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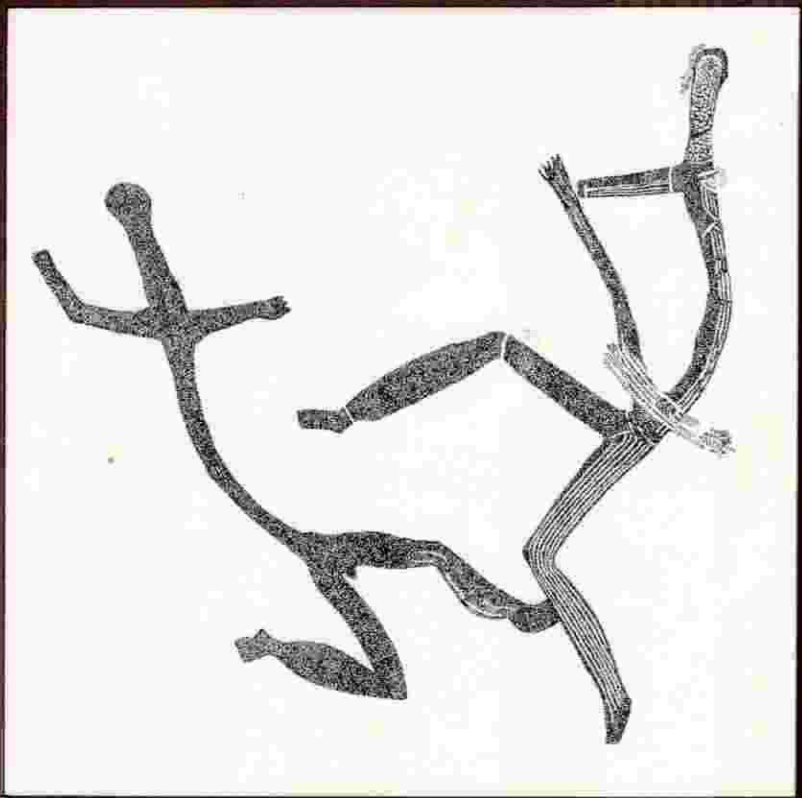

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Preistoria e storia del Sahara
Prehistory and history of the Sahara
Préhistoire et histoire du Sahara

Sodmein Cave Site, Red Sea Mountains (Egypt)

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Riassunto

Il presente articolo riferisce del lavoro sul campo nel sito della Grotta di Sodmein. Localizzata 35 km a Nord Ovest di Quseir, si tratta del primo sito nel Deserto Orientale che presenti livelli archeologici stratificati che vanno dal Paleolitico Medio al Neolitico. La grotta è di origine carsica. I depositi più antichi trovati fino ad ora sono datati a epoca ben precedente l'ultimo massimo glaciale e indicano condizioni climatiche più umide rispetto a quelle attuali. Diversi livelli del Paleolitico Medio sono associati a questi antichi depositi. Il livello superiore può essere più antico del 30.000 BP. Un'interruzione nella sedimentazione della caverna e della presenza umana ha avuto luogo durante il massimo glaciale. Una nuova fase di occupazione umana si attesta dal 7000 BP in poi. Sono presenti almeno due livelli neolitici, con testimonianze di animali domestici e di ceramiche, sempre in condizioni climatiche più umide rispetto a quelle oggi prevalenti.[1]

Summary

This contribution reports on the 1993 fieldwork in Sodmein Cave site. Located 35 km to the northwest of Quseir, it is the first Eastern Desert site to reveal stratified archaeological levels ranging from the Middle Palaeolithic to the Neolithic. The cave is of karstic origin. The oldest deposits recovered up to now are dated well before the last glacial maximum and indicate wetter climatic conditions than today. Several Middle Palaeolithic levels are associated with these older deposits. The upper level may be older than 30.000 BP. A hiatus in the cave sedimentation and human presence occurred during the glacial maximum. Renewed human occupation is attested from about 7000 BP onwards. At least two Neolithic levels, with evidence of domesticated animals and of ceramics are present, again associated with climatic conditions wetter than those prevailing at present.[1]

Résumé

Le présent article relate la campagne 1993 de fouille à Sodmein Cave. Situé 35 km au N.-O. de Quseir, ce gisement est le premier, dans le Désert Oriental d'Egypte, à livrer une stratigraphie qui va du Paléolithique Moyen au Néolithique. La grotte est d'origine karstique. Les dépôts les plus anciens reconnus jusqu'ici remontent bien au-delà du dernier maximum glaciaire et indiquent un climat plus humide que l'actuel. Plusieurs niveaux du Paléolithique Moyen sont associés à ces dépôts les plus anciens. Le plus élevé d'entre eux pourrait avoir plus de 30.000 ans d'âge. Un hiatus dans la sédimentation de la grotte et dans l'occupation humaine intervint au cours du maximum glaciaire. Une nouvelle occupation humaine est attestée à partir de 7000 BP. Au moins deux niveaux néolithiques sont présents, contenant des restes d'animaux domestiques et de la céramique, et eux aussi sont associés à des conditions climatiques plus humides que les conditions actuelles.[1]

Introduction

Localisation of the cave and geology of the area

Sodmein cave, mentioned by Prickett (1979) as site QSR-44, is located in the Red Sea Mountains of the Egyptian Eastern Desert, at 26° 14' 27" N and 33° 58' 12" E, about 35 km to the NNW of Quseir (Fig. 1). The cliff recess in Eocene Thebes limestone dominates the west bank of wadi Sodmein, where it cuts a 3 km long gap through the Gebel Umm Hammad, a local hogback. The Thebes limestone contains several bands of ovaloid shaped chert nodules, greyish, whitish or bluish in colour. They are well cemented into the limestone and therefore difficult to be extracted. Numerous chert nodules, however, have been eroded from the limestone and form now part of the scree deposits and the wadi gravels. Many nodules are of good knapping quality.

Environment

Environmental studies in the Eastern Sahara (Wendorf *et al.*, 1984, Wendorf & Close, 1992), in the Nile Valley (Paulissen and Vermeersch, 1989; Vermeersch *et al.*, 1992) and in the Red Sea Area (Alaily, 1993) give evidence for a northward shift of the summer monsoon system

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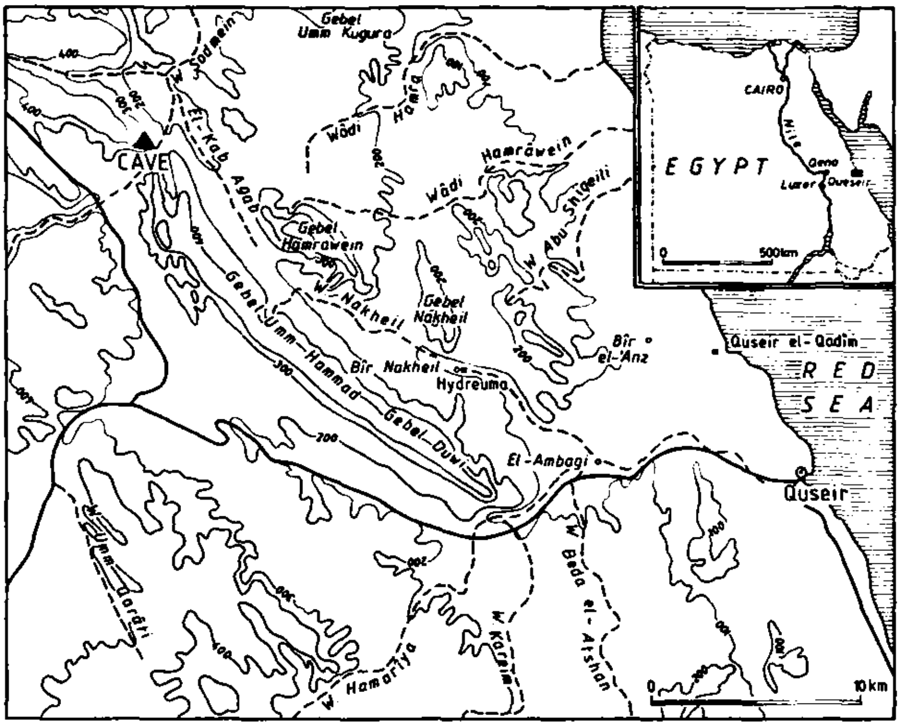

Fig. 1. Red Sea area northwest of Quseir with location of Sodmein Cave.

during the early Holocene. Apart from brief intervals of no more than a century or two, rainfall continued until about 5400 BP, when modern aridity began. Woody macrofaunal remains from the Eastern Sahara suggest that rainfall before about 8000 BP was probably < 50 mm *per annum*, and < 100 mm *per annum* even during the wettest phase after 8000 BP (Neuman, 1989).

Vegetation in the valley is now very restricted: some halophytes in the wadi bed and some very rare dispersed *Acacia* (Fig. 2). Dorcas gazelle has often been observed on the wadi floor. At Quseir an annual average rainfall of 4 mm and a mean temperature of 28°C are recorded (Griffiths, 1972). But at cold winter mornings, temperature can fall close to freezing point. Precipitation regime is very irregular too: long nearly completely dry periods are interrupted by rare high magnitude events, like the June 1934 storm with 34 mm of precipitation (Planhol and Rognon, 1970). Stream floods and mass wasting, occurring during such extreme and rare events, are the dominant landscape modelling processes. Karstic features, like dolines and hollows along joints, affect the Thebes limestone and predate the actual hyperarid climatic period.

The cave and its origin

Subvertical joints cross the Thebes limestone and point to the physical possibility for runoff water on the surface of the hogback to penetrate to the level of the cave (Fig. 3). Solutional action of this infiltration water is the probable cause for the origin of a shaft, coming from deep in the Thebes limestone with its outlet just below the roof at the upper part of the backwall (Fig. 4). The backwall of the cave is also affected by solutional undermining of the rock wall by water, infiltrating in the rock below the shaft in proximity of its former outlet.

Figure 4 shows the deposits in front of the backwall: the basal 34° scree slope is covered by an important rockfall accumulation issued from the cliff face. The corresponding backfill, issued from the interior of the cave, forms a rather flat, sandy surface of ±680 m², 15 to 21 m above the wadi floor. Backwall, backfill and the inside part of the rockfall barrier are covered by a thin veneer of loose loamy sand, containing some angular, 1 to 10 cm sized Thebes limestone fragments. This material seems to be issued from the roof and the walls of the shelter. Till deep in shaft 1, this loamy sand layer contains spherical droppings of animals.

[1] The project was a joint research by the Belgian Middle Egypt Prehistoric Project of Leuven University and the Royal Museum of Art and History, Brussels, Belgium. The expedition team included Pierre M. Vermeersch, Dr Philip Van Peer, Dr Jean Moeyersons, Mr Frans Steenhoudt, archaeologist, Royal Museum of Art and History, Brussels; Mr Cyriel Verbeek and Mr David Van Reybrouck, students at the Katholieke Universiteit Leuven and Mr Maunu Pekka Karvonen, student, University of Finland. The expedition owes a great deal of gratitude to the chief inspector, Mr Rabiah. In the field the team received the competent assistance of Mr Ahmed Gaber, inspector at Dandara. The 1993 campaign has been made possible by grants of the Belgian National Fund and the «Onderzoeksfonds K.U. Leuven». This text presents research results of the Belgian programme on Inter-university Poles of Attraction nr 28, initiated by the Belgian State, Prime Minister's Office, Science Policy Programming. The scientific responsibility is assumed by its authors.

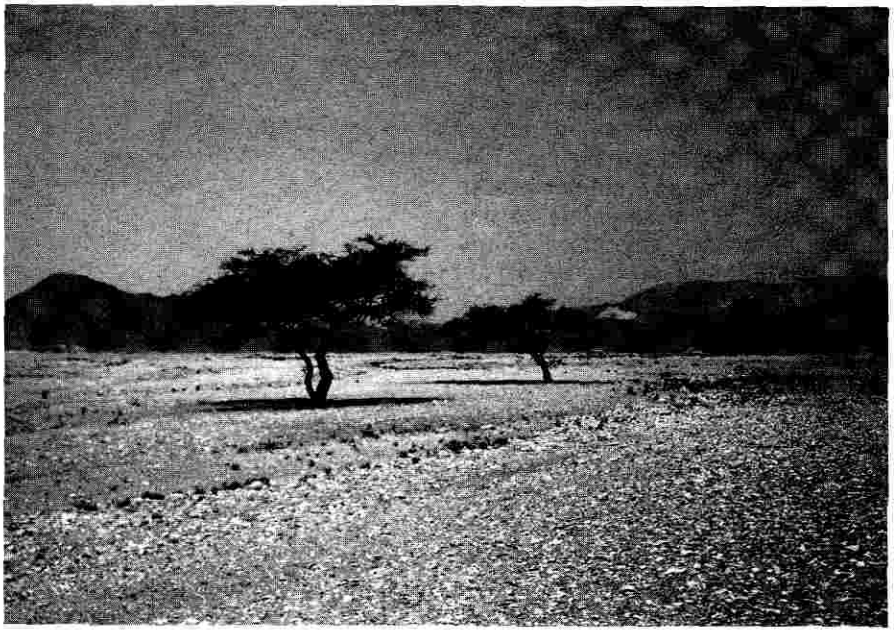

Fig. 2. View of Wadi Nakheil, near the cave.

Fig. 3. View on Sodmein Cave entrance.

Cave deposits

The deeper deposits have been studied in three trenches, exposing rockfall wall and backfill deposits: from south to north, the trenches are named A, B and C. About 77 m^2 have been excavated until a depth of maximum 2,5 m. Lower, excavations became difficult because of the presence of huge limestone blocks.

The basal deposits

The basal talus slope deposits plunge in the direction of the cave entrance at a slope angle of about 34°. The rockfall is reworked by processes which require the presence of some water upon or in the soil. This might be significant for an environment, which, today, is one of the driest in the world. The interbedded parts of an intact grass mat, the humic content and the absence of animal droppings indicate a not completely dry cave environment at that time.

The rockfall wall

The talus slope is discomfortably overlain by a rockfall wall (Fig. 4), below the cliff, and its backfill, inside the shelter. The rockfall contains essentially clast supported angular Thebes limestone and relatively abundant chertstone fragments. The debris vary in size from 1 to 25 cm, but contain also boulders of the size of several meters. The subhorizontal interfingering of rock debris lobes with the backfill layers points to the episodic character of rockfall and backfill accumulation. An episodic high water content in the fine matrix of the rockfall wall seems probable. Evaporation of this water led to the origin of discontinuous caliches.

The backfill behind the rockfall wall

The backfill is composed of a series of centimeter to decimeter thick strata, resting partly discomfortably upon the basal talus slope. In sector A, the backfill is at least 2 m thick. The remarkable preservation throughout the whole sequence of organic material, mostly animal droppings, points to quasi permanent dry conditions inside the cave, without much microbial and microfaunal attack or fermentation. However, the emplacement of the lower layers of the backfill can only be explained in a satisfactory way by at least the temporal presence of water. The apparent contradiction between wet transport processes and a long lasting dry cave environment could be explained in considering the lower layers as the result of a few individual and very exceptional events in an otherwise dry cave.

Remains of a wide faunal spectrum have been found in the older backfill. Dorcas gazelle, ibex and barbary sheep were common. The latter two species are associated with rocky dry mountains. Rock dassie and rock dove are two other well represented species confined to rocky habitats. All these species can survive in relatively harsh conditions. But Sodmein Cave has yielded some faunal elements which, today, have a far more southerly distribution. This is the case for the wild ass, Soemmering's gazelle, greater kudu, vervet monkey, hunting dog, serval (or caracal?) and leopard. Furthermore, hearths very often contained large charcoal fragments, difficult to collect at present. Therefore, it can be presumed that the climatic conditions and the environmental vegetation was somewhat better and richer than in present time.

An important part of the fauna is of non-anthropogenic origin. Remains of bats that lived in the cave during man's absence were found, as well as owl pellets. These pellets, and the small rodent bones that they contained, have been deposited by raptory birds that roosted near the cave's entrance. Living small rodents also visited the cave and left fine gnaw marks on bones lying at the surface. Fossilised, whitish droppings indicate that large and medium-sized carnivores also occasionally entered the cave. The leopard, of which also a bone element was identified, is known to regularly rest in caves. Remains of rock dove and, especially, rock dassie are well represented. Since both species are confined to rocky environments their remains may partially represent individuals which died naturally. It is likely, however, that rock dove and rock dassie were also eaten by man or by carnivores. Unfortunately, the high degree of fragmentation of the bones does not allow the traces to be studied in detail in order to help elucidate the taphonomic history. Similarly, the identified bovids do not necessarily represent exclusively human consumption refuse. This is especially so for ibex and barbary sheep which inhabit rocky areas and regularly enter caves. Remains of sick or wounded animals that died naturally in Sodmein Cave may have been deposited along with human or carnivore consumption refuse.

The younger backfill deposits rest discomfortably upon the older backfill. The individual layers can be easily distinguished on the base of the abundance of organic material. Some of them have essentially a pure mineralogical content. Other backfill layers contain an admixture of organic material. Some of those layers are nearly pure organic. As a general rule the more organic layers comprise more loamy sand while the coarser rock fragments are more weathered than their counterparts in the pure mineralogical layers.

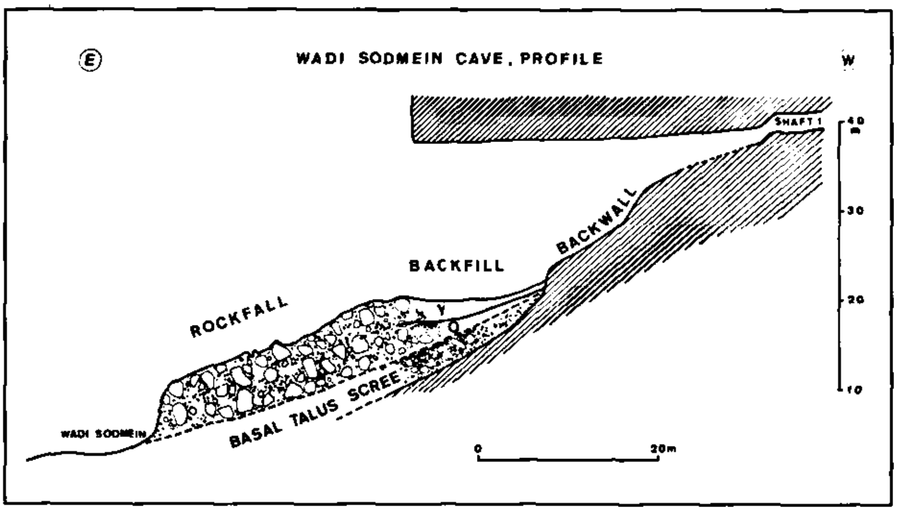

Fig. 4. Cross section through the cave, Y being the younger backfill and O the older backfill.

The amazing loose packing, the irregular thickness, the presence of interbedded lenses and pockets and the absence of fluidal structures and caliches rather invoke dry depositional processes as dry creep, gravitational grain flow, rockfall and eventually the mechanical action of passing man and animals. Local aeolian reworking of fines, evidenced experimentally, might explain the laminated structure of the finer, more organic beds. This is confirmed by the presence, especially in the more anorganic layers, of a few, allochtoneous, rounded transparent quartz grains.

The faunal remains from the younger deposits comprise mainly ovicaprines, but also dorcas gazelle and rock dassie which suggests only slightly better climatic conditions than today. Dorcas gazelle lives in the area, whereas the rock dassie has become locally extinct this century in large parts of the Eastern Desert as a result of extensive cutting of acacia trees for making charcoal. One bone element has been labeled as «goat» and several other as «goat or sheep».

Prehistoric remains

Sector A

The upper part of the younger backfill deposits mainly consists of an important dung accumulation, especially from sheep and goat. Archaeological materials such as cherts, sherds or bones are very rare, but at least twelve hearths were found on different depths in the accumulation. This suggests repeated short visits by men and herds. The top of this accumulation has been dated by ^{14}C on charcoal at 6360 ± 90 (Lv-2085). On a lower layer, an important artifact concentration extended over a surface of about 4 m^2. At least three of the four hearths, attributed to this occupation horizon were *in situ*. A ^{14}C-date on charcoal from one of the hearths gave a date of 6320 ± 100 (Lv-2082). This confirms the idea that the upper part of the younger backfill deposits accumulated within a very short time. Some two thousand lithic artifacts were collected from that horizon (Fig. 6). Only local chert has been used. Blades and microblades are rare. The rare tools are best represented by retouched and notched flakes and some endscrapers of poor quality. Interesting is the series of arrowheads. Three of them display a somewhat asymmetric foliate form. Two of them have a fully retouched dorsal surface and an inverse surface which presents only a marginal retouch. Another one is similar in the technical approach, but it is a tanged arrowhead. The tang is rather large and not much individualized. Special attention should be given to the presence of a foliate and a fragment of a bifacial larger tool. All other tools are of poor quality and can be considered as untypical.

In the lower layers of the younger backfill deposits, remains are related to several distinct occupations. Three hearths could be located. One of them provided a ^{14}C-date on charcoal of 6940 ± 100 (Lv-2083). Human occupation of this age in the cave has been confirmed by another

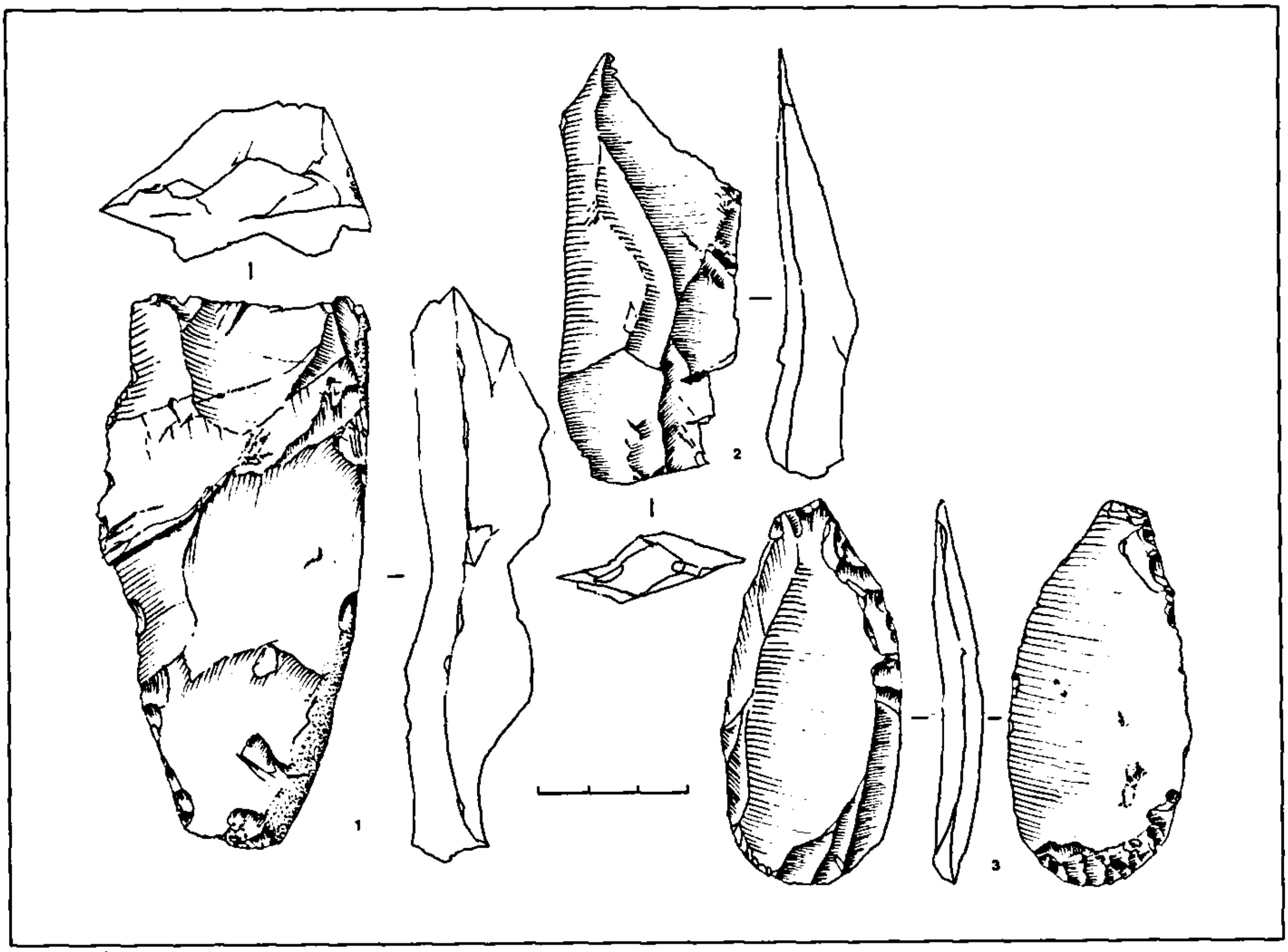

Fig. 5. Sodmein Cave: Middle Palaeolithic artifacts.

^{14}C-date on charcoal from a similar deposit in sector C: 7090 ± 80 (Lv-2086).

The top of the older backfill deposits contains an important charcoal scatter and related hearth with a large horizontal extent. Artifacts displayed an important vertical scatter. Two ^{14}C dates on charcoal give an age of 29,950 ± 900 (GrN-16782) and > = 30,000 (Lv-2084). This assemblage is clearly much more oriented towards blade production than assemblages, higher in the stratigraphy. Some good blades are present. Levallois technology is attested. A Nubian pointed flake is present. A single Levallois flake presents a very rudimentary proximal inverse retouch and presents some ressemblance with an Emireh point.

Sector B

As compared to sector A, relatively few archaeological remains occur throughout the younger rockfall and backfill layers. The uppermost layer of the older backfill comprises a rather dense scatter of artifacts around a destroyed fireplace. Blades are rather numerous. Levallois elements are rare but present. The majority of the cores have one striking platform, and apparently produced blades or laminar flakes. The small tool kit comprises some denticulates, a burin and several burin spalls, and the 3 Levallois endproducts which are retouched. One of the latter has been transformed into a classic Emireh point (Fig. 5, 3). The two others are less characteristic but may belong to the same type.

The lower part of the older backfill contains two small artifact clusters (Fig. 5, 1 and 2) around fireplaces. In terms of raw material, it seems likely that the two fireplaces were in use at the same moment. Important is the presence of a truncated-facetted piece. Such tool type does occur in Nile Valley N-group assemblages (Van Peer and Vermeersch, 1991). Its presence here may constitute one element to tie this level into the Nile

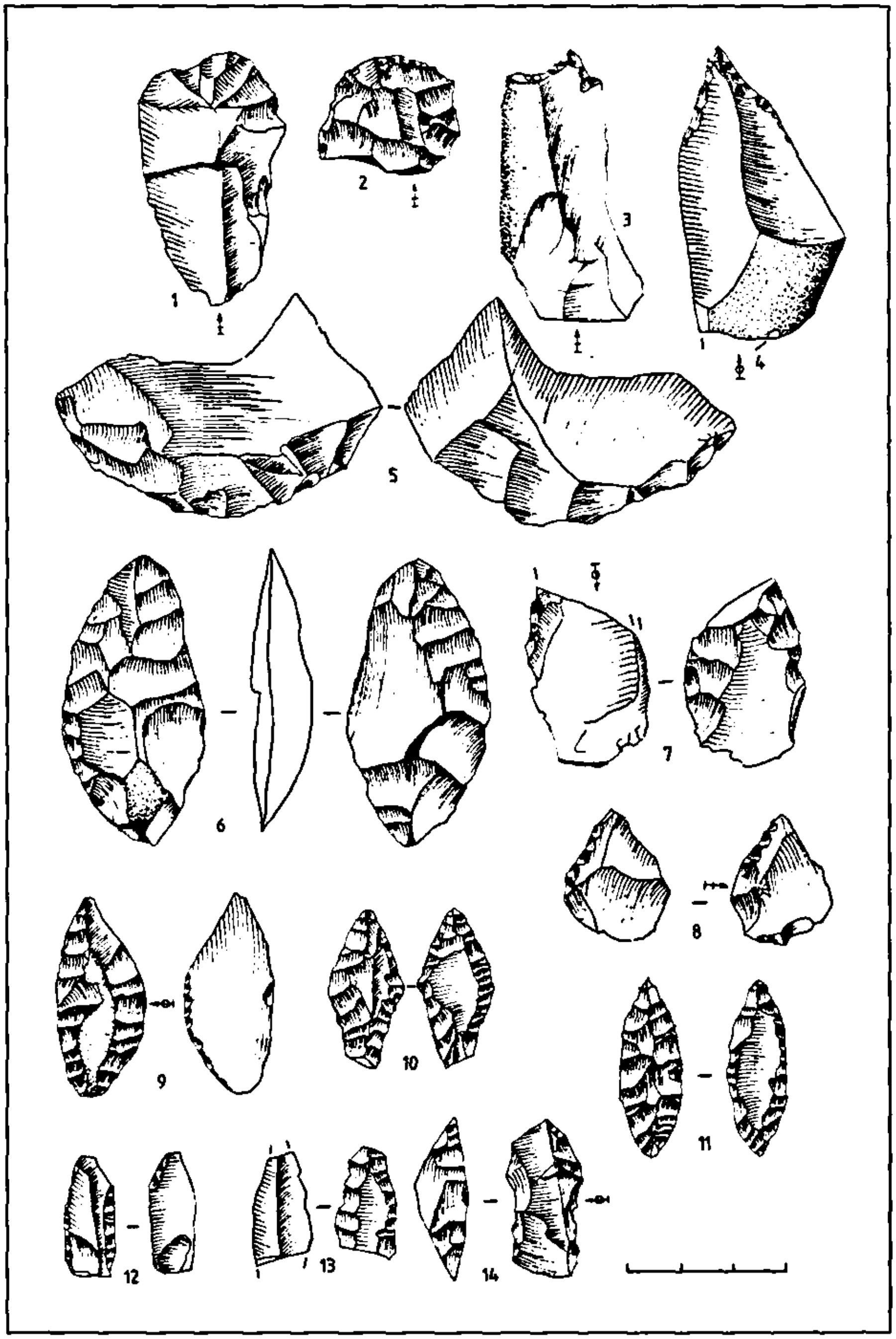

Fig. 6. Sodmein Cave: Neolithic artifacts.

Valley sequence. Charcoal from a large fireplace, situated in the western part of layer G, was dated to > = 44,500 BP (Lv-2087).

Conclusions

The origin of Sodmein cave is related to the solutional and mechanical widening of the outlet of a karst gallery in the Thebes limestone cliff. The age of the gallery and other palaeo-karst features in the area is unknown. During a later stage of cave development, rockfall from the cliff in front of the cave formed a physical barrier for the evacuation of material, issued from the ceilings of the cave. Rockfall and backfill contain Middle Palaeolithic and Neolithic archaeological remains. Upper (35,000 to 20,000 years ago) and Late Palaeolithic (20,000 to 12,000 years ago) occupation remains, abundant in the Nile Valley, have not been recorded in the cave. This absence corresponds with the sedimentological hiatus between older and younger rockfall and backfill, dating from the last glacial maximum. During that period the climate was more arid than today, probably too dry for people to travel in the desert.

Middle Palaeolithic

Middle Palaeolithic occupation is related to the older series of rockfall and backfill deposits resulting from processes as debris flows and solifluction, exceptional events in an otherwise dry cave. The faunal elements they contain, actually live far more to the south. This points to an outside environment, somewhat wetter than the contemporaneous one.

The oldest occupation, thus far recorded, occurs in the lower layer of the older backfill. In culture-historical terms, it appears to be related to the N-group industry, known in the Middle Palaeolithic of the Nile Valley (Van Peer and Vermeersch, 1990).

The next *in situ* remains are those from the top of the older backfill deposits. Technologically, this assemblage is characterized by an emphasis on blade-type reductions, but with a Levallois component. Among the tools are denticulates, burins and Emireh points. The latter have never been recorded in the Nile Valley Middle Palaeolithic and rather point to southwest Asia. Denticulates and burins, on the other hand, are well represented tool types in all Nile Valley Middle Palaeolithic assemblages. However, high blade indices as here are not noticed in the Nile valley until the Upper Palaeolithic of which Nazlet Khater 4 (Vermeersch *et al.*, 1990) is the earliest representation. Divergence in blade frequencies may be entirely related to the nature of the settlements involved. In the Nile Valley, most of the Middle Palaeolithic sites are primarily raw material processing sites. Here, on the contrary, we are dealing with very short-term occupations, during which a range of activities took place around fireplaces. Reduction preparation may, in the former sites, obscure the blade frequency. Nevertheless, it is clear that in the Nile Valley, blade reduction strategies including adaptations of the Levallois strategy, gain importance toward the end of the Middle Palaeolithic.

Previous data from the Middle Palaeolithic in Egypt did not reveal clear cultural links between Nile Valley and southwest Asia. This state of available evidence seemed in conflict with the current 'Out of Africa' theory, considering the Nile valley as the probable passageway through Egypt for anatomically modern *Homo sapiens*. Other data on the Middle Palaeolithic (Gawaracki and Perry, 1992; Montenat, 1986) presence along the Red Sea coast are rare. No detailed artifact description has been published. The Middle Palaeolithic data from Sodmein Cave suggest that the Red Sea Coast eventually served as an alternative passageway from East Africa to Southwest Asia. Already now, the completely new data open up archaeological debates on the contacts between Wadi Sodmein groups and those of the Nile Valley and, perhaps, inhabitants of the western coast of Saudi Arabia.

Prehistoric man very often visited and revisited the cave site. However, from the extent of the occupation debris, we may deduce that his stay at the cave was of very short duration, even only for overnight. The cave was probably a halt place for people that, for some unknown reason, had to travel along the Red Sea coast. The results of the faunal analysis do not contradict this hypothesis as an important part of the fauna is of non-anthropogenic origin.

Neolithic

The cave remained deserted and sedimentation rate only increased again in Holocene wet periods when Neolithic sedimentation of mainly organic origin started to accumulate. The accumulation of the mineral component of the younger backfill deposits is due to aeolian reworking, dry creep and rock- and dustfall. The faunal remains suggest only slightly better climatic conditions than today. However, surviving possibilities for trees were better, as attested by wood fragments of thick branches, found in the hearths.

The artifact concentration from the younger backfill deposits is characterized by flake production. Tools are opportunistic but some arrowheads are present. These can be compared with arrowheads which have been described by Caton-Thompson (1952) at Umm-ed-Dabadid Silt Basin, Kharga Oasis, for the Bedouin Microlithic and by M. McDonald

(1991) for some of the aceramic and ceramic neolithic Dakhla sites. Similar arrowheads are associated with the Badarian. Those industries are dated about 6500-5500 BP, fitting well with the later dates from our Neolithic occupation.

The first human visits are immediately accompanied by huge amounts of goat dung, suggesting multiple visits by large herds of these animals. Among the poorly preserved skeletal remains of domestic ovicaprines, one specimen could be positively identified as goat. The others have to be labelled as «goat or sheep» due to the absence of diagnostic characters. According to A. Muzzolini (1990) ovicaprines could have been indigenous in Africa, whereas A. Gautier (1990) states that there is no evidence whatever that wild sheep or goats were even present in north Africa. Sheep and goat being absent in the lower Sodmein cave levels, they are probably not indigenous in this part of Africa. If so, they were introduced as domestic animals and herded by men. As far as we understand the faunal component in relation to stratigraphy and ^{14}C dates, we have to accept that domesticated ovicaprines were already present just after 7000 BP.

A. Muzzolini (1990) contends that the only definite dates for the first domesticated African sheep are after 6000 BP, whereas A. Gautier (1990) is waiting upon new archaeozoological and chronometric analyses, especially on bones from E-75-8, Nabta in the Western Desert. There, ovicaprines, if the recovered bones are not intrusive, occur in Middle Neolithic context, by 6700 BP or somewhat earlier (Gautier, 1980: 93). According to M. McDonald (1991), Neolithic people from phase B in the Dakhlah Oasis, starting about 6500 BP, relied heavily on their flocks and herds, while still doing some hunting. Bones from site 271 consist almost entirely of the bones of cattle and goat, both probably domesticated.

Such an early presence of domesticated goat in both western and eastern desert is astonishing when compared to the age of their presence in the Nile valley. Indeed the oldest certified presence of sheep and goat in the Nile valley at the same latitude is not older than 6300 BP (Hassan, 1988). It has been argued (Vermeersch, 1984) that, at about 8000 BP, the Paleolithic way of subsistence was still practiced at Elkab, along the Nile in southern Egypt. We have, moreover, no indication that herding or agriculture was introduced in southern Egypt soon after 8000 BP. For that we lack sites of the period concerned. All available information suggest that gathering and hunting remained the main subsistence strategy until about 6300 BP.

Taking into account these data, we can presume, in addition to an introduction from the western desert, another way of introducing ovicaprine herding into the southern Nile valley. Not only, the western desert provided an impetus, but now one has also to take in account a possible introduction from the eastern desert. A relation with the Levant is of course obvious for this penetration corridor.

Bibliography

ALAILY F., 1993. Soil development and climatic changes during Quaternary in the north eastern part of the Red Sea Hills (Sudan). *In*: Thorweihe and Schandelmeier (eds), *Geoscientific Research in Northeast Africa*. Rotterdam: Balkema, p. 581-584.

BOMANN A., 1994. Discoveries in the Eastern Desert. *Egyptian Archaeology*, 4: 29-30.

CATON-THOMPSON G., 1952. *Kharga Oasis in Prehistory*, London.

GAWARACKI S.L. AND S.K. PERRY, 1992. Late Pleistocene Human Occupation of the Suez Rift, Egypt: A Key to Landform Development and Climatic Regime. *In*: B. Adams and R. Friedman (eds), *The Followers of Horus*. Oxford: Oxbow Monograph, 20: 139-146.

GRIFFITHS J.F., 1972. Climates of Africa. *In*: H.E. Landsberg: World Survey of Climatology, 10, Elsevier.

HASSAN F.A., 1988. Desert Environment and Origins of Agriculture in Egypt. *In*: T. Hägg (ed.), *Nubian Culture Past and Present*. Stockholm: Almqvist & Wiksell International, p. 17-32.

MCDONALD M.M.A., 1991. Origins of the Neolithic in the Nile Valley as seen from Dakhleh Oasis in the Egyptian Western Desert. *Sahara*, 4: 41-52.

MONTENAT C., 1986. Un aperçu des Industries Préhistoriques du Golfe de Suez et du Littoral Egyptien de la Mer Rouge. *BIFAO*, 86: 239-55.

MUZZOLINI A., 1990. The Sheep in Saharan Rock Art. *Rock Art Research*, 7: 93-109.

NEUMANN K., 1989. Vegetationsgeschichte der Ostsahara im Holozän: Holzkohlen aus prähistorischen Fundstellen. *In*: R. Kuper (ed.), *Forschungen zur Umweltgeschichte der Ostsahara*. Köln: Heinrich-Barth-Institut, Africa Praehistorica, 2: 13-181.

PAULISSEN E. ET P.M. VERMEERSCH, 1989. Le comportement des grands fleuves allogènes: l'exemple du Nil saharien au Quaternaire Supérieur. *Bull. soc. géol. de France*, 8, V: 73-83.

PLANHOL X. ET P. ROGNON, 1970. *Les zones tropicales arides et subtropicales*. Paris: A. Colin, 487 p.

PRICKETT M., 1979. Quseir regional survey. *In*: D.S. Whitcomb and J.H.

Johnson, *Quseir Al-Qadim 1978 Preliminary Report*. Cairo American Research Center in Egypt, 257-349.
VAN PEER P., P.M. VERMEERSCH, 1990. Middle to Upper Palaeolithic Transition: the evidence for the Nile Valley. *In*: P. Mellars (ed.), *The Emergence of Modern Humans - An Archaeological Perspective*, Edinburgh University Press, p. 139-159.
VERMEERSCH P.M., 1984. Subsistence activities on the Late Palaeolithic sites of Elkab (Upper Egypt). *In*: L. Krzyzaniak and M. Kobusiewickz (eds). *Origin and early development of food producing cultures in north eastern Africa*. Poznan: Polish Academy of Sciences, p. 137-142.
VERMEERSCH P.M., E. PAULISSEN, D. HUYGE, P. VAN PEER, 1992. Some Predynastic Hearths in Upper Egypt. *In*: B. Adams and R. Friedman (eds), *The Followers of Horus*. Oxford: Oxbow Monograph, 20: 163-174.
VERMEERSCH P.M., E. PAULISSEN, P. VAN PEER, 1990. Le Paléolithique de la vallée du Nil égyptien. *L'Anthropologie*, 94: 435-458.
WENDORF F., R. SCHILD (ASSEMBS) AND A.E. CLOSE (ED.), 1984. *Cattle-Keepers of the Eastern Sahara: the Neolithic of Bir Kiseiba*. Dallas: Southern Methodist University.
WENDORF F. AND A.E. CLOSE, 1992. Early Neolithic Food-Economies in the Eastern Sahara. *In*: B. Adams and R. Friedman (eds), *The Followers of Horus*. Oxford: Oxbow Monograph, 20: 155-162.