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Petrified Wood as Hand Weapons for the Early Egyptians

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Abstract

Human life began in eastern and northern Africa, adapting to the unstable environmental conditions by the end of the Miocene epoch, approximately six million years ago. Amid the fluctuating cycles of aridity and wet climates during this formative period, evidence of early human ancestors has been identified in various parts of Africa - though none had been discovered in Egypt until now. By chance, during an independent investigation in Lower Egypt, the author identified several artifacts that may provide preliminary clues to an early hominin presence in the region. These artifacts - petrified wood dating to the same period as human origins - may offer a subtle indication of activity that once occurred in this ancient landscape. According to their shape and form, they might have been used as hand weapons for defensive reasons. Evidence suggesting the artifacts were shaped prior to petrification is visible in three delicate, parallel incisions on one face of a presumed spearhead. These marks could only have been made when the material was still soft wood, prior to its transformation into stone in the distant past. This research focuses on nine specimens from these intriguing findings. Their dimensions and the distinct fingerprint-like impressions on each piece—perfectly suited to fit a human palm—sparked our curiosity. These characteristics suggest a logical conclusion: early humans may have inhabited this region at the dawn of their existence, around six million years ago. Adding to the significance of this discovery, the site aligns with the location of Merimda Bani Salama, a known ancient civilization west of the Nile Delta in Lower Egypt. However, this ancient settlement was not previously dated to such an early point in history as these findings imply. This paper calls for further investigation in the area to uncover additional evidence of early hominins. Such efforts could help bridge a significant gap in the history of Egypt, shedding light on the past six million years and enriching our understanding of human origins.

Keywords

Miocene epoch, Africa, Hominin, Petrified wood, Lower Egypt

1. Introduction

The African continent began to separate from the ancient supercontinent Pangaea approximately 200 million years ago. Over millions of years, this tectonic shift shaped the unique ecological and geographical characteristics of Africa (Goudie, 2005). The transformations were instrumental in creating the necessary conditions for the emergence of early hominins, thereby establishing Africa as a critical hub in the evolution of modern humans. Fossil evidence confirms that the continent was the home of some of the earliest human progenitors, and its diverse landscapes and climatic fluctuations played a critical role in the evolution of early human life (Tuttle & Encyclopaedia Britannica Editors, 2026).

These environmental pressures, occurring during the Messinian Stage of the late Miocene epoch (7.5 to 5.3 million years ago), may have contributed to the emergence of early hominin traits, including rudimentary bipedalism, which

served as a physical adaptation that facilitated erect walking, sprinting, and improved cognitive function. Early humans presumably lived in small, dispersed social groups with occasional interaction, a pattern that may have influenced both survival strategies and social cognition (Folinsbee & Brooks, 2007; Bobe & Behrensmeyer, 2004).

Figure 1. Fundamental instruments presumed to have been used by early human societies for foraging, defense, and social signaling.

The fundamental instruments in **Figure 1** that these ancient societies presumably required for survival could have been used for activities such as foraging, defense, or social signaling (Domínguez-Rodrigo & Pickering, 2017).

One critical ecological factor in this adaptive landscape was the widespread presence of dicot trees across North Africa, including Egypt, during the Miocene epoch. This region's tropical and subtropical environments are indicated by the substantial presence of fossilized forests. These trees likely played a vital role in early hominin survival, offering shelter, edible resources, and raw materials for tool-making and construction (El-Saadawi et al., 2014; El-Saadawi et al., 2017; El-Saadawi et al., 2020).

The importance of this study lies in its contribution to understanding the behavioral and technological capacities of early hominins during the Messinian Stage of the late Miocene epoch (approximately 7 to 5.3 million years ago), a critical period in human evolutionary history (Brunet et al., 2002; Bobe & Behrensmeyer, 2004). This period is consistent with the timeframe required for wood to undergo petrification, which can range from thousands to millions of years, depending on environmental conditions (Hamimi et al., 2020). By presenting nine examples of petrified wood potentially used as hand weapons, this investigation offers rare material evidence of early tool use in the Egyptian delta, which is often underrepresented in pertinent scientific discourse. The findings suggest that the ancient inhabitants of the Egyptian delta developed functional wooden hand implements during that time.

2. The Land

The evolutionary origins of Homo sapiens are traced to Africa, a conclusion largely acknowledged in the anthropological world (Stringer, 2011). The fracture of the supercontinent Pangaea began some 180 million years ago; however, the exact date of Africa's geological separation from adjacent landmasses remains ambiguous (McLoughlin, 2001).

Subsequent to this separation, Africa saw substantial geological changes that molded its ecosystems and impacted early human evolution. The Miocene epoch (23.03–5.33 million years ago) is particularly significant due to its extensive climatic and environmental transformations that influenced biotic diversity and established dynamic environments for developing human species (Potts, 1998; Bobe & Behrensmeyer, 2004; Cerling et al., 2011).

During the Late Miocene, North Africa experienced significant aridification, particularly during the Messinian Stage (7.5–5.3 million years ago). The Messinian Salinity Crisis isolated the Mediterranean Sea from the Atlantic Ocean,

transforming it into a restricted, saline basin that nearly completely desiccated (Krijgsman et al., 1999). This event likely influenced the formation of a proto-Nile, possibly accompanied by wetlands, marshes, and shallow lakes in its nascent delta, though exact timelines remain unclear (Goudie, 2005; Said, 2012). Around this time, early hominins such as Sahelanthropus tchadensis and Orrorin tugenensis emerged in Africa, marking the beginning of the lineage that would eventually lead to modern humans (Brunet et al., 2002; Pickford & Senut, 2001). However, no evidence of human-like civilization or culture exists from this period. As arid conditions intensified, savannah ecosystems expanded, fostering the growth of drought-resistant vegetation such as grasses, shrubs, and scattered trees (Cerling et al., 1997).

West of the Nile Delta lies a geomorphological feature that resembles a deltaic formation (**Figure 2)**, though it is more plausibly interpreted as an arid depression. Paleogeographic studies suggest that deltaic formations may have developed during the Oligocene due to significant water flow from the Mediterranean, but the evidence remains inconclusive without further support (Said, 1981; Goudie, 2005). Some researchers propose that this region functioned as an ancient endorheic basin, where water collected and evaporated without external drainage—a hallmark of arid landscapes (Gasse, 2000). The Mediterranean basin underwent cycles of desiccation and replenishment as environmental conditions fluctuated, especially during the Messinian Salinity Crisis, until the Atlantic eventually restored a marine environment. The subsequent Pliocene climate brought increased rainfall and freshwater inflows to North Africa, altering local ecosystems and hydrology (Flecker et al., 2015; Pound et al., 2012).

Evidence of these transformative environmental periods is preserved in areas like Gabal Qatrani, home to one of North Africa's oldest petrified forests. This site exemplifies a unique geological and palaeobotanical history (Bown & Kraus, 1988; Said, 1981). Located approximately 140 meters above sea level and 50 kilometers south of where petrified wood samples were found (**Figure 3**), the site underscores the region's ancient ecological significance.

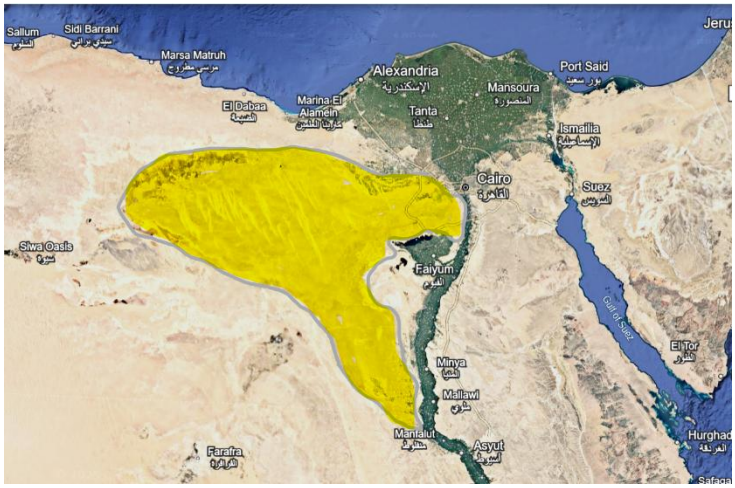

Figure 2. Custom highlight of the paleo drainage delta – in yellow- in northern Egypt. Source. Adapted from Google Maps (n.d.)

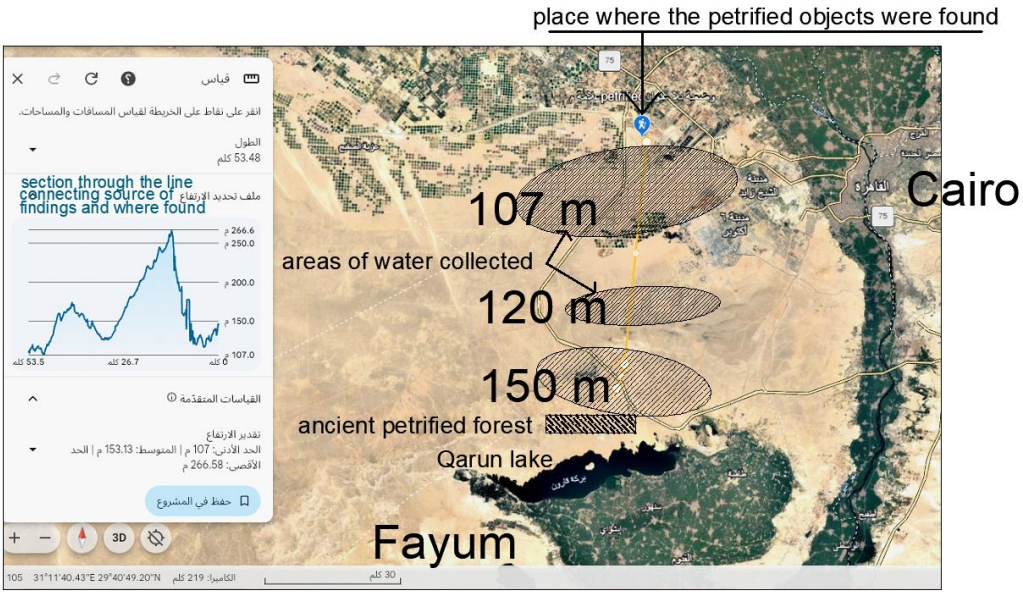

Figure 3. Location of the petrified wood objects found. Hypothetically, it came from the ancient site of the petrified forest (Gabal Qatrani) located north of Lake Qarun. For a distance of about 52 kilometers and higher about 50 meters above the site where they were found, they passed some areas where rainwater collected.
Source. Adapted from Google Maps.(n.d.)

3. The Fauna and Flora

Environmental conditions during the Miocene period fostered the development of savannah and grassland ecosystems, supporting a rich and varied biodiversity. These ecosystems hosted a dynamic mix of bird, reptile, and insect species alongside mammals such as elephants, giraffes, and antelopes, creating an ecologically diverse environment (Janis, 1993; Cerling et al., 1997). Marked by significant biological diversification, the Miocene epoch shaped ecological and climatic transformations, particularly the widespread expansion of grasslands. These changes profoundly influenced the evolutionary pathways of countless species (Bobe & Behrensmeyer, 2004; Cerling et al., 1997).

Despite conditions that favored biodiversity, the preservation of plant and bone relics from this period remains challenging due to environmental factors. Alternating wet and dry cycles increased acidity and oxidation, often disrupting fossilization processes for organic remains. Small bone fragments and plant materials were especially vulnerable to these conditions, complicating efforts to reconstruct past ecosystems (Lyman, 1994). Although Miocene ecosystems have garnered significant scientific interest, detailed studies on fossil preservation in this context remain limited.

In botanical research, significant discoveries—particularly of fossilized monocot and dicot plants—have emerged from Lower Egypt. Excavations in the Fayum region, for example, have revealed diverse fossilized flora, offering valuable insights into the Miocene paleoenvironment (El-Saadawi et al., 2020; Retallack, 2001). However, these studies have found neither evidence of petrified wooden tools from this period nor fossilized human remains in this region, leaving gaps in our understanding of human evolutionary history during the Miocene (Potts, 1998; Reed, 1997). More systematic research is needed to address these deficiencies and provide a comprehensive view of Miocene environments.

4. Hominids

Approximately seven to six million years ago, early hominids, ancestors of modern humans, inhabited Earth. The earliest fossils attributed to the human lineage, Sahelanthropus tchadensis (**Figure 4**) , discovered in Chad (~7 million years ago), and Orrorin tugenensis, found in Kenya (~6 million years ago), mark pivotal moments in hominin evolutionary history. These specimens represent the initial divergence from the last common ancestor shared with non-human primates (Brunet et al., 2002; Pickford & Senut, 2001). These discoveries signal the beginning of a

significant evolutionary trajectory that ultimately produced Homo sapiens. During this period, the human family tree branched extensively, giving rise to multiple species adapted to diverse environments.

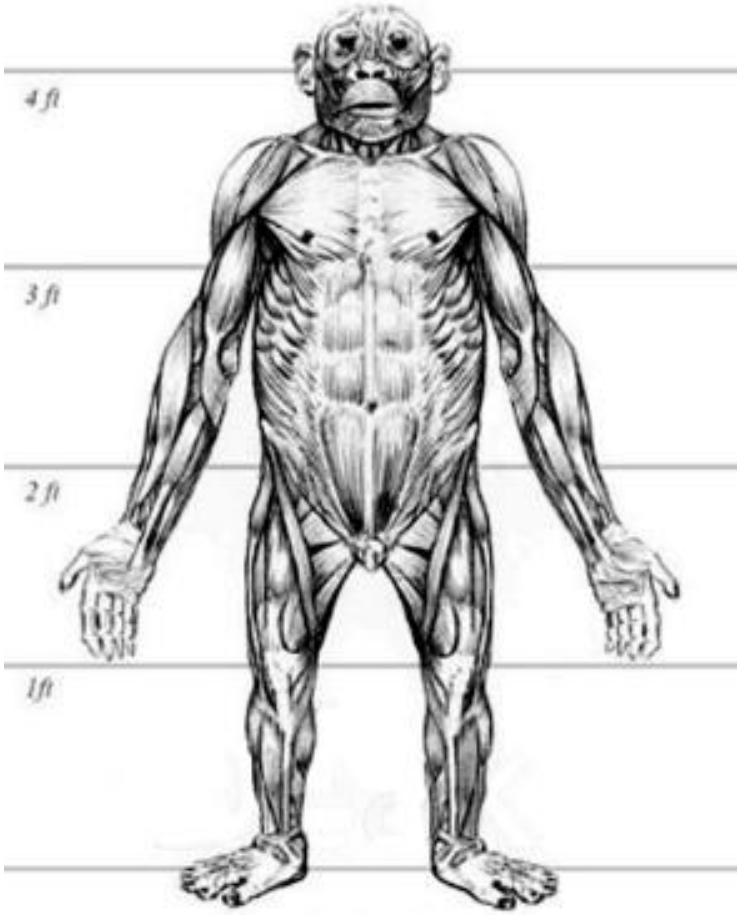

Figure 4. Sketch of Sahelanthropus tchadensis (8million years ago), discovered in Chad.
Source. Victor Deak (n.d.).

The late Miocene epoch (23.03–5.33 million years ago) was characterized by profound global climatic and ecological shifts that significantly influenced hominid evolution. The replacement of shrinking wooded areas with open savannahs and grasslands shaped early hominid dietary and behavioral adaptations (Cerling et al., 1997; Bobe & Behrensmeyer, 2004). Although fossil evidence from this period is scarce, ongoing discoveries continue to yield critical insights into the morphology, behavior, and ecological contexts of these early relatives of humans. Hominids likely adapted to diets incorporating grassland resources, such as grasses and grazing animals, during this time. Concurrently, the Miocene epoch witnessed the emergence and diversification of numerous modern animal families, including ancestral forms of antelopes, deer, giraffes, canids, ursids, hyenas, and saber-toothed felids (Janis, 1993).

Interactions among early hominid species remain an active area of research. While direct evidence is limited, genetic studies of later hominins, such as Neanderthals and Denisovans, reveal traces of interbreeding, suggesting that species interactions may have been a recurring feature of early human evolution (Green et al., 2010; Prüfer et al., 2014). Similarly, the spread of tool technologies and human dispersal across varied landscapes likely facilitated trade and social engagement. However, vast timescales and environmental barriers probably resulted in many hominin species living in relative isolation, adapting to local conditions (Foley, 1995). Whether these interactions were cooperative or competitive remains an unresolved question in human evolutionary studies.

The development of tools reflects early hominin ingenuity and adaptability in response to challenging environments, marking a transformative shift in human history. Basic cutting tools and early tool-making technologies demonstrate the cognitive and physical capabilities of these hominins, laying the groundwork for later innovations (Ambrose, 2001). Essential for survival, these advancements also signal a gradual shift toward more complex social behaviors,

including cooperation and communication (Gamble, 1999). Although evidence of interpersonal conflict among early hominins is absent, environmental pressures and resource competition likely influenced their interactions. At the same time, cooperation and the emergence of social structures may have been equally vital for survival, highlighting the diverse strategies early hominids employed to thrive in prehistoric environments.

5. Hominins, the Early Shape of Humans

Beginning about 7 to 6 million years ago, early hominins in Africa show various unique characteristics that define the early phases of human evolution. Reduced cranial capacity and diminished canine size, characterizing these early hominins, are morphological traits closely associated with the evolutionary shift toward habitual bipedalism (Brunet et al., 2002; Senut et al., 2001). Most likely, bipedalism provided more effective mobility and freed the hands for tasks like tool usage, which would define subsequent hominin species. Highlighting the role of ecological shifts in shaping evolutionary trajectories, these hominin adaptations occurred as habitats transitioned from dense forests to increasingly open savannas (Cerling et al., 1997; Bobe & Behrensmeyer, 2004). Yet, the earliest known stone tools used by hominins in Africa date to approximately two million years ago, marking a significant milestone in behavioral evolution (Semaw et al., 1997).

Recent archaeological discoveries north of Cairo, Egypt, may offer new insights into early tool use, potentially expanding our understanding of technological practices in ancient contexts. The study centers on nine unearthed pieces of petrified wood, selected for their apparent suitability for portable use. These specimens, dated to at least six million years ago, exhibit morphological features consistent with intentional shaping and potential tool function. Notably, the site lies just 50 kilometers south of Egypt's recognized "Petrified Forest," where similarly aged petrified wood -up mentioned- has been documented, making this discovery particularly compelling in its regional and evolutionary context.

Metasomatic replacement, also referred to as the petrification process, results from minerals invading the voids within and between the cells of organic wood. Minerals such as silica (silicon dioxide, SiO_2) and calcite (calcium carbonate, $CaCO_3$) often replace the original organic material while remarkably preserving the wood's microscopic structure. (Mustoe, 2003).

Discovered in Kenya in 1974, the fossilized remains of Orrorin tugenensis, an early hominin species, date to over six million years ago. They represent one of the earliest known instances of bipedal locomotion (Senut et al., 2001). This raises the question of whether Orrorin tugenensis was confined to Kenya or may have dispersed across other regions of Africa under similar climatic conditions. Given the ecological connectivity facilitated by the Nile River system, it is plausible that multiple early hominin species, including Orrorin tugenensis and Sahelanthropus tchadensis, inhabited comparable environments, potentially extending their range into Lower Egypt.

Early hominins could have found a suitable home in Lower Egypt, which was characterized by a hot and humid late Miocene climate. Limited paleontological and archaeological research in the area has hindered the identification of conclusive evidence for hominin presence. Petrified wood implements remain the only known traces of early human activity in the region, and the moist environmental conditions may have contributed to the poor preservation of organic remains. Shaped in proportions suited to human hands, these tools offer compelling insights into the behavioral patterns and adaptive strategies of early hominins (Marzke, 1983).

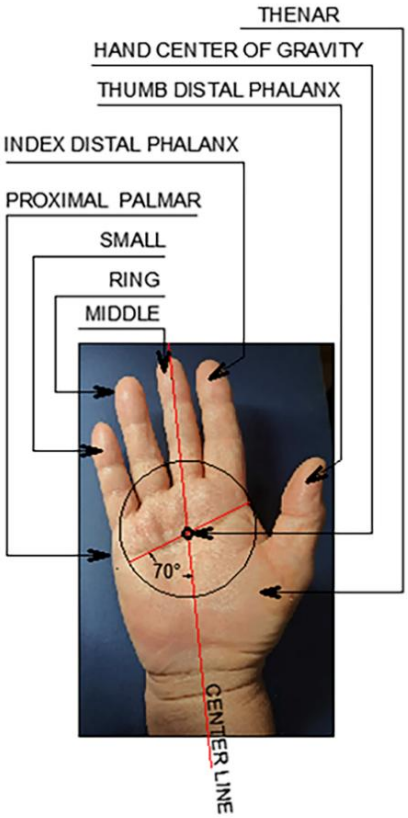

Figure 5. Human hand illustration highlights finger and palm regions corresponding to depressions observed on the petrified wood tools.

In essence, although precise timeframes and species identifications remain elusive, emerging data suggest that early hominins periodically inhabited regions such as Egypt, adapting over extended periods to shifting environmental conditions. Ongoing investigation and methodical study in the area could help to clarify Lower Egypt's role in early human evolution.

6. Hominins' Hands for Tool Use

The dimensions of the petrified wood tools analyzed in this study are almost similar to the average proportions of human hands but with some differences in details. The tools feature depressions and curvatures that align with the finger and palm locations (**Figure 5**), which exhibits an ergonomic design that differs in some way from the modern tools.

Climate shifts during the Messenian crisis along the Mediterranean coast of Africa significantly impacted vegetation cover. Early hominins, accustomed to life among widely scattered trees, were compelled to adapt to the emerging savanna landscape. This transition required increased mobility and the ability to grasp objects firmly with the entire hand for daily survival. Consequently, morphological changes in the hands, and likely other parts of the body, would have emerged in response to the demands of this new ecological context. Human hands evolved to support both precision and power grips, an anatomical advancement that distinguishes them from those of other primates. This evolution enabled early humans to manipulate tools with remarkable dexterity and strength, facilitating essential survival activities such as hunting, foraging, and self-defense (Napier, 1956; Marzke, 2013).

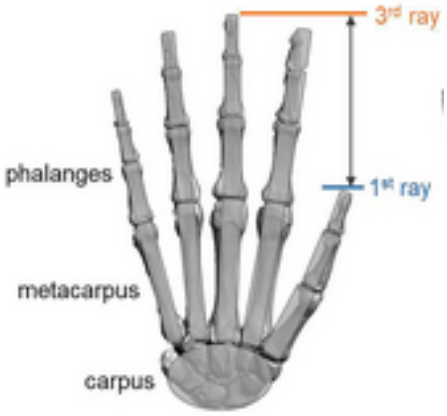

Figure 6. Human hand skeletal proportions of thumb and middle finger associated with enhanced control abilities.

Source. Adapted from Kivell et al (2022).

One important feature is the evolution of thumb proportions as well as its enhanced musculature. Hominin fossils, such as Orrorin tugenensis, reveal human-like thumb morphology associated with enhanced control abilities about six million years ago (Almécija et al., 2010). These findings suggest that the development of precise grips preceded the development of stone tools, which emphasizes the importance of hand morphology in the evolution of hominins. Morphological adaptations that distinguished the hand during this period centered primarily on the development of opposable thumbs, a key feature enabling enhanced grip, manipulation, and tool use. The powerful musculature and enhanced opposability of the thumb, allowing grip precision (**Figure 6**), is less common in other primates (Feix et al., 2016; Bardo et al., 2020). **Figures 11–19**, illustrating examples A, B, C, and D, reveal a distinct cenar positioning on each tool, identifiable by a subtle inward curvature in the silhouette. This feature may suggest that early hominin thumb musculature was already undergoing evolutionary refinement, leaving a faint anatomical imprint through repeated use or grip configuration. The second key adaptation involved shortened fingers and broadened palms, morphological traits that contributed to a stronger grip and improved manual control, thereby facilitating more precise and effective tool manipulation (Marzke, 2013). For example, Australopithecus afarensis fossils reveal shortened fingers and larger palms, which suggest arboreal and terrestrial manual capabilities that facilitated activities using tools (Kivell, 2015). The third key adaptation involved distinct finger proportions, specifically, variations in length and curvature combined with robust digital flexor tendons. These features enabled early hominins to grasp and manipulate objects of diverse shapes and sizes with greater dexterity and functional versatility (Rolian et al., 2009).

7. The Findings

Examination of the nine petrified wood specimens in **Figure 7** reveals four distinct types. Type A resembles a double-headed dagger. Specimens B1 and B2 are dagger-like with well-preserved wood grain. Specimens C1, C2, and C3 share volumetric characteristics but exhibit reduced wood texture, suggesting a standardized form. Specimens D1 and D2 were most likely designed as hand axes, while D3 probably functioned as a spearhead. Details of each specimen are presented below.

Figure 7. Morphological categories of specimens showing tail and tip proportions, finger depressions, and posterior thenar depression.

8. Common notes on the following examples

1. Analysis of the specimens presented in this paper reveals that they can be broadly classified into five distinct morphological categories. The 1st category is represented by specimen "A", the 2nd category is represented by specimens "B1 and B2", the 3rd category is represented by specimens "C1, C2 and C3", the 4th category is represented by specimens "D1 and D2" *(heads of axes*, and the 5th category is represented by specimen "D3," *the spear*. Notably, the tail and tip regions—often found incomplete—constituted approximately 15% and 22% of the total height, respectively. On the frontal surface, three prominent curved depressions were consistently observed, each measuring approximately 0.07 × H (where H denotes total height), corresponding anatomically to the index, middle, and small fingers. In contrast, the posterior surface typically exhibited a single curved depression occupying roughly 25% of the total height, interpreted as accommodating the thenar region of the hand.

2. Upon closer examination of the recovered artifacts, it was observed that five out of the nine examples lacked their tips, while two had lost their tails. Additionally, two specimens exhibited worn sharp edges at their tips. The missing parts were likely dislodged due to erosion caused by heavy rainfall. To facilitate a more comprehensive understanding, the author reconstructed the missing tips and endings using off-white silicone, which can be easily detached, if necessary (**Figure 8**).

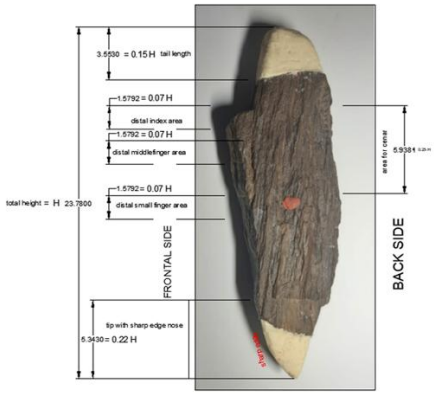

Figure 8. Reconstructed specimens showing restored tips and tails using detachable off-white silicone.

3. A comparative analysis of the rate of ring growth in modern timber and the fossilized tools (**Figure 9**) revealed a notable difference. The average annual ring growth in contemporary timber was found to be 0.16-0.18 cm, whereas the petrified tools exhibited a significantly higher rate of 0.24-0.25 cm. This suggests that the climate during the time the tools were created was characterized by wetter and cooler conditions, in contrast to the hotter and drier climate of the present day. This climatic difference may provide an explanation for the scarcity of human remains and the relative abundance of fossilized botanical specimens found at the site.

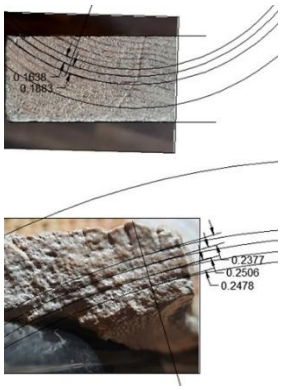

Figure 9. Comparative annual ring growth of modern timber (0.16-0.18 cm) and fossilized tools (0.24-0.25).

4. The incision observed on the posterior side of HW-D1 may have been created using the corrugated edge of an ancient shell from the same time period. This incision likely served as a recess to secure and protect the sinew or organic tendon used to lash the axe head in place.

5. Examination of the first six hand weapon examples revealed a distinctive feature: the lower portion of the attacking edge was sharp and formed a protruded nose-like shape. It is probable that this feature was adapted for use as a knife, facilitating both defensive and offensive actions (**Figure 10**).

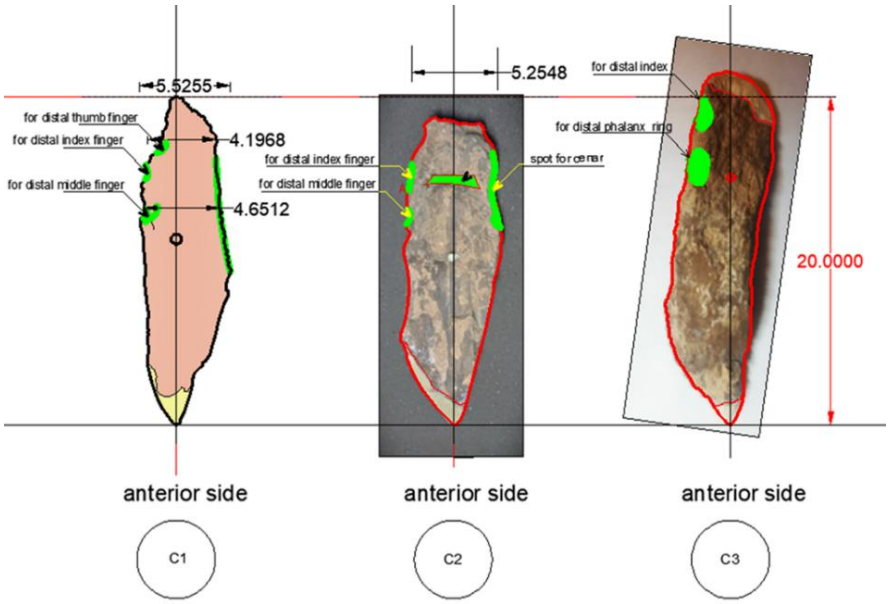

Figure 10. Hand weapon specimens with a sharp-like edge, likely adopted for dual knife use in defense and offense.

The tool in **Figure 11** represents the first of nine specimens presented in this study and exhibits the most unusual morphology within the group. It is a bi-headed implement, featuring twin tips. The angle measured from the center of gravity between the centerlines of the two tips is 30 degrees. Its total length is 25.31 centimeters. The tool possesses several ergonomic features that facilitate a secure manual grip. The centerline of the hand, when grasping the tool, forms a 74-degree angle with the tool's own centerline, both intersecting at the shared center of gravity. The distal phalanges of the index finger and thumb are proportioned appropriately to grasp the upper portion of the tool firmly.

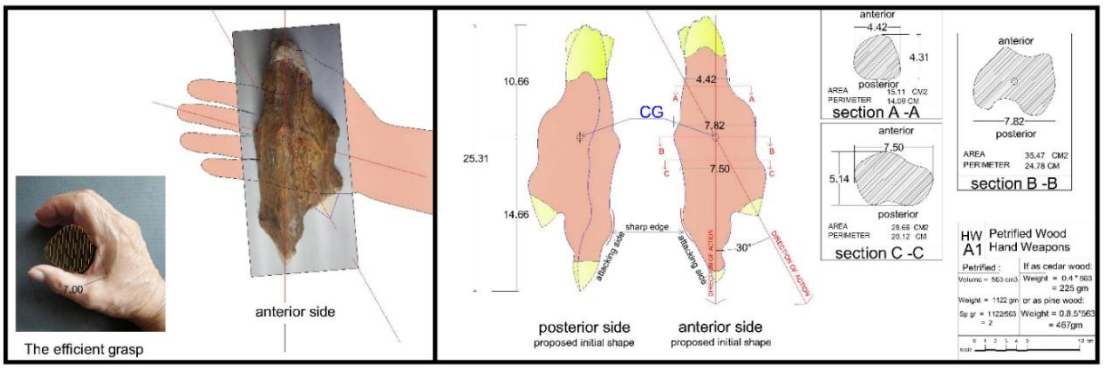

Figure 11. HW-A1, a bi-headed specimen with twin tips at a 30° angle, measuring 25.31 cm. Features include ergonomic grip adaptations, a sharpened lower edge, and inferred pointed tips.

A pronounced bulge on the anterior edge accommodates the thenar eminence, while a recessed curve on the opposite side provides anchorage for the fourth and fifth fingers, enhancing grip stability. The lower section of the opposing edge is characteristically sharp, functioning effectively as a cutting surface. Although the pointed tips are absent, the author suggests their original presence can be reasonably inferred.

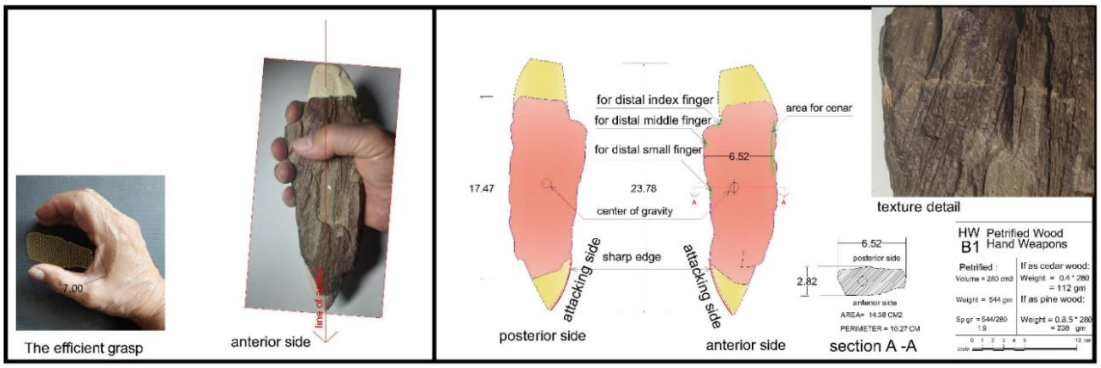

Figure 12. HW-B1, the second specimen, 17.23 cm long, with ergonomic grip features, sharpened lower edge, and an inferred pointed tip.

The second specimen (**Figure 12**) measures 17.23 centimeters in length and displays several features conducive to secure manual handling. The centerline of the hand, when grasping the tool, forms a 74-degree angle with the tool's centerline, both converging at a shared center of gravity. The dimensions of the distal phalanges of the index finger and thumb are well-suited for firmly securing the upper portion of the tool.

A pronounced curved recess on the anterior side accommodates the thenar eminence, while a recessed cut on the opposing edge provides anchorage for the index finger, enhancing grip stability. Both the pushing force exerted by the thenar region and the counteracting force applied by the index finger are directed at equal angles of 20 degrees relative to the point of engagement. The lower section of the confronting edge is distinctly sharp, allowing it to function effectively as a cutting surface. Although the pointed tip is absent, its original form has been reasonably inferred by the author.

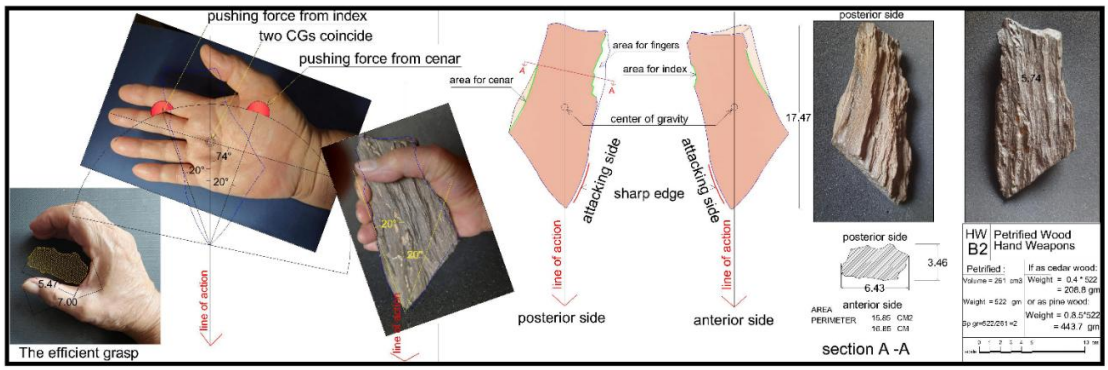

Figure 13. HW-B2, the third specimen, 17.23 cm long, with ergonomic grip features, sharpened lower edge, and an inferred pointed tip.

The third specimen (**Figure 13**) measures 17.23 centimeters in length and incorporates several features that facilitate secure manual handling. The centerline of the hand, when grasping the tool, forms a 74-degree angle with the tool's centerline, both intersecting at a shared center of gravity. The dimensions of the distal phalanges of the index finger and thumb are well-adapted for firmly securing the upper portion of the tool.

A distinct curved recess on the anterior side accommodates the thenar eminence, while a recessed cut on the opposing edge provides anchorage for the index finger, enhancing grip stability. The pushing force exerted by the thenar region and the counterforce applied by the index finger are directed at equal angles of 20 degrees relative to the point of engagement. The lower section of the confronting edge is characteristically sharp, enabling effective use as a cutting surface. Although the pointed tip is absent, its original form has been reasonably inferred by the author.

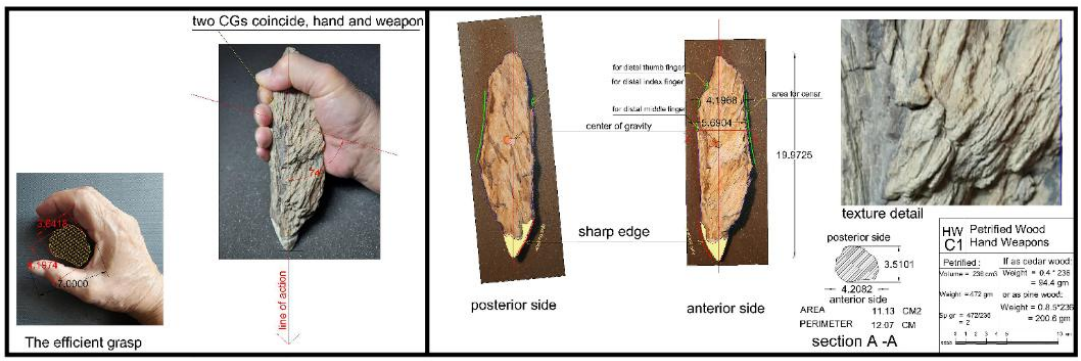

Figure 14. HW–C1, the fourth specimen, 19.97 cm long, with ergonomic grip features, recessed finger and thenar contours, and an inferred pointed tip.

The fourth specimen (**Figure 14**), measuring 19.97 centimeters in length, shares dimensional similarities with the preceding tool but differs slightly in form and surface texture. Its ergonomic design is evident in the optimized grasp position, supported by equal breadth and width at the gripping zone. The cross-sectional area at this position measures 11.13 square centimeters, with a perimeter of 12.07 centimeters.

The angle between the tool's central axis and the hand's central axis at their point of intersection, coinciding with their shared center of gravity, is approximately 74 degrees. The upper edge features recessed contours corresponding to the distal phalanges of the thumb, index, and middle fingers, enhancing grip stability. Although the pointed tip is absent, the author reasonably infers its original presence. The recessed curve accommodating the thenar eminence remains intact in its designated location.

The fifth specimen (**Figure 15**), measuring 18.7 centimeters in length, shares dimensional and textural similarities with the preceding tool. Its ergonomic design features an optimized grasp position, supported by nearly equal breadth and width at the gripping zone. The cross-sectional area at this position measures 15 square centimeters, with a perimeter of 15.6 centimeters.

The angle between the tool's central axis and the hand's central axis at their point of intersection, coinciding with their shared center of gravity, is approximately 74 degrees. The upper edge includes recessed contours corresponding to the distal phalanges of the thumb, index, and middle fingers, enhancing grip stability. Although the pointed tip is absent, the author reasonably infers its original presence. The recessed curve accommodating the thenar eminence remains intact in its designated area.

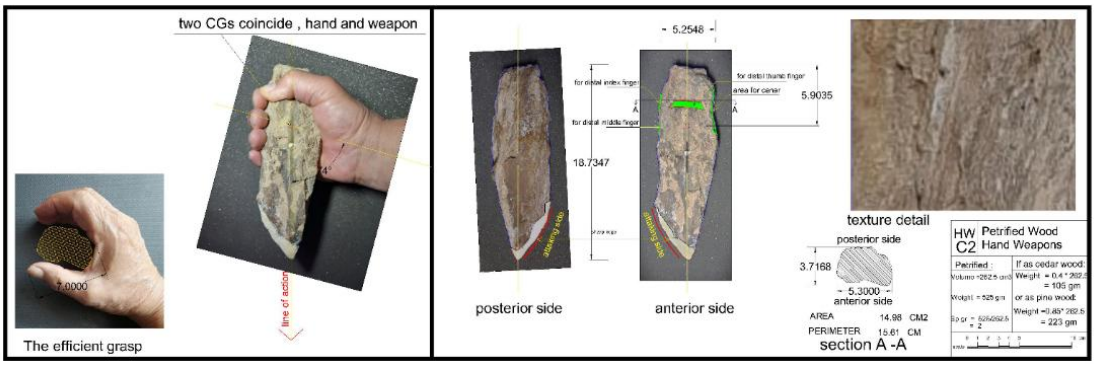

Figure 15. HW–C2, the fifth specimen, 18.7 cm long, with ergonomic grip zone, recessed finger and thenar contours, and an inferred pointed tip.

The sixth specimen (**Figure 16**), measuring 21.5 centimeters in length, shares dimensional and textural similarities with the two preceding tools. Its ergonomic design features an optimized grasp position, supported by nearly equal breadth and width at the gripping zone. The cross-sectional area at position A–A measures 16 square centimeters, with a matching perimeter of 16 centimeters.

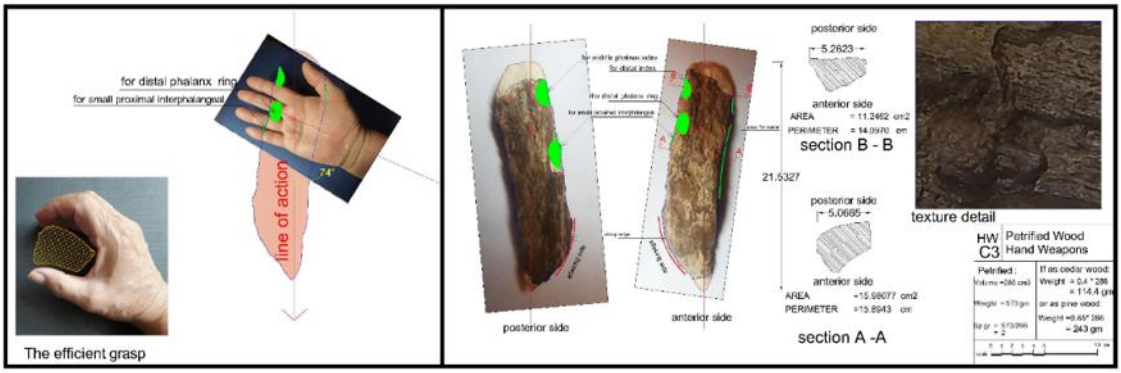

Figure 16. HW–C3, the sixth specimen, measuring 21.5 cm, with ergonomic grip features and inferred pointed tip.

The angle between the tool's central axis and the hand's central axis at their point of intersection, coinciding with their shared center of gravity, is approximately 74 degrees. The upper edge includes recessed contours corresponding to the distal phalanges of the thumb, index, and middle fingers, enhancing grip stability. Although the pointed tip is missing, its original presence is reasonably inferred by the author. The recessed curve accommodating the thenar eminence remains intact in its designated area.

The seventh example (**Figure 17**) shows another kind of tool. It was the head of an ax. Its length is 15.7 cm, width is 6 cm, and thickness is 3.8 cm. In section A-A, where it passes through the CG, the area and perimeter are almost the same in dimension – 16 cm. It has three perfect straight incisions at equal distances of 5 cm on the posterior side; they were prepared for some kind of rapping tendon to fix it with the ax handle. The cross section of the incision is a perfect V shape, which means that a sharper kind of material as blade was used.

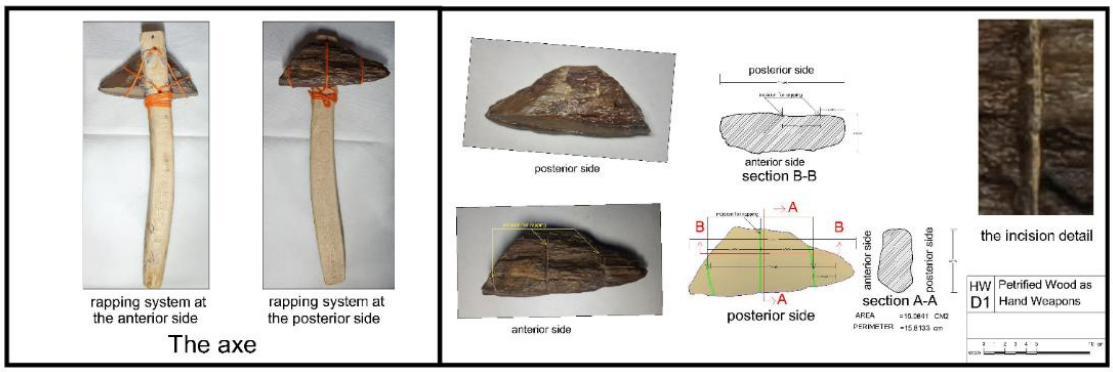

Figure 17. HW–D1, the seventh specimen, an ax head with V-shaped incisions for handle attachment.

The eighth example (**Figure 18**) is another type of axe head. It measures 12.7 cm in length, 5 cm in width, and 2.4 cm in thickness. At section A–A, which passes through the center of gravity, the cross-sectional area is 7.5 cm² and

the perimeter is 12 cm. The shape shows no peculiar features, except that no clear positions are identifiable for the wrapping tendon to secure the head to the handle.

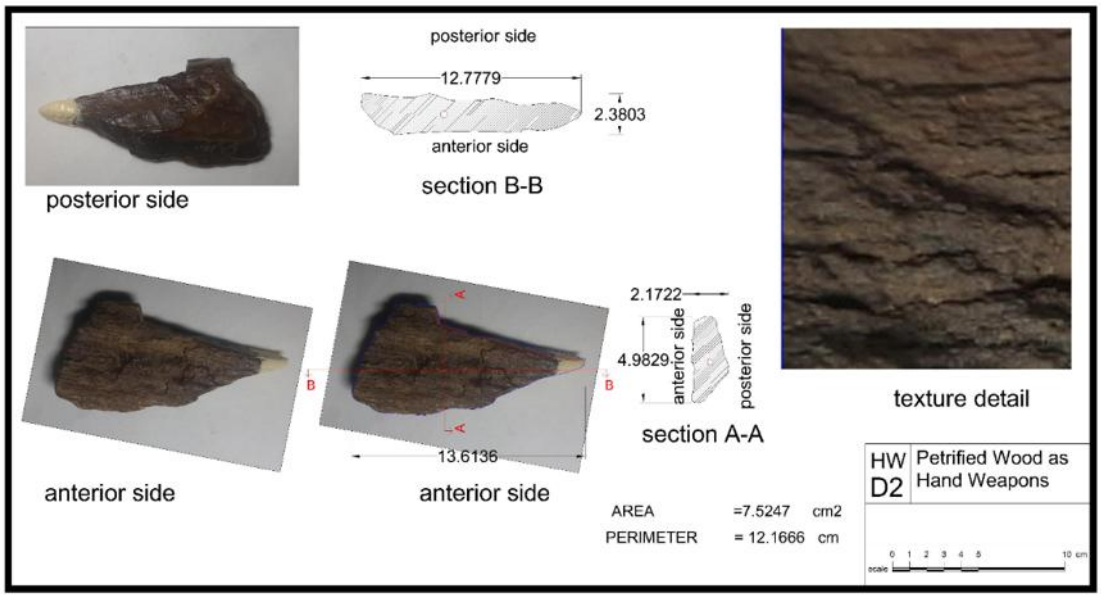

Figure 18. HW–D2, the eighth specimen, an axe head lacking identifiable wrapping tendon positions.

The ninth specimen (**Figure 19**) represents a distinct type of spearhead. It measures 11.5 centimeters in length, 5 centimeters in width, and 2.6 centimeters in thickness. At section A–A, which intersects the center of gravity, the cross-sectional area is 7.8 square centimeters, with a perimeter of 11.9 centimeters.

The overall shape presents no notable irregularities; however, there are no clearly defined features indicating where the binding tendon would secure the head to the shaft.

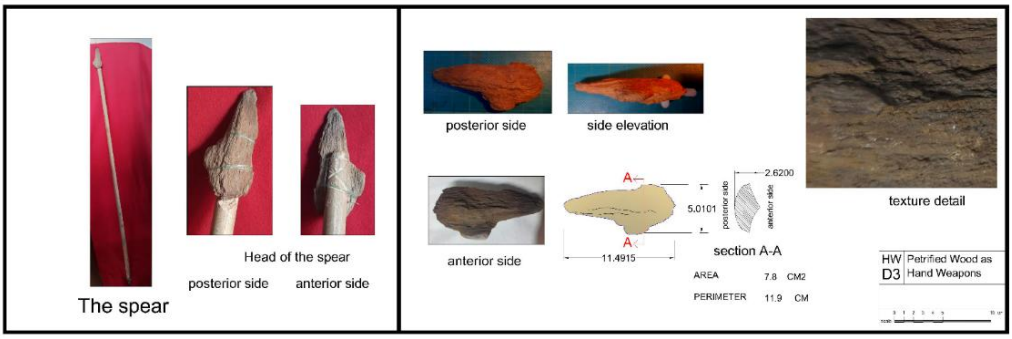

Figure 19. HW–D3, the ninth specimen, a spearhead without identifiable binding tendon positions.

9. Conclusion

Human life originated in Africa, where early hominins adapted to unstable environmental conditions at the end of the Miocene epoch, approximately six million years ago. Amid fluctuating cycles of aridity and humidity, evidence of early human ancestors has been identified across eastern and central Africa, though none has yet been documented in Egypt. Historically, knowledge of Egypt's ancient past was limited to accounts by Manetho, a third-century BCE priest who described dynastic kingdoms and monumental architecture in his Aegyptiaca. Prior to this, archaeological interest focused on sites with simpler cultural manifestations, such as Thinis (4000–3100 BCE) in Upper Egypt and Merimda Beni Salama (5000–4200 BCE) on the western side of the Nile Delta.

By coincidence, the author independently discovered several artifacts in Lower Egypt, 37 km from Merimda Beni Salama at an azimuth of 130°. These objects differ markedly from Merimda's lithic assemblage: whereas Merimda artifacts are stone, these consist of petrified wood and are tentatively dated to the same period as the emergence of early hominins. Composed of petrified wood hand tools, they offer a rare glimpse into a potential pre-lithic phase of organic tool use, a behavior now largely lost to time.

Figure 20. Acheulean hand axes. Source. Time Vault Gallery

The earliest widely recognized hand tools are Acheulean hand axes (see **Figure 20**), made of stone and dated to approximately 1.76 million years ago. While these bear some resemblance to the designs presented here, they lack the sweeping contours characteristic of later iterations. A comparable ergonomic principle appears in the modern "Fist Axe" (Valhalla), which features a sculpted handle that conforms to the fingers and thenar musculature. The Acheulean industry persisted from ~1.76 million to ~500,000 years ago, originating in southern Africa and spreading across the continent into southwestern Europe. Acheulean hand axes, crafted exclusively from stone pebbles through chipping and flaking, commonly exhibit a characteristic "drop" shape and other morphological variants.

Considering the Paleolithic period preceding the Acheulean, it is reasonable to hypothesize that earlier tools were fashioned from more readily workable materials. Wood—such as tree limbs or bark—likely served as an initial medium, shaped to fit the contours of the hand and reflecting early alignment of tool design with human morphology.

This research examines nine specimens from these findings. Their dimensions and distinct fingerprint-like impressions, which conform closely to a human palm, suggest that hominins may have inhabited this region as early as six million years ago and possibly earlier. The site corresponds geographically with Merimda Beni Salama, yet the temporal context of these specimens predates the established chronology of the site. This potentially extends the region's archaeological relevance into a much earlier phase of human activity. The paper therefore advocates further investigation to uncover additional evidence of early hominins. Such work could bridge a significant gap in Egypt's deep history, illuminating the past eight million years and refining our understanding of human origins.

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Ethics Approval

Not applicable.

Conflict of interest

The author(s) declare(s) that there is no competing interest.

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