

Not many traces of ancient plants have been discovered recently by analysing palynomorphs in the Bacsonian sites. Based on this analysis and of palynomorphs in sites

dating back to a slightly earlier period, one can trace the living paleo-environment of the dwellers at that time.

In Dơi Cave, the analysis of palynomorphs in 10 samples at depths of 0.3m to 1.8m (i.e., from the surface to the subsoil) reveals that those samples were poor in seeds and species. There is very little difference between samples retrieved from different depths. This means that the paleo-environment changed little during the pre-Bắc Sơn period (Trần Đạt & Đinh Văn Thuận, 1985, pp.50-51).

The analysis of palynomorphs in the samples from Hạ Sơn Cave II, which date back to the same or slightly earlier period of the Bắc Sơn culture, shows that these plants belonged to the period between the Pleistocene and the Holocene. They were spores of a number of species including ferns, gymnosperms (revealed seeds), and angiosperms (enclosed seeds, flowering plants). Regarding the spores of fern species, there were some genera, such as *Polypodium, Pteris, Cyathea, Sphagnum,* and *Gleichenia.* Regarding the spores of angiosperms, there were some genera and families such as *Lithoiagus, Quercus, Magnolia, Corylus, Betula, Gramineae, Araceae,* and *Ericaceae.* Regarding the spores of gymnosperms, there were *Ginkgo, Taxodium, Sequoia, Taxaceae gen,* and *Cupressaceae gen* (Nguyễn Địch Dỹ & Đinh Văn Thuận, 1981, pp.165-166).

In the 2012 excavation carried out in Ngườm Vài Cave, archaeologists discovered 448 pieces of seed coats relating to the following seeds: walnut, Mangifera foetida, canarium, Momordica cochinchinensis, peach, calabash, wild legume, pumpkin, and celtis. Remarkably, most coats of the seeds, of which the plants still exist today, were found in the mixed layers (L1-L3). Meanwhile, the coats of celtis seeds were found only at a depth of the sixth layer (L6; 70cm deep from the surface) or the lower layers (Trình Năng Chung, 2020, pp.293-294). Nguyen Viet argues that celtis was a species that grew in a dry, warm temperate or cool region; it inhabited subtropical forests at a certain altitude (Nguyen Viet, 2008, pp.80-83). The disappearance of this species in Ngườm Vài, which coincided with the rapid decline and the disappearance of *Cyclophorus* shells in the fourth, fifth and sixth layers and the appearance of species of modern plants including *Canarium,* demonstrates a change in the climate. It became hot and humid with more rain than before. This fits with the opinion of Nguyễn Thị Mai Hương who analysed palynomorphs and seed traces in some mountainous caves in the North and who supposed that the paleo-environment in the Late Pleistocene to the Early Holocene period experienced a hot and humid climate combined with the moderate one (Nguyễn Thị Mai Hương, 2018, p.15).

2.6. Grave and burial characteristics

Very few graves have been discovered. Of those that have, the most remarkable is in Nà Mò Cave. They were found between the fifth and sixth layers at depths of around 0.6m and 0.7m from the surface. A common characteristic of the Nà Mò Cave graves is

that they do not have grave boundaries. They were reinforced or covered by stone pieces. Some bone pieces of ribs and limbs were also found. However, there are no remains of any skulls, jaws, or teeth. The absence of skulls and teeth might be related to the headhunting practise that was quite common in Southeast Asia in prehistoric times. Stone tools and flakes were buried together with the dead body in graves. In Con Hổ (*Tiger*) Cave in Thái Nguyên Province, human skeleton remains were found, including the thigh, shin, calf, and feet bones of Bacsonian people. Unfortunately, these bone remains were found broken into tiny pieces making it not possible to determine the characteristics of the race (Nguyễn Đức Thắng, 2017, p.209).

In Ngườm Vài Cave (Cao Bằng Province) and Thẳm Cave (Bắc Kạn Province), a skull was found; however, there was no trace of any graves.

According to the documents published pre-2000 on the Bắc Sơn culture, graves were found in six out of 51 caves, including Thẩm Khoách, Đồng Thuộc, Kéo Phày, Khắc Kiệm, Làng Cườm, and Dơi Caves, of which Làng Cườm and Dơi Caves were the most noticeable.

During an excavation in Làng Cườm Cave in 1924, Mansuy H. and Colani M. discovered 80 to 100 pieces of human remains at depths of 0.64m to 2m. This was a collective burial site. The size and the structure of the grave are unknown. The authors described that many shells of freshwater snails of the Melania species and a biface were found in the layer of the grave. No burial traces were found below 2m; however, primitive tools and shells of *Cyclophoridae* were found thus, these collective graves perhaps dated back to the late period of Bắc Sơn culture (Mansuy, H. et Colani, M., 1925).

During the Dơi Cave excavations in 1984-1985, archaeologists discovered six graves, of which five were in Hole I at depths of 0.4m to 0.6m. Investigation of the first and the fourth graves showed the posture of how the dead bodies were buried. They were placed on one side with their legs bent and their heads facing southeast. Stone tools were buried together with the dead body. All the graves were built on an area of firm baked ground (perhaps this site used to be a kitchen) and surrounded by a stone embankment. A grave was found at a depth of 0.2m below the layer of limestone stalactite in Hole II. All remains were broken. The dead body had been buried with a Bacsonian biface placed near pieces of the skull (Nguyễn Gia Đối & Bùi Vinh, 1988, pp.12-19). In regard to the race, the ancient people in Dơi Cave have been identified as *Australoide-Mélanésien* (Nguyễn Lân Cường, 1985, pp.46-48).

3. Characteristics of Bacsonian stone artefacts

The relics found in the Bacsonian sites include stone tools, bone tools, and some ceramic pieces. These relics illustrate that a major activity of the Bacsonian people was the making and utilisation of stone tools. At present, 1,397 Bacsonian artefacts discovered by

French archaeologists in 32 archaeological sites are kept at the Vietnam National Museum of History. They are classified into five groups: 402 chipped tools (77%); 355 bifaces (25.40%); 121 pebble choppers (8.64%); 448 Bacsonian sharpening tables (*Bắc Sơn traces*) (31.63%); and 72 flakes (5.51%). Of these artefacts, Bacsonian sharpening tables, chipped tools and bifaces were typical of the Bắc Sơn culture (Vietnam National Museum of History, 1969). Characteristics of the Bacsonian artefacts discovered after 2000 will be described in a newly published book (Trình Năng Chung, 2020). The authors have chosen three collections, including those found in Ngườm Vài, Ốc, and Pắc Tà Caves, to represent the newly discovered artefacts for their comparative research with the previous findings. In total, the authors selected 2,317 stone artefacts from the three collections, specifically 1,243 from Ngườm Vài Cave, 1,519 from Ốc Cave, and 1,074 from Pắc Tà Cave (Nguyễn Trường Đông, 2018).

3.1. Materials

In the three sites, the archaeological materials found are pebbles obtained from nearby rivers or streams.

The statistics of the stone components demonstrate that three types of stone were mainly used in the three sites, as follows:

- Igneous rocks, including basalt, diabase, granite, dacite, and volcanic glass. These rocks were mainly used to make core and flake tools.

- Metamorphic rocks, including quartzite, semi-quartzite, and quartz. While quartzite and semi-quartzite rocks were used to make tools, quartz was rarely used as it could easily be broken into small pieces.

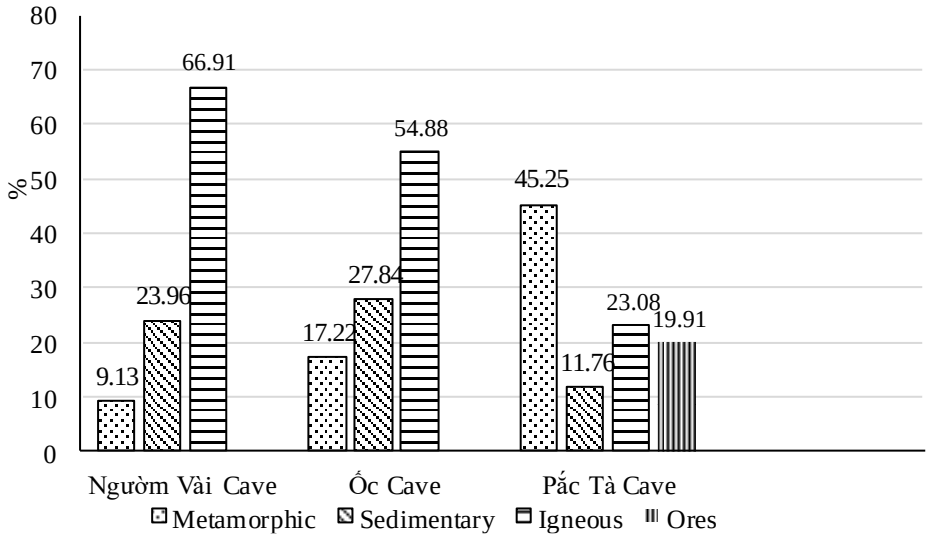
- Sedimentary rocks: most of these rocks were used to make sharpening stones, grinding pestles, and sharpening tables. The rocks were mainly composed of sand and clay mixed tightly together. Remarkably, siliceous sedimentary rocks and limestone were also used to make tools, although they made up a small proportion (Figure 3) (Nguyễn Trường Đông, 2018, pp.10-11). The authors' new research findings on the materials and the types of rocks of Bacsonian artefacts completely relates to what Hà Hữu Nga presented previously (Hà Hữu Nga, 2001, pp.48-52).

3.2. Types of artefacts

3.2.1. Broad comparison

In all three sites, including Ngườm Vài, Ốc, and Pắc Tà Caves, the following seven types of artefacts were found. However, the proportions of each were different between the three sites (Table 2).

Figure 3: Comparison of Stone Types of Artefacts in Three Archaeological Sites



Source: Nguyễn Trường Đông, 2018.

Comparing the proportions of these seven types of artefacts, one can see similarities in four types, although the proportion in each site might be higher or lower. Specifically, these four types are ranked in the following descending order: large flakes (41.74%); Sơn Vi-style traditional tools (11.30%); chipped cores and pebbles (6.45%); and, finally Hoabinhian-Bacsonian style tools (2.17%).

Table 2: Statistics of Types of Artefacts in Three Sites (Unit: %)

Type of artefacts	Ngườm Vài Cave	Ốc Cave	Pắc Tà Cave	Average
Traditional tools (Sơn Vi style)	12.07	10.01	12.1	11.30
Hoabinhian- Bacsonian style tools	1.77	0.92	3.82	2.17
Large flakes	50.6	48.16	26.44	41.74
Flakes	0.72	14.16	24.12	13.0
Chipped cores and pebbles	6.11	7.64	5.59	6.45
Ground tools and hand axes	0.48	0.99		0.49
Tool bearing the usage traces	16.73	17.19	4.1	12.67
Materials	10.06	0.92	23.83	11.60
Total (%)	98.54	99.99	100	100

Source: Author.

The differences in the proportions of specific types can be described as follows:

- The proportion of Hoabinhian-Bacsonian style tools in Pắc Tà Cave (3.82%) is double the corresponding figure in Ngườm Vài Cave (1.77%) and four times higher than that in Ốc Cave (0.92%).

- The proportion of the artefacts bearing usage traces is large in Ngườm Vài and Ốc Caves (16.73% and 17.19% respectively) but very small in Pắc Tà Cave (4.1%).

- The proportion of materials is very large in Pắc Tà Cave (23.83%) but small in Ngườm Vài Cave (10.06%) and very small in Ốc Cave (0.92%).

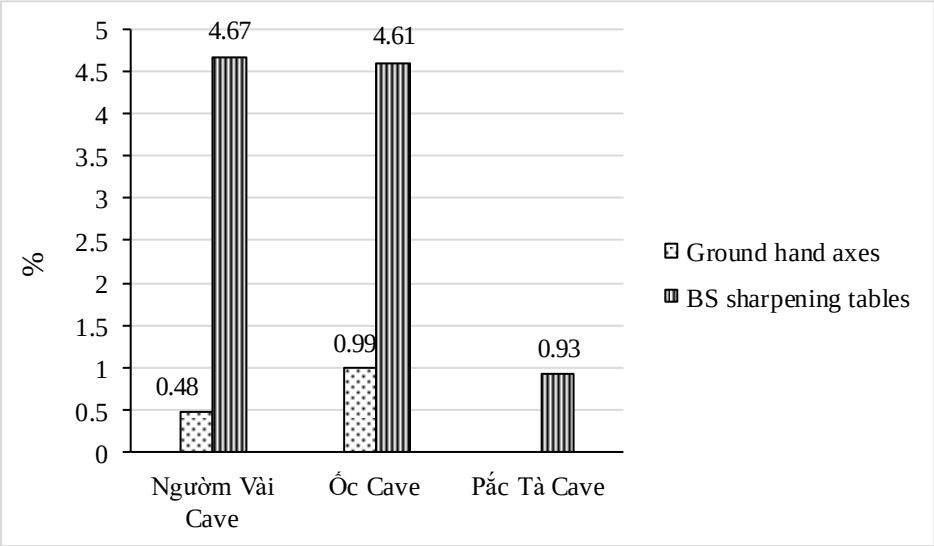
- The proportion of non-used flakes is very large in Pắc Tà Cave (24.12%), but small in Ốc Cave (14.16%) and very small in Ngườm Vài Cave (0.72%).

Other similarities and differences between the three sites can be recognised in respect of the proportions of ground hand axes and Bacsonian sharpening tables, specifically:

- The proportion of ground hand axes (0.48% and 0.99%) and that of Bacsonian sharpening tables (4.67% and 4.61%) are quite similar between the Ngườm Vài and Ốc Caves.

- Meanwhile, the proportion of Bắc Sơn sharpening tables in Pắc Tà Cave was very small and no ground hand axes were found at all (Figure 4).

Figure 4: Similarities and Differences between Three Archaeological Sites



Source: Nguyễn Trường Đông, 2018.

Based on the above-mentioned analyses, the authors make the following comments:

- The similarities in the proportions of the four types of artefacts demonstrate that the lithic technique was quite similar between the three sites.

- There was a difference in the proportions of the artefacts bearing usage traces such as grinding pestles, cupstones, Bacsonian sharpening tables, and grinding tables. This is quite common for the artefacts discovered before 2000 as well as the newly discovered ones.

3.2.2. Detailed comparison

After making detailed comparisons of traditional tools and Hoabinhian-Bacsonian style tools between three typical sites, including Ngườm Vài, Ốc, and Pắc Tà Caves, the authors came to the following conclusions:

+/ In respect of Sơn Vi-style traditional tools:

There is a similarity in some points as follows:

- In all three sites, there were tools indicative of the traditional culture such as tools with a horizontal blade (chopping tools), tools with a vertical blade (hand axes), pointed tools, pebble quarters; horse-hoof shaped tools, tools with blades at both ends, and tools with blades on three sides. The shapeless tools especially account for a high proportion.

Meanwhile, there is a difference in tools types as follows:

- Regarding pointed tools, they were found in Ngườm Vài and Pắc Tà Caves, but there no such tools were found in Ốc Cave.

- Regarding shapeless tools and hand axes with a horizontal blade, the proportion of shapeless tools in Ốc and Pắc Tà Caves was large (7.91% and 7.54% respectively), followed by the proportion of tools with a horizontal blade (1.38% and 1.96% respectively). In Ngườm Vài Cave, however, the proportion of tools with a horizontal blade was higher (7.08%), followed by the proportion of shapeless tools (2.49%).

In general, the Sơn Vi-style traditional tools found in the Bacsonian caves account for a certain proportion (11.39%) in the group of pebble core tools, showing the characteristics of Palaeolithic tools. In regard to typology, they were not as typical as other tools of the Sơn Vi culture found in the open air along large rivers such as the Red River, the Đà River, the Miện River, or the Lô River. Nevertheless, they were differentiated from the Hoabinhian-Bacsonian style tools.

+/ In respect of Hoabinhian - Bacsonian style tools:

The Hoabinhian-Bacsonian style tools are recognised by some particular features, such as oval, disc-shaped, and rectangular tools, and shorthand axes. The shapes of tools of the two cultures are generally similar; it is difficult to differentiate between them. This was why archaeologist Colani M. often used the compound “Hòa Bình - Bắc Sơn” in his descriptions of the Bacsonian stone tools. It was also why many researchers suppose that the Bắc Sơn culture was a localised version of the Hòa Bình culture (Chử Văn Tần, 1984; Hoàng Xuân Chinh, 1978; Ngô Thế Phong, 1984).

- A similarity between the three sites is shown by the fact the above-mentioned types of tools were found in all the sites. The number of the tools was nearly the same, making up a small proportion.

- One difference between the three sites is that the number of shorthand axes found in Ngườm Vài Cave was far greater, while the number of rectangular tools found in Pắc Tà Cave was very high.

- In previous research works, the presence of shorthand axes was seen as a particularity of the Bắc Sơn culture (Hà Văn Tấn, 1998, pp.169-170). In the authors' research, there are shorthand axes, but they make up a very small proportion of the artefacts (Ngườm Vài Cave 0.97%, Pắc Tà Cave 0.78%, and Ốc Cave 0.24%) (Nguyễn Trường Đông & Trình Năng Chung, 2017, pp.22-28).

- In the authors' new research, disc-shaped tools make up an extremely small proportion. Very few such tools have been found in four of 23 Bacsonian sites, including Pắc Tà Cave (0.39%), Ngườm Vài Cave (0.24%), Ốc Cave (0.13%), and Thẩm Vài Cave (0.063%) (Nguyễn Trường Đông, 2018). Before 2000, disc-shaped tools were found in three sites: Minh Lệ, Vô Mường, and Dơi Caves (Hà Hữu Nga, 2001, p.58).

Hoabinhian-Bacsonian style tools found in Bacsonian sites look similar to the Sumatralith tools, but they were neither the main nor the most popular tools.

+/ In respect of other tools:

- The tools that played a major role in the Bacsonian tool-making technique are large-sized shapeless flakes. Thus, the shapelessness is a remarkable feature of the collections of Bacsonian tools.

- The proportions of raw flakes and flakes used to make tools are higher than those in the Hoabinhian tools.

- Of the Bacsonian tools, ground hand axes and sharpening tables account for a small proportion (0.49%); they make the collection of Bacsonian tools different from the Hoabinhian tools. They can be considered as the identity code of the Bắc Sơn culture. In caves in the northeast mountains, the discovery of ground axes and Bacsonian sharpening tables helps to affirm that these caves are Bacsonian sites.

Comparing the types and the proportions in the collections of Bacsonian artefacts recently discovered with those in the collections of Bacsonian artefacts discovered before 2000 (Hà Hữu Nga, 2001, p.48), the authors noticed many similarities. For example, the Hoabinhian-Bacsonian style tools make up a large proportion but they do not play a significant role in the collections of Bacsonian artefacts. Meanwhile, the proportion of Bacsonian sharpening tables found in the core area of the Bắc Sơn limestone mountains is higher than that of Bacsonian sharpening tables found in the peripheral areas. This can be seen as a factor relating to localities or development periods. Of all the artefact collections which have been discovered since 2000, none bear traces of carvings. In addition to stone tools, the Bacsonian people also used tools made from bones or horns, but there were very few 'monotonous' type tools.

3.3. In respect of tool-making technique

The Bacsonian tools were made by two major methods: trimming and grinding.

3.3.1. Trimming technique

After studying the tool-making techniques in the three archaeological sites, including Ngườm Vài, Ốc, and Pắc Tà Caves, the authors found that the trimming technique consisted of two methods: on-hand trimming and on-anvil trimming. On-hand trimming was used to make tools of certain shapes, stone cores, and flakes. Meanwhile, on-anvil trimming was used to make pebble chips. According to the tool-making technique herein, the three collections of stone artefacts are classified into two groups: cores and flakes.

The statistical data of the analysis shows that:

- The ratio of flakes to cores in Pắc Tà Cave is the highest (3.51%) and is almost the same between Ốc and Ngườm Vài Caves (2.91% and 2.79% respectively). The high ratio of flakes to cores reflects the significance of flakes in these collections. It can be seen as one of the particular characteristics of Bacsonian tools.

- Trimming or chipping pebbles to obtain flakes took place in the three sites, although they are located in different geographical areas with different sources of pebbles differentiated in composition and shape. This shows a quite common characteristic of the Bacsonian sites.

The authors carried out research on the tool types and tool-making techniques in the three collections, aiming to ascertain which methods were used to make specific tools. As a result, the authors make the following observations:

- In the collections of artefacts in Ốc and Pắc Tà Caves, all traditional tools were made directly from pebbles. At the same time, the ground hand axes were mainly made from pebble cores. Thus, tools discovered in Ốc and Pắc Tà Caves were made from pebble cores.

- In the collection of artefacts found in Ngườm Vài Cave, all traditional trimmed tools were also made from pebble cores. However, the ground hand axes were made from large-sized pebble flakes.

- A similarity of the three sites relates to the tools fashioned from pebble chips. The proportion of the tools made from pebble chips is higher than that of the tools made from pebble cores, accounting for 50.60%, 48.16%, and 26.44% in the collections of Ngườm Vài, Ốc, and Pắc Tà Caves respectively.

Unlike the tools made from pebble chips, which often come in certain shapes in the Hoabinhian sites, shapeless tools account for a very high proportion of the tools made from pebble chips found in the Bacsonian sites.

- In regard to the stone tool-making technique, the tools made by chipping, bifacial trimming, or multi-facial trimming account for a high proportion in the collections of stone tools (Trình Năng Chung, 2020, p.262). This further demonstrates that chipping, bifacial and multifacial trimming are particular tool-making methods used by the Bắc Sơn ancient people.

3.3.2. Grinding technique

Regarding grinding techniques and ground tools, it is necessary to mention two typical Bắc Sơn culture artefacts, including Bacsonian sharpening tables and ground hand axes. In addition, attention is paid to grinding tables. Some characteristics of these artefacts can be recognised as follows:

- The proportions of ground hand axes and Bacsonian sharpening tables in the artefacts found in Ngườm Vài and Ốc Caves are almost the same (the proportions of Bacsonian sharpening tables in these two sites are 4.67% and 4.61% respectively, and 0.48% and 0.99% respectively for ground hand axes). Meanwhile, there are no ground hand axes found in Pắc Tà Cave and the proportion of Bacsonian sharpening tables is also very small (0.93%).

- The proportion of grinding tables in Ốc Cave is the highest (4.74%), followed by Ngườm Vài Cave (3.06%) and Pắc Tà Cave (1.49%).

Regarding ground hand axes, there are some similarities and differences as follows:

- The number of hand axes, of which blades were ground, found in Ốc and Ngườm Vài Caves is almost the same (four in Ốc Cave and three in Ngườm Vài Cave).

- The hand axes with ground blades in Ốc Cave were mainly fashioned from flat pebbles (three out of four), while those in Ngườm Vài Cave were mainly made from chipped pebbles (two out of three).

Research carried out on the newly discovered Bacsonian sites demonstrates that the owners of the Bắc Sơn culture used grinding methods to produce tools very early on, around 12,000 BP. This is convincingly proved by the presence of Bacsonian sharpening tables, hand axes with ground blades, and grinding tables discovered in Kim Sơn Cave (11,380 ± 275 BP), Thần (*Deity*) Cave (10,640 ± 260 BP), Thẩm Cave (10,570 ± 315 BP), and Ngườm Càng Cave (10,440 ± 320 BP).

4. Dates and relevant issues

Identifying the date of the Bắc Sơn culture was a process that took quite a long time, depending on the available documents. Before 1930, French scholars supposed that the Bắc Sơn culture dated back to the transitional period from the Palaeolithic to the Neolithic, or the Early Neolithic (Mansuy, H. et Colani, M., 1925).

From 1960 to 2001, many different opinions on the date of the Bắc Sơn culture were raised by Vietnamese archaeologists (Chử Văn Tần, 1984, pp.66-72; Hà Hữu Nga, 2001, pp.111-114; Hà Văn Tấn, 1969, pp.199; Hà Văn Tấn, 1998, pp.179-180; Hoàng Xuân Chinh, 1978, pp.16-17; Nguyễn Khắc Sử, 2004, p.31).

Remarkably, in the research work titled "*Vietnam Archaeology, Volume 1: Stone Age in Vietnam*", the authors wrote: "According to the radiocarbon dating (or carbon-14 dating), the Bắc Sơn culture dates back to 10,295 ± 100 BP (as per the sample in Bó Lúm) or 11,000 ±

200 BP (as per the sample in Dơi Cave) at the earliest. Thus, the absolute dating of the Bắc Sơn culture ranges from 11,000 to 7,000 BP" (Hà Văn Tấn, 1998, pp.179-180). This also means that the culture was determined as belonging to the Early Neolithic. This was seen as an official viewpoint of the Bắc Sơn culture date, advocated by many Vietnamese archaeologists over a long period.

As of the 2020s, 14 Bacsonian archaeological sites have been excavated with 30 samples for radiocarbon dating ^{14}C (Trình Năng Chung, 2018, pp.30-35). This is important evidence in re-determining the date of the Bắc Sơn culture.

Of the above-mentioned 30 samples, seven were determined to date back to over 10,000 BP. They are the samples found in Kim Sơn Cave (11,380 ± 275 BP), Dơi Cave (11,200 ± 200 BP and 11,000± 200 BP), Thần Cave (10,640 ± 260 BP), Thẩm Cave (10,570 ± 315 BP), Ngườm Càng Cave (10,440 ± 320 BP), and Bó Lúm Cave (10,295 ± 200 BP). Based on archaeological publications, especially those referring to dates of the samples found in Kim Sơn and Dơi Caves, the authors suppose that the Bắc Sơn culture period started around 12,000 years ago. This date is about a thousand years earlier than the date of the previously discovered sites. A common factor of those sites determined to date back to the early period is the existence of a large number of trimmed tools bearing the Sumatralith technique, Bacsonian sharpening tables, and hand axes with ground blades, together with a considerable number of large-sized flake tools, and some flakes bearing the tool-making technique of the Ngườm culture.

In the recently discovered Bacsonian sites such as Ốc Cave (Thái Nguyên Province), Pắc Tà Cave (Hà Giang Province), and Ngườm Vài Cave (Cao Bằng Province), artefacts show that the Bắc Sơn culture remained quite developed until 6,000 years ago (Nguyễn Trường Đông & Bùi Huy Toàn, 2015, pp.95-96; Nguyễn Trường Đông et al., 2018, pp.56-57). A new opinion about the late period of the Bắc Sơn culture has been proposed based on the absolute dating of the artefacts found in Nà Mò Cave (Bắc Kạn Province).

The 2013 excavation in Nà Mò Cave yielded typical Bắc Sơn culture artefacts. In addition to Sumatralith-style pebble tools, of which one side was trimmed, many Bacsonian sharpening tables, ground hand axes, bone tools, and coarse ceramics were found. By 2020s, three periods in the cultural layers in Nà Mò Cave have been determined by radiocarbon dating, including the fourth layer: 4,770 ± 220 BP, the fifth layer: 4,930 ± 225 BP, and the seventh layer: 5,650 ± 170 BP.

The excavation and research findings demonstrate that Nà Mò Cave is one of the Bacsonian sites. Most of the Nà Mò Cave dwellers lived around 5,000 years ago. According to the division of periods by Vietnamese archaeologists, the cave belongs to the Middle Neolithic (Trình Năng Chung & Nguyễn Trường Đông, 2016, pp.3-13).

Owing to the site in Nà Mò Cave, it can be realised more and more clearly that the late period of the Bắc Sơn culture lasted until 5,000 BP.

Based on the above-mentioned research findings, the date of the Bacsonian sites is determined to range from 12,000 to 5,000 BP.

Obviously, at that time, the Bắc Sơn culture did not belong completely to the Early Neolithic. A large part of the period of the Bắc Sơn culture was in the Early Neolithic, but a small part was in the Middle Neolithic.

Thus, the Bắc Sơn culture can be divided into two periods:

- The early period: the representative sites for the early period of the Bắc Sơn culture include Dơi (the lower layer), Lạng Nắc, Thắm, Ngườm Cắng, Kim Sơn, Thần, and Thủng Caves, which date back to the period from 12,000 to 7,000 BP.

- The late period: the representative sites for this period include Ngườm Vài, Pắc Tà, and Ốc Caves, which date back to 7,000 to 6,000 BP. In particular, the site in Nà Mò Cave dates back to 5,000 BP and belongs to the Middle Neolithic.

The existence of the Bacsonian sites dating back to around 5,000 BP partly explains why the sites of the Late Neolithic are commonly found in caves in the northeast mountains. It was a continuity of the prehistoric cultural development in the region.

A point relating to the date is the origin of the Bắc Sơn culture. Most researchers suppose that the culture mainly originated in the Ngườm tool-making technique. In the authors' opinion, the first cultural layer (the uppermost) in the Ngườm site dates back to 17,000 BP, while the lower cultural layer in Dơi Cave probably belongs to the pre-Bắc Sơn culture period which then developed into the Bắc Sơn culture in the northern limestone mountainous environs (Trình Năng Chung, 1991, p.20). Thus, the origins of the Bắc Sơn and Hòa Bình cultures are different, and the Bacsonian people inhabited the northeast mountainous region before Hoabinhian people relocated there.

According to the archaeological documents, the Hoabinhian culture started around 10,000 years ago in the northeast mountainous region of Vietnam and ended around 6,000 years ago (Trình Năng Chung, 2020, pp.14-32). Based on the absolute dating and the order of cultural development in the archaeological layers, it can be supposed that the presence of the Hoabinhian sites in the northeast mountainous region was a consequence of the movement of Hoabinhian people in the Red River and Lô River basins. As rainfall increased greatly during the Early Holocene, the people relocated to live in the caves of the northeast limestone mountains and highland areas along the Gâm River. It is also highly probable that some groups of Hoabinhian people migrated from the core areas of Hòa Bình and Thanh Hóa Provinces to the northeast mountainous region in search of new places to live due to pressures of an increasing population and the higher rainfall. However, followers of the Bắc Sơn culture already occupied and resided in most of the limestone mountains in the northeast beforehand.

Thus, more or less 10,000 years ago the two communities of the Hoabinhian and Bacsonian lived side by side in the northeast mountainous region. The contact and exchange between these two groups mutually impacted on each other. The analysis of their relations and contact will be presented in another paper.

5. Conclusion

The research carried out on 23 Bacsonian sites, which have been discovered since 2000, has drawn the following conclusions:

5.1. In addition to 51 Bacsonian sites discovered before 2000, other sites have since been unearthed. Thus, a total of 74 Bacsonian sites have been discovered and studied. The number of Bacsonian sites will rise once the investigation into the limestone mountains in the northeast continues. The Bacsonian sites have been found not only in Lạng Sơn Province and Võ Nhai District (Thái Nguyên Province) but also in Hà Giang, Cao Bằng, Bắc Kạn, and Tuyên Quang Provinces (a large part of the former Việt Bắc Province). This is a new point in the awareness of the distribution area of Bắc Sơn culture.

5.2. The Bắc Sơn culture does not belong wholly to the Early Neolithic. Many Bacsonian sites date back to the Middle Neolithic. In other words, the Bắc Sơn culture lasted from the Early to the Middle Neolithic in the primitive cultural history of Vietnam.

5.3. The research findings of the characteristics of the Bacsonian sites and artefacts in different sub-regions indicate that there are particular features relating to specific locations and periods, in addition to the common traits of the Bắc Sơn culture. The farther a site is located from the core area of the culture (Lạng Sơn Province), the later it dates back.

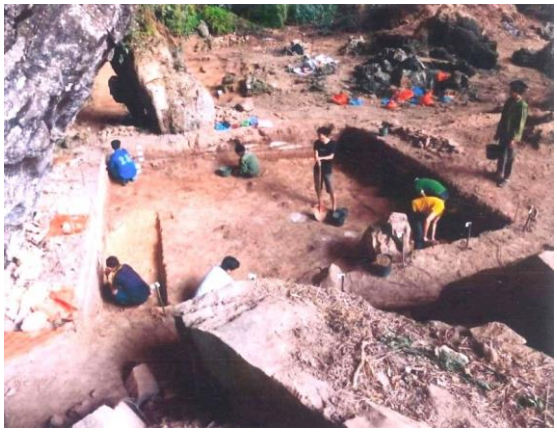
5.4. The Bắc Sơn culture arose independently and has a different origin from its Hòa Bình counterpart. Compared with the Hoabinhian sites found in the same region, the Bacsonian ones seem to date back to an earlier period. The followers of the Bắc Sơn culture occupied and exploited the northeast mountains before Hoabinhian people moved there. However, this is just a hypothesis that should be proved by more evidence, especially statistics on absolute dating information.

ILLUSTRATIONS

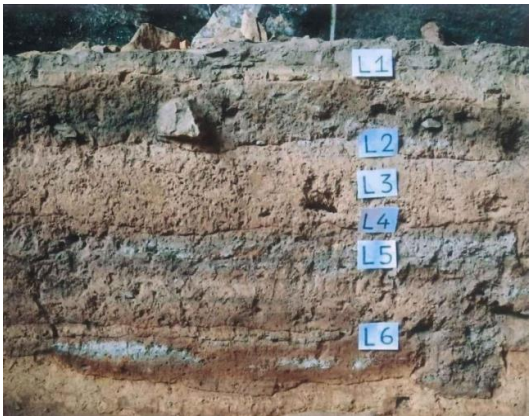
Picture 1: Thắm Cave (Bắc Kạn Province)

Picture 2: Ốc Cave (Thái Nguyên Province)

Picture 3: Excavation in Pắc Tà Cave (Hà Giang Province)



Picture 4: Layers of Excavated Holed in Pắc Tà Cave



Picture 5: Excavation in Pắc Tà Cave (Hà Giang Province)

Picture 6: Excavation in Nà Chảo Cave (Hà Giang Province)

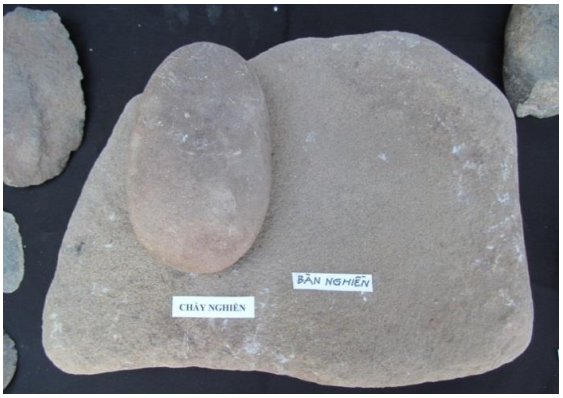
Picture 7: Flake Tools in Pắc Tà Cave

Picture 8: Bắc Sơn Sharpening Tables in Pắc Tà Cave

Picture 9: Ground Hand Axe in Ốc Cave (Thái Nguyên Province)

Picture 10: Stone Tools in Ốc Cave (Thái Nguyên Province)

Picture 11: Pestle and Grinding Table in Ngườm Vài Cave (Cao Bằng Province)

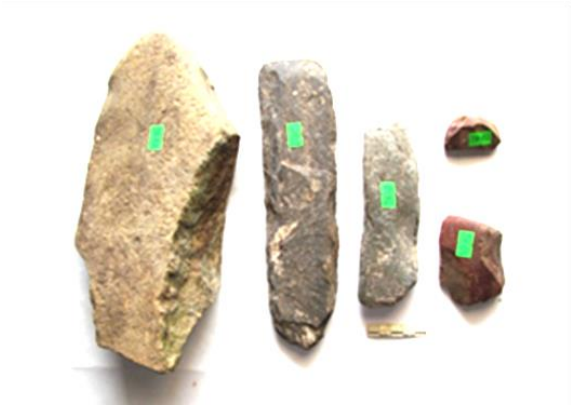


Picture 12: Chipped Pebble Tools in Ngườm Vài Cave (Cao Bằng Province)

Picture 13: Tools in Nà Mò Cave (Bắc Kạn Province)

Picture 14: Bắc Sơn Sharpening Table in Nà Mò Cave (Bắc Kạn Province)

Picture 15: Hand Axe and Grinding Tables in Nà Thắm Cave (Bắc Kạn Province)



Picture 16: Animal Bones and Mollusc Shells in Nà Thắm Cave

Picture 17: Mollusc Shells Found in Ngườm Vài Cave (Cao Bằng Province)

Picture 18: Animal Bones and Tooths in Thắm Cave (Bắc Kạn Province)

Picture 19: Homo Sapiens Skull Fragment Found in Thắm Cave (Bắc Kạn Province)

Picture 20: Canarium Seeds Found in Ngườm Vài Cave (Cao Bằng Province)

Picture 21: Excavation in Nà Mò Cave (Bắc Kạn Province)

Picture 22: Collecting Palynomorphs in Nà Mò Cave

Picture 23: Site of Excavation Pit in Nà Mò Cave

Picture 24: Archaeological Prospection Pit in Nà Khuyên Cave (Lạng Sơn Province)

Source: The pictures were taken by the author.

Note: This paper was published in Vietnamese in *Khảo cổ học*, số 3, 2020, then developed into this English version. Translator: Nguyễn Tuấn Sinh. Language editor: Stella Ciorra.

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Nghiên cứu các di tích văn hóa Hòa Bình và văn hóa Bắc Sơn qua các tài liệu khảo cổ học được phát hiện từ năm 2000-2015 ở miền núi Đông Bắc Việt Nam do PGS.TS Trình Năng Chung làm chủ nhiệm, Hà Nội. [Nguyễn Trường Đông (2018), *Similarities and Differences between Three Bacsonian Sites in Cao Bằng, Hà Giang, and Thái Nguyên Provinces*, Special Paper in the Research Project of Vietnam Academy of Social Sciences *Research on Hoabinhian and Bacsonian Sites in Archaeological Materials Discovered from 2000 to 2015 in Northeast Mountainous Region of Vietnam* headed by Assoc.Prof., PhD. Trình Năng Chung, Hanoi].

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