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Cultural relics as Saharan landscape elements

Man has changed the face of the earth in a different and sometimes radical way, most radically in urban areas. But also the rural landscape of Central Europe has been formed since many generations, the single episodes having engraved their specific traces in the soil. Cultural landscapes turn out to be good historical archives (Schwind 1964). In modern times, however, the density of population and the “land consumption” (Borcherdt and Kuballa 1985) for traffic and urbanization, for economic or touristic purposes make it necessary to preserve and protect natural or historical monuments by force of law (Burggraaff and Kleefeld 1998; Horn et al. 1993).

But what about the Sahara, the huge areas nearly without any inhabitants? What kind of relics do exist there, and are they really threatened, too? Indeed, their risk is manifold: by booming tourism and by the activities of oil companies (Kröpelin 2002; Milburn 1994), by land reclamation, by the installation of traffic lines or other infrastructural investments, by the modernization of oases by irrigation systems and so on. So, an urgent desire seems first an inventory of those visible cultural relics on maps or digitally, in a landscape information system like it is made in Europe (cf. Peters and Klinkhammer 2000).

Such a project is not equivalent to mapping of (pre-)historic sites: the more or less conspicuous surface features should be able to be recognized from a distance of about 20 m; therefore, they should have a certain dimension, say at least half a square meter in plain surface or some decimetres in height, if performed in soil, gravel or in other disintegrated substratum. In principle, these elements could be fully registered by the modern remote sensing system HRSC with its high resolution of digital data of about 20 cm (Hoffmann and Lehmann 2000; Wewel et al. 1998). It is just a matter of funds and of political bureaucracy.

Traces in soil or solid rock are *per se* immobile which is a second demand for the definition of landscape elements. Thirdly, they should be able to be

defined as characteristics for certain areas or localities, more or less sharply outlined against their surrounding. And last, as being historical relics, they should have lost their previously intended functional meaning, though their purpose is not always clear today.

In humid areas like Central Europe these landscape elements can be vegetable arrangements like hedges, roadside tree rows, osiers, old orchards or farm-gardens, single big oaks or lime-trees, where people assembled for leisure, for feasts or jurisdiction. In the desert such phenomena are scarce. Just some ring clumps of shrub near Zouar (Tibesti) may be explained as former livestock fences (Gabriel and Schmid 1981). Or date palms on remote water points, often dry today, are relics of ancient settlements or caravan halts.

Manifold and most frequent, on the other hand, are the anorganic traces in soil or solid rock. They are, by the way, one of the main arguments for pluvials, for climatic change in the past (Gabriel 1982). Some are even not at once perceptible as being due to human action: a geomorphological phenomenon has first to be recognized, isolated and defined morphographically, it has to be noticed as being conspicuous, before speculating if it is of natural or of human origin (Gabriel 1979). Very helpful for such a diagnosis is a good field experience in the respective area and a practical as well as a theoretical training in the regularities of prehistory/archaeology/historical geography on the one hand *combined* with geomorphology/geology/soil science on the other. Though, sometimes, a newcomer will inquire things which seem to be obvious to the expert. You can traverse the same area frequently and then suddenly you hit upon a structure that you have not realized before (cf. Dittmann 1999: 52), comparable to the correction of a printer's proof!

Several examples may underline the risks of misinterpretation. First, the case of the stone sites or stone places (*Steinplätze*), which are most likely the fireplaces of the Neolithic cattle pastoralists (Gabriel 1973; 1977; 1987; 2002a). They are unpretentious, almost lost to view for an untrained eye, though they are widespread nearly all over from the eastern to western Sahara, except the northern and southern border zones. Once perceived, they seem to be the most frequent and dispersed cultural landscape elements over large areas. Geomorphologists have noticed them, but have explained them as being of natural origin or just mysterious (Coque 1973: 94, Meckelein 1959: 109). A second example: grinding material is common in Saharan prehistory. Even whole fields of such mills in solid rock are known here and there (cf. Gabriel 1977: 56; 1979: 138; Gabriel et al. 1985: 110), though the procedure which has led to the formation of sites like Fig. 1 is obscure. Did, for example, each "bowl" belong to an individual? Did several people work contemporaneously in such tightness? Why are there so many facets all parallel to each other? Here, at the edge of large pre-

Islamic cemeteries to the north of Naga (Butana, Sudan), the rock surface is sloping which is an additional difficulty to explain these doubtless anthropogenic features. But it is sometimes even not easy to decide, if cavities, holes or scratches in solid rocks are man-made or natural. Prehistoric mills have been explained as oriçangas, as natural weathering pits or solution cups (K. Kaiser 1972: cf. figs. 22-24). Ancient mining pits and quarries often escape the attention of archaeologists (Gabriel 1979: 142; 1997: 25). Widespread veins of Egyptian alabaster (or 'calcite-alabaster') occur in the Egyptian Western Desert near Gara, though ancient mining sites of this material are mentioned and described only from the Eastern Desert (Klemm and Klemm 1992: 199ff.; cf. also Klemm and Klemm 1991).

A third example: on both sides of the Western Desert Road in Egypt, north of Assiut (at the latitude of Mallawi), the surface of the undulating gravel terraces is covered by small depressions, many thousands - say: millions! - of pits, hardly more than half a meter deep and some three to five meters wide, with different contour shape: circular, star- or crescent-like, oblong, oval or else. No explanation for their natural origin can be offered, they could have been formed by wind or water, by surface or subsurface erosion, by animals or plants. Areas of these clusters of pits are clearly separated from primordial surfaces without pits, well to be seen in the distance even from the running car on the road.

Exactly the same picture of a 'pock-marked' landscape occurs over many square kilometres at the foot of the escarpment in Dakhla Oasis, between Balat and Tineida, on hilly undulating gravel terraces. In Fig. 2 the foreground is nearly undisturbed, but the surface of the terrace accumulations in the back is covered by these irregular small pits. Chert and flint artefacts are scattered around (cf. also Kleindienst 1999: 90 ff.), so the interpretation of the Stone Age mining pits for raw material seems to be the most likely. Kleindienst et al. (1999: Fig.1.24), however, associate these morphological features with "historical gravel stripping for industrial and local uses".

The modification of the original landscape, i.e. the human impact on these areas, is immense. Nevertheless, the pits seem to have only exceptionally or accidentally attracted the attention of geoscientists or archaeologists. If they really are of Palaeolithic times as the artefacts suggest, they are a unique example of a widespread, excessive alteration of man's natural environment in his very early phase of history. According to the common view, the Palaeolithic people did not leave prominent traces in the Sahara, nor elsewhere, which can be classified as historical monuments. Only some local mining activities are known from the Nile Valley (Vermeersch et al. 1986, 1989) or in Fezzan (Ziegert 1976).

Quite similar features are reported by Fuchs (1995) in the Egyptian Nile Valley. Here, the pits appear to be more concentrated, perhaps because of

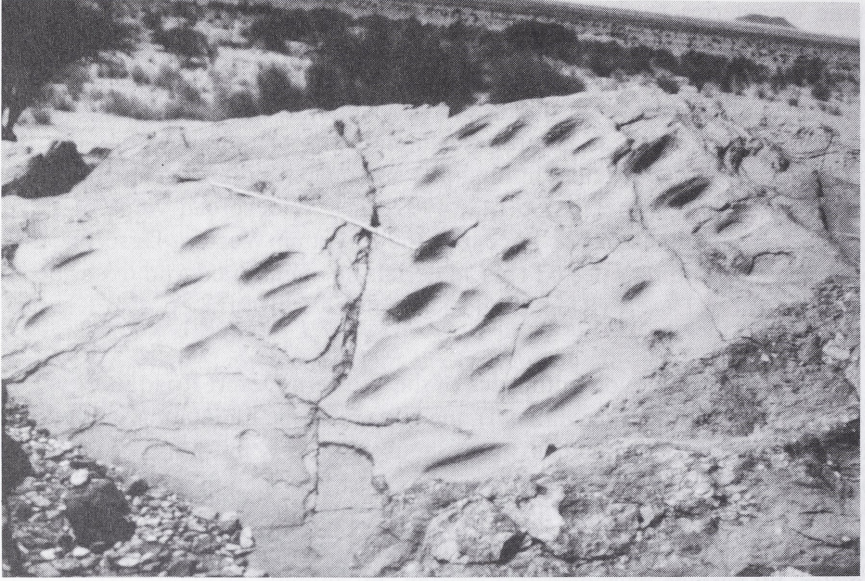


Fig. 1. Grinding surfaces on solid rock north of Naga (Butana, Sudan).



Fig. 2. Ancient mining pits near Balat, Dakhla (Egyptian Western Desert).

repeated digging and searching for raw material in a limited area. The author's presumption is that they are of Predynastic age. They clearly occur in many parts of the Nile Valley. I identified them, for example, on the upper Nile terraces near the pyramids of Sakkara while they were missing on similar terrace at Dahshur. Chmielewski (1965: 157) found such Palaeolithic mining pits in coarse gravel accumulations near Wadi Halfa. W. Kaiser, nevertheless, interpreted plenty of pits near Hierakonpolis as housing or storage constructions (1961:7).

A last example is given by the interpretation of natural transport of single boulders over many kilometres of the plains east of Gilf Kebir (Pachur 1999: 376 ff.). These boulders occur in a sandy matrix in the vicinity of Neolithic remains. No natural force is conceivable for their transport, especially since the isolated and erratic blocks are of angular shape. Human procurement seems here to be obvious. We have to remember that the severe lack of rocky material on the plains must have caused considerable problems to Stone Age people (Gabriel 1984a: 392; cf. Close 1996).

A difficult task is the selection and the classification of all landscape elements which should be included in the scheme, cf. Schliephake (1974) from a linguistic and agro-geographical approach or the preparation of a „Dictionary on Saharan Prehistory“ by B. Barich, K.-H. Striedter and T. Tillet (U.I.S.P.P., XXVth Scientific Commission, Forli, Sept. 1996). Basic aspects in such a classification can be the relation of these elements to other phenomena (their importance and role within an assemblage), their size, shape, age, purpose, location or the material they consist of (cf. Hallmann and Peters 1993: 6; Peters and Klinkhammer 2000; Scherer-Hall 1996). Not a single criterion is suited for this aim. Age and purpose of the elements are often not to be detected (or only after intensive and long lasting investigations), but nevertheless, they can not be omitted in the classification scheme.

Only in the Neolithic and subsequent times people have left significant relics of settlements like ruins of huts and houses, harvesting and irrigation systems, defence constructions, game traps or 'alamat' (sing. 'alam', i.e. cairns or single big stones in an upright position, in modern times sign posts or barrels) as markers for caravan routes, sometimes adoration places and often tomb and grave monuments. Rock art, mills in solid rock, inscriptions or just some enigmatic, but artificial scratches on rock walls seem to be not older than the end of Palaeolithic, too. Fig. 3 shows an ancient stone-walled hut construction, filled by aeolian sand, with two Islamic tombs to the right, found not far from Terarart, south of Djanet (southern Algeria). Such ruins of (semi-)nomadic settlements are to be found in many parts of the desert.

Every cultural landscape is a type of coagulated history. For many centuries the Sahara has played the role of an agency for trade and commerce

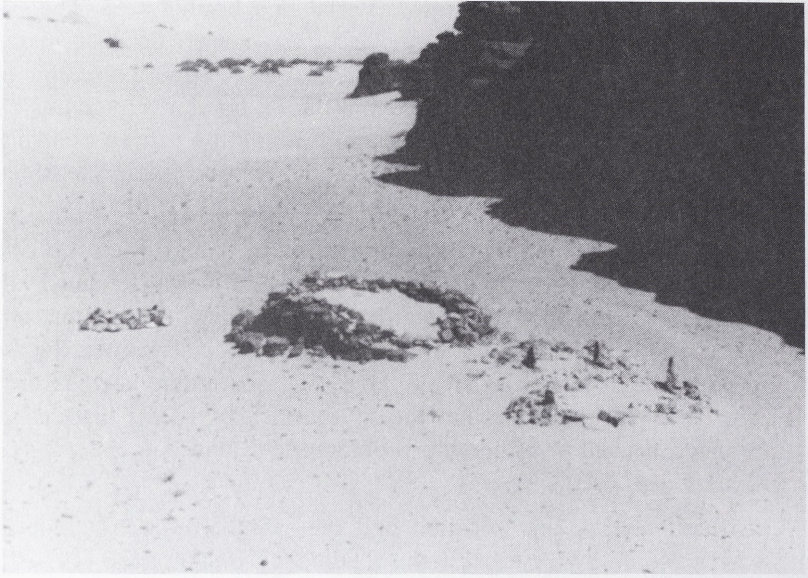


Fig. 3. Ruins of a nomadic settlement south of Djanet (southern Algeria).

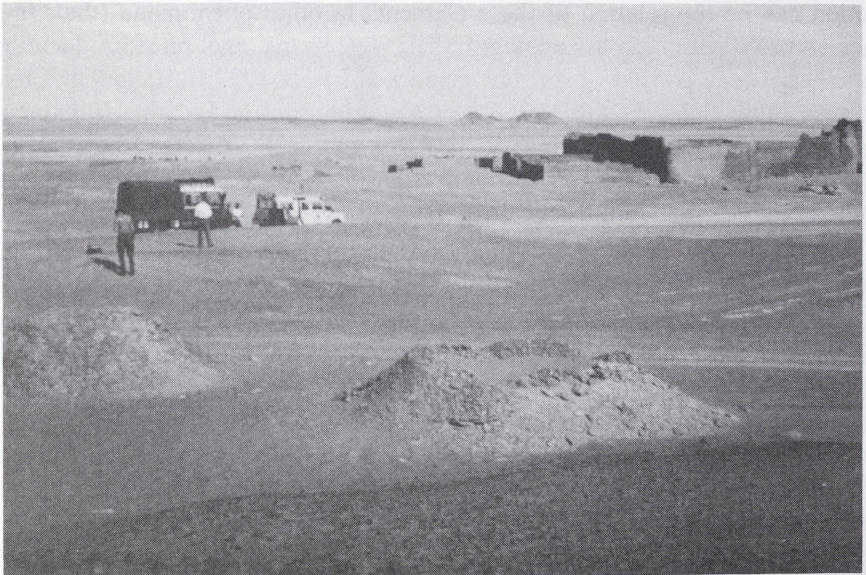


Fig. 4. Abandoned medieval township in Touat (southern Algeria).

between Central Africa and the Mediterranean World. Now the caravan routes have mostly lost their importance, and many of small townships have been abandoned, like in Touat (southern Algeria, cf. Gabriel 1984b), see Fig. 4: in the foreground are two small hillocks of the ancient subsurface water harvesting system. Strings of these 'foggara' hillocks are typical and spectacular landscape elements in certain areas of the Sahara.

Different, consecutive human generations have left their traces in a specific way. So did their changing actions for gaining the daily livelihood, for subsistence and living standard, for art, leisure, cult and fashion. Natural resources have lost their transient value and new needs arose. Nobody will ask these days for obsidian which is said to have been the first important article of trade and commerce. Salt has been counterbalanced by gold in the humid tropics of Central Africa in medieval times, and during the 20th century the uranium has gained and lost its significance within two generations, whereas water will play an increasingly important role in the time to come. The value of any material and resources can change within a short period of time and the concept of sustainability seems therefore dubious or relative at least. Rubbish or litter of yesterday might be a treasure for today - see archaeological excavations - and our refuse dumps might become precious sources of scientific knowledge or of diminished raw materials in the future (cf. Köstering and Rüb 1993).

So rubbish may have a kind of a half-life period: after few decades the enduring relics of our predecessors in the Sahara may become interesting souvenirs, like tins with inscriptions from the twenties or thirties, from World War II and thereafter, beer bottles with strange shape and ancient stopper types. Broken-down vehicles and old camps of the Long Range Desert Group, military equipment, cairns of empty fuel tins, temporary fortresses and air stripes - they all may have been located on maps as landmarks and are surely headed for by tourists and research groups. A ten years old carcass of a Mercedes Unimog left near the Gilf Kebir (at 23° 36,459' N - 26° 34,926' E after GPS) - is it already a cultural marker? Has it become a landscape element worth to be mapped and safeguarded? A pile of petrol tins from World War II or before become a landmark near Wadi Shaw in NW-Sudan (Fig. 5). Is it worth enough to be classified as a cultural landscape element and to be protected as such? And what about minefields from World War II or from more recent conflicts, sometimes surrounded by a barbed wire if their location is known? They do protect themselves, but there is no doubt that we should not estimate these horrible 'cultural relics' as precious items. Nevertheless, we must keep in mind that our ideas and decisions are mostly personal, not free from bias, religious or political ideology or from the spirit of age.

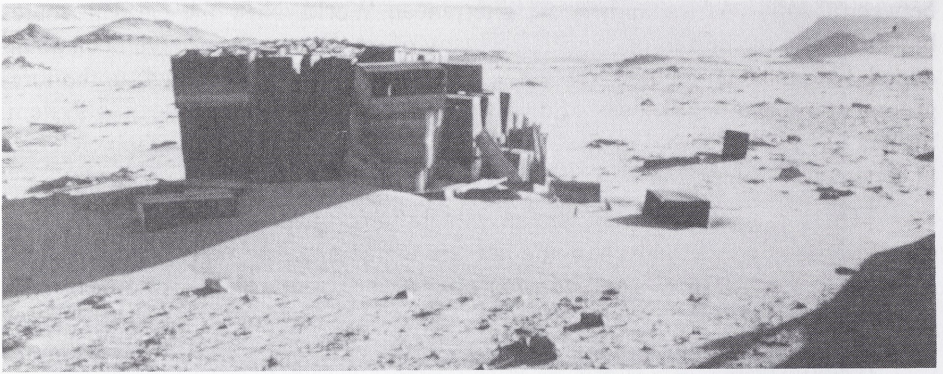


Fig. 5. A pile of empty petrol tins near Wadi Shaw (Northwest Sudan).



Fig. 6. Stone circles near Merga (Northwest Sudan).

There is a lot of uncertainty in defining a historical landscape element worth to be protected. What, for example, about natural elements if they have only a historical, religious or mythological meaning, like a battle field or the mountain in Sinai, where Moses got the Ten Commandments? They are qualified as 'associative landscapes' in the UNESCO-classification for the World Cultural Heritage List (Burggraaff and Kleefeld 1998: 158). What about political frontiers? Or about natural landscape elements where prehistoric man left middens without changing their outer appearance like caves or rock shelters or dune summits (Gabriel et al. 1985) ? How to manage and protect hidden elements like subsurface mining activity, buried or submerged monuments, cave dwellings or tombs without any superficial features?

The approach to a systematic division of the cultural landscape elements seems to be best based on historical periods, whereas a last category should be reserved for uncertain, questionable associations:

1. Palaeolithic,
2. Neolithic,
3. Antiquity (including Ancient Egyptian, Greek, Roman periods etc.),
4. Pre - Islamic + Late Antiquity (sometimes called Protohistoric, including e.g. the Garamantes, the Proto-Berbers or the Early Christian relics),
5. Early Islamic (pre-colonial periods),
6. European influence to recent,
7. Dubious origin or uncertain age.

In this classification we leave aside modern localities like the fascinating car cemetery of Leclerc's army near Zouar (Tibesti), the curious land scenery of huge coloured sandstone hills near Bardai (Tibesti) or the ruins of the atomic bomb pilot plant of Reggane in southern Algeria. We will not mention all modern transformations of Saharan landscape since the time of motor cars and aeroplanes (cf. Poste Weygand and Bidon V in the Tanezrouft, Algeria), likewise we will forget all structures not visible on open surfaces and those which are well known since a long time: ancient buildings (temples, pyramids) or ruins of whole villages or towns (Leptis Magna, Germa, Old Siwa, Aghurmi etc.). They will not escape the attention of a prospecting archaeologist and local authorities. We will instead focus on smaller, not so spectacular items (e.g. lonely and hidden proto-historic Berber retreat settlements, cf. Gabriel 1984b; Gabriel et al. 1977).

Within the systematic division mentioned above we can distinguished two groups of landscape elements:

- A. Human influence on disintegrated, loose material (soil, accumulations of gravel, sand, silt or clay) and specifically:
 1. Plain elements, where human effects are visible just in a change of grain

- size, of colour or type of the material: fireplaces, outlines of houses and farmsteads, irrigation and agricultural systems.
2. Sunken features (“negatives”): pits or depressions, ditches or trenches, wells or cave dwellings, tracks.
 3. Elevated elements (“positives”): hills or hummocks, tells, dikes or walls, barrages, slagheaps and dumps, stone lines or cairns, ruins or tombs.
 4. Combination of “positives” and “negatives”: terraces, walk-in wells, hafirs (Sudanese water storages), interment holes with corresponding sediment.
- B. Human influence on solid rock: paintings, engravings, inscriptions, sculptures, other traces, shafts or tunnels, quarries, artificial caves and mining activities (Gabriel 1979: 139 ff.; 1997: 25, 2002b).

A subdivision of group B does not seem to be practical as the human traces can only be plane (paintings) or were engraved, polished, pecked, grooved, drilled or were made by any other kind of abrasive activity. Perhaps it might be better to construct such a subdivision with regard to the significance or purpose of the elements ?

Another aspect of classification should be the horizontal extension of the elements (cf. Hallmann and Peters 1993: 6), namely:

1. Single items (points),
2. Linear structures or
3. Surface area (dimension).

In this classification a tomb would be comprehended as a single item, but the whole assemblage, consisting of components like stone lines, steles, pavings and tumulus, might have a diameter of more than 100 m (Gabriel 1999; Milburn 1988; Savary 1966). Burggraaff and Kleefeld (1998: 159), considering cultural landscape types in a larger scale, even consider whole villages or towns as ‘points’. More problems arise as regards the chronology: do Predynastic objects belong to the Neolithic or to the Antiquity ?

There are a lot of enigmatic features in the Sahara which cannot be attributed to any epoch nor to any purpose. Nevertheless, their human origin is without doubt, for example the triliths (Milburn 1987) or lines of stones interpreted as game traps (Hester and Hobler 1969: 21). Circles of stones may suggest basal constructions of ancient huts or tents. These illustrated in Fig. 6 seem to be particularly obscure, because dozens of them were found without any artefacts or other associated relics indicating their age or purpose. Simple small rings of stones, too small for being hut circles and/or remains of tombs or hearths, may have served as animal watering-places (with the help of a leather inlay, Gabriel 2002a: 60). But how to interpret the various types of stone monuments which are apparently neither tombs nor alamt or dwelling constructions (cf. Gauthier and Gauthier 1999; Milburn 1988) ? How to explain the numerous stone cup marks

(for example near Djanet, Gabriel 1979: 141) or the curious cup-and-groove arrangements known from near Gabrong (Tibesti) (cf. Gabriel 1978) and from the Sudan ?

Our study of cultural relics in the Sahara should collect all elements in a surveyed area in a list with the numerals of the classification, and also with detailed measurements and descriptions as well as with the GPS-data. This would not only form a base for all kinds of studies, but it will also help to protect the cultural heritage. It can be valuable for a better orientation on maps and in the uninhabited, sometimes homogeneous landscapes, where place-names and landmarks are scarce. Finally, it could help to develop tourism and to manage the growing streams of visitors.

References

- BORCHERDT, C. and KUBALLA, S. 1985. Der 'Landverbrauch' - seine Erfassung und Bewertung, dargestellt an einem Beispiel aus dem Nordwesten des Stuttgarter Verdichtungsraumes. *Stuttgarter Geographische Studien* 104.
- BURGGRAAFF, P. and KLEEFELD, K.-D. 1998. Historische Kulturlandschaft und Kulturlandschaftselemente. *Angewandte Landschaftsökologie* 20 (Bonn-Bad Godesberg).
- CHMIELEWSKI, W. 1965. Archaeological research in Northern Sudan. In: F. Wendorf (ed.), *Contributions to the Prehistory of Nubia*: 147-164. Dallas.
- CLOSE, A.E. 1996. Carry that weight: The use and transportation of stone tools. *Current Anthropology* 37 (3): 545-553.
- COQUE, R. 1973. Reconnaissance géomorphologique au Fezzan (Sahara central). In: Maghreb et Sahara. *Acta Geographica*, Paris: 91-97 (Festschrift J. Despois).
- DITTMANN, A. 1999. Paläogeographie und Petroglyphen. Neuere Ergebnisse zur Synopse geomorphologischer und prähistorischer Befunde aus dem Bereich des Gebel Galala-el-Qibliya (Ägypten). *Frankfurter Geowissenschaftliche Arbeiten* 25: 43-73.
- FUCHS, G. 1995. Chert mining near El-Tod (Eastern Desert, Egypt). *Sahara* 7: 103-104.
- GABRIEL, B. 1973. Steinplätze: Feuerstellen neolithischer Nomaden in der Sahara. *Libyca* 21: 151-168
- 1977. Zum ökologischen Wandel im Neolithikum der östlichen Zentralsahara. *Berliner Geographische Abhandlungen* 27.

- 1978. Gabrong. Achttausendjährige Keramik im Tibesti-Gebirge. In: *Sahara - 10.000 Jahre zwischen Weide und Wüste*: 189-196 Köln: Museen der Stadt Köln.
- 1979. Ur- und Frühgeschichte als Hilfswissenschaft der Geomorphologie im ariden Nordafrika. *Stuttgarter Geographische Studien* 93: 135-148.
- 1982. Die Sahara im Quartär. Klima-, Landschafts- und Kulturentwicklung. *Geographische Rundschau* 34 (6): 261-268.
- 1984a. Great plains and mountain areas as habitats for the Neolithic man in the Sahara. In: L. Krzyzaniak and M. Kobusiewicz (eds), *Origin and Early Development of Food-producing Cultures in North-Eastern Africa*: 391-398. Poznan.
- 1984b. Zur vorzeitlichen Besiedlung Südalgeriens (Tanezrouft, Tidikelt, Touat, Gourara). *Die Erde* 115 (1-2): 93-109.
- 1987. Palaeoecological evidence from Neolithic fireplaces in the Sahara. *The African Archaeological Review* 5: 93-103.
- 1997. Zur quartären Landschaftsentwicklung der nördlichen Butana (Sudan). *Mitteilungen der Sudanarchäologischen Gesellschaft zu Berlin* 7: 23-30.
- 1999. Enneri Tihai - eine vorgeschichtliche Grabanlage aus Südlibyen. *Beiträge zur Allgemeinen und Vergleichenden Archäologie* 19: 129-150.
- 2002a. Neolithic camp sites in the Sahara. Anticipation of future research. *Africa Praehistorica* 14: 51-66. (Festschrift R. Kuper).
- 2002b. Spuren im Sand und Gestein. Kulturhistorische Landschaftselemente der Sahara. *Hildesheimer Universitätschriften*.
- GABRIEL, B., ALLIMANT, U. and MAY, D. 1977. Djebel Aziza. Die Ruinen einer Berber-Rückzugssiedlung in Südtunesien. *Stuttgarter Geographische Studien* 91: 213-236.
- GABRIEL, B., KRÖPELIN, S., RICHTER, J. and CZIESLA, E. 1985. Parabeldünen am Wadi Howar. Besiedlung und Klima in neolithischer Zeit im Nordsudan. *Geowissenschaften in unserer Zeit* 3 (4): 105-112.
- GABRIEL, B. and SCHMID, M. 1981. Wachstumsdichtemuster in der Sahara: Die Straßenrandvegetation. *Erdkunde* 35: 66-70.
- GAUTHIER, Y. and GAUTHIER, C. 1999. Un nouveau type de monuments en pierres sèches à la limite nord de l'Edeyen de Murzuq (Fezzân, Libye) ? *Almogaren* 30: 131-143
- HALLMANN, H.W. and PETERS, J. 1993. *Kulturhistorische Landschaftselemente in Brandenburg*. Berlin: L. Großer Vlg.
- HESTER, J.J. and HOBLER, P.M. 1969. *Prehistoric settlement patterns in the Libyan Desert*. Salt Lake City: Univ. of Utah Anthropological Papers 92, Nubian Series No. 4.
- HOFFMANN, A. and LEHMANN, F. 2000. Vom Mars zur Erde. Die erste digitale Orthobildkarte Berlin mit Daten der Kamera HRSC-A. - *Kartographische Nachrichten* 50 (2): 61-72
- HORN, H.G. et al. (eds.). 1993. *Archäologie und Recht. Was ist ein Bodendenkmal ?* Mainz: Ph. von Zabern.
- KAISER, K. 1972. Prozesse und Formen der ariden Verwitterung am Beispiel des Tibesti-Gebirges und seiner Rahmenbereiche. *Berliner Geographische. Abhandlungen* 16: 49-80.

- KAISER, W. 1961. Bericht über eine archäologisch-geologische Felduntersuchung in Ober- und Mittelägypten. *Mitteilungen des Deutschen Archäologischen Instituts, Abteilung Kairo*, 17: 1-53.
- KLEINDIENST, M.R. 1999. Pleistocene archaeology and geoarchaeology of the Dakhleh Oasis: a status report. In: C.S. Churcher and A.J. Mills (eds), *Reports from the Survey of the Dakhleh Oasis, Western Desert of Egypt 1977-1987*: 83-108. Oxbow Monograph 99.
- KLEINDIENST, M.R., CHURCHER, C.S., McDONALD, M.M.A. and SCHWARCZ, H.P. 1999. Geography, geology, geochronology and geoarchaeology of the Dakhleh Oasis region: an interim report. In: C.S. Churcher and A.J. Mills (eds), *Reports from the Survey of the Dakhleh Oasis, Western Desert of Egypt 1977-1987*: 1-54. Oxbow Monograph 99.
- KLEMM, D.D. and KLEMM, R. 1991. Calcit-Alabaster oder Travertin? Bemerkungen zu Sinn und Unsinn petrographischer Bezeichnungen in der Ägyptologie. *Göttinger Miscellen* 122: 57-70.
- KLEMM, R. and KLEMM, D.D. 1992. *Steine und Steinbrüche im Alten Ägypten*. Berlin etc.: Springer Vlg.
- KÖSTERING, S. and RÜB, R. (eds.) 1993. Müll von gestern? Eine umweltgeschichtliche Erkundung in Berlin und Umgebung 1880-1945. Berlin: Technische Univ. Berlin.
- KRÖPELIN, S. 2002. Damage to natural and cultural heritage by petroleum exploration and desert tourism in the Messak Settafet (Central Sahara, Southwest Libya). *Africa Praehistorica* 14: 405-423 (Festschrift R. Kuper).
- MECKELEIN, W. 1959. *Forschungen in der zentralen Sahara. I. Klimageomorphologie*. Braunschweig: Westermann.
- MILBURN, M. 1987. Note au sujet des trilithes sahariens. *Le Saharien* 100 (1): 30-35.
- 1988. Typological enquiry into some dry-stone funerary and cult monuments of the Sahara (Mauritania, Morocco and NW Niger). *Scientific Reviews on Arid Zone Research* 6: 1-126.
- 1994. Some current difficulties in recording and conservation of archaeological and ethnological material: the case of the Sahara. *Africa* 50 (4): 69-74.
- PACHUR, H.-J. 1999. Paläo-Environment und Drainagesysteme der Ostsahara im Spätpleistozän und Holozän. In: E. Klitzsch and U. Thorweih (eds.), *Strukturen und Ressourcen*: 366-445. Weinheim: Wiley-VCH.
- PETERS, J. and KLINKHAMMER, B. 2000. Kulturhistorische Landschaftselemente. Systematisieren, kartieren und planen. Untersuchungen in Brandenburg. *Naturschutz und Landschaftsplanung* 32 (5): 147-152.
- SAVARY, J.-P. 1966. Monuments en pierres sèches du Fadnoun (Tassili n'Ajjer). Alger: Mém. du C.R.A.P.E. 6.
- SCHERER-HALL, R. 1996. *Kleines Lexikon der historischen Kulturlandschaft und ihrer Elemente mit tabellarischer Übersicht zur Inventarisierung von historischen Kulturlandschaftselementen*. Köln: Büro für Geographische Informationsverarbeitung.
- SCHLIEPHAKE, K. 1974. Terminologie du paysage culturel arabo-islamique. *Cahiers de Tunisie* 22 (85-86): 211-213.
- SCHWIND, M. 1964. *Kulturlandschaft als geformter Geist*. Darmstadt: Wissenschaftliche Buchgesellschaft.

- VERMEERSCH, P.M., PAULISSEN, E., GIJSELINGS, G. and JANSSEN, J. 1986. Middle Palaeolithic chert exploitation pits near Qena (Upper Egypt). *Paléorient* 12 (1): 61-65.
- VERMEERSCH, P.M., PAULISSEN, E. and VAN NEER, P. 1989. Palaeolithic chert quarries and mines in Egypt. *Sahara* 2: 95-98.
- WEWEL, F. et al. 1998. Digitale Luftbildaufnahme mit der HRSC. Ein Schritt in die Zukunft der Photogrammetrie. *Photogrammetrie, Fernerkundung, Geoinformation* 6/98: 337-348.
- ZIEGERT, H. 1976. Quarzitbergbau der Altsteinzeit in der Sahara. In: *Kulturgeschichte und Kulturkunde*. (Uni HH Forschung, Hamburg) 8: 72-78.