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ARCHAEOLOGICAL EVIDENCE FOR EARLY HOMINID MIGRATION TO THE ARABIAN PENINSULA

ABSTRACT: This chapter examines the little known archaeological record of Southern Arabia, reports on the results of fieldwork there, and documents that the earliest hominid occupation there dates to at least the lower Pleistocene. The documentation of Developed Oldowan industries there, found in clear archaeological contexts, not only indicates hominid presence but also reveals another route used by hominids to colonize Eurasia.

KEY WORDS: Southern Arabia – Hominid colonization – Lower Pleistocene – Oldowan industries – Migration routes

INTRODUCTION

Based on currently available archaeological data, three basic directions of original human migrations out of East Africa are generally recognized. A southern direction is documented by Swartkrans and Sterkfontein sites in South Africa (Leakey 1970). Sidi Aderrahman site in Morocco (Biberson 1967) and Ain Hanech site in Algeria (Balout 1955) suggest early human migration to northwestern Africa. Finally, the third direction is represented by well-investigated site of 'Ubeidiya in the Jordan Valley (Bar-Yosef, this issue, with references, Jaeger 1983). Two questions may be raised regarding all these sites: When did each migration occur? What were the routes of those migrations? In this paper, I consider the part Arabian Peninsula played in early human migration through western Asia.

THE GEOARCHAEOLOGICAL CONTEXT

Because the Arabian Peninsula is close to the area of human origins, some researches long ago assumed, *a priori*, that early humans migrated into the Asian continent through Arabia. There is some indirect evidence supporting such an assumption. Both flora and fauna in southern Arabia, as well as its geological history, are very similar to those of East Africa (Ivanova 1982). Given that the earliest sites are located along the Rift Valley in East Africa, similarities in geological history between the two areas, and those related to rift formation in particular, appear significant.

The Great African-Arabian Rift centers in Afar Valley in northern Ethiopia and radiates from there in three directions. One of its parts runs southward through Ethiopia, Kenya, and Tanzania to South Africa. Another part of the rift extended along the bottom of Bay of Aden and the southern Arabian coast. The rift also extends northward along the bottom of Red Sea and the western coast of the Arabian Peninsula and continues on the continent as the present-day Jordan Valley. The rift formation of the African-Arabian Rift created a unique environment which, if it did not stimulate, at least played a role in human evolution. This is well-documented both archaeologically and palaeoanthropologically, and serves as a main argument for the commonly accepted monocentric theory of human origins. However, by the

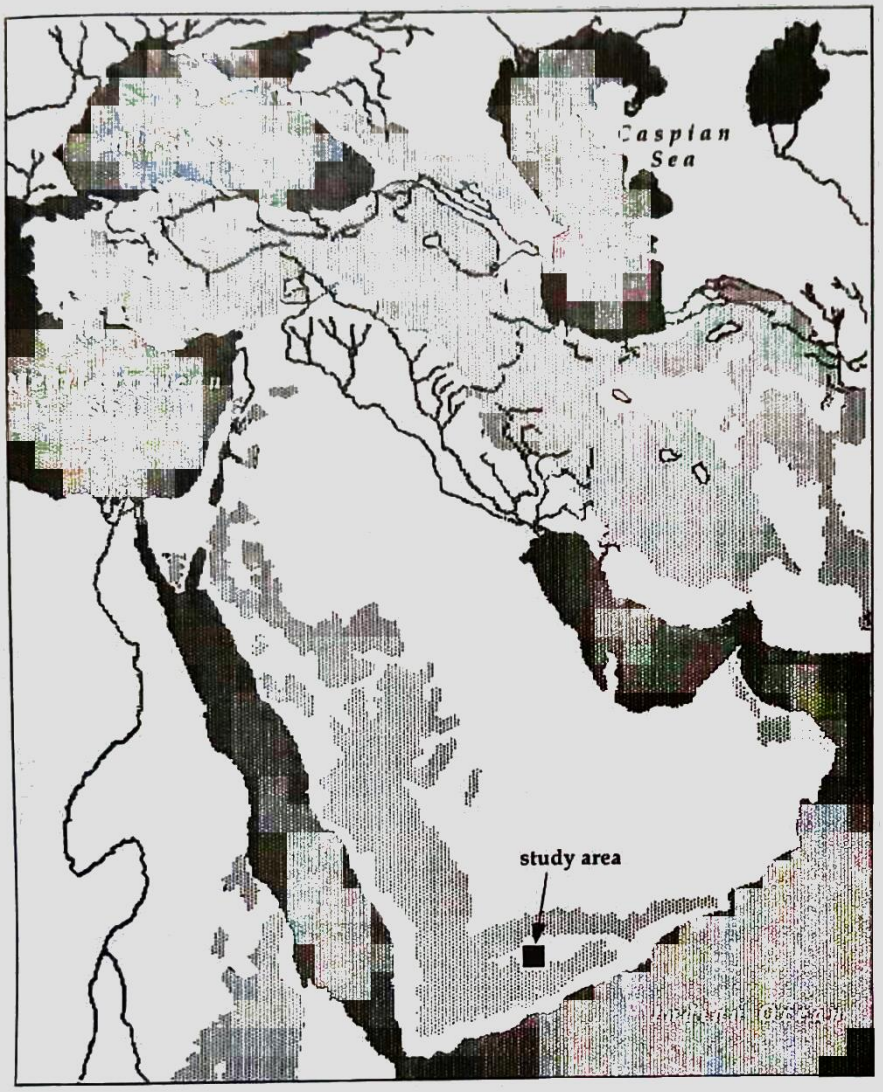

FIGURE 1. The location of the study area.

same token, this suggests that the evidence of early human activities can be found within a rift zone.

This indirect evidence has been supported by archaeological data from Shuwayhitiyah site in Saudi Arabia (Whalen *et al.* 1989, Whalen, Pease 1990) (*Figure 1*). Archaeological material representing different periods of the Paleolithic was found on a modern erosional surface. Based on typological and technological analyses, the oldest lithic artifacts have been assigned to the Developed Oldowan A and B.

Given the available dates for these stages of Oldowan Industry in East Africa as well as that the earliest non-African sites postdate 1–1.5 Mya, Whalen and Pease (1990: 72–73) suggest that the Shuwayhitiyah locality represents the earliest evidence for human penetration into Asia. As a result, they proposed a short migration route to Asia through the area of modern Straits of Bab-el-Mandeb, in addition to or as an alternative to a long one through the Ethiopian highlands and the Nile Valley.

Although reasonable, their hypothesis can be accepted only if it is supported by more reliable archaeological data. Unfortunately, the sites used to support this hypothesis, both in Saudi Arabia and in other area in Western Asia (Thibault 1976), lack any stratigraphic context and chronometric dates. In addition, the cultural history of this area during the Paleolithic is discontinuous and poorly understood, all of which makes the proposed interpretation conjectural at best.

THE STUDIED SITES

There are, however, more reliable archaeological materials discovered and subsequently investigated by the Soviet-Yemen expedition in Southern Arabia in 1983–1991 (*Figure 2*). Specifically, a series of Paleolithic sites in the Hadramaut Wadi (Amirkhanov 1986, 1991) have been excavated and studied using a multidisciplinary approach, including archaeologists, paleogeographers, geomorphologists, paleomagnetologists, and other specialists from a number of institutions. Petrologic studies were conducted by the Institute of Geology, Russian

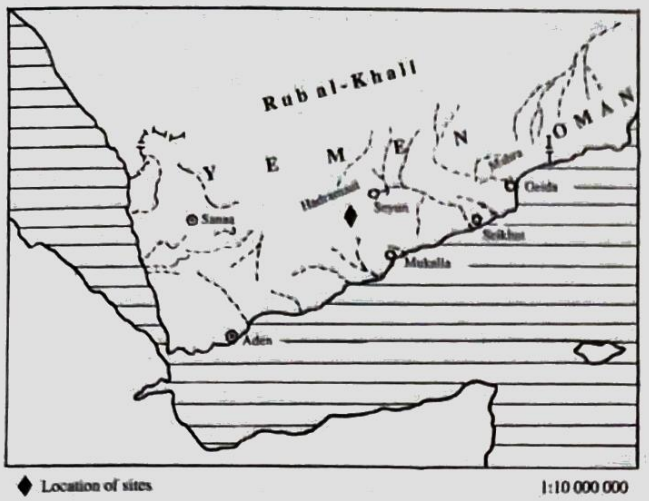

FIGURE 2. The location of Al-Guza, Charkhabil, and Al-Amira sites in Southern Arabia – indicated by a solid rhomboid.

Academy of Sciences (RAN). Pollen samples were analyzed by the Department of Geography, Moscow University, and by the Institute of Archaeology. Uranium-thorium dates were produced by the Institute of Oceanology and by Moscow University. The data obtained by several geological expeditions in the area have also been analyzed. Unfortunately, the majority of data have not been published in English, and thus remain unknown to many scholars.

The earliest sites in Hadramaut Wadi are Al-Guza and Sharhabil caves and Al-Amira rock-shelter (*Figure 2*). A trench 14.5 m deep was excavated through the entire sequence of deposits across the Al-Guza cave. Other sites were excavated with test pits which did not reach bedrock. All these sites are located close to each other in the Al-Guza Gorge, a tributary of Al-Gabr Wadi, which drains into the Dauan Wadi, the largest western tributary of the Hadramaut Wadi. All three sites have common features related to their origin and taphonomy. These include similar karst genesis, processes of subsequent roof collapse, and the presence of travertine conglomerates in front of cave mouths.

Al-Guza Gorge exhibits a large number of collapsed karst formations. For instance, only the deepest 3–4 m segment of Al-Guza cave has remained undestroyed. It is filled with 5.6 m of deep friable cave sediments almost up to its roof. Reconstructions have shown that the original cave would have been about 20 m high, 20–25 m wide, and approximately 50 m long. The internal (corridor) part of the cave would have constituted *ca* 50% of its length.

A 20×2 m trench was located in the middle part of original cave. In this area, the roof collapsed completely but cave sediments were well-preserved. In total, an area of 39 m^2 was excavated. The profile in this area consists of 13 litho-stratigraphic horizons, twelve of which contain archaeological remains (*Figure 3*). The cultural horizons directly overlie each other with no intervening sterile levels in between. The overall depth of the horizons bearing cultural material is 12.8 m. The cultural horizons produced lithic artifacts and two hearths found at different depths. Bone and arboreal plant casts were found in travertine mass in the mouth of the original cave.

Sedimentologically and lithologically the Al-Guza deposits can be coalesced into two beds. The development of the 1.5 m thick, predominantly travertine and pebble Lower Bed is related to the original late Pliocene deposition of pebbles at the bottom of Al-Guza Gorge. During that time, either standing water or temporary floods transported pebbles into the cave. At the same time concentrations of travertine formed in open areas upon reaching the surface deposited lime tufa. Where karstic water contacted pebble deposits, it cemented them and turned them into conglomerates. The overlaying Upper Bed consists exclusively of cave sediments.

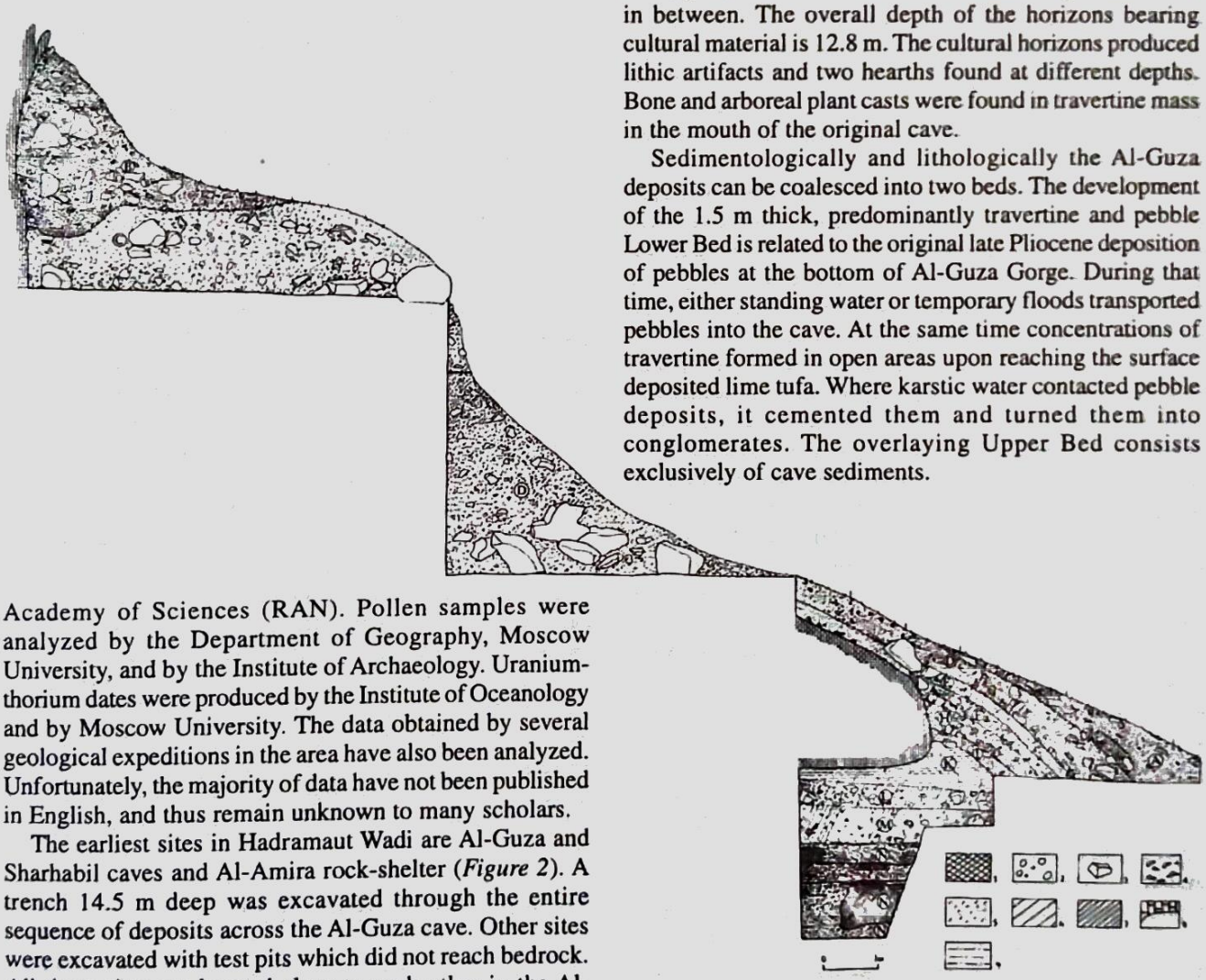

FIGURE 3. The profile of the Al-Guza deposits: 1 – travertine; 2 –cobbles; 3 – limestone fragments; 4 – rubble; 5 – scree; 6, 7, 9 – variety of fine sediments; 8 – basal limestone.

Archaeological material first appears in the upper part of the Lower Bed. The formation of the bed began in the late Pliocene when the down-cutting erosional phases in the major valleys changed to the first in-filling phase. This shift took place when the base levels of at least the minor valleys were not yet in equilibrium. This, in turn, suggests that the geological evolution of Southern Arabia was affected by episodic climatic changes and implies that the earliest evidence for human activity there may correlate with one of these changes.

Coring has shown that similar conglomerates are often found at the bottom of all the valleys in the Hadramaut Basin. In the Hadramaut Wadi and its major tributaries, these deposits are as deep as 80 m, which implies that extensive aggregation accompanied conglomerate formation. At least a part of this span of geological history falls within the Plio- Pleistocene transition which occurred around 1 Mya ago.

The core data also show that the gravels and pebbles overlying the conglomerates were deposited during the middle Pleistocene. Their accumulation was accompanied with a noticeable decline of ground water activity, slope denudation, and collapsing of cave roofs. The general geological trend, as demonstrated by the lithology of sediments, remained the same while humidity decreased significantly.

The most representative archaeological assemblages come from the Al-Guza cave itself. Quantitatively meaningful lithic assemblages from the different cultural layers are heterogeneous both morphologically and technologically. Cached raw material, cores, blanks, tools, and debitage are all present in each layer.

It is more difficult to classify the assemblage functionally. These materials have been preliminarily analyzed by V. E. Schelinskiy. The working edge of one of the choppers exhibited microwear attributed to wood chopping. The functional analysis of the piece was possible due to its specific taphonomic context. After the chopper was abandoned, it fell into still unconsolidated travertine mass which covered its surface and protected it from weathering. Generally speaking, microwear is more often observed and more developed on the choppers.

A comparative study of lithic assemblages from the different layers shows only slight technological and typological variations within the same groups of artifacts. Archaeological material from the lowest layer, however, is clearly distinguishable in lithic raw material use. Pebbles served as raw material in the earlier deposits while during later occupations some tool types were made from crystallized limestone nodules. These nodules are abundant and can, even today, be easily found in the walls of Al-Guza Gorge. Thus, the first inhabitants of the cave used familiar raw material which was literally under their feet. Having adapted to a new habitat, they switched to the new easily flakeable raw material that required less energy investment to produce traditional tools. Such selectivity of the raw materials increased during the subsequent stages of the Paleolithic in Hadramaut. Acheulean artifacts there were primarily made of crystallized and sillicified rocks. During the Middle Paleolithic they were supplemented with flint which became the sole raw material used during the Upper Paleolithic.

The range of techniques and technological methods of stone tool manufacture used by the residents of Al-Guza cave was limited. It is not possible to unambiguously differentiate between primary flaking and secondary retouch there. Direct percussion appears to have been the main technique for preliminary shaping. Delicate retouch was done by direct percussion removing smaller flakes. The industries contain cores with a single striking platform. Heavily exhausted cores, however, have not been found to date.

Despite a number of archaic traits, the Al-Guza lithic assemblages exhibit certain systematics and standardization. There is an obvious differentiation between working and non-working edges of a tool, as well as in the basic methods used to shape them. Three techniques were used to make choppers, for example: the anvil technique, the bipolar technique, and hand-held direct percussion – with the latter two being more common. In some cases tool production was not restricted to the shaping of the working edge but also required modification of other parts of the artifacts. To coarsely shape an artifact, flakes were frequently detached from its long axis. When necessary, more delicate percussion was used to refine the tool's flaked surfaces and edges.

The entire lithic assemblage from all excavated layers consists of 972 artifacts and contains about 30 typological groups of artifacts. These include cores with a single striking platform, more than 10 types of choppers, several side-scraper type, notched tools, massive scrapers, "becs", hammerstones, a large number of both modified and unmodified flakes and other debitage, and nodule fragments. Finished tools, on the average, constitute 15% of each assemblage – a ratio sometimes considered as characteristic of long-term occupation where all stages of tool manufacture took place. Choppers constitute more than half of all tools, and usually account for 8–10% of the entire assemblage from each layer. It should be stressed that the term "chopper" is used here to denote a formal category only and the term's use does not suggest that all items so designated functioned as choppers. Indeed, given the work of Toth (1985) and others, it seems clear that most so-called choppers were the exhausted cores used for the detachment of expedient flakes which, in turn, constituted the main components of Oldowan and related tool kits.

EXTERNAL CORRELATIONS

Quantitative and qualitative characteristics of Al-Guza lithic assemblages allow to place this industry within the Paleolithic sequence of Western Asia and of Northeast Africa. Lithic assemblages of this type are usually classified

as pebble industries which typically lack bifaces. Although choppers represent a small proportion of the entire assemblage, they numerically predominate among other tools. These inventories also contain some polyhedrons, dihedrons, and discoids morphologically similar to the choppers. Few straight and transverse side-scrapers present are made on both flakes and small fragments. A few "becs" are also present. A particular type of a large core with a single striking platform is commonly used for flaking.

The lithic assemblages displaying such composition of artifact types are usually assigned to the Oldowan Industry. Absolute dates, however, are needed to define the precise cultural and chronological position of this industry.

Some typologically Oldowan industries may be of Acheulean age, while others remain undated. The definition of their position clearly depends on the existence of a known Paleolithic sequence in a particular region. If the cultural and chronological contexts of a site are not clear, its industry is commonly classified as Early Acheulean (Boriskovskiy 1977: 16, 1979: 16), pre-Acheulean, para-Acheulean (Hours 1975), or Late Developed Oldowan (Korobkov 1979: 155). Based on this approach, the Al-Guza industry can be classified as both Oldowan and pre-Acheulean. Chronometric dates as well as the stratigraphic context of this assemblage make it possible to refine this further.

CHRONOSTRATIGRAPHY AND DATING

The Al-Guza cultural layers lack any materials suitable for potassium-argon dating. To date, uranium-thorium, palaeomagnetic, and TL dates have been obtained for the Lower Bed and overlaying horizon. The uranium-thorium date lies outside the accepted range for this method. Palaeomagnetic dating points to a shift from reverse to normal polarity. The combination of two dates suggests that the Lower Bed probably corresponds to Brunhes/Matuyama boundary. There is a remote possibility, however, that the palaeomagnetic data reflect the Jaramillo or an even earlier episode of normal polarity.

Termoluminescence dating produced a date of about 600,000 yrs B.P. for the overlying horizon. This seems to support a date of the Brunhes/Matuyama boundary for the Lower Bed. Recently, however, some serious disagreements have arisen about both the application and resolution of TL dating. Specialists from Moscow University have argued that the traditionally employed TL dating method used in Russia is completely inappropriate for obtaining very old chronometric dates (Shliukov *et al.* 1985: 106). They have proposed that the lowest limit for reliable TL dates does not exceed 300,000–400,000 yrs while western scholars have even questioned this limit. We therefore do not consider here the TL date obtained by the old method. Thus, the minimal age for the Lower Bed of Al-Guza cave sediments corresponds to Brunhes/Matuyama boundary.

The lower portion of the stratigraphic section in the cave is directly related to the bottom sediments in the Al-Guza Gorge. This permits to correlate the beginning of sediment accumulation in the cave with the geological history of the Gorge and of the Hadramaut Basin. As noted above, the geological dating of the Lower Bed depends on the establishing of the age of conglomerate formation in the bottom portions of the Hadramaut Basin valleys. A. A. Lukashev and V. A. Bol'shakov, who studied deep geological deposits at Avarid Wadi (Bal-Haf region) approximately 20 km from the coast of the Bay of Aden, argue that the chronological range of these deposits is much greater than that of the sediment package in the Hadramaut Wadi (pers. comm., 1985). Their regional stratigraphy includes two basalt lava beds separated by conglomerates and consolidated sands. Both lower and upper basalt beds exhibit reverse polarity.

Nearly identical stratigraphic sequences are found in the mouth portions of the valleys in Eastern Arabia (e.g. Raniah Wadi, As-Sahba Wadi). These stratigraphic sections consist of lower basalt bed, fanglomerates (analogues of conglomerates in the continental areas of the peninsula), and an upper basalt bed. Lower and upper basalt beds have been dated by K, Ar to 3.5 and 1.1–1.3 Mya respectively. In the regional stratigraphy of the Arabian Peninsula this time range is assigned to the Late Pliocene/Early Pleistocene. The conglomerates found within valley deposits are attributed to this period. Their genesis, together with the composition of the preserved floral assemblages, indicate significantly milder climate. One of the major climatic shifts from humid to arid conditions conforms to a stratigraphic boundary between the Late Pliocene/Early Pleistocene and the Middle Pleistocene periods. Relics of this large-scale regional event have been found in both the Al-Guza Gorge and the Al-Guza cave. During that time the roofs of caves and rock-shelters collapsed, springs significantly decreased in number due to the lowering of ground water discharge level, and the process of travertine formation in front of the caves came to a halt. Palaeobotanical data from the Al-Guza cave sediments support this climatic reconstruction. For example, macroscopic floral remains from the travertines that include *Chamaerops sp.*, *Ficus sp.* (*sp. Senegalensis*), *Sterculia sp.* (*Firmina sp.*), point to a markedly humid climate during the formation of the Lower Bed (E. Spiridonova, pers. comm., 1986).

CONCLUSION

The sum of the data suggest that the Lower Bed at Al-Guza dates back to about 1 Mya. This date, however, likely signals only the occupation of the site itself, and not the date of the original arrival of hominids on the Arabian Peninsula. It is significant that geomorphological and stratigraphic positions of the sediments in coastal portions of eastern Arabian valleys show that the sea level dropped

some 150 m after the Late Pliocene/Early Pleistocene. This marked the onset of continental glaciations in the northern latitudes which brought about increased aridity in the tropical zone and, on the global scale, resulted in the lowering of the sea levels.

If it is assumed that early hominids migrated to Arabia through the short route across the currently submerged Bab-el-Mandeb land bridge, it appears that the earliest colonization of this area occurred during a glacial period sometime about 1.65–1.35 Mya. The data presented above also bring evidence of the routes used by hominids to colonize Southern Asia.

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