Review

Possible Traces of Early Modern Human Architectural Heritage: A Comment on Similarities Between Nest-Building Activity of Homo Species and Shelter Forms of Indigenous People in Sub-Saharan Africa

Hasan Basri Kartal *, Mehmet Emin Şalgamcıoğlu , Asiye Nisa Kartal

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Article

Possible Traces of Early Modern Human Architectural Heritage: A Comment on Similarities Between Nest-Building Activity of *Homo* Species and Shelter Forms of Indigenous People in Sub-Saharan Africa

Hasan Basri Kartal [1,*], Mehmet Emin Şalgamcıoğlu [2] and Asiye Nisa Kartal [3]

[1] Architectural Design PhD Program, Department of Architecture, Istanbul Technical University, 34485, Istanbul, Türkiye
[2] Department of Architecture, Istanbul Technical University, 34485, Istanbul, Türkiye
[3] Engineering and Architecture Faculty, Nevşehir Hacı Bektaş Veli University, 50300, Nevsehir, Türkiye
* Correspondence: kartalha@itu.edu.tr or hbasrik@gmail.com

Abstract: The architectural artefacts, materials, and techniques for building shelters may have some common properties from the architectural culture that evolved during the human species. This article studied the material features and settlement organisations used by the first human species' nest-building activities and shelter forms belonging to indigenous people living in sub-Saharan Africa. The article questioned that early modern human species' unsubstantiated notions of architectural heritage may have been carried out across the nest construction, typological differentiation, material use, and transfer to new generations and habitats. The focus was on the home-based spatial organisation and structure building. We were aware we needed to point out some fundamental misunderstandings regarding the nature of cultural and archaeological taxonomies and the misuse of analogical reasoning when comparing recent hunter-gatherer populations with some hominin groups. The paper aimed to discuss whether that early Homo 'architecture' in Africa may have some resemblance features to that of recent or current Africans. The discussion may imply that architectural products used in the settlement remains of early *Homo* species may have similar characteristics to the huts of the San people living as hunter-gatherers in Sub-Saharan Africa. We thought discussing different human species' architectural activities was productive as early human species' architectural understanding and principles may be adapted to current placemaking scenarios, urban design attitudes, and housing models. We think that with further evidence, the basis of the idea may be developed.

Keywords: early human species; *Homo habilis*; *Homo erectus*; architectural heritage; nest building activity; shelter forms; San people

1. Introduction

According to the current biological anthropology, evolutionary biology, and paleoanthropology discussions, there are different opinions about when the separation of humans from their common ancestor with the chimpanzee occurred. The last common ancestor of humans and chimpanzees is thought to have lived close to *Sahelanthropus tchadensis*, approximately 6 or 7 million years ago [11]. The emergence of the *Australopithecus* species, which differed from its common ancestor with chimpanzees (Panina) and is one of the first members of the sub-tribe Hominina, due to its features such as being able to stand on two legs and resembling the human species in terms of jaw structure, is dated to approximately 4–4.5 million years ago. Based on the fossil evidence found, it is known

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that the human species associated with *H. habilis* and *H. habilis* (for example, *Homo rudolfensis*, *Homo gautengensis*), accepted as the first species of the human (*Homo*) genus, emerged approximately 2.3 million years ago [47,64,78,99]. Later, other species of the human genus (*Homo*) appeared (e.g., *H. ergaster*, *H. erectus*, *H. antecessor*, *H. floresiensis*, *H. neanderthalensis*). About 300,000 years ago, *Homo sapiens*, which is accepted as an anatomically modern human species, emerged. About 160,000–90,000 years ago, *Homo sapiens sapiens*, the only subspecies of *Homo sapiens* that is not extinct today, emerged. In the evolutionary process of the human species, it is not certain exactly when today's humans began to emerge from an anatomical point of view (with features such as standing on two legs, increased brain size, and extended ability to make tools). At the same time, the issue of which criteria can be accepted as the beginning of the relevant humanisation is controversial [2,32,35,49,132,136,137].

This study expected to find evidence for early nest/shelter building, so looking for evidence of hominin nests and shelter buildings was the inquiry for this study. The discussion interwove aspects of homebase spatial organisation (ground-sleeping, the clearing of spaces, the location of fireplaces, the distribution of bones and artefacts) with unsubstantiated notions of structure building or architecture. Looking for evidence of hominin nest or shelter building was followed up on the references we used to support our claims.

On a theoretical level, the use of an analogy was a critical component of the argument. Such arguments, however, required either direct historical or relational evidence. For example, a direct historical analogy compelled the discussion to demonstrate cultural continuity between source and subject. This point would need evidence of homologous relationships in genetic and cultural evolutionary studies such as Shennan's work [105]. Lane [71] discussed tracing living communities directly back into the past, assuming heritable continuity was rarely unproblematic. Relational analogies, on the other hand, depended on direct relational links between source and subject, exploring both the causes for similarities and differences. According to Pargeter et al. [89], the quality of an analogical debate is disclosed by looking at whether the proper nature e of the analogy is efficient in the first place. This study attempted to draw on direct historical and relational analogy, but we know the spatiotemporal leaps were simply unsubstantiated.

2. How Architectural Activities May Have Evolved Until *Homo habilis* and *Homo erectus* and Related Species (Variations)?

The remains of the species *Graecopithecus freybergi*, *Sahelanthropus tchadensis* and *Orrorin tugenensis*, which are accepted as the first African *Homininae* and lived in the late Miocene-early Pliocene period, have behavioural and cognitive similarities with modern-day chimpanzees [1,85,97]. It is understood that the fossils belonging to *Ardipithecus kadabba* and *Ardipithecus ramidus* species from the hominin tribe are anatomically different from chimpanzees regarding bipedalism. Except for standing on two legs, features such as brain size, jaw, and tooth structure of the Hominin tribe did not differ significantly from chimpanzees [52,53,104]. African hominids (*Homininae*) and species of the Hominin tribe are generally thought to lead a tree-centred life like chimpanzees. It is argued that chimpanzees and bonobos exhibit similar nesting behaviours. It can be thought that African hominids (*Homininae*) and species of the Hominin tribe generally live in forested areas. All these arguments support the view that their anatomical structures are more suitable for living in trees. However, it has also been stated that the related subfamily and tribe species also spend time on the ground and prefer arboreal life to protect themselves from possible dangers [31,39,40,51,62,100,111,124,135].

The scarcity of fossils belonging to the related species and the complex findings regarding the classification of these species prevent us from making factual claims about the nesting behaviour of these species. For example, among the related species, *Ardipithecus* species (*A. kadabba*, *A. ramidus*) can be said to build nests to improve night-time sleep quality, similar to chimpanzees. However, unlike chimpanzees, it has been suggested that the height of the nest does not differ concerning sex [36,39,67,111,112,127,135]. In addition, the fact that *Ardipithecus* species are more advanced in baby care compared to chimpanzees can show that nest construction has reasons other than improving

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sleep quality. In other words, there is an opinion that nest construction is also done for the care of the young [4,30,45,54,79,107].

A transition between *Australopithecus* species (4.5–1.2 million years ago), African hominids (*Homininae*) (7.2–4.4 million years ago) and human (*Homo*) (2.3 million years ago to present) species recognised as a form. The nesting behaviour of *Homo habilis* (2.3–1.65 million years ago), considered the first human (*Homo*) species and related species is related to the nesting behaviour of *Australopithecus* species. We may say *Australopithecus* species bear remarkable similarities with *H. habilis* and its variations (*H. rudolfensis and H. gautengensis*) in nesting behaviour [21]. We know Coolidge and Wynn [21] provided no clear evidence for Homo nesting behaviours; they speculated about ground sleeping based on a few skeletal remains. It is understood from the fossil records that the oldest *Australopithecus* species emerged approximately 4.5 million years ago and spread over a large area from east to south of Africa. Within the sub-tribe *Australopithecina*, some species are thought to be involved in the evolution of the human (*Homo*) genus in terms of evolution. However, there are different species belonging to the genera *Paranthropus* (2.6–0.6 million years ago) and *Kenyanthropus* (3.3–3.2 million years ago) that evolved in a different direction from the direction of human evolution (such as *P. aethiopicus*, *P. boisei*, *P. robustus*, *K. platyops*) [15,56,114,115].

It is argued that the anatomical, behavioural and cognitive features of species such as *Australopithecus sediba* (about 1.98 million years ago), which emerged in the later period, are very similar to *H. habilis*, which is considered to be the first human species. Species such as *Australopithecus sediba* appear to be closer to *Homo* than *Australopithecus* species [7,59,64,65]. Regarding nesting behaviour, *Australopithecus* species and *H. habilis* and their variations progressed from nesting in trees to nesting on land. In other words, these are the genera and species in which fossils can be found, and the changes in the human nesting area can be traced. In this context, it can be traced back to about 1.8–1.5 million years ago, when the *Homo* species acquired a terrestrial life form and started to make its nest on the earth [20,21,68]. A problem here is that Coolidge and Wynn [21] speculated about ground sleeping, not nest-making exactly. The Koops et al. [68] DNA study suggested that ground-nesting amongst a specific Chimpanzee group could indicate ground-nesting in hominins before *H. erectus*. However, they mentioned little about nest 'architecture' apart from 'simple' chimpanzee nests being too weak to support an animal's weight overnight, and 'elaborate' nests are often associated with the presence of faeces below or near the nest, providing no evidence of hominin nest-building. Coolidge et al. [20] explored the cognition of ground-sleeping in hominins, but no evidence of ground-sleeping architecture.

It is known that *Australopithecus anamensis*, which is accepted as one of the first *Australopithecus* species based on fossil records and emerged approximately 4.5 million years ago, prefers sparsely wooded forest areas as its habitat [141]. In addition, it is assumed that this species, exhibiting an example of bipedalism close to later humans, climbed trees based on its anatomical features and lived like chimpanzees in trees. Its anatomical structure has evolved for short-distance journeys on land but uses trees as living and resting areas. Based on its habitat and anatomical features, *Australopithecus anamensis* is thought to nest in trees to sleep and rest like chimpanzees. In this context, nesting behaviours are estimated to be close to chimpanzees [19,39,106,111].

It is understood from the fossil records that *Australopithecus afarensis* species, which emerged approximately 3.9 million years ago, have a more suitable skeletal structure than *A. anamensis* species. It is understood that *Australopithecus afarensis* species spend more time on the ground, can stand on two legs, and prefer sparse forests and savannas as habitats [5,9,62,126]. It is also discussed that the nesting activity of *Australopithecus afarensis* species shows similarities with *A. anamensis* and chimpanzees. It is thought that the species spend more time on the ground compared to *A. anamensis*, and they also use their nests in the tree for sleeping, resting and feeding. In *Australopithecus afarensis*, there is anatomical differentiation between sexually male and female individuals. Males of *Australopithecus afarensis* species are thought to spend more time on earth than females (just like chimpanzees). Although the foot and leg structure of *A. afarensis* has evolved to be able to walk long distances, it is generally thought that it spends most of its time on trees [22,57,62,93,110,117,131].

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Australopithecus africanus, which is thought to have emerged approximately 3.3 million years ago and is an *Australopithecus* species, has a habitat and anatomical structure like *A. afarensis*. This situation reinforces the opinion that this species' nesting habit is similar to that of chimpanzees. It is thought that *A. africanus* is not as suitable for living on the ground as *A. afarensis*, due to the scarcity of fossil records and its anatomically small foot structure. For this reason, the idea that this species leads a more tree-centred life is dominant. In addition, it is thought that the nesting behaviours of *Australopithecus bahrelghazali* (3.6–3.3 million years ago), *Kenyanthropus platyops* (3.3–3.2 million years ago), *Australopithecus deyiremeda* (3.5–3.3 million years ago) species have similarities with *Australopithecus* species based on their ecological and anatomical structures [28].

It is known that newer *Australopithecus* species, such as *Australopithecus garhi*, dated to about 2.6–2.5 million years ago, and *Australopithecus sediba*, dated to about 1.98 million years ago, spent more time on the earth's surface than previous *Australopithecus* species. Based on the fossil record, it is thought that these species exhibit behavioural and cognitive characteristics similar to the first *Homo* species. It is understood that these species have a skeletal structure to support movement on the ground surface. At the same time, it is known that they do not entirely lose their joint structures that will support the climbing action to climb trees. In this context, it has been revealed by examining the fossil records that they show anatomical features suitable for living partly in terrestrial and partly in trees [42,63,101,104,110,121]. The presence of tool-like remains in regions with fossil records of these species is one of the critical proofs that these species spent time on the ground. However, these species are thought to nest in trees like other *Australopithecus* species. It is known that *Homo habilis* and *Homo rudolfensis*, which show significant similarities with the late period *Australopithecus* species and are accepted as the first species of the *Homo* genus, spend more time on the earth's surface compared to the late *Australopithecus* species. It is understood that these species prefer the ground surface rather than trees for sleeping, both of their anatomical features and the ecological characteristics of their habitats [10,19,39].

Remains of stone tool technology were found during excavations in Douglas Korongo (DK) (Ngorongoro Region, Arusha, Tanzania) area, located east of the junction between the third and fourth faults in Olduvai Gorge Bed I, one of the areas where *Homo habilis* fossils were first found. In addition, archaeological remains dating to 1.8 million years ago, based on the regular arrangement of stones around a 12-foot-diameter circle, were also found. The fact that the stones in these ruins were arranged orderly led to interpretations that these remains might belong to a settlement [41,73,122,123]. Whether the remains belong to the *Homo erectus* or *Homo habilis* species and their variations is controversial. They refrain from saying that the interpretation of the circle as a deliberately built shelter has been questioned by Potts [91] and Stanistreet et al. [108]. Instead, of an actual, built structure, it may be an area that developed naturally or mostly naturally under a shade tree. We may say there were carefully constructed stone circles of Khoe-San hunter-gatherers, and the Olduvai circle resembled nothing like the Holocene circles of southern Africa. Returning to analogy, if such structures were built habitually since 1.8 million years ago as a part of generational skill transfer, we would expect to find them more often on the sub-Saharan African landscape. The surface of this landscape is strewn with Earlier and Middle Stone Age artefacts. However, no other hominin 'architecture' exists until the Later Stone Age/Holocene stone circles, stonewalling and desert kites. This lack of evidence for hominin architecture for the greatest portion of the African Stone Age requires critical thinking and discussion before any analogy with Khoe-San architecture can be inferred. The earliest archaeological records of a shelter may date back nearly 1.8 million years ago, when variations of *Homo erectus* and *Homo habilis* lived together in similar geographies [44].

Homo erectus and its variations were the first human species to have fully adapted to life on earth, lost their characteristics of living in trees anatomically, and made great journeys on earth and left the African continent. It is thought that the *Homo ergaster* species, which is associated with the *Homo erectus* species and the *Homo erectus* species, developed the behaviour of nesting on land and built simple huts, like the *Homo* species' ancestors. In addition, it is thought that they may have used natural and sheltered areas as a habitat, similar to *Homo habilis*. It is understood from the archaeological findings that there may be a section reserved for a hearth in the huts they built due to

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the discovery of fire by the species associated with *Homo erectus* [13,88,98,129,140]. The fact that *Homo erectus* and its variations travelled long distances out of Africa and roamed different continents suggested that they produced temporary and fast-build huts and led a nomadic life [14,16,18,95].

According to paleoanthropologists such as Ian Tattersall, the *Homo ergaster* species is considered a variation of *Homo erectus* that lived in Africa [119]. It is seen as a subspecies of *Homo erectus* by primatologists such as Colin Groves and paleoanthropologists such as Vratislav Mazák [50]. We do not have any remains of structures/nests regarding the settlements of *Homo ergaster*, which emerged approximately 1.9 million years ago. It is thought that *Homo ergaster* built huts in the form of small round beehives, as it was a transitional form between *Homo erectus* and *Homo habilis*. Again, no explicit references were provided for how exactly was doing that *Homo ergaster* built small beehive huts. And what exactly were the solid bases for the assumptions that *Homo ergaster* built beehive huts? We already know there was quite a obvious leap between a few roughly situated stones at Olduvai and the construction of an enclosed beehive structure—to make such a leap at least some forms of evidence were needed. Compared to *Homo erectus*, *Homo ergaster* did not emerge from the African continent and did not use effectively the spatial memory and ability to code space much to explore new places. This situation brings the nesting behaviour and cognitive capacity of *Homo ergaster* closer to *Homo habilis* [2,27,138,139]. In addition, it may be defined that the internal and external distinction is made in the nest built from *Homo habilis* or *Homo ergaster* species. It is understood from archaeological studies that a conceptual background for this distinction has begun to emerge. We may say that the interior of the settlement area was left clean in a planned manner in the areas where settlement remains are found. In addition, it was determined that the materials were arranged more regularly in the inner area, and the wastes were thrown out. We think this is highly understandable, but clearing a space from debris and starting to use space more organised does not automatically imply the construction of beehive huts during the Earlier Stone Age in Africa. This situation may say us that space was conceptualised as internal and external in the *Homo erectus* species. At the same time, it can be considered as an indication that hygiene and privacy are gradually associated with shelter, as well as increasing protection and sleep quality [23,33,81,96]. In addition, the beginning of the use of fire in the shelter is an essential indicator that the concept of home has gradually started to be used in the concept of home [48].

3. Architectural Artefacts, Materials and Settlement Forms of *Homo habilis*, *Homo erectus* and Present-Day Indigenous Peoples in Sub-Saharan Africa

We discussed nest building details of Great Apes/Hominidae (see Table 1). The *Homo* species that stopped nesting in trees and started to nest or settle on the earth during the human evolution process are *Homo habilis* and its variations, *H. rudolfensis* and *H. Gautengensis* [21]. These human species are thought to build nests for protection or sleep while spending time on the ground surface. It is understood from the fossil record that *H. rudolfensis* and *H. gautengensis* species prefer sheltered natural areas such as caves or high rocks on the ground surface. It is also thought that *Homo habilis* and its variations could produce tools and lead a terrestrial life. It is argued that the species live in simple huts called 'beehive type' by combining the surrounding branches, stones and mud. We may say that *Homo habilis* and its variants built simple domed huts or semicircular windbreaks [73,74] seen in African tribes [1,60,72,84,90,96,103]. We need to say that Leaky et al. [73] talk about 'a rough circle of loosely piled stones on the living floor' and Leaky [74] suggests that the Olduvai stone circle is 'believed to be the remains of a windbreak'. It may be said that nothing is clearly illustrated about 'domed huts' or beehive huts that closely resemble the built shelters of archaeologically and/or ethno-historically recorded African populations. Beehive-type simple huts of the Bushman tribe living in the Kalahari Desert today, or !Kung tribe of the San peoples [72] or the Okombambi/Okombambe place people living in Northwest Namibia [58,75] may be given as examples, similar to the huts built by *Homo habilis* and its variations. Okombambi/Okombambe place: The people who live here are mostly from the Ovahimba tribe, who have built now rondavel-type dwellings. We know Langdong [72] (p. 96) says: "*The stones might have anchored branches or some perishable material forming the type of hut used by some hunter-gatherers in Africa in modern times. Other, natural interpretations have been offered,*

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and the proper explanation may never be known". We are also aware Langdon [72] talks about Isaac's observed 'patterns of living' of !Kung Bushmen—nothing is clearly said about their beehive-type huts in those pages. In addition, there may be architectural similarities in the plan arrangement of the huts of the Twa pygmies living in the Equatorial region of Africa [29], the '*Baka mongulu*' huts (leaf houses) of the Baka pygmies in Southeast Cameroon [86] and the settlement organisation of *Homo habilis* species.

The San peoples are indigenous hunter-gatherer cultures, the earliest cultures of South Africa, whose lands include Botswana, Namibia, Angola, Zambia, Zimbabwe, Lesotho, and South Africa. San's, also nomadic, do not engage in agriculture and animal husbandry, as they feed on game animals and plants. San peoples living in Sub-Saharan Africa today have relatively isolated lives and have adopted an architectural understanding similar to the early human settlement culture [77]. Their shelter-building materials are light and temporary and can be carried by various pack animals [102]. They are structures with a dome-like appearance and a radius approximately equal to the height. The construction of the building is itself in a dome-like form rather than placing a dome-like roof over a body. More herbal ingredients are used. Materials such as grass, reed and straw are processed as filling material. The '*skerm*' is a useful example of the beehive housing units used by the Bushmen belonging to the San (Saan/Basarwa) tribe [120].

According to the fossil record, *Homo erectus*, which came out of Africa, they somehow reached all other continents except America and Antarctica. Therefore, there are many fossils belonging to *Homo erectus* and archaeological remains belonging to the settlements of *Homo erectus*. Archaeological evidence of well-preserved *Homo erectus* shelters is the remains of the Acheulean culture dated to 500–400 thousand years ago [17,80,129]. It is known that they built circular huts by bringing together various branches, stones and mud pieces, such as *Homo habilis*, while nesting. These huts are stylistically similar to the shelter forms of the San peoples living in sub-Saharan Africa today [6,12,87]. The population living together by the earth life in Homo erectus settlements increased, and settlement patterns consisting of huts emerged. We may say the remains of a *Homo erectus* hut located on a hillside near Chichibu prefecture, Japan, date to 500,000 years ago [92]. In addition, the settlement remains dated to 400,000 years ago, found in the Mediterranean Basin and France, and the models produced from these remains provide essential clues about the architectural activities of *Homo erectus* [13,24,66,98,129,133].

Archaeological studies have shown that *Homo erectus* used fire in a controlled manner. It has been determined that *Homo erectus* produced various small hearths by cooking the soil about 200–150 thousand years ago [3,46,61,109]. The Terra Amata archaeological site, located near Nice, France, where *Homo erectus* fossils are found, is important. In the remains of twelve *Homo erectus* huts dated 380 thousand years ago, it was observed that the foundations were made of flattened stones. It is understood that these foundations were placed in this area with some soil excavation. The perimeter walls were built by placing the poles on the foundations in such a way as to surround them. In addition, it was observed that filling materials such as tree branches were filled between the main pillars. The remains of the hearth formed as a hollow area covered with pebbles, which were found inside the hut. This point is one of the indicators that *Homo erectus* had an architectural design approach close to today's hunter-gatherers [6,12,13,140]. However, we need to say there are some ideas about why the Terra Amata site in Nice did not yield *Homo erectus* fossils; and they are related to the ideas of whether these really are structures.

At the Bilzingsleben archaeological site in East Germany, three huts with a size of 2.75/3 × 4 m, which are thought to belong to Homo erectus, dated to about 350,000 years ago, each with a central pillar made of mammoth ivory, were discovered [82,83]. It is thought that these discovered settlement remains have similar characteristics to the San tribes living in the Kalahari Desert of Africa and the huts of the Twa pygmies scattered in the Equatorial region of Africa [69,118]. It has been observed that the remains of huts discovered in the Terra Amata and Bilzingsleben archaeological excavations are generally oriented towards the southeast to protect them from the northwest winds. This point is critical, as the huts were used for a settled life, not a nomadic one. Findings of ash in the area facing the entrances of the huts in the Bilzingsleben area suggested that the *Homo erectus* members living

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here also used fire for cooking rather than heating. The hearth belonging to members of the same species in the Terra Amata region is in the centre. At the archaeological site of Bilzingsleben, an area surrounded by bone, ivory and smooth-surfaced stones encircling an 8.2-m diameter circle was discovered. This situation makes us think that *Homo erectus* members who lived in Bilzingsleben organised this area as a socialisation and cultural activity area [82,83,125,130]. As a result of archaeological excavations, it was revealed that the shelters in Terra Amata were nearly 8–14.6 m long and 4–6 m wide [134]. In this context, we may say fire may have played a central role in socio-cultural activities for members of the same species here [82,83,125,130]. Here, we say *Homo erectus* is described as using shelters across huge geographic spaces and periods, and we don't aim to attribute the evidence of other species to *Homo erectus*. We are aware from the ideas that say the remains from Bilzingsleben were originally described as a subspecies of *Homo erectus;* this may be now attributed to early Neanderthals, or at least *Homo heidelbergensis*.

Table 1. Comparison of nesting behaviour and products in terms of different characteristics in Great Apes and Hominids (for orangutans, see [94,128]; for gorillas, see [70,113]; for chimpanzees and bonobos, see [38,111]; also see [37]; for Australopithecines, see [39,55,111].

Nest Building Behaviour in Great Apes/Hominidae				
	Orangutan (*Pongo*)	Gorilla (*Gorilla*)	Chimpanzee and Bonobo (*Pan*)	Pre-Paleolithic (8–2.5 million years ago) *Australopithecines* (*Hominina/Australopithecine*)
Habitat	Trees	Ground Surface (Use of trees for sleeping)	Trees, Rarely the Ground	An evolution from trees to nesting on the ground
Purpose	Protection from microorganisms, improving sleep quality (especially night sleep), baby care and thermoregulation, use as a danger stimulus (signal function), socialisation			Increasing sleep quality and layers, protection from dangers and predators, care of young, storage of animal carcasses and tools, protection from microorganisms, thermal regulation, socialisation
Transfer to New Generations	Social Learning (Cultural) (A participatory construction activity)			Social Learning (Cultural)
Factors Affecting Its Formation	Environmental Conditions (climate, availability for sleeping conditions), Material Availability and Properties, Population Structure and Learning Possibility, Number of Offspring, Temporal Activity Pattern, Frequency of Use, Natural Selection Pressure (Number of Hunters, etc.)			Environmental Conditions, Material Availability and Properties, Population Structure and Learning Possibility, Natural Selection Pressure
Usage Period	Temporary Use (Daily or for a few days)			Temporary Use
Behaviour Patterns	Sleeping platform and nest production based on combining branches and branch segments by bending, breaking and joining/joining together branches of different and close trees			The production of a sleeping platform/hut is formed by bending, breaking and combining/combining branches and branch parts or by stacking stones
Frame Complexity, Material Use, and Material Culture	More complex framed nest, rigour and differentiation in material selection, more material cultural elements (sleeping platform, pillow, sleeping cover, roof)	Differentiation in material selection about material possibilities and diversity, sleeping platform on the ground, the sleeping platform with the closed environment and the sleeping platform with a closed environment in the tree	Greater use of single wood material and narrower nests (woodland and sparsely wooded savannas) in chimpanzees, more selective use of different material types in bonobos, and wider nests (dense woodland)	Due to the scarcity of archaeological findings, features such as framework and material are not known precisely. However, in terms of material culture, it is estimated that tools related to cutting, mowing and hunting were used in nests concerning functions such as nest building and breaking up the prey.
Build Time and Frequency	Approx. 8 min (Daily Construction)	Approx. 5 min (Daily Construction)	Approx. 3 min (Daily Construction)	
Typological Differentiation	Differentiation based on day and night (Day nests are more sloppy,	Rainfall and temperature, presence of herd leader, sex of the	Nest on the ground surface related to material abundance and diversity,	Differentiation (?) with activity pattern (sleeping, hunting, etc.), in relation to gender, and in terms of habitat characteristics (forest, savanna, etc.)

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	nocturnal nests have more complex materials and frameworks, especially re-use of day nests, more material culture elements in night nests)	individual, age and body size, differentiation based on day and night (females and juveniles mostly on trees, males on the ground, on the ground surface in relation to material abundance, between nests in relation to body size) distance increase, tree nesting in the absence of the pack leader)	differentiation in the day and night nests, seasonal variation in nest type, variation in nest ground clearance in different habitats (especially rainy and dry climatic conditions) and concerning sex, age and predator pressure	
Learning Process of Nest Construction	It begins at the age of six months and is completed at the age of three years.	It begins with the onset of walking and is matured in some cases by six months of age and generally by two years of age.	It begins at weaning (at eight months of age) and matures to nest at three years of age.	

4. Conclusions

Subspecies of *Homo sapiens* are classified in different ways in many sources. It is a controversial issue in which members of the human genus (*Homo*) need to be considered a subspecies of *Homo sapiens*. The study focussed on architectural artefacts and materials for nest buildings used by human species that existed before today's human species. The paper's discussion may indicate some convergences common in nest-building forms and settlement organisation between the modern human species.

It appears that there may be some apparent similarities in terms of plan organisation between *Homo habilis* and *Homo erectus* species' shelter remains and the shelters built by the local tribes living as hunter-gatherers in sub-Saharan Africa today. It may be thought that the materials and techniques used in the nests and dens of *Homo habilis* and *Homo erectus* species show architectural continuities with the San Tribes today. Regarding nest-building behaviours or settlement organisation, the '*skerm*' of the !Kung tribe in San peoples [102] and circular huts belonging to the Okombambi/Okombambe tribe in Northwest Namibia [43] may show apparent similarities with circularly arranged lava blocks found of *Homo habilis* in the Douglas Korongo (DK), Olduvai Gorge Bed I area [8]. The remains of a hut thought to belong to *Homo erectus* at the archaeological site of Ogasaka, near Chichibu in Saitama prefecture, Japan, dated 500,000 years ago and the findings of a hut dated to 400,000 years ago, thought to belong to *Homo erectus* found in Terra Amata, eastern province of Nice, France [25] may reveal some similarities in terms of plan details. The remains of a hut thought to belong to *Homo erectus*, found in Terra Amata, near Nice, France, dated 400,000 years ago, need to be pointed. The rounded plan organisation of the fire pit is made of flat pebbles to protect the fire from the northwest wind, and the place where the tools were produced in the hut [25] was interesting to discuss. The area thought to belong to *Homo erectus* at the Bilzingsleben archaeological site in the Sömmerda region of the Thuringia state of East Germany provides information about the settlement of this species. The areas with a circular plan organisation and the circular sit stones may have been designed for the living places and activity areas [82]. The settlements belonging to the Bushman tribes living in the Kalahari Desert of Africa and the ceremonial/event courtyards surrounded by these settlements [102] may have similarities in the plan to the aforementioned living places of early *Homo* species.

The remains of circularly designed nests of *Homo habilis* and beehive-shaped huts created by *Homo erectus* by piling up stones may bear material and technical resemblances with the shelter plans and forms of present-day human species living in sub-Sahara. The interplay between palaeoanthropology and ethnoarchaeology may signify the architectural activities of the San peoples, may have got similarities with the nest building of early *Homo* species, which do not exist today.

Here, we see some important disagreements related to the nature of cultural and archaeological taxonomies, and the use analogical reasoning when comparing recent hunter-gatherer populations with Pleistocene hominin groups. Pargeter et al. [89] have already suggested that researchers need to care about these issues.

Lastly, we think we have seen something worthy of saying that early Homo 'architecture' in Africa resembled that of recent or current Africans. The paper's discussion may support the idea that indigenous architectural artefacts, materials, and techniques have been inherited throughout the evolution of architectural culture. We consider that examining the architectural evidence of the first human species is invaluable for urban design, architecture, paleoanthropology and ethnoarchaeology.

Possible settlement forms and dwelling ideas of *Homo* species may open new understanding for placemaking concepts. Early signs of building material use may contribute to efficient, ecologically successful urban design principles. Housing plans are worth discussing as possible construction methods, and housing production strategies may address unique spatial strategies. We think the early housing forms and dwelling patterns discussed in the paper created by early *Homo* species acquired architectural achievements. The interventions and indications of early *Homo* species had the adaptation ability to the natural environment thanks to the housing units, settlement pattern and dwelling.

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