ENVIRONMENTAL CHANGE AND HUMAN CULTURE
IN THE NILE BASIN AND NORTHERN AFRICA
UNTIL THE SECOND MILLENNIUM B.C.
Poznań 1993
PL ISSN 0866-9244 ISBN 83-900434-1-6

BALDUR GABRIEL, BERND VOIGT and
MUMIN MOHAMUD GHOD

Quaternary ecology in Northern Somalia: a preliminary field report

Introduction

The preliminary results here are based on two journeys to Northern Somalia in December 1987 and in March/April 1988 mainly to the Darror Valley and to the area of Bosasso. As a part of the Special Research Unit 69 at the Technical University of Berlin, sponsored by the German Research Foundation (DFG), they were performed to find out whether climate and landscape in Northern Somalia had changed during the Quaternary in a significant way and if so to what extent these changes had affected the country and at what time this had happened. The aim was to establish a chronological time table of Quaternary events and to compare it with the changes in the Saharan desert belt to the north or with Central and Eastern Africa.

Palaeoecological knowledge can be deduced from different kind of sources; reliable statements are expected not from a single type of argument but only from a whole interdisciplinary spectrum of available hints and as many indications and observations as possible have to be collected to contribute altogether to a true and veritable picture of the past. Nevertheless, because of limited time in the field and limited scientific specialists, there was a restriction to selected types of investigations.

Soil investigations

More than 50 soil sections were described and sampled in the field by K. Stahr, F. Alaily and B. Lassonczyk. Some of them, especially hydromorphic soils, were embedded within Quaternary sediments. Vertisols occurred here and there, but orthic solonchacs predominated on most surfaces. Detailed analyses in the laboratories shall provide an overview over climatic induced weathering types and soil forming processes during different times in the past.

Prehistoric archaeology

Prehistoric man left numerous relics, which show various periods of fairly good living conditions in that area. Lower Stone Age remains are rare, restricted to single handaxes of dubious origin (Fig. 1), but a Middle Stone Age complex is rather well represented. Stone artefacts of this type cover slopes and terraces or

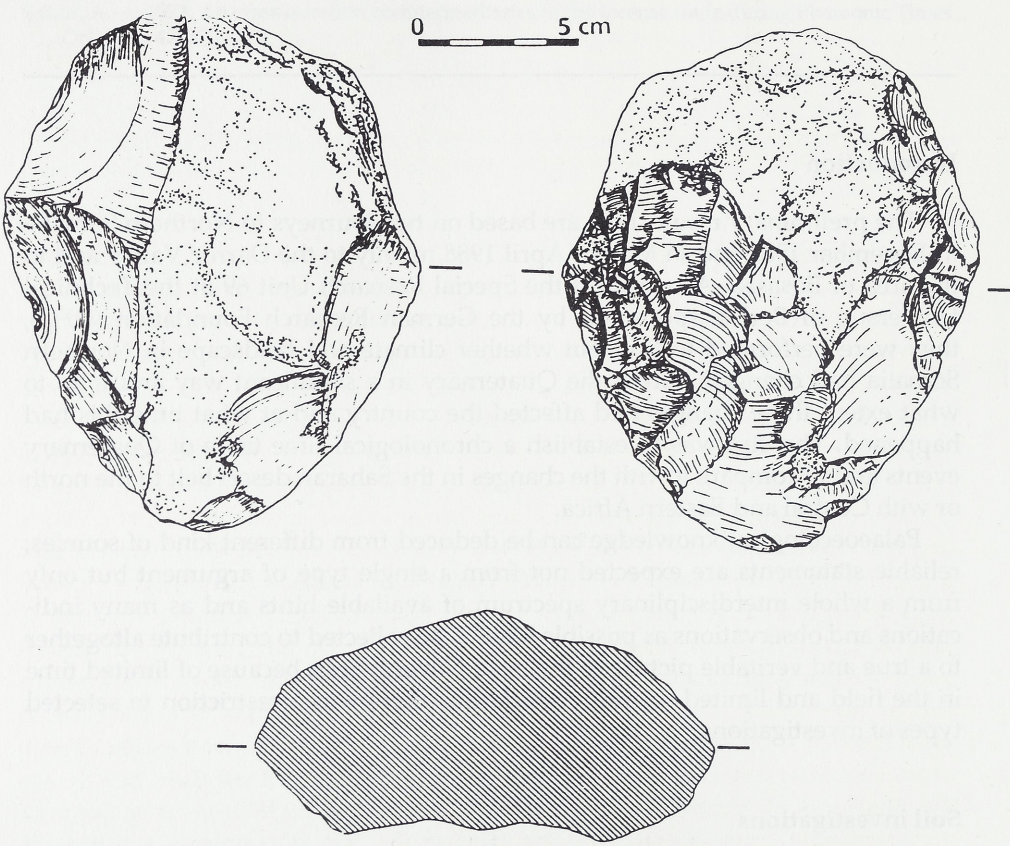

Fig. 1. Handaxe made of chert, found near the spring travertine of Lac, 20 km west of Karin, Bosasso area.

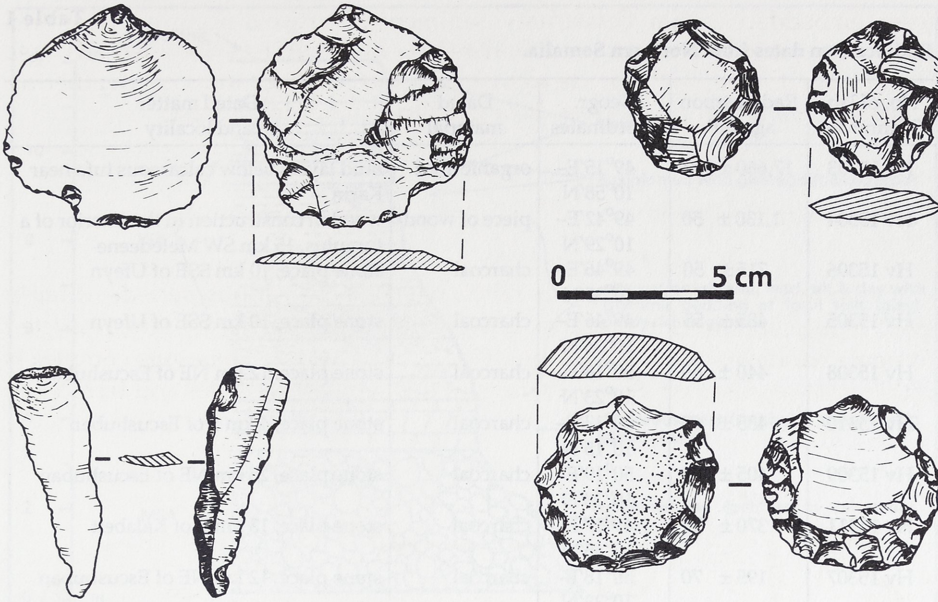

Fig. 2. Upper Palaeolithic artefacts made of chert, from the surface of the spring travertine of Lac, 20 km west of Karin, Bosasso area.

are even embedded in the base levels of fluvial deposits. In the middle and upper layers of several sections artefacts of Late Stone Age type are to be found (Fig. 2) and on the top of them Neolithic habitation sites with few ceramic sherds and ancient fireplaces; the latter, the so-called "stone places" (Gabriel 1987) occur still in modern times. The late Preislamic period is documented especially by large graveyards with dozens, sometimes hundreds of tombs of different types. They are called "Galla graves" (Lewis 1961, *cf.* Jönsson 1983), but in reality their ethnic origin and their age are unknown. A wooden piece of the inner construction of a destroyed tomb near Meledeene in the Darror Valley had the radiocarbon age of 1,130 ± 50 B.P. (Hv 15303, see Table 1). It seems that the graveyards represent a 1st millennium A.D. to medieval period of dense population with a sedentary way of life and better living conditions than today. Special architectural elements, like stone pavements and alignments with orientation east or south-east (Gabriel 1970; 1993), may indicate cultural relations to similar phenomena in the Sahara from where the immigration may have taken place (Brandt and Carder 1987; Clark 1980). The "stone places" on the other hand, cannot be interpreted in the same way as in the Sahara where they mostly are the fireplaces of Neolithic cattle herders (Gabriel 1977; 1987). Here in Somalia they originate from nomadic people during the last millennium. A series of charcoal data from the Darror Valley ranged between 715 ± 50 B.P. (Hv 15306) and recent times (Table 1).

Table 1

Radiocarbon dates from Northern Somalia.

No. of lab. (Hannover)	Radiocarbon age B.P.	Geogr. coordinates	Dated material	Dated matter and locality
Hv 15303	17,660 ± 300	49°15′E–10°58′N	organic mud	mud layers below calcareous tufa near Karin
Hv 15304	1,130 ± 50	49°42′E–10°29′N	piece of wood	wooden construction in the interior of a tumulus, 15 km SW Meledeene
Hv 15306	715 ± 50	49°46′E–10°35′N	charcoal	stone place, 10 km SSE of Ufeyn
Hv 15305	485 ± 55	49°46′E–10°35′N	charcoal	stone place, 10 km SSE of Ufeyn
Hv 15308	440 ± 60	50°18′E–10°23′N	charcoal	stone place, 12 km NE of Escushuban
Hv 15310	435 ± 60	50°13′E–10°15′N	charcoal	stone place, 4 km S of Escushuban
Hv 15309	405 ± 55	50°19′E–10°28′N	charcoal	stone place, 25 km NE of Escushuban
Hv 15311	370 ± 50	49°17′E–10°45′N	charcoal	stone place, 13 km E of Kalabeit
Hv 15307	195 ± 70	50°18′E–10°23′N	charcoal	stone place, 12 km NE of Escushuban
Hv 15312	110 ± 60	50°11′E–10°07′N	charcoal	fireplace besides a tomb, 10 km S of Escushuban
Hv 15313	(75 ± 55)	49°43′E–10°27′N	charcoal	stone place, 20 km S of Meledeene

Fluvial terraces

A sequence of at least three, sometimes four different fluvial terraces exists in many of the wadis (Clark 1954; Mussi 1975). They seem to indicate a changing climatic regime of erosion and accumulation, but they are difficult to date as they mostly consist of pebbles or gravel and sand and do not yield much palaeoecological information. Therefore it was more valuable to look for fossil bearing accumulations of fine material which had possibilities for dating by archaeological, radiocarbon and other isotopic methods; such deposits occur in several parts of the survey area.

The Karin Formation

Near Karin, some 40 km south of Bosasso, over more than 10 square kilometers the valley floor is covered by a sequence of Middle and Late Quaternary sediments (Fig. 3). They are well exposed in numerous sections and have a thickness of about 10 to 12 m. Pebbles at their base are consolidated by a calcareous matrix. This conglomerate is overlain sometimes by travertine, sometimes by calcareous crusts. Alternating sands, silts, marls, hydromorphic soils, sometimes rich in gypsum, follow in the middle part of the sections. The se-

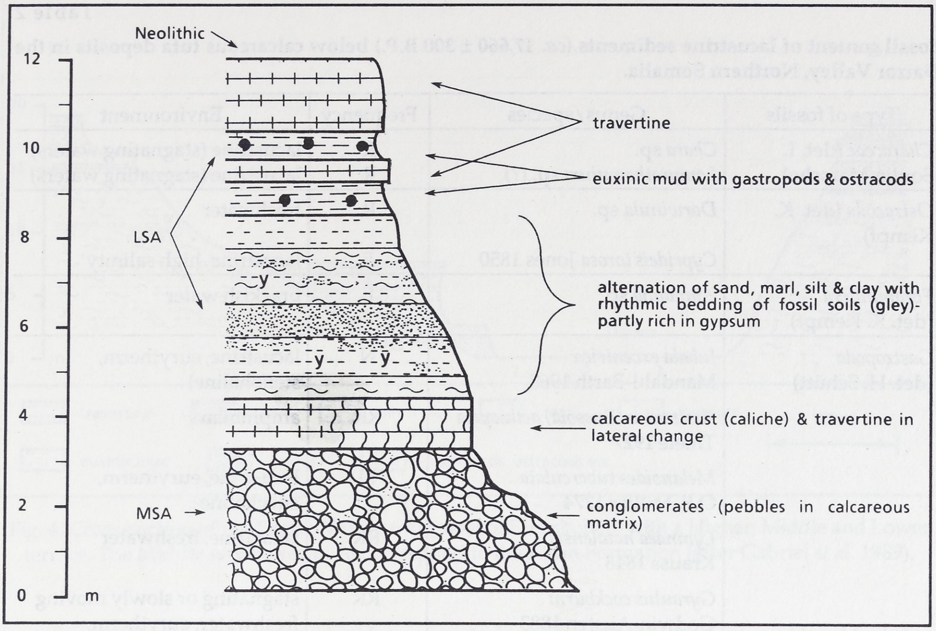

Fig. 3. Standard section of the Karin Formation. The euxinic mud layers at the base of the top travertine yielded a radiocarbon date of 17,660 ± 300 B.P. (after Gabriel *et al.* 1989).

quence continues normally with euxinic mud deposits, which are intercalated with thin layers of travertine. On top the sections are sealed by tufa or travertine which can reach a thickness of 4 m.

Usually the dark mud horizons are rich in organic matter. Apart from microfossils like ostracodes, foraminifera and charophytic remains they contain at least 7 different species of snails (Table 2). They indicate a lacustrine environment most likely with freshwater; the salt content may have changed laterally or vertically in the sequences. After the desiccation of the lakes or of parts of them, small snails (*Ceciliodes munzingeri* det. H. Schütt) intruded into the swampy soils and lived from organic matter in the subsoil up to a depth of 2 m. From some artefacts in several sections a Mid-Pleistocene age for the conglomerates at the base and an End-Pleistocene to Early Holocene age for the upper layers was estimated. On the surfaces of the accumulations Late Palaeolithic tools and potsherds of presumed Neolithic date marked the end of the sedimentation. The first radiocarbon date of one of the fossil bearing mud horizons 3.80 m below the top travertine had an age of 17,660 ± 300 B.P. (Hv 15303). This is astonishing when compared to previous results all over Central and Eastern Africa. Nearly all authors presume a cool and dry climate for that time until the beginning of the Early Holocene wet period at about 12,000 B.P. (Bonnefille and Hamilton 1986; Brook 1986; Flohn and Nicholson 1980; Gasse 1980; Gasse *et al.* 1980; Hurni 1981; Messerli and Frei 1985; Rognon 1976; van Zinderen Bakker 1982; Williams 1985).

Table 2

Fossil content of lacustrine sediments (*ca.* 17,660 ± 300 B.P.) below calcareous tufa deposits in the Darror Valley, Northern Somalia.

Type of fossils	Genus/species	Frequency	Environment
Characeae (det. I. Soulié-Märsche)	*Chara* sp. *Lamprothamnium* sp. (?)	R R	lacustrine (stagnating waters) lacustrine (stagnating waters)
Ostracoda (det. K. Kempf)	*Darwinula* sp.	R	freshwater
	Cyprideis torosa Jones 1850	F	lacustrine, high salinity
Foraminifera (det. K. Kempf)	*Ammonia* sp.	F	brackish water
Gastropoda (det. H. Schütt)	*Jubaia excentrica* Mandahl-Barth 1968	N	lacustrine, eurytherm, stenohaline)
	Assiminea (Eussoia) aethiopica Thiele 1927	RR	amphibian
	Melanoides tuberculata O.F. Müller 1774	N	lacustrine, eurytherm, euryhaline
	Lymnaea natalensis Krauss 1848	RR	lacustrine, freshwater
	Gyraulus cockburni Godwin-Austen 1883	RR	stagnating or slowly moving freshwater, eurytherm,
	Biomphalaria pfeifferi Krauss 1848	F	lacustrine, freshwater
	Ceciliodes munzingeri Jickeli 1873	RR	subterraneous (in humid soils)

R - rare; RR - repeated; F - frequent; N - numerous.

Similar deposits near Escushuban and Elayo

Very similar sequences are exposed south of Elayo, here and there intercalated with marine strata which include oysters; on a large scale they occur in the Darror Valley some 6 km west of Escushuban (Fig. 4). Here conglomerates at the base, dark mud horizons with snails of the same species as at Karin, and thick travertine deposits on the top, some layers with artefacts, show that this type of accumulation was not a local exception but was obviously linked with a certain climatic period; in some other regions (*e.g.* 23 km south of Las Daoué) at the same period, the content of organic matter, clay and calcium carbonate or other evaporites is much less.

Older travertine covers

West of the Escushuban as well as near Karin it is obvious that there exist much older but undated travertine layers. They occur as widespread, horizontal, deeply dissected covers on the top of red soils and fluvial deposits. We must wait for Uranium/Thorium determinations such as those which Brook (1986)

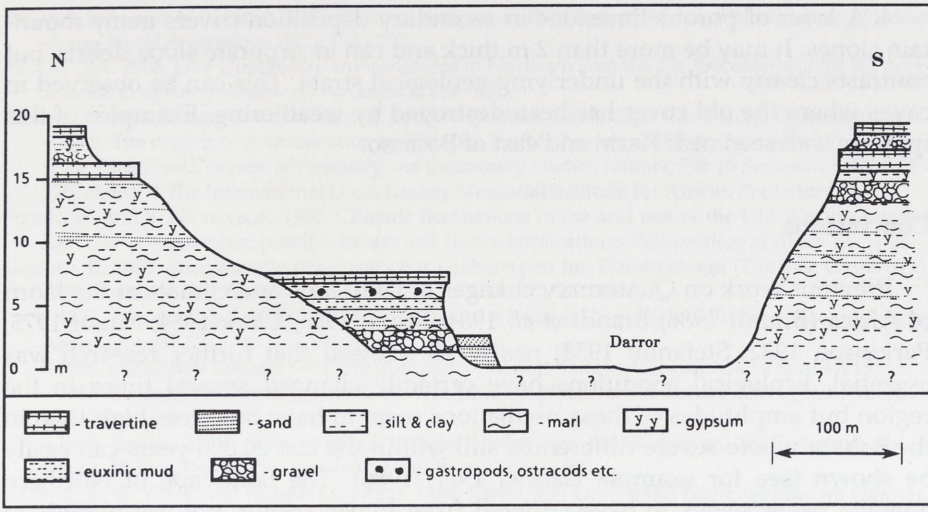

Fig. 4. Cross-section of the Darror Valley, 6 km west of Escushuban, with a Higher, Middle and Lower terrace. The Middle terrace seems to correspond to the Karin Formation (after Gabriel *et al.* 1989).

got from cave speleothems and spring tufa in Northern Somalia. The 16 dates ranged between 5,000 and 260,400 B.P. with distinct clusters around 255,000 B.P., 175,000 B.P., 80,000 B.P. and the Early Holocene. Surely there have been several periods of increased travertine formation in that area, and elevated outcrops near Karin and Escushuban may easily be of Early Pleistocene or Pre-Pleistocene age.

Other types of tufa and travertine formation

Besides the already mentioned horizontal sheets – the genesis of which is still to be explained – there exist at least four other types of calcareous deposits during the Quaternary:

1. One is linked to former springs, coming out of mountain slopes and leaving huge masses of spring travertine with snail shells and casts of plants and leaves. Examples of this type are found near Karin or near the small village Lac, 20 km west of Karin. The deposits there are about 30 m high and 100 to 300 m long;

2. Another type is a result of sinter dams developing across running water channels by precipiting calcium carbonate. Small lakes accumulated behind those barriers and with overflows the deposits grew higher and higher. Impressive examples of this type are to be seen in the valleys of Ufeyn, where one of the nearly vertical travertine walls has a height of about 40 m;

3. Cave speleothems are mentioned by Brandt and Brook (1984) and by Brook (1986) from the western part of Northern Somalia. In the area of Bosasso and in the Darror Valley they seem to be not very well represented;

4. A layer of porous limestone in secondary deposition covers many mountain slopes. It may be more than 2 m thick and can incorporate slope debris, but contrasts clearly with the underlying geological strata. This can be observed in caves where the old cover has been destroyed by weathering. Examples of this type are well seen near Karin and east of Bosasso.

Conclusions

Previous work on Quaternary changes of landscape and climate at the Horn of Africa (Brandt 1986; Brandt *et al.* 1984; Brook 1986; Clark 1954; Mussi 1975; Parkinson 1932; Stefanini 1933) nearly all stressed that further research was essential. Ecological conditions have certainly changed several times in the region but amplitudes of those oscillations seem to have been less high than in the Sahara where severe differences still within the last 20,000 years can easily be shown (see for example Gabriel 1977; 1986). The landscape of Northern Somalia never seems to have suffered from hyper aridity, nor are periods of high humidity discernible. Today the country is not a real desert and its semi-aridity sustains a relatively dense vegetation including many different woody species. No thick sediment series of pluvial lakes, as in the Sahara, have been found, nor did similar quantities and different types of prehistoric relics or faunal remains to the Sahara appear. The fossil soil record was poor as well. The changes are less obvious than in the Sahara and maybe were less intense. Brandt (1988) speaks of a "dramatic contrast" in respect to these climatic oscillations but this reflects the necessity of trying to quantify the results; this and exact age determinations of the different periods will be the main problems in the future.

Acknowledgements

We are very much indebted to Prof. Dr. M.A. Geyh from Niedersächsisches Landesamt für Bodenforschung, Hannover, for having dated our samples.

New results which modify the preliminary report in some details are published in: Gabriel *et al.* 1989; Schütt *et al.* 1991; Voigt 1992 and Voigt *et al.* 1990.

References

Bonnefille, R. and A. Hamilton. 1986. Quaternary and Late Tertiary history of Ethiopian vegetation. *Symbolae Botanicae Uppsalienses* 26(2): 48 - 63.

Brandt, S.A. 1986. The Upper Pleistocene and Early Holocene prehistory of the Horn of Africa. *The African Archaeological Review* 4: 41 - 82.

– In press. *The Stone Age of Somalia.*

Brandt, S.A. and G.A. Brook. 1984. Archaeological and paleoenvironmental research in Northern Somalia. *Current Anthropology* 25: 119 - 121.

Brandt, S.A., G.A. Brook and T.H. Gresham. 1984. Quaternary paleoenvironments and prehistoric human occupation of Northern Somalia. *Proceedings of the 2nd International Congress of Somali Studies, Hamburg 1983,* 2: 7 - 22. Hamburg: Buske Verlag.

BRANDT, S.A. and N. CARDER. 1987. Pastoral rock art in the Horn of Africa: making sense of udder chaos. *World Archaeology* 19(2): 194 - 231.

BROOK, G.A. 1986. Late Quaternary environments in Northern Somalia. In: *Proceedings of the 9th International Congress of Speleology, Barcelona* 1: 288 - 290.

CLARK, J.D. 1954. *The prehistoric cultures of the Horn of Africa*. Cambridge: Cambridge University Press.

– 1980. The origins of domestication in Ethiopia. In: R.E. Leakey and B.A. Ogot (eds.), *Proceedings of the Panafrican Congress of Prehistory and Quaternary Studies, Nairobi, 5 to 10 September 1977:* 268 - 270. Nairobi: The International Louis Leakey Memorial Institute for African Prehistory.

FLOHN, H. and S. NICHOLSON. 1980. Climatic fluctuations in the arid belt of the Old World since the Last Glacial maximum; possible causes and future implications. *Palaeoecology of Africa* 12: 3 - 21.

GABRIEL, B. 1970. Bauelemente präislamischer Gräbertypen im Tibestigebirge (Zentrale Ostsahara). *Acta Praehistorica et Archaeologica* 1: 1 - 28.

– 1977. *Zum ökologischen Wandel im Neolithikum der östlichen Zentralsahara.* Berliner Geographische Abhandlungen 27.

– 1986. *Die östliche Libysche Wüste im Jungquartär.* Berlin: Berliner Geographische Studien 19.

– 1987. Palaeoecological evidence from Neolithic fireplaces in the Sahara. *The African Archaeological Review* 5: 93-103.

– 1993. Enneri Tihai. Eine vorgeschichtliche Grabanlage aus Südlibyen. In: *Festschrift für G. Smolla. Materialien zur Vor- und Frühgeschichte von Hessen* 8.

GABRIEL, B., B. VOIGT und MUMIN M. GHOD. 1989. Klima und Landschaft Nordsomalias im Quartär. *Eiszeitalter und Gegenwart* 39: 132 - 144.

GASSE, F. 1980. Late Quaternary changes in lake-levels and diatom assemblages on the south-eastern margin of the Sahara. *Palaeoecology of Africa* 12: 333 - 350.

GASSE, F., P.ROGNON and F.A. STREET. 1980. Quaternary history of the Afar and Ethiopian Rift lakes. In: M.A.J. Williams and H. Faure (eds.), *The Sahara and the Nile. Quaternary environments and prehistoric occupations in northern Africa:* 361-400. Rotterdam: A.A. Balkema.

HURNI, H. 1981. Simen Mountains – Ethiopia: palaeoclimate of the last cold period (Late Würm). *Palaeoecology of Africa* 13: 127 - 137.

JÖNSSON, S. 1983. *Archaeological research co-operation between Somalia and Sweden.* Stockholm: Central Board of National Antiquities International Report No. 1.

LEWIS, I.M. 1961. The so-called Galla graves of Northern Somaliland. *Man* 61: 103 - 106.

MESSERLI, B. and E. FREI. 1985. Klimageschichte und Paläoböden in den Gebirgen Afrikas zwischen Äquator und nördlichem Wendekreis. *Geomethodica* 10: 31 - 70.

MUSSI, M. 1975. Etats des connaissances sur le Quaternaire de la Somalie. *Quaternaria* 18: 161 - 183.

PARKINSON, J. 1932. Climatic changes in British Somaliland. *Nature* 129 (3261): 651.

ROGNON, P. 1976. Essai d'interprétation des variations climatiques au Sahara depuis 40.000 ans. *Revue de Géographie Physique et de Géologie Dynamique* 18 (2 - 3): 251 - 282.

SCHÜTT, H., B. GABRIEL and B. VOIGT. 1991. Quartäre Mollusken aus Somalia und ihre Rolle als Klimazeugen. *Quartär* 41/42: 87 - 110.

STEFANINI, G. 1933. Notizie sulle formazioni plioceniche e pleistoceniche della Somalia. *Palaeontographia Italica* 32 (Suppl. 1): 55 - 66.

VOIGT, B. 1992. *Klima und Landschaft am Horn von Afrika im Quartär.* Berliner Geographische Studien 36.

VOIGT, B., B. GABRIEL, B. LASSONCZYK and MUMIN M. GHOD. 1990. Quaternary events at the Horn of Africa. *Berliner Geowissenschaftliche Abhandlungen (A)* 120(2): 679 - 694.

WILLIAMS, M.A.J. 1985. Pleistocene aridity in tropical Africa, Australia and Asia. In: I. Douglas and T. Spencer (eds.), *Environmental change and tropical geomorphology:* 219 - 233. Boston: Allen and Unwin.

ZINDEREN BAKKER, E.M. van. 1982. African palaeoclimates 18,000 years B.P. *Palaeoecology of Africa* 15: 77 - 99.