



# Cultural Characteristics of Prehistoric Cave Dwellings in Java

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## ABSTRACT

Beneath the ancient veil of Java's karst regions, prehistoric humans carved out their lives in caves and crevices. The island's rugged topography, shaped by eons of geological forces, created a diverse landscape that fostered unique cultural adaptations. In the south, towering mountains and sheer cliffs provided shelter and vantage points, while the gentler northern slopes offered fertile valleys and hidden caves. This study explores the fascinating interplay between human ingenuity and the natural world, as revealed in the prehistoric caves of Java. Through a descriptive-analytical approach that combines surveys and excavations, we will reconstruct the lives of these early inhabitants, examining their exploration patterns, resource utilization, and spatial planning. By delving into the depths of these ancient abodes, we can uncover the secrets of a lost civilization and gain a deeper understanding of our own human journey.

**Keywords:** *dwelling cave, Environment, Adaptation, technology*

## 1. INTRODUCTION

The archaeological perspective on prehistoric human life, particularly from the late Pleistocene to early Holocene, emphasizes the profound dependence on the surrounding natural environment for survival. With advancements in intelligence and technology, these ancient humans exhibited greater capacity for sustaining settled lifestyles and exploring their environment, as evidenced by their preference for caves or rock shelters as archaeological sites [1]. In Southeast Asia, life in caves or rock shelters reached its zenith during the Holocene period. The choices made by humans of that time in utilizing caves or rock shelters as dwellings were not arbitrary. This indicates that not all caves or rock shelters were used as habitation sites. Based on their strategic location, humans tended to select caves or rock shelters in areas that provided essential resources, such as aquatic or non-aquatic food sources deemed advantageous for subsistence. Conversely, they would avoid areas with scarce food resources, barren landscapes, high risks, unhealthiness, or difficulties in communication and transportation with other regions. Additionally, for sustenance, they fashioned tools from materials available in their surrounding environment, such as stone, bone, antler, mollusc shells, and wood. Thus, environmental resources determined the trajectory of technological advancement applied in tool production [2].

Evidence of prehistoric cave-dwelling life in Indonesia can be found in several regions such as Sulawesi, East Nusa Tenggara, Papua, Maluku, Kalimantan, Sumatra, and Java. Each of these prehistoric cave settlement areas has its own distinct characteristics [3]. The crafting of stone/lithic tools was a common practice in all prehistoric cave dwellings, using either Mesolithic or pre-Neolithic technologies. However, each region had its own distinctive type of lithic tool, such as flakes with concave or convex bases, serrated or flat edges, and some that were simple without retouching. This means that secondary trimming was not carried out to sharpen the tools. Retouching in stone tool technology, particularly in Mesolithic terminology, became a characteristic feature of the flake tool technology. The Toala culture, renowned for its toothed or pointed arrowheads, is dominant in the Mesolithic lithic assemblages found in the caves of Maros, South Sulawesi [3]– [5]. Additionally, cultural remnants, particularly in Sulawesi and eastern Indonesia, include cave or rock wall paintings that have been found to extend into the regions of Kalimantan, Papua, and Maluku [6]. However, in the Java region, rock art remains have not been discovered to date. A distinctive feature of the Java region is the bone tool industry, famously known as the Sampung Bone Tool Industry [1], [3], [7].

The naming of this industry is based on the first discovery, which occurred in Lawa Cave, belonging to the Sampung group in Ponorogo [3], [4]. The

concentration of bone tool findings in the caves of the eastern Java region exhibits prominent characteristics. In addition to the dominance of bone, antler, and mollusc shell tools, there are also other elements present. These include grinding stones, whetstones, unretouched flake tools, arrowheads with curved bases, shell ornamentations, and red or ochre pigments. Furthermore, evidence has been found indicating the existence of burial practices during that period, demonstrated by the discovery of folded-position burials [4], [5]. The evidence of folded-position burials is intriguing, as it completes the picture of human life in these caves with the discovery of human remains. The findings of these human skeletons allow for the identification of the inhabitants of these cave regions as belonging to the Mongoloid race, with some elements of Austroromelanesoid [3].

Based on the description above, in line with the title of this paper, the discussion will revolve around the characteristics of prehistoric cave dwellings in Java. The question arises whether all prehistoric cave dwellings are remnants of the Sampung culture, or if each cluster of caves possesses its own distinct characteristics. As is known, Java is an island bounded by mountains in the south and karst mountains with numerous caves or rock shelters in the north. Do these two mountain ranges share similarities in both environment and cultural remnants? This paper aims to elucidate the cultural remnants and characteristics of prehistoric cave dwellings in the Northern and Southern Mountains of Java.

## 2. THE FUNDAMENTAL BASIS OF THE STUDY

The study of prehistoric cave dwellings is one of the areas related to settlement archaeology. Settlement archaeology is a field of study that pertains to human habitation. It can be defined as a specialized branch of archaeology that focuses on the distribution of human occupation and activities, as well as the relationships within spatial units, with the aim of understanding the technological, social, and ideological systems of past societies. This definition encompasses three fundamental characteristics in the study of settlements: a) distribution; b) relationships; and c) spatial units, along with their underlying basic assumptions. [6].

Primarily, the lifestyle of prehistoric cave-dwelling humans centred on hunting and obtaining advanced food resources, which relied heavily on the natural resources of their surroundings. Humans sought out caves for habitation that were near to food and tool-making materials. Stones or food remnants, such as bones and shellfish shells, were used as raw materials in the production of commonplace instruments. Three major periods are recognised in the evolution of prehistoric stone instrument technology: Palaeolithic (old stone), Mesolithic or pre-Neolithic (middle stone), and Neolithic (new stone). The cultural remains of prehistoric cave inhabitants are linked to pre-Neolithic or Mesolithic technology in relation to the development of stone tool technology [7]. The technological level during this period

is more complex in terms of primary flaking and secondary retouching compared to the relatively simple Paleolithic technology. In addition to the development of both stone and bone/shell tool technology, the life of prehistoric cave dwellers began to incorporate awareness of post-mortem existence. This is linked to spiritual and supernatural needs, including belief in the power of nature or the spirits of the deceased (ancestors). Cultural remnants in this context include burials and rock art, which represent the embryonic stages of religious practice [8], [9].

Northern and southern regions of the island of Java are distinguished by karst mountains with distinct geomorphological features. In terms of their archaeological potential, the distribution of caverns and rock shelters in these two mountain ranges is strikingly distinct. The caves in the Northern Mountains of Java are relatively less habitable, comprising primarily of underground rivers, vertical caves, sinkholes, and crevices in the sides of hills. Caves in Situbondo, Tuban, Rembang, and Blora have been investigated, with Kidang Cave in Blora serving as the focus of this paper. In contrast, caverns in the Southern Java Mountains are found in the regions of Gunung Sewu, Ponorogo, Tulung Agung, and Jember. Below is a breakdown of prehistoric cave dwellings that have been investigated. (Picture 1).



**Picture 1.** The distribution of prehistoric cave dwellings in Java Sumber: Nurani, 2005

Specifically, the caves in the Southern Mountains of Java, especially in Gunung Sewu, hold significant cultural remnants [10]. The caves in Gunung Sewu are highly representative in revealing various aspects of prehistoric cave dwellings. Some of the researched caves include Song Terus, Song Keplek, Song Gupuh, Song Tritis, Braholo, and Song Mandung [10]–[12].

## 3. MATERIAL AND METHOD

The research is conducted by integrating archaeological, geological, and environmental data using a spatial archaeology approach. It is anticipated that this will reveal human occupation from the late Pleistocene to the early Holocene and cast light on their survival strategies. [6], [13]. The availability of natural resources, particularly raw materials (stone, shellfish shells, bones), had a significant impact on the development of technology. The people of that time extracted and used what was easily accessible from their natural surroundings as their only source of resources. To suit their needs for tools, they simply altered and made

objects. This suggests that these areas were used as activity sites since it strongly suggests a relationship between people and the places where raw materials were available. [14].

The Gunung Sewu and Southern Mountains of Java region generally demonstrate the potential for archaeological traces and remains dating from the late Pleistocene to the early Holocene, particularly in river basins, slopes, and hillsides. In contrast, the conditions of both nature and sites in the Rembang Zone, especially in the Northern Mountains of Java, are different. Some cave sites in this area do not yield as comprehensive findings as those in the Southern Mountains of Java. Apart from scattered cave sites in the Northern Mountains of Java that have limited cultural remnants of prehistoric dwellings, this situation presents its own challenges, especially in terms of adaptation for survival. Prehistoric habitation caves are scarce, and most are unsuitable for habitation. However, if a habitation cave site is discovered, it undoubtedly holds high archaeological potential, as exemplified by the cultural remains at the Kidang Cave site [15] or Bedug Cave in Rembang [16]. The dominating feature observed in the morphology of caves in the Northern Mountains of Java is the presence of dolines, which are typically located beneath the surface or serve as conduits for subterranean rivers. [15].

This article aims to elucidate the notable differences in natural resources between the Southern Mountains and the Northern Mountains of Java. Furthermore, it is obvious that there are fluctuations in the availability of raw materials during the evolution of tool-making technology. Another factor that warrants further investigation is the correlation with the Sampungian bone industry culture. To what extent may the observable traits of the Sampungian culture persist despite the presence of various natural resources, or are the distinctions observed in each of these places unconnected to the Sampungian culture?

#### 4. DATA AND DISCUSSION

Currently, scholarly investigations pertaining to settlements have predominantly centred around survey ranges or have maintained an exploratory approach. In light of the aforementioned circumstances, there exists a strong imperative to undertake a more comprehensive examination of settlements. The current understanding of settlement patterns involves multiple meanings within the realm of terminology.

- a. The manner in which human being's structure, coordinate, and adjust their lifestyles on the planet Earth with respect to physiographic environments (Chang).
- b. The positioning of humans on Earth in relation to the arrangement of homes has been discussed by Parson.
- c. The spatial distribution of houses and community units on Earth's surface exhibits discernible patterns (Vogt)

Based on the aforementioned definitions, it is evident that a comprehensive analysis of item c, as

expounded by E.Z. Vogt, is warranted. This pertains to the spatial configurations and hierarchical arrangements present within a settlement pattern. [6].

In relation to the settlement patterns of prehistoric cave dwellings that have been studied, it is evident that there is a spatial scale in the utilization of cave land [17]. The understanding of spatial archaeology is divided into three levels of space: micro, semi-micro, and macro [18]. However, it is worth noting that there are scholars that classify it into two distinct spatial levels, namely micro and macro [21]. The concept of spatial archaeology, as explained by Ph. Subroto, revolves around the distinction between micro space and macro space. Micro space pertains to an individual structure or site, whereas macro space comprises multiple structures or sites within a given area. The micro and macro spaces observed in settlement patterns are commonly denoted as community scale (micro) and zone size (macro).[19].

The research findings presented in this study are primarily derived from cave sites located in various regions of the Southern and Northern Mountains of Java. The disparities seen can be attributed not only to the characteristics of the natural environment in which they are situated, but also to the unearthing of various artefacts and ecofacts. The findings provide insights into the means by which the prehistoric humans residing in caves managed to support their livelihoods, including advancements in technology, arrangements of physical space, and fulfilment of spiritual requirements.

##### 4.1. Subsistence of Prehistoric Cave Dwellers

The concept of subsistence, in a broad sense, can be characterised as a lifestyle that adheres to minimalistic principles. The term "human endeavours" pertains to the actions undertaken by individuals with the objective of ensuring their survival. The Gunung Sewu region exhibits a formidable environment with restricted availability of water resources, which are solely accessible during the brief period of precipitation. Nevertheless, this region has a significant abundance of prehistoric cave habitations that possess considerable archaeological value and are accompanied by ancient chronologies. Consequently, it has acquired the moniker "thousands of mountains, thousands of stone tools." [20]. In conjunction with stone implements, archaeological evidence of prehistoric cave-dwelling societies encompasses the presence of terrestrial animal remains, diverse bone tools, residual snail and oyster fragments, shell-based tools, and interments. The ancient inhabitants of the caves employed a highly refined subsistence strategy in order to optimise the utilisation of the resources at their disposal. The Mandung Cave, located in the Gunung Sewu region, has substantial evidence indicating that early human inhabitants of cave environments engaged in the consumption of diverse terrestrial species. These included primates, such as monkeys, as well as porcupines, deer, pigs, cattle, rats, snakes, and monitor lizards. Furthermore, they engaged in the consumption of terrestrial fauna, as well as freshwater and marine species. The site's advantageous

location in close proximity to a lake and within a mere 5 km of the coast facilitated access to various aquatic resources, including fish, freshwater snails, marine shells, mussels, crabs, and water fowl. The archaeological discoveries made at Mandung Cave, as well as other prehistoric cave dwellings, provide evidence of an extensive investigation and utilisation of both land-based and coastal resources as a means of subsistence for survival [11].

The excavation results at Braholo Cave in Gunungkidul show that the consumed animals were predominantly arboreal and semi-arboreal fauna, particularly the Javan lutung or long-tailed monkey. Remains of these fauna were found above a layer dominated by fragments of fauna from open habitats, such as cattle and apes. This indicates a forest expansion in the early Holocene. The increasing variety of hunted animals, including aquatic, terrestrial, and arboreal species, suggests that humans had explored various ecological rock shelters. They had knowledge of which locations provided the food resources they needed for survival. On the other hand, the increasing diversity of hunted animals necessitated the development of technology for crafting hunting too [21].

In contrast, the excavation findings at Kidang Cave in Blora reveal that the majority of hunted animal remains primarily consist of aquatic or amphibious species such as turtles, shellfish shells, and snails. Although vertebrate animals like Cervidae, Bovidae, and Aves (bird species) were also discovered. [22]. Additionally, mammals, especially large mammals, played a crucial role in the survival of the cave-dwelling humans at Kidang Cave. This is because these animals were easily hunted and provided ample meat to meet nutritional needs. Other types of animals found in abundance included birds (Aves), reptiles (Reptilia), and fish (Pisces), although their numbers were not as significant as the mammals. When considering the most heavily utilized fauna, it is evident that the cave-dwelling humans at Kidang Cave showed a preference for hunting animals that inhabited grasslands or open areas, such as Bovidae (buffaloes) and Cervidae (deer). Additionally, they made use of animals that resided in trees, such as Maccaca (monkeys), Serpentes (snakes), and Sciuridae (squirrels), as well as those living in the forest, including Suidae (pigs), Tragulidae (mouse deer), Elephantidae (elephants), Canidae (dogs), Viveridae (civets), and Muridae (rats). However, among all the discovered animal bone fragments, no intact or nearly intact bones of large mammals were found. This indicates that the cave-dwelling humans only brought to the cave bone parts that contained a substantial amount of meat, such as the front and hind limb [23].

#### 4.2. The utilization of cave land (spatial arrangement)

Based on the extant research, namely undertaken by the old Archaeological Office of Yogyakarta (now incorporated into BRIN), under the thematic investigation titled 'Patterns of Utilising Prehistoric Cave

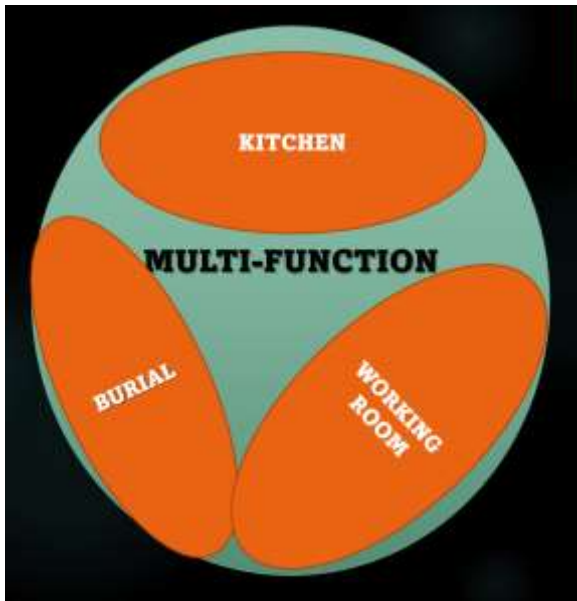
Land,' it is evident that each cluster of caves demonstrates discernible patterns of utilisation. [17]. The research conducted by the Archaeological Office of Yogyakarta from 1993 to 2003 on the patterns of cave land utilization in East Java, carried out in the regencies of Jember, Situbondo, Bojonegoro, and Ponorogo, successfully generated interpretations. Among the interpretations obtained are those concerning the prehistoric cave settlement patterns on micro, meso, and macro scales. [24].

The findings derived from extensive surveys conducted in specific regions, such as districts, encompassing prehistoric cave habitations in both the Northern and Southern Mountains of Java, can be summarised as follows: The analysis of cave utilisation in the Gunung Watangan region, specifically in Jember, reveals that individual caverns played unique roles within their own communities. The archaeological site of Gua Macan served as a culinary space, as evidenced by the prominent discovery of mollusk shells, clams, and snails, as well as the presence of implements crafted from shells and limestone. Gua Sodong served a dual use as a culinary area, where the majority of the artefacts consisted of vertebrate bones and teeth from terrestrial animals. The Gua Marjan site functioned as a sepulchral cave, housing many human skeletal remains devoid of any associated material culture. In addition, Ceruk Gelatik served as a designated space for the purpose of conducting workshops or engaging in the skill of stone tool production. [17]. Further details can be seen in the following illustration of the utilization of a single cave land.



Picture 2. The utilization of a single-function cave (source: Nurani, 2023).

In contrast, the utilization of cave land in Gunung Sewu Area is different. One cave is used for multiple functions, so all traces of activities are found in a single cave land. Research results, as in Song Keplek, Song Terus, and Braholo, reveal various activities such as food processing, workshops (equipment manufacturing), and burials [10], [25].



**Picture 3.** The utilization of a multi-functional cave (source: Nurani, 2023)

The utilisation of cave area in the Sampung Area exhibits a distinct purpose, as evidenced by research findings. Lawa Cave fulfils several roles, whereas the rock shelters situated within the body of Sampung hill exclusively serve as a workshop for the production of stone implements. [26], [27]. This is intriguing and merits further investigation, especially given that in rock shelters within the hill's structure, such as Layah and Ngalen, the excavation findings reveal pottery in the upper layers and stone artifacts in the lower layers. [24].

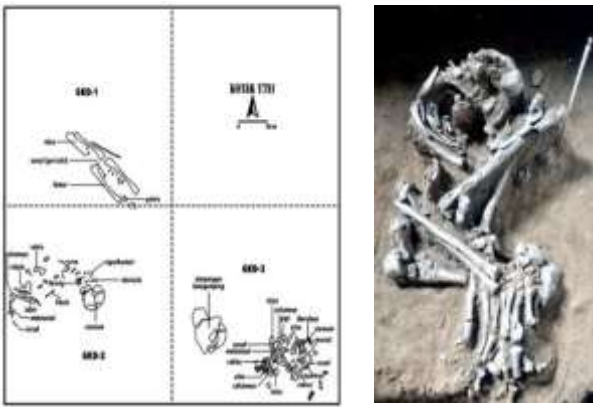
A fascinating characteristic of the caverns in Dander, Bojonegoro, East Java, is the limited presence of archaeological discoveries. In the Tuban region, the caves primarily offer fragments of shellfish, which serve as evidence of both dietary consumption and the utilisation of tools. This suggests the presence of a settlement in close proximity to the northern coast of Bojonegoro. The region located in the southern half of Bojonegoro, as previously described, exhibits a significant archaeological potential in the area of Sampung. Is it possible that the caves in Bojonegoro functioned as intermediate resting points during the travel route from Sampung to Tuban? Based on the available evidence, it is justifiable to do additional research. [28].

### 4.3. Burial

The cave-dwelling lifestyle demonstrates an awareness of burial practises, suggesting a belief in an existence beyond death. Consequently, they adopted a demeanour of reverence towards the deceased. Furthermore, there is also a presence of early religious evidence that is evident in the remains of rock art, a phenomenon that has not been found in any other regions of Java. Religion, in its strictest definition, refers to the observance of specific activities or behaviours that reveal a belief system and a desire to exhibit reverence and seek favour from a prevailing authority. Religion, as an integral element of cultural systems, involves a collection

of beliefs and practises that emerge within diverse communities and serve to exert influence over many areas of the universe. Furthermore, it is widely acknowledged as a symbolic system that serves the purpose of imbuing individuals with robust, profound, and long-lasting determination and drive. This is accomplished through the formulation of comprehensive and overarching conceptualizations on the nature of existence, which are then enveloped inside a context characterised by factual accuracy, so imbuing the atmosphere and motivation with a heightened sense of realism. [9].

The excavation of graves, whether found in superficial layers or deeper below the soil, yields valuable information that sheds light on the characteristics of the individuals interred. This evidence encompasses various aspects such as gender, age, height, and even pathologies, which can be inferred from the anatomical features observed in human skeletal remains. The excavation of prehistoric cave dwellings in Java has yielded a significant number of Homo sapiens skeletons, as indicated by the research findings. The majority of these human skeletal remains have a consistent orientation towards the west, which is plausibly indicative of a symbolic representation of the sinking sun. The orientations of the skeletal remains exhibit considerable variation, with certain specimens positioned in a supine manner, while others are found in a semi-flexed posture, and a subset are even arranged in a folded configuration, such as a seated position. Furthermore, within the realm of post-mortem care, specific burial settings are often accompanied with funerary objects. The categorization of grave goods can aid in the establishment of the chronology of cultural artefacts, social hierarchies, and the extent of technological knowledge possessed by the inhabitants. The manner in which the bones were arranged within Kidang Cave, located near Blora, is a noteworthy illustration of the practises employed by cave-dwelling humans in their treatment of the departed. The unearthing of three separate human bones within Kidang Cave encompasses various cultural strata, each characterised by unique spatial arrangements [31]. The skeletal remains of the initial individual were discovered in the most profound stratum, situated at a vertical distance of 170 cm below the earth's surface. The posture was elongated, with the hands positioned between the legs, and the fingers, together with the ulna and radius bones, were observed. Upon ascending to the higher stratum, the skeletal remains of the second individual were discovered in a flexed posture, wherein both hands were positioned beneath the cranium. The skeletal remains of the third individual, discovered in the stratigraphic stratum above, were in a seated position and exhibited absence of the cranial region. The orientation of all the skeletons was seen to be in an east to west direction [32]. This paper presents a complete analysis of the spatial orientations and anatomical locations of the three skeletal remains recovered from Kidang Cave., Blora can be seen from the following picture.



**Picture 4.** Left : The three human skeletons' placement in boxes and within separate cultural strata[29] Right: the third individual's skeleton, seated position without a head [30]

#### 4.4. Technology

As outlined above, the technology developed for crafting tools in the Sampung culture is characterized by bone industry. However, based on research findings at the caves of Gunung Sewu, the dominant tools are made of stone. Various techniques of trimming and retouching to create sharp edges are highly prominent, resulting in a more diverse range of tool types such as flakes, percussors, side scrapers, concave scrapers, and many core stones have been found in use [10]. Tools made from bone, antler, and shells are also frequently found, which are distinctive features of the bone industry in Sampung [5] Such as ladles, spatulas, as well as tools made from antler.



**Picture 5.** Bone and antler tools characterize the Sampung culture [31]

Meanwhile, the development of tool-making technology found in prehistoric cave dwellings in the Northern Mountains of Java is more prominently associated with shell tools. It appears that the availability of high-silica stone raw materials is limited. As an adaptation, the cave-dwelling humans in the Northern Mountain Region tended to focus on crafting tools and ornaments from shells and bones [32].



**Picture 6.** Serrated and perforated scrapers, findings in Kidang Cave [33]

## 5. CONCLUSION

Based on the preceding description, it is possible to conclude that prehistoric cave homes in Java's Northern and Southern Mountains exhibit distinct characteristics. Cave houses in the Southern Mountain region, particularly Gunung Sewu, have greater archaeological potential than prehistoric cave dwellings in Java's Northern Mountains. In neither mountain region is the Sampungian bone industry culture fully present. Artefacts, both tools and ornamentation, discovered in Northern Mountains cave dwellings are predominantly constructed of shell and bone, with little or no stone. Meanwhile, high-silica stone materials dominate the discoveries in prehistoric cave homes in the Southern Mountains.

Burials are indicative of early religious customs observed by prehistoric humans residing in caves and are commonly encountered in virtually all inhabited cave sites. In contrast to cave houses in the northern mountains, the abundance of human bones found in the caverns of Gunung Sewu is notably higher. The skeletal arrangements exhibit a striking similarity, as they are predominantly positioned in a supine, semi-flexed, and flexed configuration, with a consistent orientation facing from east to west.

The examination of cave terrain demonstrates variations across different regions, wherein certain caves are employed for numerous purposes, while others serve singular roles, and some exhibit a combination of both inside a cave complex. Moreover, according to studies conducted on prehistoric cave habitations in Java, there remains a considerable number of caves that have yet to be thoroughly investigated. Notably, this includes the caverns situated in the Tulung Agung and Blitar regencies inside the Southern Mountains, as well as the caves located in the Rembang zone of the Northern Mountains. The significance of this study lies in its contribution to a more thorough understanding of prehistoric cave habitation in Java. It offers valuable insights on the migration patterns of prehistoric humans in Java, examining both the synchronic and diachronic aspects of their movements.

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