

# POTTERY AS PREHISTORIC ARCHAEOLOGICAL EVIDENCE IN GUA KELEDUNG KECIL, NENGGIRI VALLEY, HULU KELANTAN

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## Abstract

This article is about the discovery of prehistoric pottery in Gua Keledung Kecil, Nenggiri Valley of Hulu Kelantan. Numerous studies have focused on prehistoric pottery in Malaysia, especially within sites like Gua Cha, Gua Peraling, Gua Jaya, and Gua Kemiri located in the Nenggiri Valley of Hulu Kelantan. However, these studies still do not provide complete coverage of the region or the broader Malaysian context. Significant research gaps still exist and need further exploration. This research, conducted in 2022, uncovered evidence indicating that pottery artifacts were widely used by ancient populations and potentially point to trading connections with distant communities. The research includes a comparative analysis of manufacturing techniques, forms, and functions of pottery between Gua Keledung Kecil and other archaeological sites in the Nenggiri Valley, Hulu Kelantan. Furthermore, chemical analyses employing X-Ray Diffraction (XRD) and X-Ray Fluorescence (XRF) techniques were utilized to identify the mineral composition of the pottery and evaluate manufacturing techniques, as well as trade relationships and external cultural influences. Archaeological excavations at Gua Keledung Kecil successfully discovered a total of 459 pottery artifact fragments, consisting of cord-marked and plain patterns in various sizes and colors. The most abundant finds were cord-marked patterns, totaling 253 units, and plain pottery without decoration, totaling 201 units. These pottery discoveries at Gua Keledung Kecil are anticipated to generate fresh and deeper discussions regarding ancient community lifestyles, fostering a more comprehensive understanding and enriching the archaeological narrative in Kelantan and Malaysia.

**Keywords:** prehistoric pottery, culture, ancient societies, X-Ray Diffraction, X-Ray Fluorescence

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**Abstrak**

*Artikel ini mengenai jumpaan tembikar prasejarah di Gua Keledung Kecil, Lembah Nenggiri, Hulu Kelantan. Banyak kajian telah menumpukan pada tembikar prasejarah di Malaysia, terutamanya di tapak seperti Gua Cha, Gua Peraling, Gua Jaya, dan Gua Kemiri yang terletak di Lembah Nenggiri, Hulu Kelantan, namun kajian ini masih belum memberikan liputan lengkap tentang rantau ini atau konteks Malaysia yang lebih luas. Jurang penyelidikan yang ketara masih wujud dan memerlukan penerokaan lanjut. Kajian ini dijalankan pada tahun 2022, menemui bukti yang menunjukkan bahawa artifak tembikar digunakan secara meluas oleh populasi purba dan berpotensi menunjukkan hubungan perdagangan dengan komuniti yang jauh. Kajian ini merangkumi analisis perbandingan teknik pembuatan, bentuk dan fungsi tembikar antara Gua Keledung Kecil dan tapak arkeologi lain di Lembah Nenggiri, Hulu Kelantan. Tambahan pula, analisis kimia yang menggunakan teknik Pembelauan Sinar-X (XRD) dan Pendarfluor Sinar-X (XRF) telah digunakan untuk mengenal pasti komposisi mineral tembikar dan menilai teknik pembuatan serta hubungan perdagangan dan pengaruh budaya luaran. Penggalan arkeologi di Gua Keledung Kecil berjaya menemui sejumlah 459 serpihan artifak tembikar yang terdiri daripada corak bertanda tali dan polos dalam pelbagai saiz dan warna. Penemuan yang paling banyak ialah corak bertanda tali, berjumlah 253 unit dan tembikar polos tanpa hiasan, berjumlah 201 unit. Penemuan tembikar di Gua Keledung Kecil ini dijangka akan menjana perbincangan yang segar dan lebih mendalam mengenai gaya hidup masyarakat kuno, memupuk pemahaman yang lebih komprehensif dan memperkayakan naratif arkeologi di Kelantan dan Malaysia.*

**Kata kunci:** tembikar prasejarah, budaya, masyarakat purba, Pembelauan Sinar-X, Pendarfluor Sinar-X

**Introduction**

According to Rice (1987), pottery represents humanity's earliest synthetic invention,<sup>1</sup> and this invention constitutes one of the most significant technological innovations in the history of human civilization, as it marked the beginning of broader developmental trajectories. Unlike stone artifacts, which possess distinctive characteristics formed naturally over millions of years, pottery are type of products that human-made created through the deliberate combination of four fundamental natural elements which earth, water, fire, and air (wind).<sup>2</sup>

Prehistoric pottery stands as a crucial cultural marker, offering invaluable insights into the lives, technological advancements, and social structures of ancient societies in Malaysia. The Anker Rentse report reports that there are a total of 30 archaeological sites in

1 Prudence M. Rice, *Pottery Analysis A Sourcebook*, The University of Chicago Press, London, hlm 3.

2 *Ibid.*

Kelantan covering the Mesolithic period (Hoabinhian), 17 Neolithic sites, one Bronze Age archaeological site<sup>3</sup>. Some of the excavations that have been carried out in Kelantan mostly are located in an area called Lembah Nenggiri or Nenggiri Valley. For decades, Lembah Nenggiri in Hulu Kelantan is recognized as a significant archaeological region<sup>4</sup>, crucial key to uncovering the mysteries of ancient civilizations with popular sites such as Gua Cha, Gua Peraling, Gua Jaya and Gua Kemiri.

Despite extensive documentation of prehistoric pottery typology and morphology from previous archaeological investigations in the Nenggiri Valley, these studies represent incomplete coverage of both the broader Nenggiri region and the Malaysian prehistoric landscape. Significant research gaps remain, requiring further scholarly attention. Considering these limitations, a series of excavations was conducted at Gua Keledung Kecil around 2022, a site that demonstrates considerable potential as an important prehistoric locality. This study was conducted around November 2022 involving 3 trenches. Gua Keledung Kecil identified as a small size rockshelter located in the Bukit Keledung Complex in Kampung Keldong. The topographic reading of this cave site is located at latitude 05.07437 North and longitude 101.90666 East or 5°04'27.7"N 101°54'24.0"E with an altitude of 84 meters above sea level. Gua Keledung Kecil is strategically positioned about 50 meters from the right bank of the Sungai Nenggiri (Nenggiri River). The cave was discovered by a research team from the Institusi Alam dan Tamadun Melayu (Institute of Malay World and Civilization), Universiti Kebangsaan Malaysia (UKM), led by Assoc. Prof. Dr. Zuliskandar Ramli in the end of 2016. Therefore, this article presents a comprehensive examination of the pottery assemblage from Gua Keledung Kecil. The discussion includes analyzing the pottery's physical characteristics, decorative patterns, manufacturing techniques and material composition. The research objectives encompass understanding the functional roles of pottery within prehistoric society and identifying evidence of inter-regional trade relationships and cultural transmission that shaped the material culture of prehistoric communities in the Sungai Nenggiri region.



**Figure 1** : Gua Keledung Kecil map and the other caves.  
Source: Wan Noor Shamimi 2019.

- 3 Mohd. Kamaruzaman A. Rahman, Penyelidikan Arkeologi Prasejarah di Negeri Kelantan, *JEBAT 18*, 1990,  
hlm 17-19.
- 4 Zulkifli Jaafar, *Gua-gua Batu Kapur di Malaysia dalam Perspektif Arkeologi Jilid Satu*, 2003, Jabatan Muzium  
dan Antikuiti Kuala Lumpur, hlm 31.



**Figure 2** Bukit Keledung Complex



**Figure 3:**  
Gua Keledung Kecil (cave entrance)



**Figure 4:**  
Gua Keledung Kecil (interior of the cave)

### Study of Prehistoric Pottery

The history of pottery extends deep into human prehistory. Early research suggests that pottery technology emerged during the Neolithic period, coinciding with transformations in subsistence strategies from hunting and gathering practices, thereby representing a pivotal moment in human dietary evolution. The examination of ancient pottery on a global scale enhances our comprehension of early human communities and their adaptation mechanisms in the face of environmental and societal transformations. As a significant technological advancement, pottery vessels fulfilled practical functions including food preparation and preservation, while simultaneously providing valuable evidence regarding cultural traditions and community dynamics within prehistoric contexts.

In Asia, for example, sites including Xianrendong<sup>5</sup> and Yuchanyan<sup>6</sup> provide compelling evidence that mobile hunter-gatherer communities employed pottery for more than ten millennia before transitioning to sedentary settlement patterns or plant cultivation. The antiquity of pottery (ceramic) production at these locations 20,000 years before present at Xianrendong and 18,000 to 16,000 years before present at Yuchanyan corresponds temporally with the climax of the last glacial period, an era marked by reduced productivity of food resources across the region. Based on the soot marks on sherd exterior surfaces indicate that they were likely used for cooking purposes. The same function is identified by the Jomon pottery at Odai Yamamoto I in Aomori Prefecture and Fukui Cave in Kyushu. Pottery from these sites is estimated to be around 14,500 to 12,700 years old<sup>7</sup>.

Studies from various regions of Atlantic Europe indicate that pottery played a crucial role during the Neolithic period, corresponding with major shifts in subsistence strategies. Organic residue analysis of Early Neolithic pottery (ceramic) reveals a strong dependence on animal products, especially dairy,<sup>8</sup> while coastal communities also consumed fish and shellfish.<sup>9</sup> Research on Early Neolithic pottery from Northern Europe provides substantial evidence of milk processing, with certain vessel types appearing to be specifically designed for dairy production. Stable isotope analysis of dental calculus dating to 8,000-7,000 years ago confirms the presence of milk proteins, demonstrating a clear link between pottery use and cattle farming.<sup>10</sup> Collectively, this evidence suggests that dairy production and cattle herding formed the foundation of Early Neolithic economies, particularly in temperate zones such as the Rhine-Meuse Delta.<sup>11</sup>

From technological perspective, pottery production provides valuable information about prehistoric European communities. Archaeometric analysis of pottery materials, such as studies conducted at Italy's Pian del Ciliegio rock shelter, has revealed considerable variation in production methods and clay sources within pottery collections. These findings indicate the influence of different cultural traditions across various time periods.<sup>12</sup> Such variability

- 5 Xiaohong Wu *et al.*, Early Pottery at 20,000 Years Ago in Xianrendong Cave, China, *Science* 336 (2012): 1696, <https://doi.org/10.1126/science.1218643>, hlm 1696-1670 [dirujuk pada 30 Oktober 2025].
- 6 Elisabetta Boaretto *et al.*, "Radiocarbon Dating of Charcoal and Bone Collagen Associated with Early Pottery at Yuchanyan Cave, Hunan Province, China," *Proceedings of the National Academy of Sciences* 106, no. 24 (2009): 9595–9600, <https://doi.org/10.1073/pnas.0900539106>, hlm 9596-9598. [dirujuk pada 30 Oktober 2025].
- 7 Hiroki Obata, Aya Manabe, Naoko Nakamura, Tomokazu Onishi & Yasuko Senba, A New Light on the Evolution and Propagation of Prehistoric Grain Pests: The World's Oldest Maize Weevils Found in Jomon Potteries, Japan," *PLOS ONE* 6, no. 3 (2011): e14785, <https://doi.org/10.1371/journal.pone.0014785>, hlm 6.
- 8 Miriam Cubas *et al.*, Latitudinal Gradient in Dairy Production with the Introduction of Farming in Atlantic Europe, *Nature Communications* 11, 2020, (2036), <https://doi.org/10.1038/s41467-020-15907-4>, hlm 1-4.
- 9 Lucquin, A., Robson, H. K., Oras, E., Lundy, J., Moretti, G., Carretero, L. G., ... & Craig, O. E. (2023). The impact of farming on prehistoric culinary practices throughout northern europe. *Proceedings of the National Academy of Sciences*, 2023, (43) 120. <https://doi.org/10.1073/pnas.2310138120> hlm 1-3.
- 10 Miriam Cubas *et al.*, Latitudinal Gradient in Dairy Production with the Introduction of Farming in Atlantic Europe, *Nature Communications* 11, 2020, (2036) <https://doi.org/10.1038/s41467-020-15907-4>, hlm 1-4.
- 11 Kamjan, S., Gillis, R. E., Çakırlar, C., & Raemaekers, D, Specialized cattle farming in the neolithic rhine-meuse delta: results from zooarchaeological and stable isotope ( $\delta^{18}\text{O}$ ,  $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$ ) analyses. *Plos One*, 2020, 15(10), e0240464. <https://doi.org/10.1371/journal.pone.0240464>.
- 12 Capelli, C., Cabella, R., Lucchese, A. D., Piazza, M., & Starnini, E. Archaeometric analyses of early and middle neolithic pottery from the pian del ciliegio rock shelter (finale ligure, nw italy). *ArchéoSciences*, 2008, 32: 115-124. <https://doi.org/10.4000/archeosciences.1023> hlm 116.



demonstrates how distinctive cultural characteristics were expressed and transferred through pottery traditions.<sup>13</sup> The transportation and trade of pottery across regions indicates the existence of advanced networks of interactions among ancient populations. The spread of pottery manufacturing knowledge from Eastern to Western Europe illustrates how cultural practices developed through trade connections and cultural exchange.<sup>14</sup> These discoveries highlight pottery's importance in revealing prehistoric social organization, knowledge transfer, and intercultural contact that influenced ancient communities.

Neolithic freshwater shell middens in Latvia, containing pottery fragments, offer additional evidence of prehistoric social patterns. Midden characteristics, including size and placement can reveal information about group composition, settlement density, and regional population levels. These multi-functional residential sites show that pottery using hunter-gatherers participated in seasonal gatherings, which facilitated collective activities and resource sharing.<sup>15</sup> Research on Chalcolithic pottery from Bulgaria demonstrates technological connections between various crafts, including salt extraction and basketry. These relationships show how pottery technology supported natural resource exploitation.<sup>16</sup> The identification of specific vessel forms designed for processing and storing particular foods reflects important cultural practices among early agricultural societies.<sup>17</sup> The distribution of pottery styles and their morphological development reveal complex social networks among prehistoric Europeans. The Bell Beaker phenomenon exemplifies widespread pottery style distribution throughout Western Europe, driven by both commerce and population movement. Recent research highlights this cultural transmission, demonstrating how social structures and shared technical knowledge fostered collective identities across different regions.<sup>18</sup> Ultimately, prehistoric pottery analysis offers essential perspectives on the technological, social, and economic aspects of early European societies. Through various analytical approaches including residue analysis and petrographic studies, researchers can reconstruct ancient subsistence patterns, social organization, and technological development, revealing the complexity of human adaptation and interaction in prehistoric contexts.

Beyond its utilitarian role, pottery functioned simultaneously as a technology and as a 'text' of Neolithic transformation, yields not only information about clay types but also the 'operational sequence' of manufacture and firing, while revealing the labour rhythms of

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- 13 Spataro, M. (2015). First Impressions Of Early Neolithic Russian Pottery Technology. *Samara Journal of Science*, 2015, 4(3), 142-153. <https://doi.org/10.17816/snv20153214>, hlm. 144-146.
  - 14 Jordan, P., Gibbs, K., Hommel, P., Piezonka, H., Silva, F., & Steele, J. Modelling The Diffusion Of Pottery Technologies Across Afro-Eurasia: Emerging Insights And Future Research, *Antiquity*, 2016, 90(351), 590-603. <https://doi.org/10.15184/aqy.2016.68> hlm. 593.
  - 15 Berzins, Valdis, Ute Brinker, Christina Klein, Harald Lübke, John Meadows, Mudīte Rudzīte, Ulrich Schmölcke, Harald Stümpel, dan Ilga Zagorska, New Research at Rinņukalna, a Neolithic Freshwater Shell Midden in Northern Latvia. *Antiquity* 88, 2014, (341): 715–732. <https://doi.org/10.1017/S0003598X0005064X>, hlm 716. [dirujuk pada 1 November 2025].
  - 16 Andonova, M. and Nikolov, V. Pots On Mats: Mat-Imprinted Salt-Extraction Pottery At Chalcolithic Provadia-Solnitsata, Bulgaria, *Antiquity*, 2021, 96(385) : 51-66. <https://doi.org/10.15184/aqy.2021>, hlm. 51-52 [dirujuk 1 November 2025].
  - 17 Eusebio, M., Foodways Through Ceramics In Southeast Asian Archaeology: A View From Southern Vietnam. *Journal of Indo-Pacific Archaeology*, 2015, (37) : 14-24. <https://doi.org/10.7152/jipa.v37i0.14745>.
  - 18 Salanova, L *et al*, What Are Large-Scale Archaeometric Programmes For? Bell Beaker Pottery And Societies From The Third Millennium BC In Western Europe, *Archaeometry*, 2015, 58(5), 722-735. <https://doi.org/10.1111/arc.12173>.

cultivators and emergent modes of landscape use. In another side, studies of pottery through its forms and decorations communicated status, symbolism, and belonging. It also reflects the broader social and economic transition inaugurated by the introduction of agriculture, which redefined human environment interactions as well as relations within and between communities.<sup>19</sup>

This situation can be seen at Gobero, on of the prehistoric site in Southwest Africa where the change from the Kiffian hunter-gatherer community to the Tenerean agro-pastoral community in Gobero reflects a major transition in their lifestyle and economy<sup>20</sup>. This change in the pastoral economy (cattle raising) represents a significant example in the study of African prehistory. It illustrates a major transformation in human lifestyle, economy, and social structure as a response to climate change and cultural. This shift also created the conditions, both in terms of time and stability that allowed for the advancement of pottery production, particularly for the storage of food and livestock-related resources. At Ounjougou, Mali, pottery functioned beyond its practical role, it served as a medium of cultural signification, articulating local identities and social status indicator. At this part, the skills demonstrated through the study of pottery produced by the Ounjougou society also serve as early evidence of human interaction with the environment in the early Holocene. Indirectly, scholars have learned that humans remained capable of adapting and developing pottery technology under pressure of changing ecological conditions but still capable on sourcing materials, organizing production and expressing meaning through artistic creativity and aesthetic values.<sup>21</sup>

## Regional Morphology

The morphology of Bukit Keledung can be examined within the broader geological framework of Western Kelantan, which comprises the Olistostrome (Western Kelantan), Taku Schist, and Gua Musang Formation. The Gua Musang Formation represents the most extensive geological formation occupying Kelantan State<sup>22</sup>, characterized by diverse lithological features including argillite, carbonate rocks, and volcanic rocks that demonstrate lateral facies variations throughout the region.<sup>23</sup> Gua Musang is recognized as part of the Central Belt of Peninsular Malaysia, distinguished by complex geological formations including folds, faults, and various rock types such as porphyritic diorite (evidence of past magmatic or volcanic activity).

Although the Gua Musang Formation experienced low-grade metamorphism, this process did not inhibit cave formation.<sup>24</sup> Limestone hills develop through several

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- 19 O. E. Craig et al., Molecular and Isotopic Demonstration of the Processing of Aquatic Products in Northern European Prehistoric Pottery, *Archaeometry* 49(1), (2007): 135–152, <https://doi.org/10.1111/j.1475-4754.2007.00292.x> hlm. 138.
  - 20 Elena A. A. Garcea, Gobero: The No-Return Frontier. Archaeology and Landscape at the Saharo-Sahelian Borderland Frankfurt: Africa Magna Verlag, 2013, hlm. 210-212.
  - 21 Huysecom, Eric, Michel Rasse, Laurent Lespez, Katharina Neumann, Asmaa Fahmy, Aziz Ballouche, Sylvain Ozainne, Marino Maggetti, Christine Tribolo, dan Stéphane Soriano, The Emergence of Pottery in Africa during the Tenth Millennium cal BC: New Evidence from Ounjougou (Mali). *Antiquity* 83, 2009, (322): 905–917. <https://doi.org/10.1017/S0003598X00099245>, hlm 908-910 [dirujuk pada 1 November 2025].
  - 22 Jatmika Setiawan dan Ibrahim Abdullah, Geologi Struktur Pada Formasi Gua Musang Di Negeri Kelantan, *Warta Geologi*, 2010, 36(2), hlm. 97.
  - 23 Lee Chai Peng *et al*, Stratigraphic Lexicon of Malaysia, Persatuan Geologi Malaysia. Kuala Lumpur, 2004, hlm 44.
  - 24 *Ibid*. hlm. 44.

interconnected geological processes, sedimentary deposition, tectonic activity, chemical dissolution, and erosion. The sequence begins when skeletal remains of marine organisms accumulate on the seafloor and lithify into limestone layers. Plate movements and crustal pressures then deform these horizontal deposits. Through folding, uplift, and compression, these tectonic forces create geological structures such as anticlines, synclines, and faults. These tectonic processes also facilitate cave formation through chemical weathering of the carbonate rock. Rainwater containing dissolved atmospheric CO<sub>2</sub> forms carbonic acid, which gradually dissolves the limestone through carbonation, creating initial voids and channels. Continued dissolution and mechanical erosion cause these openings to expand and connect, eventually forming complex karst cave systems.

This general geological explanation of Gua Musang indirectly elucidates the geological conditions in the study area located at Bukit Keledung. Simply stated, this natural yet complex phenomenon occurs continuously, resulting in the surface structures visible in the environment where Bukit Keledung is situated. Regarding Bukit Keledung's morphology, another crucial factor is the role and relationship with Sungai Nenggiri, which serves as the main waterway in central Kelantan.<sup>25</sup> This river formed from the confluence of two tributaries Sungai Betis (Betis River) and Sungai Berok (Berok River) where connects to Sungai Kelantan. Sungai Nenggiri itself plays a significant role in the formation processes of existing caves in the area.

## Research Methodology

This research employed both qualitative and quantitative methodological techniques. The qualitative component involved content analysis drawing from existing scholarly literature, including published books, academic theses, and peer-reviewed journal articles accessed through online databases and physical archives, providing supporting evidence for primary findings. This method enabled the collection of background information concerning the study location. Previous archaeological research was systematically reviewed to strengthen the literature foundation relating to the researched area.

The quantitative component comprised three main techniques includes site reconnaissance, archaeological excavation, and artefact analysis. Reconnaissance activities aimed to evaluate site suitability and archaeological potential prior to excavation work. A preliminary survey of Gua Keledung Kecil was carried out in late 2016 by UKM researchers to determine its prehistoric significance. Formal excavation activities commenced in late 2022 with the specific aim of recovering prehistoric pottery artefacts for analytical study.

Site preparation began with thorough clearing to avoid any operational difficulties during excavation, after which a primary datum point was established, followed by grid installation, baseline demarcation, and spatial mapping of excavation units. All measurements maintained north-south and east-west orientations. Eleven excavation units were opened at Gua Keledung Kecil, labelled using an alphabetical system (A, B, C, D, E, F, G, H, I, J, K) with dimensions of 1×2 metres or 2×2 metres. Survey equipment includes a prismatic compass,

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25 *Ibid...*



levelling staff, and measuring tape. Site mapping was then undertaken to obtain topographical information of the research area.

A spit system was employed to control data recovery for each excavation unit, with 5 centimetres in depth for each spit, allowing precise vertical and horizontal documentation of archaeological data. The excavation process demanded meticulous attention to prevent artefact damage from improper tool application; therefore, appropriate tool selection was essential. Standard excavation tools included trowels, scrapers, brushes, and sieves. Each artefact recovered from every spit was systematically documented on recording forms to ensure data integrity and photographed with north arrow, unit designation, spit number, scale bar, and date for future reference. Additionally, soil data including texture and color were recorded for each spit to observe cultural layer changes and soil composition. Soil color identification was assisted by the Munsell Soil Color Chart.

Stratigraphic methods were employed to obtain relative dating and determine cultural layers for this site. Each layer was physically plotted using stakes and white string, then transferred to graph paper before being rendered into digital illustrations. Photos were also taken along with scales and measuring poles as guides. Artifacts discovered at the study site were labeled according to square and spit before being transported to the laboratory for analysis based on morphological, typological, lithological, and technological manufacturing attributes. Each stone artifact was carefully cleaned to prevent damage or defects to the lithic tools. Equipment used in the cleaning process included wooden picks, fine brushes, and toothbrushes. Subsequently, stone artifacts were classified according to their attributes. Data including measurements, weight, type, and function of all stone tools were recorded and entered into a database for comprehensive analysis.

## Literature Review

The chronology of prehistoric times in Malaysia is still being unraveled and compiled. The study of the historiography of prehistoric pottery could possibly be one of the tips to understand Malaysia prehistory, especially Kelantan since pottery is one of the early human inventions. In this regard, Gua Musang, one place rich with historical remains, has played a significant role, particularly in Lembah Nenggiri. Archaeological research conducted through systematic phases has successfully identified several archaeological sites and demonstrated that prehistoric communities in Malaysia has long been engaged in the use of pottery since ancient times. This phased archaeological research has provided substantial evidence for understanding it more thoroughly the temporal framework of Malaysian prehistoric chronology.

Archaeological data in Kelantan, especially in the Lembah Nenggiri, found many artifacts in the form of earthen pottery. All of these units either in the form of small fragments, large fragments or complete ones. Interestingly, the discovery of this earthen pottery has become a polemic among both foreign and local researchers. The history of primitive Malay pottery-making was first studied in the early 20th century,<sup>26</sup> which was first explored by H.D.

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26 Azmi Arifin, Traditional Malay Pottery of Kuala Kangsar: Its History and Development, *Kajian Malaysia* 33, 2015, 3(2), hlm. 115.

Noone in 1935 in Gua Cha (Noone 1935), where this report then was published in 1939. In this excavation, in Noone (1935)<sup>27</sup> and G. Sieveking (1954)<sup>28</sup> record, Gua Cha was still known as Gua Menteri, and two trial trenches were excavated, which successfully recovered prehistoric pottery believed to be closely associated with the burial practices of Neolithic communities. These findings represents material evidence of the sophisticated cultural practices that characterized Neolithic societies in Malaysia, demonstrating their technological capabilities and the symbolic importance they placed on pottery vessels within their burial customs. The next researcher to conduct research in Kelantan was P.D.R. William Hunt who conducted archaeological studies in 1945-1950 and 1951.<sup>29</sup> He managed to find pottery fragments in the 1945-1950 experimental excavation, then in 1951 in Gua Musang, Gua Serai and Gua Menteri (Gua Cha) he then found other Neolithic pottery fragments with reddish cork-marked markings patterned. In particular archaeological significance were the findings at Gua Serai, where pottery fragments were discovered in direct mortuary association with human skeletal remains that had been deliberately placed upon slabs or sheets.

The study of prehistoric pottery in the Nenggiri Valley was then carried out by G.de G.Sieveking,<sup>30</sup> who is an Archaeologist who works at the Museum of the Federated Malay States in Gua Cha. In this study, it was concluded that Gua Cha shows the presence of a society during the Hoabinh & Neolithic period, which also used pottery as one of the burial practices. Pottery pots and personal ornaments were found buried with bodies buried in a straight manner. This study is considered more systematic because he records stratigraphic data, found artifacts and non-artifacts. Most of the earthen pottery found in fragmentary tombs was either pottery with rough cork-marked markings or plain traditional pottery of the Neolithic period. 14 human skeletal remains were from the Hoabinhian and three were from the Neolithic. In this excavation carried out by G. de G. Sieveking and his wife, earthen pottery fragments were found in such large quantities reached 2,759 pieces in various shapes, sizes, and colours.

The next research was carried out by Adi Taha also in Gua Cha.<sup>31</sup> This excavation was the second phase of excavation and a re-examination of Sieveking previous study. The concern was about the long prehistoric time gap between two different eras, one characterized by the Hoabinh period and the other characterized by the Neolithic period. As a result Adi Taha confirmed that Gua Cha was indeed inhabited by people from two different eras. This is evidenced by discoveries with distinct characteristics across different stratigraphic layers. The lower layers contain remains from the Hoabinhian period, characterized by flexed burials without grave goods. The upper layers reveal Neolithic period remains, distinguished by extended burials accompanied by stone tools, pottery vessels, and personal ornaments. Adi Taha conducted research and excavation at this cave site in 1994 where he found the remains

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- 27 H. D. Noone. Report on New Neolithic Site in Ulu Kelantan. *Journal of the Federated Malay Museum State*. XV (1). 1939.
  - 28 G. De G. Sieveking ada menjelaskan tentang perubahan nama Gua Menteri kepada Gua Cha di dalam penulisannya 'Excavations At Gua Cha. Kelantan. 1954'. Sila rujuk Federation Museum Journal. Vol I dan II, 1954 hlm. 6.
  - 29 Williams-Hunt, Recent Archaeological Discoveries in Malaya (1945-50), *Journal of the Malayan Branch Royal Asiatic Society*. 24 (1): 186. 1951.
  - 30 G. De G. Sieveking, *Federation Museum Journal*, Vol I & II, 1954.
  - 31 Adi Taha, *The Re-Excavation Of The Rockshelter Of Gua Cha, Ulu Kelantan, West Malaysia*, Tesis Sarjana Sastera, School of General Studies, Australian National University, Canberra, 1981.

of Neolithic pottery fragment artifacts with cork-marked patterns. A study on pottery was also conducted in Gua Chawas<sup>32</sup> and Gua Peraling<sup>33</sup> by Adi Taha in 2007 where the characteristics of the artifacts found are the same as those found in Gua Cha. His report stated that there was a discovery of Neolithic-era pottery utensils dated to 3,500 BC with a cord-marked decorative pattern.

Around 2015 to 2016, prehistoric pottery research was conducted more vigorously under Dr. Zuliskandar Ramli's supervision and this study began with an initial survey conducted by him and Yunus Sauman along with Universiti Kebangsaan Malaysia research team. Starting in 2018, a series of research and excavations were carried out in Hulu Kelantan caves including Gua Chawan, Gua Gua Kecil Batu Tambah, Gua Lubang Kelawar dan Gua Kelew, directly adding new data related to prehistoric pottery artifacts found in Hulu Kelantan. For example, a study at Gua Jaya in 2017-2018<sup>34</sup> recovered at least 140 pottery fragments or units, of which 17% consisted of rim parts, 80% of body parts, and 3% were carinated parts. This 2017 excavation was not the first at Gua Jaya, previously, H.A. Lamb and B.A.V. Peacock had conducted an excavation in 1963 and found pottery fragments in a 30 cm thick burnt layer as well as soot traces on the ceiling surface, along with prehistoric human skeletons believed to be from Neolithic culture. Then in Gua Kechil and Gua Lubang Kelawar located in Bukit Batu Tambah complex in 2018<sup>35</sup> and 2020<sup>36</sup>, pottery fragments were also found along with ecofacts such as shell remains and animal bones. Based on the analysis and classification revealed patterned pottery consisting of cross-hatched lines, parallel lines, and cord marked. Artifact fragments were also found in Gua Kelew in 2020, but in small quantities. Although the pottery fragments number is small compared to other sites, its presence in the cave still shows signs of pottery use by the local community.<sup>37</sup>

In conclusion, based on past studies conducted by previous researchers, various artifact discoveries found in Malaysia, especially Kelantan state, provide insights into past cultures. Accordingly, this study contributes to the expansion of archaeological research networks, particularly within prehistoric historiography, by offering new empirical evidence and analytical insights. The research strengthens the chronological and cultural framework of prehistoric studies in Malaysia while facilitating comparative analyses with other regional sites, thereby advancing scholarly discourse on Southeast Asian prehistory.

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- 32 Adi Taha, *Archaeology of Ulu Kelantan First Edition*, Department of Museum Malaysia, Kuala Lumpur, 2007, hlm. 182.
- 33 Adi Taha, *Archaeology of Ulu Kelantan First Edition*, Department of Museum Malaysia, Kuala Lumpur, 2007, hlm. 185.
- 34 Nur Sarahah Mohd Supian. 2020. Arkeologi di Gua Jaya, Hulu Kelantan. Tesis Sarjana Persuratan, Universiti Kebangsaan Malaysia, 2020.
- 35 Wan Noor Shamimi Wan Azhar, *Penyelidikan Dan Ekskavasi Arkeologi Prasejarah Di Gua Kecil Batu Tambah Dan Gua Lubang Kelawar Batu Tambah, Hulu Kelantan*. Tesis Sarjana, Universiti Kebangsaan Malaysia, 2021.
- 36 Natasha Edreena Mohamad Nasruddin, *Arkeologi Prasejarah di Gua Lubang Kelawar Batu Tambah : Kronologi, budaya dan hubungan dengan Persekitaran*, 2023.
- 37 Nur Farriehah Azizan, *Arkeologi Prasejarah di Gua Kelew: Kronologi, Budaya dan Hubungan dengan Persekitaran*. Tesis Sarjana. Universiti Kebangsaan Malaysia, 2022.

**Table 1 : Summary Of Prehistoric Pottery Finds In Caves Around Lembah Nenggiri.**

| Site                           | Quantity               | Researchers                                              | Decorative Motifs                      | Scientific Analysis |
|--------------------------------|------------------------|----------------------------------------------------------|----------------------------------------|---------------------|
| Gua Cha                        | Thousands of Fragments | Noone (1935), G.de Sieveking(1954,1957), Adi Taha (1979) | Cord marked, plain                     | XRD<br>XRF          |
| Gua Jaya                       | Thousands of Fragments | Dr. Lamb & Peacock (1963), Zuliskandar Ramli (2020)      | Horizontal, cord marked, zigzag        | XRF                 |
| Gua Kelew                      | 35 Fragments           | Nur Fariehah Azizan, Zuliskandar Ramli (2022)            | Horizontal, cord marked                | XRD<br>XRF          |
| Gua Lubang Kelawar Batu Tambah | 146 Fragments          | Wan Noor Shamimi, Zuliskandar Ramli (2021)               | Horizontal, cord marked.               | XRD<br>XRF          |
| Gua Peraling                   | Not specified          | Adi Taha (1979)                                          | Not specified                          | XRD<br>XRF          |
| Gua Musang                     |                        | Peacock (1963)                                           |                                        | -                   |
| Gua Kechil Batu Tambah         | 11 Fragments           | Wan Noor Shamimi, Zuliskandar Ramli (2021)               | Cord marked, plain                     | -                   |
| Gua Kemiri                     | 419 Fragments          | Hamisatun Adilah, Zuliskandar Ramli (2024)               | Cord-marked, plain, abstract, geometry | -                   |

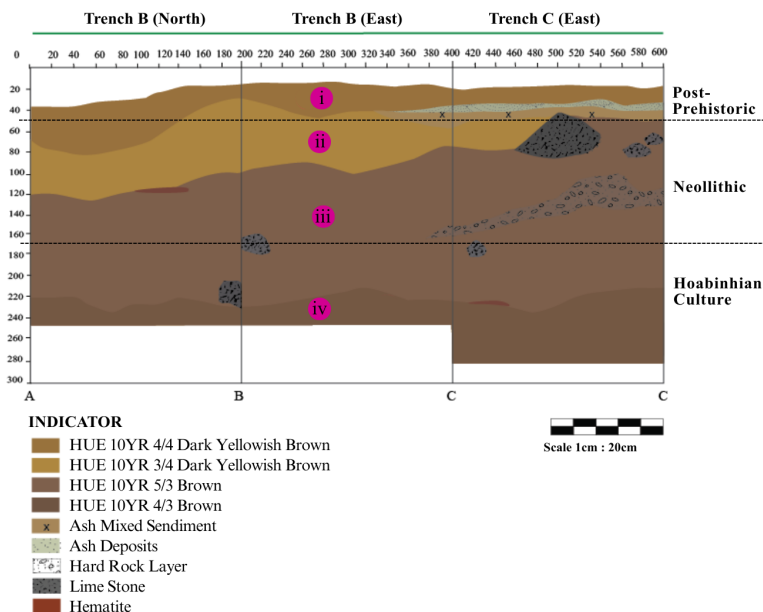
The table above presents a summary of prehistoric pottery discoveries in the Lembah Nenggiri region. Based on this data, cord-marked pottery represents the most prevalent decorative pattern frequently encountered throughout the Lembah Nenggiri archaeological sites. According to research by previous scholars such as Noone (1935), G. de Sieveking (1954, 1957), Dr. Lamb & Peacock (1963), and Zuliskandar Ramli (2020, 2021), majority of these pottery artifacts were not manufactured in those area. Rather, they were produced non-locally and subsequently introduced through trade networks or transported by coastal communities. Significant variations in the quantities discovered across different archaeological sites have generated diverse interpretations among researchers. The discovery of prehistoric pottery in caves throughout the Lembah Nenggiri and surrounding areas provides compelling evidence that local communities had, at minimum, received and adopted cultural influences from the Neolithic tradition. This archaeological evidence indirectly suggests that pottery served as a crucial cultural marker, reflecting the societal transition from hunter-gatherer lifestyles to more sedentary, agriculture-based communities. Contemporary scholarly research on prehistoric pottery in Malaysia encompasses multiple dimensions, including manufacturing techniques, aesthetic motifs, and their relationship to ancient economic systems and trade networks. These pottery assemblages serve as material testimonies to the complex cultural exchanges and technological innovations that characterized prehistoric Southeast Asian societies.

The presence of non-local pottery in the Lembah Nenggiri demonstrates the existence of extensive inter-regional connections and the active participation of interior communities in broader prehistoric trade networks, challenging traditional assumptions about the isolation of inland populations during the Neolithic period. The archaeological significance of these

findings extends beyond mere artifact documentation, as they contribute to our understanding of cultural diffusion patterns, technological transfer mechanisms, and the gradual development of complex societies in prehistoric Malaysia. This is why one of the critical aspects of pottery research is its role in understanding technological innovation. The emergence of pottery represents a significant step in human material culture, marked by advancements in pyrotechnology, which facilitated the production of more durable and functional vessels for storage, cooking, and food preparation. Understanding where technology is made of can also bring an understanding of where it comes from.

Pottery analysis often involves typological and morphological assessments to provide a comprehensive understanding of the functions and cultural practices of prehistoric communities. Therefore, physical characteristics such as size, thickness, color and decorative motifs play a crucial role in interpreting the manufacturing techniques and usage of pottery. However, to gain deeper insights into aspects such as firing techniques, mineral composition, and the provenance of the pottery, scientific analyses such as X-ray Diffraction (XRD) and X-ray Fluorescence (XRF) are essential. These scientific methods offer detailed information about the mineralogical composition of the pottery, helping researchers determine whether the artifacts were produced locally or imported. Such analyses also confirm the existence of trade networks between inland communities in Hulu Kelantan and more advanced coastal settlements, illustrating cultural interactions through the exchange of materials and ideas. Archaeological sites such as Gua Cha, Gua Jaya, Gua Kelew, Gua Kechil, Gua Lubang Kelawar, Gua Peraling, Gua Musang, and Gua Kemiri provide clear evidence that this region once experienced significant Neolithic cultural influence.

## Research Findings in Gua Keledung Kecil



**Figure 5 :** Stratigraphic Sample of the Gua Keledung Kecil site from the BC trenches.



Based on the excavations that have been carried out, there are various types of pottery artifacts found in the Gua Keledung Kecil from three trenches with a total of 459 units. Based on the excavations that have been carried out, various types of pottery artifacts have been found in Gua Keledung Kecil from three trenches, totaling 459 units. However, each trench provides a different number of findings, types, and analyses. The interpretation of each pottery find can be identified by conducting physical research and categorizing it based on its morphological properties. The data are then classified by cultural layers to make the identification of each aspect more consistent and clear.

Referring to Figure 5, which displays the stratigraphic profile of Gua Keledung Kecil from trench BC, three distinct cultural layers have been identified within four soil strata characterized by variations in color and texture. The stratigraphic sequence provides valuable insights into the cultural transitions and human occupation patterns at the site.

The uppermost stratigraphic layer (i) represents the post-prehistoric period, where this layer contains several artifacts that are not of prehistoric phase, including iron objects and modern ceramic materials from contemporary production. The presence of these modern materials indicates recent human activity and disturbance at the site, likely associated with historical or contemporary use of the cave shelter. This mixed assemblage serves as a clear demarcation between prehistoric occupation layers and more recent intrusions.

The second stratigraphic layer (ii) has been identified as belonging to the Neolithic period or at least as a layer that received Neolithic cultural influence. This interpretation is based on the increased quantity of pottery artifacts from a depth of 80cm to 140cm (spit 12) from the ground surface, which begins to decline after a depth of 150cm (spit 13). Within this stratigraphic section, pottery sherds or fragments appear in every excavation spit in various sizes, colors, and forms. These layers provide clear evidence of an established pottery-making tradition, characterizing the technological practices and culture of the Neolithic period. The concentration and diversity of ceramic artifacts within this zone suggest intensive occupation and well-developed ceramic production techniques, which are hallmark features of Neolithic communities in Southeast Asia.

The third stratigraphic layer (iii) is situated between two cultural phases, the Neolithic and Hoabinhian. This determination is based on the presence of pottery finds that continue to exist but progressively decline until pottery finds cease at a depth of 170cm (spit 15). Concurrently, stone tools with Hoabinhian characteristics remain consistent and subsequently increase in frequency with greater depth. This transitional layer is particularly significant as it represents a critical period of cultural change, potentially indicating either the gradual adoption of Neolithic practices by Hoabinhian populations or a temporal overlap between the two cultural traditions. The coexistence of both pottery and Hoabinhian lithic technology suggests cultural continuity alongside technological innovation.

The fourth and deepest layer (iv) represents the Hoabinhian or pre-Neolithic period, as the majority of artifacts exhibit characteristics typical of this earlier technological tradition. Furthermore, the frequency of pottery discoveries decreases significantly in this layer, consistent with the pre-pottery nature of the Hoabinhian cultural assemblage. The dominance of stone tools with distinctive Hoabinhian morphological attributes, coupled with the virtual absence of ceramic materials, confirms this layer as representing the earliest phase of human occupation at Gua Keledung Kecil. This stratigraphic evidence aligns with the broader regional pattern of pre-Neolithic hunter-gatherer societies that relied primarily on stone tool technology prior to the introduction of pottery production.

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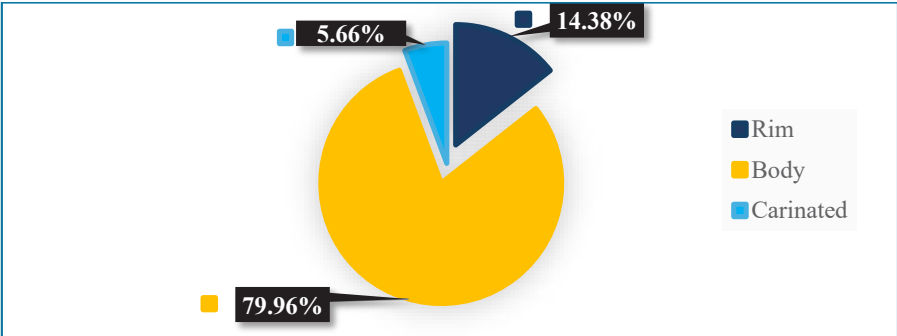
**Table 2 : Morphological Classification and Analysis Used in Gua Keledung Kecil**

| Pottery part     | Description                                                                                         | Total | Percent |
|------------------|-----------------------------------------------------------------------------------------------------|-------|---------|
| Rim fragments    | representing the vessel mouth and lip areas                                                         | 66    | 14.38%  |
| Body sherds      | constituting the main vessel walls                                                                  | 367   | 79.96%  |
| Carinated sherds | fragments exhibiting multiple morphological features or angular transitions between vessel sections | 26    | 5.66%   |
|                  |                                                                                                     | 459   | 100%    |

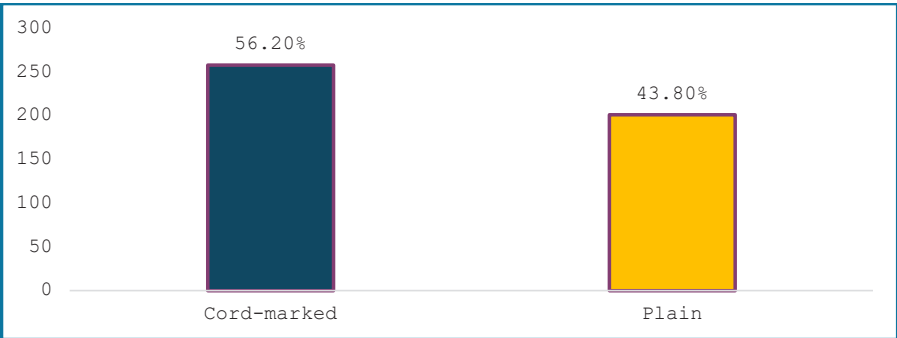
**Table 3 : Classification of Pottery Artifacts based on Stratigraphy Layers and Patterns.**

| Motifs              | Stratigraphy Layers |     |     |    | Number | Percent |
|---------------------|---------------------|-----|-----|----|--------|---------|
|                     | i                   | ii  | iii | iv |        |         |
| Cord-marked         | 3                   | 184 | 51  | 20 | 258    | 56.20%  |
| Plain               | 21                  | 145 | 18  | 17 | 201    | 43.80%  |
| <b>Total number</b> | 24                  | 329 | 69  | 37 | 459    | 100%    |

**Figure 6 : Pie Chart Data of the Pottery Section in Gua Keledung Kecil**



**Figure 7 : Graph Bar Data of the Pottery by motifs in Gua Keledung Kecil**



Earthenware pottery, representing the synthesis of four natural elements, earth, water, fire, and air, constitutes compelling evidence of technological advancement and innovation achieved by prehistoric societies. It is typically manifested in diverse forms, patterns, and dimensions. In Gua Keledung Kecil, each cultural layer (I to iv, refer to the Table 3) recorded different analysis results. The number of finds reached 459 units, representing 13.51% of the total finds in Gua Keledung Kecil. The earthenware pottery fragments found during excavations were systematically classified into morphological categories comprising rim fragments, body sherds, neck fragments, base parts, and pottery fragments consisting of combinations of several parts in one fragment called carinated or carination sherds. These earthenware pottery fragments vary in size and display diverse shapes and forms. Most of the pottery was found in layer ii, with a total of 329 units, of which 145 units were plain and 184 units with patterns (motifs). In the other layers, cultural layer i yielded 24 units, consisting of 21 plain and 3 patterned, while layer iii contained 69 units, comprising 18 plain and 51 patterned and lastly, layer iv contained 37 unit with 17 plains, 20 patterned. This situation suggests that the culture layer ii is a layer that shows active Neolithic cultural practices than the other layers, which also means it represents the most active period of Neolithic occupation in this site. The high number of pottery fragments in layer ii suggests that people lived there more intensively during this time compared to the other periods, indirectly indicates those community was perhaps larger, stayed longer, or used the cave more frequently for daily activities like to store goods, pottery production, cooking and even as a food storage. The findings provides indirect evidence of that layer ii was the main period of settlement activity, making it important for understanding how prehistoric people lived in this region.

Refer to the pie chart in Figure 6 presents a fraction of pottery parts found in the Gua Keledung Kecil. As for the total findings, the body part of pottery recorded the highest percentage, at 79.96 %, thus indicating that this part was found the most compared to other parts. The rim or part of the pottery lip was in second position with 14.38 % while the carinated part recorded the least amount, at only 5.66 %. The significant dominance of pottery body parts may reflect the habit of dumping or preserving pottery fragments at such archaeological sites, where body parts are more durable and tend to remain intact compared to finer parts such as rims and necks. This statistical description provides an important insight into the composition of pottery artifacts in the Gua Keledung Kecil and provides the basis for a more in-depth interpretation of pottery making technology, usage styles, and cultural aspects of the people who once inhabited the area.

Although pottery sherd artifacts were found in large quantities, they appears to be just a small fragment, typical size of archaeological pottery finds in Hulu Kelantan especially in Lembah Nenggiri area. The measurement scale from the Institut Alam dan Tamadun Melayu, Universiti Kebangsaan Malaysia shows the artifact is quite compact, estimated size of less than 6 cm. This makes it difficult to assemble the fragments into a complete pottery. The average decorated or with motifs pottery fragment consists of a cord-marked pattern but with a different design (refer to figures attached) about 258 units concurrent with 56.20%, while plain or without any decorative are 201 units around 43.80%. The samples of pottery motifs finds is as shown in figures below.

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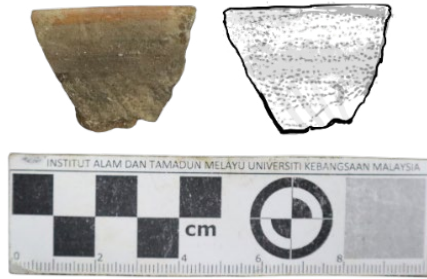


Figure 8 : Pottery fragments plain motif in the Gua Keledung Kecil.



Figure 9 : Pottery fragments plain motif in the Gua Keledung Kecil.



Figure 10 : Pottery fragments with cord-marked motifs in the Gua Keledung Kecil.



Figure 11 : Pottery fragments with cord-marked motifs in the Gua Keledung Kecil.



Figure 12 : Pottery fragments with cord-marked motifs in the Gua Keledung Kecil.



Figure 13 : Pottery fragments with cord-marked motive in the Gua Keledung Kecil.

Based on the analysis, reveals that Gua Keledung Kecil was part of a prehistoric settlement area. The substantial presence of pottery sherds amounts 459 units, demonstrates that Gua Keledung Kecil experienced the Neolithic period or at least a phase that practiced Neolithic cultural traditions, particularly practice the use of pottery in daily life. Several pottery fragments recovered exhibit evidence of burning, confirming the use of fire. The use of fire and pottery is typically linked with food preparation practices. The discovery of pottery fragments alongside ecofact remains further substantiates this argument. Moreover, the diversity of cord-marked motifs found during excavation attests to the creativity of the local community. The variation in styles, choices, technological innovations, and material compositions observed in the pottery assemblage directly provides robust evidence of sustained cultural interaction between the cave-dwelling community and coastal populations. The research potential presented by the pottery artifacts from Gua Keledung Kecil extends beyond the scope of current studies, opening new avenues for interdisciplinary research.

In this regard, the comprehensive analysis of pottery artifacts discovered at Gua Keledung Kecil has fundamentally transformed scholarly understanding of prehistoric settlement patterns and cultural dynamics in the Hulu Kelantan region, thereby providing new discourse that broaden interpretations of prehistoric societies in Ulu Kelantan and Malaysia. These archaeological findings extend beyond mere evidence of Neolithic presence or influence but also reveal developments in social organization, economic systems, and cultural networks operating within this historically significant landscape. Besides, this prehistoric study serves as an important chronological marker in archaeology, not only documenting the existence of an established Neolithic community but also recording the complex technological traditions and cultural practices that characterized these prehistoric populations. The morphological diversity and technological sophistication of these earthenware remains suggest a higher level of specialized craftsmanship and a more advanced knowledge transmission system than previously anticipated.

Future research directions should encompass detailed analysis. Another aspect that can be drawn from the findings at Gua Keledung Kecil is the notable similarity between pottery patterns found at this site and those reported from other caves in previous studies, indicating the existence of extensive cultural networks and shared technological traditions throughout the region. For instance, through academic comparison, cord-marked pottery patterns (motifs) from Gua Keledung Kecil display clear similarities with patterns previously discovered at Gua Lubang Kelawar and Gua Kechil within the Bukit Batu Tambah complex, a complex located not far from the study area (refer Wan Nur Shamimi 2021)<sup>38</sup>. These similarities indirectly indicate the existence of a same strong tradition of pottery making across various cave sites. The consistency of cord-marked patterns across various sites suggests the existence of a unified cultural network or shared knowledge system among prehistoric communities in the region. The distribution of these patterns may reflect several interrelated processes, human movement between sites, exchange of technological knowledge, or the influence of shared cultural practices dispersed across different settlements. Technical similarities in pottery production methods, including the selection of tempering materials, firing and temperature

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38 Wan Noor Shamimi Wan Azhar. *Penyelidikan Dan Ekskavasi Arkeologi Prasejarah Di Gua Kecil Batu Tambah Dan Gua Lubang Kelawar Batu Tambah, Hulu Kelantan*. Tesis Sarjana. Universiti Kebangsaan Malaysia. 2021.



control techniques, surface treatments, further support the hypothesis of sustained cultural interaction and knowledge sharing among cave-dwelling communities. The presence of comparable decorative motifs and manufacturing techniques indicates that these communities were not isolated entities living in solitude, but rather part of a larger cultural network that facilitated the exchange of ideas, innovations, and technology.

The determination of the origin of pottery (*provenans*) is carried out through a comparative analysis of the mineralogic and chemical composition between pottery fragments and environmental clay deposits, in addition to structural analysis and inspection of firing techniques to assess whether pottery is produced locally or imported from outside. If the mineral that found in pottery, including elements such as aluminum, silica, magnesium, and iron, closely corresponds with clay deposits near the archaeological site, there is a high probability that the pottery was produced locally. However, if the mineral composition differs significantly from local clay sources, this indicates that pottery was brought from external regions through trade activities or exchange networks between coastal and inland communities. According to mineralogical and chemical composition analysis of pottery sherds found at Gua Lubang Kelawar (refer Muhamad Shafiq 2023)<sup>39</sup>, results indicate that the mineral and elemental composition of pottery does not match clay deposits in the vicinity of the cave area, thus strengthening the hypothesis that the pottery was not produced locally in the cave area but was imported from other regions through trading activities or exchange systems between coastal and inland societies. Additionally, technological analysis of firing techniques revealing inconsistent temperature control also supports the conclusion that the pottery was not produced *in situ*, given that local production typically demonstrates more consistent firing control. Physical comparison between pottery from Gua Keledung Kecil and Gua Lubang Kelawar also indirectly suggests that earthenware from Gua Keledung Kecil originated from external regions and represents the product of trade relations with outside communities who likely obtained pottery from areas more advanced in earthenware manufacturing technology. This evidence demonstrates the existence of sophisticated exchange networks connecting cave-dwelling communities with pottery production centers beyond, thereby highlighting the complex nature of prehistoric trade relations and technological diffusion in the region.

Overall, this analysis indicates that the Gua Keledung Kecil habitation site was part of the Neolithic cultural tradition or at least practiced similar Neolithic traditions and customs, particularly concerning the use of pottery in daily life. The evidence compiled suggests the existence of well-established trade networks and cultural exchange systems connecting inland cave areas with coastal zones, thereby challenging previous assumptions about the isolation of cave-based communities and highlighting the interconnected nature of prehistoric societies across diverse settlement zones.

## Conclusion

In summary, the pottery assemblage recovered from Gua Keledung Kecil marks a transformative milestone in understanding Malaysia's prehistoric past. The site provides

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39 Muhamad Shafiq Mohd Ali et al.. Analisis Fizikal dan Mineral Tembikar Tanah di Gua Lubang Kelawar Bukit Batu Tambah, Hulu Kelantan. *Journal of Social Science*. 2023. 9 (2) ISSN 2289-9391 / eISSN 2462-2443 : 73-93

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exceptional evidence regarding the elaborate social organization, technological proficiency, and extensive regional networks that characterized Neolithic communities. Beyond illuminating local prehistoric patterns, these archaeological materials make substantial contributions to wider scholarly debates on Southeast Asian prehistory, particularly concerning mechanisms of cultural exchange and pathways toward social complexity in tropical contexts. Sustained examination of this material collection holds considerable potential for revealing further critical insights into Malaysia's ancient heritage and its significance within the broader framework of Southeast Asian cultural evolution.

## Reference

- Adi Taha. 1981. The Re-Excavation Of The Rockshelter Of Gua Cha, Ulu Kelantan, West Malaysia, Tesis Sarjana Sastera, School of General Studies. Canberra : Australian National University.
- Adi Taha. 2007. *Archaeology of Ulu Kelantan*. Kuala Lumpur : Department of Museums Malaysia. Ministry of Culture and Heritage.
- Ali, M. S. M., Ramli, Z., & Supian, N. S. M. 2021. Geochemistry And Mineralogy Of Prehistoric Pottery Shards Found At Gua Jaya, Nenggiri Valley, Kelantan, Malaysia. *Bulletin of the Geological Society of Malaysia*. 72, 205-213. <https://doi.org/10.7186/bgsm72202116>
- Andonova, M. and Nikolov, V. 2021. Pots On Mats: Mat-Impressed Salt-Extraction Pottery At Chalcolithic Provadia-Solnitsata, Bulgaria. *Antiquity*. 96(385), 51-66. <https://doi.org/10.15184/aqy.2021.145>
- Ard, V. and Darvill, T. 2015. Revisiting Old Friends: The Production, Distribution And Use Of Peterborough Ware In Britain. *Oxford Journal of Archaeology*. 34(1). 1-31. <https://doi.org/10.1111/ojoa.12046>
- Azmi Arifin. 2015. Traditional Malay Pottery of Kuala Kangsar: Its History and Development. *Kajian Malaysia* 33. 3(2) : 113-133.
- Berzins, Valdis, Ute Brinker, Christina Klein, Harald Lübke, John Meadows, Mudīte Rudzīte, Ulrich Schmölcke, Harald Stümpel, dan Ilga Zagorska. 2014. New Research at Rīnukalns, a Neolithic Freshwater Shell Midden in Northern Latvia. *Antiquity* 88 (341): 715–732. <https://doi.org/10.1017/S0003598X0005064X>.
- Boaretto, Elisabetta, Xiaohong Wu, Jiarong Yuan, Ofer Bar-Yosef, Vikki Chu, Yan Pan, Kexin Liu *et al.* 2009. Radiocarbon Dating of Charcoal and Bone Collagen Associated with Early Pottery at Yuchanyan Cave, Hunan Province, China. *Proceedings of the National Academy of Sciences* 106(24): 9595–9600. DOI: 10.1073/pnas.0900539106
- Capelli, C., Cabella, R., Lucchese, A. D., Piazza, M., & Starnini, E. 2008. Archaeometric Analyses Of Early And Middle Neolithic Pottery From The Pian Del Ciliegio Rock Shelter (Finale Ligure, NW Italy). *ArchéoSciences*. 32. 115-124. <https://doi.org/10.4000/archeosciences.1023>
- Craig, O. E., Forster, M., Andersen, S. H., Koch, E., Crombé, P., Milner, N., ... & Heron, C. 2007. Molecular and isotopic demonstration of the processing of aquatic products in northern european prehistoric pottery. *Archaeometry*. 49(1). 135-152. <https://doi.org/10.1111/j.1475-4754.2007.00292.x>
- Cramp, L. Ethier, J. Urem-Kotsou, D. Bonsall, C. Borić, D. Boroneanț, A. & Ivanova, M. 2019. Regional Diversity In Subsistence Among Early Farmers In Southeast Europe Revealed By Archaeological Organic Residues. *Proceedings of the Royal Society B: Biological Sciences*, 286(1894), 20182347. <https://doi.org/10.1098/rspb.2018.2347>
- Elisabetta Boaretto, Xiaohong Wu, Jiarong Yuan, Ofer Bar-Yosef, Vikki Chub, Yan Pan, Kexin Liu, David Coheng, Tianlong Jiaoh, Shuicheng Lic, Haibin Gud, Paul Goldbergi, and Steve Weiner. 2009.
- Eusebio, M. (2015). Foodways Through Ceramics In Southeast Asian Archaeology: A View From Southern Vietnam. *Journal of Indo-Pacific Archaeology*, 37, 14-24. <https://doi.org/10.7152/jjipa.v37i0.14745>
- Garcea, Elena A. A. 2013. *Gobero: The No-Return Frontier. Archaeology and Landscape at the Saharo-Sahelian Borderland*. Frankfurt: Africa Magna Verlag.
- Hamisatun Adilah Mohamed Abd Aziz. 2024. Arkeologi Gua Kemiri: Analisis Tembikar Tanah Dan Perkaitannya Dengan Jumpaan Di Tapak Prasejarah Lain Di Lembah Nenggiri. *Asian Journal of Environment, History and Heritage*. 8 (2) ; 83-108. ISSN 2590-4213 e-ISSN 2590-4310.

- Hiroki Obata, Aya Manabe, Naoko Nakamura, Tomokazu Onishi & Yasuko Senba. 2011. A New Light on the Evolution and Propagation of Prehistoric Grain Pests: The World's Oldest Maize Weevils Found in Jomon Potteries, Japan. *PLOS ONE* 6(3): e14785. DOI: 10.1371/journal.pone.0014785
- Huysecom, Eric, Michel Rasse, Laurent Lespez, Katharina Neumann, Asmaa Fahmy, Aziz Ballouche, Sylvain Ozainne, Marino Maggetti, Christine Tribolo, dan Stéphane Soriano. 2009. The Emergence of Pottery in Africa during the Tenth Millennium cal BC: New Evidence from Ounjougou (Mali). *Antiquity* 83 (322): 905–917. <https://doi.org/10.1017/S0003598X00099245>.
- Jordan, P., Gibbs, K., Hommel, P., Piezonka, H., Silva, F., & Steele, J. 2016. Modelling The Diffusion Of Pottery Technologies Across Afro-Eurasia: Emerging Insights And Future Research. *Antiquity*, 90(351), 590-603. <https://doi.org/10.15184/aqy.2016.68>
- Kamjan, S., Gillis, R. E., Çakırlar, C., & Raemaekers, D. 2020. Specialized cattle farming in the neolithic rhine-meuse delta: results from zooarchaeological and stable isotope ( $\delta^{18}\text{O}$ ,  $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$ ) analyses. *Plos One*, 15(10), e0240464. <https://doi.org/10.1371/journal.pone.0240464>
- Lee, Chai Peng, Mohd Shafeea Leman, Kamaludin Hassan, Bahari Md. Nasib, and Rashidah Karim. 2004. *Stratigraphic Lexicon of Malaysia*. Kuala Lumpur: Persatuan Geologi Malaysia.
- Lucquin, A., Robson, H. K., Oras, E., Lundy, J., Moretti, G., Carretero, L. G., ... & Craig, O. E. 2023. The impact of farming on prehistoric culinary practices throughout northern europe. *Proceedings of the National Academy of Sciences*, 120(43). <https://doi.org/10.1073/pnas.2310138120>
- McClure, S. B., Podrug, E., Moore, A. M. T., Culleton, B. J., & Kennett, D. J. 2014. Ams 14c Chronology And Ceramic Sequences Of Early Farmers In The Eastern Adriatic. *Radiocarbon*, 56(3), 1019-1038. <https://doi.org/10.2458/56.17918>
- McLaren, D., Dunne, J., Gillard, T., Evershed, R. P., Hamilton, D. A., Engl, R., ... & Wilson, S. 2022. Expanding current understanding of the function, style and chronology of grooved ware from the a9 dualling. *Proceedings of the Society of Antiquaries of Scotland*, 151, 31-73. <https://doi.org/10.9750/psas.151.1335>
- Miriam Cubas, Alexandre Lucquin, Harry K. Robson, André Carlo Colonese, Pablo Arias, Bruno Aubry, Cyrille Billard..... 2020. Latitudinal Gradient in Dairy Production with the Introduction of Farming in Atlantic Europe. *Nature Communications* 11: 2036. DOI: 10.1038/s41467-020-15907-4
- Mohd. Kamaruzaman A. Rahman. 1990. Penyelidikan Arkeologi Prasejarah di Negeri Kelantan, *JEBAT* 18, 15-34,
- Morris, E. and Woodward, A. 2003. Ceramic petrology and prehistoric pottery in the uk. *Proceedings of the Prehistoric Society*, 69, 279-303. <https://doi.org/10.1017/s0079497x00001353>
- Muhamad Shafiq Mohd Ali, Zuliskandar Ramli, Yunus Sauman, Mohd Riduan Mt Said & Mohamad Sazuan Sahrom. 2023. Analisis Fizikal dan Mineral Tembikar Tanah di Gua Lubang Kelawar Bukit Batu Tambah, Hulu Kelantan. *Journal of Social Science*. 9 (2) 2023 ISSN 2289-9391 / eISSN 2462-2443 : 73-93
- Natasha Edreena Mohamad Nasruddin. 2023. Arkeologi Prasejarah di Gua Lubang Kelawar Batu Tambah : Kronologi, budaya dan hubungan dengan Persekitaran.
- Nur Farriehah Azizan. 2022. Arkeologi Prasejarah di Gua Kelew: Kronologi, Budaya dan Hubungan dengan Persekitaran. Tesis Sarjana. Universiti Kebangsaan Malaysia.
- Nur Sarahah Mohd Supian. 2020. Arkeologi di Gua Jaya, Hulu Kelantan. Tesis Sarjana Persuratan, Universiti Kebangsaan Malaysia.
- Rice, Prudence M. 1987. *Pottery Analysis: A Sourcebook*. Chicago: University of Chicago Press.
- Roffet-Salque, M., Bogucki, P., Pyzel, J., Sobkowiak-Tabaka, I., Grygiel, R., Szmyt, M., ... & Evershed, R. 2012. Earliest evidence for cheese making in the sixth millennium bc in northern europe. *Nature*, 493(7433), 522-525. <https://doi.org/10.1038/nature11698>

- Salanova, L., Martínez, M. P. P., García, X. C. i., Convertini, F., Suárez, Ó. L., & Cortizas, A. M. 2015. What Are Large-Scale Archaeometric Programmes For? Bell Beaker Pottery And Societies From The Third Millennium BC In Western Europe. *Archaeometry*, 58(5), 722-735. <https://doi.org/10.1111/arc.12173>
- Spataro, M. 2015. First impressions of early neolithic russian pottery technology. *Samara Journal of Science*, 4(3), 142-153. <https://doi.org/10.17816/snv20153214>
- Teetaert, D., Vannoorenberghe, M., Velde, T., Boudin, M., Bodé, S., Kubiak-Martens, L., ... & Boeckx, P. 2024. Pottery use across the neolithic transition in northern belgium: evidence from isotopic, molecular and microscopic analysis. *Archaeological and Anthropological Sciences*, 16(8). <https://doi.org/10.1007/s12520-024-02030-4>
- Wan Noor Shamimi Wan Azhar. 2021. Penyelidikan Dan Ekskavasi Arkeologi Prasejarah Di Gua Kecil Batu Tambah Dan Gua Lubang Kelawar Batu Tambah, Hulu Kelantan. Tesis Sarjana. Universiti Kebangsaan Malaysia.
- Xiaohong Wu, Chi Zhang, Paul Goldberg, David Cohen, Yan Pan, Trina Arpin & Ofer Bar Yosef. 2012. Early Pottery at 20,000 Years Ago in Xianrendong Cave, China. *Science* 336,1696-1700. DOI:10.1126/science.1218643
- Zuliskandar Ramli, Yunus Sauman & Nik Hassan Shuhaimi Nik Abdul Rahman. 2011. Analisis Komposisi Tembikar Tanah, Mortar Dan Bata Yang Terdapat Di Kota Melawati. Selangor. *Jurnal Arkeologi Malaysia* 24: 93 – 131.
- Zuliskandar Ramli. 2019. Penemuan Terkini Tapak Prasejarah Di Lembangan Sungai Nenggiri. *Jurnal Arkeologi Malaysia* 32(1): 1-20.
- Zulkifli Jaafar. 2003. *Gua-gua Batu Kapur di Malaysia dalam Perspektif Arkeologi Jilid Satu*. Kuala Lumpur : Jabatan Muzium dan Antikuiti.