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Great plains and mountain areas as habitats for the Neolithic man in the Sahara

In the Sahara besides hilly and broken land we find vast areas which are flat and normally covered with alluvial sediments. These so-called *serir* or *reg* can be more than 500 km. in diameter like Tanezrouft, Ténéré or Serir Tibesti. Usually, their elevation is below 500 m. In contrast to them the mountain areas, of which Hoggar and Tibesti are the largest, reach up to 3,415 m above sea level in their peaks. But they comprise also large plateaus elevated between 2,000 and 2,500 m, built up by volcanic lava.

Most of the mountain areas are dissected by numerous valleys. Their slopes are steep and, when are build of magmatic rock or schists, are covered by debris. Sandstone areas are often decomposed into small massifs with sandy alluvial plains around and between them. At the foot of the vertical sandstone walls we find rock shelters which are less frequent in other geological structures.

The great plains or mountain areas; which, of these two different types of landscape, were more favourable for man during Neolithic times? This does not seem to pose a serious question. When we consider only the number of sites and the amount of Neolithic remains, we will find that Acacus, Tassili, Tibesti, Ennedi and Uweinat abound in these relics. The same is true only for a few plain areas, mainly for Serir Tibesti and Ténéré, where people lived on the edges of small lakes or swamps. So Balout and Roubet (1980: 170) are convinced (like most authors) that the Saharan Neolithisation could have reached its climax only in the higher mountain areas. This is surely true. But let us point out that some of these massifs like Air, Adrar of the Iforas and Hoggar do not seem to be as rich in Neolithic material or rock art, and let us ask what role did the great plains, without permanent freshwater lakes, play for Neolithic man.

A decisive factor for him were certainaly those environments where he could get, or produce, sufficient food and where he could find a good water supply. Therefore, the prime factor must have been the climate as fundamental for soil formation, and vegetation cover, and consequently for collecting, hunting, herding and agricultural activities; it was also responsible for lack or abundance of drinking water.

We can also assume that too low or too high a temperature did not restrict the habitat of man (with the exception of regions above 2,500 m); the most important climatic element was unquestionably the degree of aridity or humidity.

Climate must have influenced the settlement behaviour of prehistoric man more than the relief could do, though impenetrable mountain areas with steep slopes and narrow gorges were usually avoided. Man tends to desire open plains for traffic and trade, for movement and communication, for agriculture and horticulture. Therefore, he looks in the mountains at least for large valleys, river terraces, easy passages over mountain ridges, wide pediments or sandy alluvial plains, accessible plateaus or other kinds of flat surfaces.

There are further aspects to be considered. The severe, sometimes, lack of rock material on the plains covered by mud, sand or gravel deposits, must have been a considerable problem for prehistoric people. In Palaeolithic times they used mainly quartzite as a raw material which, by its resistance against weathering can be seen as outcrops even in lower regions; such raw materials as basalt and rhyolith could have been collected in volcanic areas. Ziegert (1976) describes obvious mining activity of Palaeolithic man for a good quartzite in Fezzan.

In Neolithic times people looked particularly for flint, obsidian and other kinds of stone which facilitated the manufacture of small implements like arrow heads, needles or microliths with scrupulous, subtle retouches. Sandstone or volcanic rock were also still in use, *e.g.* for portable hand mills and grinding stones which are found hundreds of kilometers from the nearest outcrops of these rocks. They must have been, therefore, transported and they certainly were precious possessions on the stoneless plains.

Much of the Tibesti obsidian has been found in the Neolithic sites (but not in the earlier ones) of the Central and Eastern Sahara. No other source locality of this raw material is known to exist in this area. Obsidian mines can be seen in Tibesti in volcanic layers of Trou au Natron and Tarso Yega. Amazonite mines occur in the Djebel Eghei of northern Tibesti. This green variant of feldspar was used for making jewellery (beads, etc.) during the Neolithic, Pharaonic and later times. It is presumed that all its pieces came from the mines in Eghei Zouma (Cf. Monod, 1974), but I found a similar kind of green stone also in the region of Djebel Uweinat (near Peter and Paul); therefore, we cannot exclude its different place of origin.

In addition to being raw material for making various artifacts, the stone played an important role in the whole spectrum of life of the people of the Stone Age. They used it to build fireplaces, wind shelters and small houses, traps and fences for game and cattle, or for grinding corn with hand mills made of hard rock. Stone could also have been used in their art and worship. In the mountain areas stone monuments like tombs occur as well as sanctuaries, monoliths and triliths, grooved stones and mobile pieces of rock art. It is almost impossible to find a source of these raws in vast areas covered with fine grain sandy deposits. The people must have – if at all – worked many of their objects from perishable material like wood, bone or leather.

If there had been tumuli made of mud or sand on the plains at least some of them would have survived; but there is nothing to be found. Perhaps graves with such a tumulus would not have saved the dead from being disturbed by hyenas, jackals or other beast of prey and, therefore, the people brought their dead for interment to mountain areas where tumuli are in abundance. But they might have had open-air funeral places so that nothing was left of the corpses. In dried up swamps to the north of Tibesti I investigated several Neolithic skeletons in contracted position obviously originally submerged in the mud. Their bones were exposed by wind deflation in recent times (Gabriel, 1970; Herrmann and Gabriel, 1972).

There are only a few traces of cult and aesthetics of the people living in the plains: in Erg d'Admer, at the foot of Tassili n'Ajjer, several mobile stone sculptures showing animals were found; in the area of the Capsian Neolithic decorations of ostrich eggs, bones and pottery are also known (Camps-Fabrer, 1966).

Huge tomb constructions as in Fadnoun (Savary, 1966) or Tibesti (Gabriel, 1984) are in contrast to the situation in the plains: building of megalithic monuments is not possible in the plains.

The mountainous landscape may also have affected the mythology and animistic imagination concerning single peaks or the custom of adoring gods in high places. Such places can still be seen, *e.g.*, near Pic Toussidé in Tibesti. Moreover, volcanic areas as the Tibesti can produce hot springs like in Soborom (Bruschek, 1972), where the Tibbu go since immemorial times to cure sickness and disease. Normally, such medical customs are linked with transcendental attitudes.

Nevertheless, these circumstances of geology and relief have surely been of secondary importance. With regard to climate the mountain areas are nearly always favourable. Windward slopes get additional rainfall because air masses are compelled to ascend and form clouds. Besides, high mountains ascend through several climatic zones and they have various meso- and microclimates while the plains are subjected to homogenous atmospheric conditions. The vertical gradient of temperature in Hoggar and Tibesti is of about 0.7°C to 0.8°C for 100 m (Heckendorff, 1977: 66). In more humid periods it might have been somewhat lower (Cf. Messerli, 1972) but at least today the upper areas are more than 10°C cooler than the lower ones. A similar situation exists as regards precipitation. In Tibesti it rises from about 25 mm/year in the lower parts (800 - 1,000 m) to nearly 100 mm/year in altitudes of 2,400 m. During Neolithic times it might have ranged (after several indices, Cf. Gabriel, 1977: 75) between 600 and 1,000 mm/year according to altitude.

The hypsometric differentiation of rainfall and temperature must have varied living conditions for vegetation, animal and man. The wadis were fed by precipitations in the summit zones. Runoff occurred throughout the year or periodically. Geomorphologists have even found relics of small glaciers and something like peat-bog in the summit areas (Messerli, 1972; Rognon, 1967; Gavrilović, personal communication) so that we can assume the existence of a broad spectrum of ecological niches in the mountains.

The evidence points to the existence of Neolithic lakes in Tibesti. They were situated in volcanic craters such as Trou au Natron or Tarso Yega, or were made by the running waters in the wadi channels which were barred by calcareous tufa banks across the valleys. It is thought that in the cooler summit zones, above 2,000 m, calcium was dissolved while the water became saturated in warmer zones, around and below 1,000 m, by evaporation and loss of carbondioxide. This happens especially at the start of narrow ravines or at rapids as well as by the existence of various aquatic flora which can be traced in fossilized prints preserved in the tufa deposits (Gabriel, 1977).

Due to the broad diversity of living conditions it must have been the mountain areas where during the process of desiccation man found still the possibilities to survive as he does today, too. Therefore the mountains must have been settled for longer periods, they must have served as retreats in arid phases.

But did annual wet and dry seasons exist actually in the Sahara during Neolithic times and did people retreat to the sheltering valleys and moister heights accordingly? Did they really practise transhumance, as Balout and Roubet (1980: 169), Camps (1974: 247), Van Noten (1978: 15ff) and others believe? It is indeed difficult to accept that precipitation in the plains was occurring during all seasons. If humidity came from the westerlies of the polar front, rain must have fallen usually in winter. If it came from the monsoonal tropics, summer was moist. There is every indication (Gabriel, 1977: 74 and 79) that after 7,000 B. P. the climatic regime of the Sahara changed from temperate non-tropical to a lateron tropical character. Maybe during the temperate period and during the time of transition distinct annual dry seasons had not developed. We find much evidence from these times that the plains were inhabited, and that the people living there were quite different from those in the mountains, as regards their cultural development and, perhaps, even their race (cf. Gabriel, 1977: 20ff.).

I found literally thousands of fireplaces in the great plains which are interpreted as being mostly the remains of the camp sites of the Neolithic cattle herdsmen (Gabriel, 1973; 1976; 1977). I called them "stone places" or "stone sites". They are to be found in sometimes surprising quantities, especially on the flat *serirs* or *regs* covered with soil and alluvium, often too far away from mountains as to explain them as relics of people practising the transhumance.

On the basis of more than 30 radiocarbon dates, the Neolithic "stone places" of the Sahara can be classified into three stages: an initial between 8,500 and 5,800 B. P. (roughly), a main between 5,800 and 5,300 B. P. and a final between 5,300 and 3,800 B. P. (Table 1). The quantitative proportion of "stone places" during these three stages is approximately 1 : 5 : 1 per unit.

There is no doubt that the producers of the "stone places" were nomads. Very rarely do we find layers of kitchen midden or other remains that could indicate longer occupation of the site. As in the African Sahel today people must have migrated from one water-hole to another when their cattle could not find enough pasture in the area.

Table 1

Radiocarbon chronology of the Neolithic "stone places" in the Sahara

Stage	Age B.P.	Duration in years	Number of dates	Average time interval in years
Initial	8,550	2,715	11	247
Main	5,835 - 5,355	480	12	40
Final	3,830	1,525	8	191

In Tidikelt, I found concentrations of more than 300 "stone places" within an area of about one acre. Five radiocarbon datings from such a field gave dates ranging from the beginning of the initial to the end of the final stage (Table 2). This confirmed my o pinion that such concentrations were not the contemporanous camp sites of a large

Table 2

Radiocarbon dates from a "stone place" site in Tidikelt (Algeria, 27°12′ N – 01°21′ E; samples processed by M. A. Geyh, Hannover)

(Hv 9696) 8,550 ± 335 B.P.
(Hv 9693) 8,165 ± 200 B.P.
(Hv 9692) 7,000 ± 365 B.P.
(Hv 9694) 5,355 ± 115 B.P.
(Hv 9695) 4,200 ± 190 B.P.

group with every family having their own fireplace, but that the "stone places" are concentrated in localities where, during some millennia of the Neolithic wet phase, people returned from time to time because of favourable circumstances: that is, they were visiting their water-points.

Cattle is not a mountain animal, it does not like to climb like sheep or goats. It prefers open country such as prairies, savannahs and steppes, Pampa or Puszta, *i.e.* open grassland, marshland and lowland. Within steep and narrow mountain valleys, where good pasture can only be found on the bottom of the valley, the herds are not flexible enough in case of emergency. That the Neolithic ecology of the plains was favorable for the existence of cattle can be ascertained by several indications: bones of big mammals like elephants demonstrate that fastidious fauna could survive there (Gabriel, 1977: 39 ff.). Lake deposits as well as fluvial channels report relatively humid conditions at the time (Pachur, 1974). The lakes, after all, do not show signs of seasonal desiccation. The fundamental disparity of the people in the plains from those in the mountains is mainly marked by their different cultural remains: archaeological strata beneath rock shelters, stone houses on fluvial terraces and sandy alluvial plains, deep hollowed mills in hard rock and abundance of pottery characterize a more sedentary life in the mountains. On the other hand, "stone places" (which were probably used as earth ovens) and arrow heads are rare here, while they abound on the plains where the "stone places" are almost always accompanied by

ostrich egg shells and often by grinding stones. But we do not find much pottery in these assemblages.

It is not certain if people on the plains already knew some kind of agriculture as Hester and Hobler (1969: 169) advocate. Their economic basis was surely a nomadic one, composed of hunting, herding cattle and possibly collecting food.

One might rise objections against the interpretation of the "stone places". For example one might be astonished that bones of domesticated cattle are rarely associated with the "stone places". But we must keep in mind that still today the cattle herders very exceptionally slaughter their animals. They live mostly from their milk and blood. Or one might stress the fact that the famous rock art of the pastoral period does only exist in the mountains. But this is no wonder, for the only possibility to paint or delineate on imperishable material exists on rock walls! Besides, Lhote (1962: 210 f.) points out that rock art of the pastoral people is especially arranged on the margin zones of massifs, not in their interior. Surely there must have been contact areas between the two different cultural zones. Furthermore, Camps (1974: 245) believes that most of the Tassili bovine pictures are products of the final phase of this period, and Maitre (1971: 68 ff.) emphasizes that the cattle herdsmen penetrated the mountains (Hoggar – Tefedest) only during the major desiccation *i.e.* in the final Neolithic; the plains' inhabitants mixed with the people of the Saharo-Sudanese tradition.

This author agrees with this theory and concludes: transhumance might have been practised locally but most of the cattle herdsmen were real nomads, distinct from the sedentary, pottery producing, probably Negroid, people of the Saharo-Sudanese tradition in the mountains.

The "stone place" people lived in a savannah-like habitat. There was enough surface drinking water for men and animals alike. Annual precipitation can be estimated at 300 - 400 mm. Along wetter river beds or channels a higher-growing tree and shrub vegetation must have extended over the large plains which could have fed the herds of elephant, giraffe and buffalo. The plains situated between the drainage lines were covered with thornbush steppe and grassland. Assemblages of limnetic freshwater molluscs found in different places can only be explained as the remains of lakes which, in all probability, did not dry up for decades at least.

In the mountain areas many rivers were barred by calcareous tufa banks or sinter dams. Lacustrine molluscs and diatomea in the sediments as well as imprints of plants (reeds) in the tufas and many pollen relics of various kinds of trees (mostly of Mediterranean or temperate character) give evidence of good living conditions. A brownish soil was accumulated on the valley bottoms. Their slopes were probably covered by a macchia-like plant formation.

Rock pictures of the hunters' period show mainly big African game: elephant, giraffe, buffalo, rhinoceros. Already before 8,000 B. P. people advanced to a new stage of social and economic organization (Gabriel, 1972; 1977; 1978a-b), as they did, too, in the Near East at the same time. They produced technically remarkably good

pottery (with dotted wavy line decoration) and probably began fairly early to cultivate the plants. During the following millennia pottery and rock art prospered and differentiated into many styles (cf. Gabriel, 1981). People lived in small huts on the lower river terraces, on the sandy alluvial plains or under the rock shelters. An exact chronological differentiation within the mountain people is however difficult to organize at this stage.

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