The Bilzingsleben engravings in the context of Lower Palaeolithic palaeoart

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Zusammenfassung

Die Gravierungen von Bilzingsleben im Kontext altpaläolitischer Paläokunst

Die These, die in den 1980ern laut wurde, daß der altpaläolithische Mensch Gravierungen angefertigt hat, stand zur damaligen Zeit im Gegensatz zur vorherrschenden ideologischen Meinung in der Archäologie weltweit. Sie wurde deshalb weitgehend abgelehnt. In den späten 1990ern schlug das Pendel dann in die entgegengesetzte Richtung: Diesen Wesen wurde zumindest menschlicher Status zugebilligt. Der Beweis für Kunstäußerungen in den ältesten Phasen der menschlichen Technikentwicklung wird auf dem gegenwärtigen Stand überprüft, und es wird gezeigt, daß hierzu auch die gravierten Objekte von Bilzingsleben zu rechnen sind. In der Tat wurde nicht nur die Kunst, die von den Menschen des Altpaläolitikums hergestellt wurde, bei weitem unterschätzt, sondern auch deren technologische, kognitive und kulturelle Fähigkeiten.

Introduction

Dietrich Mania's many contributions to the study of Pleistocene hominids have greatly enriched this field in many areas, but from a global perspective his pioneering work in recognising the authenticity and significance of the engravings from Bilzingsleben is perhaps his greatest single achievement. While his work in demonstrating the cultural complexity of Lower Palaeolithic societies is well appreciated, his claims that they were cognitively far more competent than mainstream world archaeology has admitted is of an entirely different order of importance. Moreover, it is to be appreciated that during the 1980s his claims involved not just pioneering thought of the finest tradition, they required true professional courage. Following the rise of the 'New Archaeology', as it was called, the discipline underwent a phase of denying all typically human faculties to hominids right up to fully modern humans of the last 30,000 years of the Pleistocene. Archaeologists not subscribing to this paradigm were courting danger, and the timing of the first presentation of the Bilzingsleben engravings (Mania/Mania 1988) was in that sense rather inopportune. It coincided with the time when the 'short range' proponents were engaged in their final assault on the 'long range' model (Chase/Dibble 1987; Davidson/Noble 1989; Noble/Davidson 1993; Noble/Davidson 1996; Gamble 1993; Stringer/Gamble 1993; Byers 1994; Gargett 1989; Mellars 1996; d'Errico/Villa 1997; Mithen 1998). Buoyed by (often misleading) information from geneticists they soon declared that 'Moderns' had wiped out all previous hominid populations wherever these had existed, and that all hominids who lacked language (according to them all pre-modern humans) were said to belong to the apes rather than the humans (Davidson/Noble 1990). Thus the Neanderthals, for instance, found themselves effectively relegated to pongid status. This ideology became the favoured model especially in Anglo-American archaeology and was particularly eagerly espoused by the Cambridge school.

Seen in the context of these developments in the 1980s and through much of the 1990s, Mania's quiet but undetered persistence deserves our unreserved admiration. In the international politics of archaeology it is always a difficult and thankless vocation to go against the current. Some years later, however, the tables have begun to turn, and it is therefore most timely to review Mania's claims in the light of recent developments. This will be attempted here, beginning with a summary of the available evidence.

Lower Palaeolithic palaeoart

Material that can be defined as Middle Pleistocene palaeoart has been described for well over 150 years, but it has remained largely ignored, misinterpreted or at least controversial. The relevant evidence can readily be divided into a few groups: small perforated objects that may have been used as beads or pendants, petroglyphs, indications of pigment use, figurines, engravings on portable objects, and unmodified objects that are thought to have been carried around because of some outstanding property (manuports).

Bilzingsleben has provided the largest site assemblage of Lower Palaeolithic (L.P.) engravings. This major occupation site of the Holstein Interglacial in Germany (Mania 1983; Mania 1990; Mania 1991; Mania 1991a; Mania/Vlček 1987; Mania/Weber 1986; Schwarcz et al. 1988) has yielded a substantial lithic industry together with numerous skeletal remains of pre-modern hominids. Also found were five engraved bone fragments, mostly of the forest elephant, one presumed engraving on the fragment of a large ivory point, and one on a quartzite slab (Mania/Mania 1988; Bednarik 1988; Bednarik 1993a; Bednarik 1995). It is widely accepted that the grooves found on these specimens were made with the points of stone tools, but some commentators have considered them to be incidental results of utilitarian activities. However, the D-shaped marking on the stone slab shows repeated application of a tool to master its difficult curved

part. While most of the other engravings are merely groups of linear grooves, those on the first four bone objects reported have been demonstrated by lasermicroscopic analysis to have been made intentionally (Steguweit 1999). Five of the bundled sub-parallel grooves on bone object No. 3 were clearly all made with the same stone tool (Bednarik 1988), and the rectangular arrangement on a metatarsal elephant bone is far too complex to be incidental (Bednarik 1995, 609). Moreover, it resembles the engraved rectangular pattern on a 70,000-year-old Blombos Cave haematite slab (d'Errico et al. 2001) and even similar Upper Palaeolithic finds. These and other factors negate the attribution of the marks to utilitarian activities. Finally, one of the several engraved bone fragments from gravel pit Oldisleben 1, Thuringia, found with an apparent Micoquian industry and Middle Pleistocene fauna (Günther 1994), displays markings almost identical to those on the No. 1 (fig. 1a) object from Bilzingsleben. This scapula fragment bears two distinctly intentional sets totalling almost twenty engraved parallel lines, arranged in the same manner as those on the Bilzingsleben specimen (fig. 1b). These and other consistent features in the earliest known palaeoart suggest that even in these remote times, conventions that are definable as 'traditions' already existed (Bednarik 1995; Hodgson 2000).

The status of a similarly marked elephant bone from another central European hominid site, Stránská skála in the Czech Republic (Valoch 1987), remains to be clarified. However, the anthropic authenticity of a similarly engraved bone fragment from the Acheulian of Sainte Anne I, France seems assured (Raynal/Séguy 1986; Crémades 1996). The Rissian mammoth tusk from Whylen near Lörrach bears a series of about twenty short, obliquely cut notches, arranged in a line (Moog 1939) (fig. 2).

Whereas there has been discussion of the palaeoart-status of some of these earliest engravings known, this uncertainty does not apply to petroglyphs whose anthropic origin has been demonstrated. The first rock art ascribed to the Acheulian are the eleven petroglyphs in Auditorium Cave, Bhimbetka complex, Madhya Pradesh, India (Bednarik 1993a; Bednarik 1994). Two of them were found in an excavation, covered by the uppermost part of substantial Acheulian occupation deposits. Another Indian quartzite cave, Daraki-Chattan, contains two vertical panels densely covered by 498 cupules (Kumar 1996). In June 2002, the Early Indian Petroglyphs (EIP) Project (Bednarik 2000; Bednarik 2001) excavated three exfoliated rock slabs in Daraki-Chattan, bearing a total of five cupules from within the Acheulian occupation deposit. Dating of the sediments containing them is currently being undertaken with the optically stimulated luminescence method, which will provide a minimum dating for the cupules. While these two Indian sites present the currently oldest known rock art in the world, there are also three southern African finds that need to be considered here: the phonolite cobble Leakey (1971, 269, Pl. 17) reported from Floor FLK North 1 in Bed 1, Olduvai Gorge; the grindstone of the Fauresmith industry bearing a grid pattern from Blind River Mouth in East London, South Africa (Laidler 1933); and a series of very early quartzite cupule sites P. Beaumont (pers. comm.) discovered recently in the Korannaberg region of the southern Kalahari.

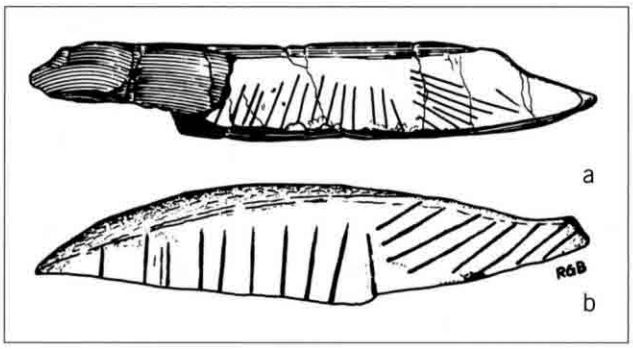

Fig. 1 Comparison of the markings on Bilzingsleben object No. 1 (a) and one of the engraved bone fragments from Oldisleben 1 (b), indicating a distinct similarity in marking strategies.

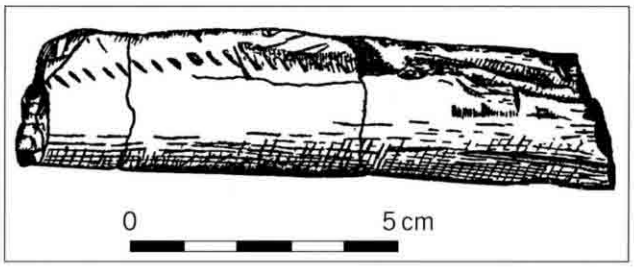

Fig. 2 The engraved mammoth ivory fragment from Whylen.

Petroglyphs of the L.P. may still be comparatively rare phenomena, but evidence of the use of iron oxides and hydroxides, presumably as colouring matter, has long been demonstrated from many sites in the Old World. Finds of haematite and similar minerals that bear striation use-marks are known from several occupation sites of this period, in various parts of Africa, Europe and India (Bednarik 1992; Bednarik 1994a). In Wonderwork Cave, South Africa, they occur in all levels down to bedrock, the lowest of which are thought to date from the early Middle Pleistocene (Beaumont 1990; Beaumont 1999; Binneman/Beaumont 1992; Bednarik 1994a). A haematite piece from Kabwe Cave near Broken Hill, Zambia, is probably in the order of 300,000 years old, and there is a spheroid stone with red staining from the same site (Clark et al. 1947). Clark (1974) also reports evidence of pigment use from the Acheulian site at Kalambo Falls, Zambia, which is probably around 200,000 years old. Somewhat older than that is a ground piece of haematite from Nooitgedacht, South Africa (Beaumont/Morris 1990). In Europe, Marshack (1981) has analysed a striated haematite piece from the Acheulian of Beçov, Czech Republic. Ochreous materials have also been reported from the Acheulian of Terra Amata (Lumley 1966) and Achenheim (Thévenin 1976) in France, and from Ambrona in Spain (Howell 1966, 129). Among a series of about twenty haematite pebbles found in the Acheulian layer of Hunsgi, India, one specimen bears a distinct facet with sub-parallel striations indicative of its use as a crayon to colour a rock surface (Bednarik 1990).

Recently the quantity of pigment from the Lower Stone Age of sub-Saharan Africa has been increased significantly, and with it the evidence of use in the form of striation facets. This includes more than seventy red ochre pieces from site GnJh-15 in the Kapthurin Formation, Kenya,

>285,000 years old (McBrearty 2001, 92); and more than 306 pieces of pigment excavated at Twin Rivers, Zambia, dated to between 270,000 and 170,000 years BP (Barham 2002). Ten of these specimens show signs of modification by grinding or rubbing. Finally, the red pigment traces on the Tan-Tan figurine from Morocco also need to be considered in this context (Bednarik 2001a; Bednarik 2003).

The existence of figurines in the L.P. has only recently been seriously considered and we currently have only two specimens that appear to deserve the designation 'figurine'. One is a basaltic tuff pebble containing scoria clasts from the Late Acheulian at Berekhat Ram, Israel, older than 230,000 years (Goren-Inbar 1985). Its natural form, suggestive of a female human, has been emphasised by grooves implying that the iconic properties of the object were appreciated (Goren-Inbar 1986; Goren-Inbar/Peltz 1995). As in the case of the Bilzingsleben engravings, most commenting authors rejected the find in the subsequent years without examining it (e.g. Chase/Dibble 1987; Davidson 1990; Pelcin 1994; Nowell 1995; Noble/Davidson 1996, 75; Davidson/Noble 1998). Marshack (1996, 1997) and d'Errico and Nowell (2000) conducted microscopic studies of the object and its various markings, concluding that the grooves and abrasive markings were made with stone tools.

The issue was finally resolved with the report of a second stone figurine. The object from Tan-Tan, Morocco, is of quartzite and comes from a Middle Acheulian occupation layer thought to be about 400 ka old on the basis of the lithic typology (Bednarik 2001a; Bednarik 2003). Its anthropomorphous form is much more pronounced than that of the Israeli specimen and is emphasised by eight symmetrically arranged grooves (fig. 3). Five of these lines were found to have been modified and microscopic traces of a brilliant red pigment seem to indicate that the figurine had once been coated by red paint. This is not only the earliest figurine we have currently, but also the earliest evidence of applied pigment.

Another class of palaeoart objects from the L.P. is formed by small perforated objects that may have been used as beads or pendants. Their perforations may be either natural or artificial. Their importance is not so much related to their manufacture, but to the need for complex symbolic behaviour patterns without which it would be impossible to find any justification for the great investment of labour such utterly non-utilitarian products often involve. Boucher de Perthes (1846) not only discovered Palaeolithic tools, he also found at St Acheul a large number of fossilised sponge fragments with central perforations (*Coscinopora globularis*), which were considered to have been used as beads (Prestwich 1859, 52). Prestwich himself, who also found some specimens, remained undecided but did note that some of the holes appeared to have been enlarged artificially. The possible beads had been forgotten by the time Smith (1894, 272–276) excavated about 200 identical items from an Acheulian site at Bedford, England. These were of the same species and also showed artificial enlargement of the natural orifice. Smith was certain that his specimens were used as beads, which in view of the identical French finds from the same period is indeed likely. Keeley (1980, 164) examined some of the English sample and confirmed that there is no doubt that their perforations were modified,

Fig. 3 The Tan-Tan quartzite figurine.

and Marshack's (1991) analysis detected organic residues in some of the holes of these apparent beads. Goren-Inbar et al. (1991) also recovered disc-like and centrally perforated fossil casts from an Acheulian site, Gesher Benot Ya'aqov in Israel, although these are crinoid segments (*Millericrinus* sp.) and no evidence of modification was noted. The use of these objects as beads is rendered particularly plausible by the excavation of similar disc beads at El Greifa site E, a Late Acheulian site in Libya (Ziegert 1995; Bednarik 1997). They are of ostrich eggshell and were very expertly manufactured around 200,000 years ago.

Similarly, there is no doubt about the authenticity of two pendants from the Repolusthöhle in Austria (Bednarik 1992; Bednarik 1997). Their perforations are clearly anthropic, but since their discovery (Mottl 1951) they have attracted almost no attention. A drilled wolf incisor and flaked bone point were recovered together with a large lithic assemblage variously described as Levalloisian, Tayacian and Clactonian, probably a late L.P. industry. According to the regionally well-known palaeontology, especially the phylogeny of the bears, the occupation seems to be in the order of 300,000 years old.

The last group of L.P. palaeoart objects to be considered are the manuports, unmodified objects collected, transported and deposited by hominids. They can be identified when they occur in occupation deposits in which they could not possibly occur naturally. Another distinctive characteristic of manuports is that they possess some outstanding visual properties that are presumed to have prompted their acquisition. The collection and cultural use of exotic objects is not limited to hominids, it can be observed in various other animals, notably in certain bird species.

The earliest reported manuport dates from the very beginnings of hominid phylogeny, being almost 3 million years old. Attributed to Australopithecus until recently, the discovery of *Kenyanthropus platyops* (3.5 million years) offers another possible explanation for its occurrence in a

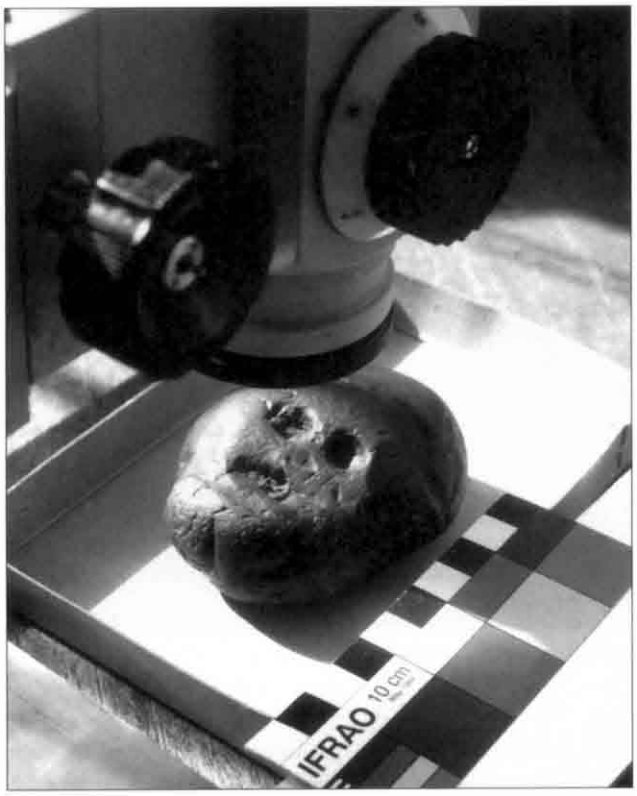

Fig. 4 Microscopic examination of the Makapansgat cobble.

Fig. 5 The Erfoud manuport.

dolomite cave. The Makapansgat jasperite cobble was excavated in 1925 from the fossiliferous, australopithecine-bearing breccia 3 of the Limeworks cave, Makapan valley, South Africa (Eitzman 1958; Dart 1974). Its history was reconstructed by microscopic study of its surface markings and accretions (Bednarik 1998). The distinctive markings of the cobble, especially the most prominent 'eyes' and 'mouth', seem to have prompted its collection at least several kilometres from the site, either by australopithecines or by some of the earliest hominids (fig. 4).

This find remains entirely unique, but clear prismatic rock crystals are a more common form of manuports at early occupation sites. They are sometimes so small that they could not possibly have served any utilitarian purpose, but their obvious visual properties seem to have attracted curiosity. Rock crystal prisms occur in all Acheulian occupation layers of Wonderwork Cave, the lowest of which have been suggested to be about 900,000 or 800,000 years old (P. Beaumont, pers. comm.). Numerous small quartz crystals were excavated from the Acheulian layer of Gesher Benot Ya'aqov, Israel (Goren-Inbar et al. 1991). The Lower Acheulian site Singi Talav in India has yielded six complete and unmodified quartz prisms ranging from only 7–25 mm. They differ mineralogically, which suggests that they originate from different crystal flowers and were probably brought to the site independently (d'Errico et al. 1989). Zhoukoudian in China provided about twenty more quartz crystals, occurring in this case with *Homo erectus* remains (Pei 1931, 120). The fragment of a large clear rock crystal was excavated in the Acheulian layer of the Gudenushöhle, Austria, together with several smaller fragments of this glass-like material (Bednarik 1992).

Oddly enough, the most-cited specimen of a L.P. evidence of 'symbolic cognition' is a handaxe from West Tofts, Norfolk (Oakley 1981). While it is quite possible that the well-preserved fossil cast on its surface was noted by the maker of this artefact, this is not at all possible to demonstrate. Fossil casts occur occasionally in all sedimentary silicas, and there is a statistical probability that such a feature can appear on a large stone tool without intentionality having to account for this.

Similarly, the anthropomorphous dolomite piece from Mumbwa Caves, Zambia (Barham 2000), may well be a manuport, but until it is shown to have been either introduced or modified by hominids its status remains to be clarified. Dated to oxygen isotope stage 5e, it was found in debris associated with the foundations of a windbreak. This brings to mind the identical context of the Erfoud manuport from Morocco, which was also found within the outline of a Late Acheulian windbreak or dwelling structure (Bednarik 2003). This fossil cast of *Orthoceras* sp. is distinctively reminiscent of a human penis in every aspect of form, size and surface appearance (fig. 5). Cuttlefish fossils are very common in other parts of Morocco, but they do not occur naturally in the region of the find site, so this is also a L.P. manuport.

I am prepared to accept that the iconicity of a natural and unmodified object was recognised by hominids when it occurs at an occupation site where its presence cannot be credibly accounted for by natural means, and when its iconic qualities are particularly striking or obvious. There are hundreds of L.P. specimens, mostly flint nodules, in which many investigators perceive likenesses of human and animal forms. These finds are generally excluded from formal archaeological discourse, and for the major part justifiably so. However, in recognising that some iconic recognition does extend to the L.P. it would be precipitate to a priori reject all these claims. These hundreds of specimens need to be culled to select those few that derive from occupation layers so that they can be subjected to specialist study.

The Bilzingsleben engravings in context

Not only has it become clear that recognition of three-dimensional iconic resemblance was available in the L.P., we now have ample evidence of ochre use in the Middle Pleistocene, which may include the application of pigment to rock surfaces. We know with certainty that the Acheulians at least of India created groups of randomly arranged cupules on prominent vertical rock panels, with an incredible investment of labour. Elsewhere they perceived three-dimensional iconicity in naturally shaped objects and modi-

fied these to produce the first figurines. We also know that some of these hominids went to great pains to produce tiny, perfectly made beads from ostrich eggshell, and other forms of beads and pendants were probably used.

But there are far greater corrections we have to accept to our previous consensus model of hominid capabilities. The evidence for maritime navigation by L.P. sailors has been available for 40 years, but its full significance has only begun to be appreciated in the late 1990s (Bednarik 1997a; Bednarik 1999; Bednarik 2003; Bednarik 2003a; Bednarik/Kuckenburg 1999). The most comprehensive proof comes from Indonesian islands never connected to any landmass in their short geological history, but clearly occupied before the end of the Early Pleistocene. While the oldest direct archaeological evidence for seafaring in the Mediterranean is considerably more recent (Bednarik 1999a), it is still of the L.P., and there is a growing corpus of indirect evidence suggesting that the first hominids to reach Europe did so by crossing the Strait of Gibraltar. This may never be conclusively demonstrated, but the pattern of L.P. dispersal in Europe and the similar trajectories of culture north and south of the western Mediterranean, combined with the much greater maritime feats in Indonesia at the time of first human colonisation in Europe render this scenario most persuasive.

Be that as it may, the solid proof of *Homo erectus*' seafaring ability in Indonesia provides every reason for us to rescind our general construct of the capabilities of L.P. hominids entirely and to replace it with a paradigm more in tune with this reality. We have very severely misjudged the cognitive, cultural and even technological competence of early humans. Seafaring colonisers were certainly skilled users of language or speech, we have to assume that they used cordage and knots, and my replicative experiments in L.P. seafaring technology have suggested that their exploits would have been impossible unless they had planned them for several months in advance (Bednarik 1999; Bednarik 2001b; Bednarik 2003; Bednarik 2003a). In any realistic review we need to consider that hominids such as *Sahelanthropus tchadensis* may have begun their reign 7,000,000 years ago, and that almost 300,000 years ago a hominid found the Makapansgat cobble sufficiently interesting to carry it around. When we consider the massive encephalisation it is simply absurd to expect that almost no cognitive evolution should have occurred in hominids for 7 million years. The view that this was followed by an immense 'explosion' in their cognitive faculties during the last third of the Late Pleistocene, i.e. the last 0.5% of the duration of hominid evolution, is similarly absurd. No increase in cranial volume occurred then. Yet this is what palaeoanthropology and archaeology have favoured over the last two decades, especially in the Anglo-American school of archaeology. The 'discontinuist' or 'short-range' model of human evolution that has dominated recent discussions is almost certainly false. It is much more probable that the increase in cognitive competence occurred gradually, over a long period of time, perhaps roughly reflecting the increase in cranial capacity over the same period. This applies also to language or speech and to other fundamentally human capacities such as the creation of concepts of reality, concepts of self, and the acquisition of non-utilitarian systems facilitating advanced cultural and social constructs. All of this developed long before the advent of *Homo sapiens sapiens*.

But perhaps most importantly for the Bilzingsleben question, the few portable engravings we have of the L.P. imply the existence of already distinctive if rudimentary traditions. There is especially a marking behaviour one might call 'spatially determined doodling', which is still present in the subconscious of humans today (e.g. in the kind of doodles we generate 'involuntarily' on the pages of telephone directories). I define this as a graphic reaction to a given surface area or configuration that seems to invite the filling in of morphologically distinct areas, or the emphasising of their shape. There are also several apparent reactions to edges evident in the available sample. In other words, in considering these earliest engravings it is important not to see them in isolation, but within the context of the surface facet or the features delimiting the same. This is evident from some of the Bilzingsleben engravings, especially objects 1 and 3, and in more recent examples where the palaeoartist clearly responded to existing natural conditions. For instance in the East London specimen, a set of parallel natural lines was turned into a grid by adding a second set at right angle, and the Mousterian nummulite from Tata (Bednarik 1995, 613) presenting a natural divided circle became a radial motif in a circle by the simple addition of one line on each side. Other examples implying evolutionary processes are the Blombos Cave haematite engravings and the Bacho Kiro zigzags, which are in terms of complexity half-way between the L.P. engravings and the Upper Palaeolithic geometric engravings from India, Israel, China and Russia. Similarly, there appears to be a progression in complexity, from the random cupules of the L.P., via the paired cupules of the Mousterian at La Ferrassie, to the geometrically arranged cupule patterns of more recent times. In short, the record presents considerable evidence of evolution in palaeoart, but it also permits us to trace rudimentary palaeoart traditions all the way back to the L.P.

Until now these developments have remained obscured by the inadequate attention given to the earliest palaeoart forms, and by biased procedures of data acquisition and data evaluation. Seen in the light of what is now apparent about the evolution of very early graphic behaviour the kinds of engravings Mania reported from Bilzingsleben are precisely the kind of evidence we should have expected from the period they belong to: sets of grouped sub-parallel lines that appear to be responses to edges or facet shapes. Mania recognised their significance without knowing that this is how engravings of that period should look. Comparable material was either not known at the time, or had not yet been found. The simple fact that his material is of the kind that is to be expected from the late L.P. confirms not only that he was right, but also that he is an outstanding pioneer of early palaeoart studies. Many pioneer researchers in archaeology never experienced the vindication of their work and ideas in their own lifetimes. Professor Dr. Dietrich Mania is fortunate in this respect: all recent discoveries squarely confirm the veracity of his early pronouncements, and I am certain that he will witness much more vindication of his claims concerning the cognitive sophistication of Lower Palaeolithic hominids.

Literaturverzeichnis

Barham 2000
L. S. Barham, The Middle Stone Age of Zambia, south central Africa (Bristol 2000).

Barham 2002
L. S. Barham, Systematic pigment use in the Middle Pleistocene of south-central Africa, Current Anthr. 43, 2002, 181–190.

Beaumont 1990
P. B. Beaumont, Wonderwerk Cave. In: P. B. Beaumont/D. Morris (eds.), Guide to archaeological sites in the Northern Cape (Kimberley 1990) 101–134.

Beaumont 1999
P. B. Beaumont, Wonderwerk Cave. In: INQUA XV International Conference Field Guide: Northern Cape (Kimberly 1999) 27–31.

Beaumont/Morris 1990
P. B. Beaumont/D. Morris (eds.), Guide to archaeological sites in the Northern Cape (Kimberley 1990).

Bednarik 1988
R. G. Bednarik, Comment on Mania and Mania 1988. Rock Art Research 5, 1988, 96–100.

Bednarik 1990
R. G. Bednarik, An Acheulian haematite pebble with striations. Rock Art Research 7, 1990, 75.

Bednarik 1992
R. G. Bednarik, Palaeoart and archaeological myths. Cambridge Arch. Journal 2,1, 1992, 27–43.

Bednarik 1993
R. G. Bednarik, Die Bilzingslebener Gravierungen im Lichte altpaläolithischer Beweise kognitiver Fähigkeit. Ethnogr.-Arch. Zeitschr. 34, 1993, 550–554.

Bednarik 1993a
R. G. Bednarik, Palaeolithic art in India. Man and Environment 18, 2, 1993, 33–40.

Bednarik 1994
R. G. Bednarik, The Pleistocene art of Asia. Journal World Prehist. 8, 4, 1994, 351–375.

Bednarik 1994a
R. G. Bednarik, Art origins. Anthropos 89, 1994, 169–180.

Bednarik 1995
R. G. Bednarik, Concept-mediated marking in the Lower Palaeolithic. Current Anthr. 36, 1995, 605–634.

Bednarik 1997
R. G. Bednarik, The role of Pleistocene beads in documenting hominid cognition. Rock Art Research 14, 1997, 27–43.

Bednarik 1997a
R. G. Bednarik, The origins of navigation and language. The Artefact 20, 1997, 16–56.

Bednarik 1998
R. G. Bednarik, The australopithecine cobble from Makapansgat, South Africa. South African Arch. Bull. 53, 1998, 3–8.

Bednarik 1999
R. G. Bednarik, Maritime navigation in the Lower and Middle Palaeolithic. Comptes Rendus de l'Académie des Sciences Paris 328, 1999, 559–563.

Bednarik 1999a
R. G. Bednarik, Pleistocene seafaring in the Mediterranean. Anthropologie 37, 1999, 275–282.

Bednarik 2000
R. G. Bednarik, Early Indian petroglyphs and their global context. Purakala 11, 2000, 37–47.

Bednarik 2001
R. G. Bednarik, The Early Indian Petroglyphs Project (EIP). Rock Art Research 18, 2001, 72.

Bednarik 2001a
R. G. Bednarik, An Acheulian figurine from Morocco. Rock Art Research, 18, 2001, 115–116.

Bednarik 2001b
R. G. Bednarik, Replicating the first known sea travel by humans: the Lower Pleistocene crossing of Lombok Strait. Human Evolution 16, 3–4, 2001, 229–242.

Bednarik 2003
R. G. Bednarik, A figurine from the African Acheulian. Current Anthr. 44, 2003 (page numbers not yet in hand).

Bednarik 2003a
R. G. Bednarik, Seafaring in the Pleistocene. Cambridge Arch. Journal 13, 1, 2003, 41–66.

Bednarik/Kuckenburg 1999
R. G. Bednarik/M. Kuckenburg, Nale Tasih: eine Floßfahrt in die Steinzeit (Stuttgart 1999).

Binneman/Beaumont 1992
J. Binneman/P. Beaumont, Use-wear analysis of two Acheulean handaxes from Wonderwerk Cave, Northern Cape. South African Field Archaeology 1, 1992, 92–97.

Boucher de Perthes 1846
J. Boucher de Perthes, Antiquités celtiques et antédiluviennes (Paris 1846).

Byers 1994
M. Byers, Symboling and the Middle–Upper Palaeolithic transition. Current Anthr. 35, 1994, 369–399.

Chase/Dibble 1987
P. G. Chase/H. L. Dibble, Middle Palaeolithic symbolism: a review of current evidence and interpretations. Journal Anthr. Arch. 6, 1987, 263–296.

Clark 1974
J. D. Clark, Kalambo Falls prehistoric site, Vol. 2 (Cambridge 1974).

Clark et al. 1947
J. D. Clark/K. P. Oakley/L. H. Wells/J. A. C. McClelland, New studies on Rhodesian man. Journal Royal Anthr. Soc. 77, 1947, 4–33.

Crémades 1996
M. Crémades, L'expression graphique au paléolithique inférieur et moyen: l'exemple de l'Abri Suard (La Chaise-de-Vouthon, Charente). Bull. Soc. Préhist. Française 93, 4, 1996, 494–501.

Dart 1974
R. A. Dart, The waterworn australopithecine pebble of many faces from Makapansgat. South African Journal of Science 70, 1974, 167–169.

Davidson 1990
I. Davidson, Bilzingsleben and early marking. Rock Art Research 7, 1990, 52–56.

Davidson/Noble 1989
I. Davidson/W. Noble, The archaeology of perception: Traces of depiction and language. Current Anthr. 30, 1989, 125–155.

Davidson/Noble 1990
I. Davidson/W. Noble, Tools, humans and evolution: the relevance of the Upper Palaeolithic. Paper presented to the symposium 'Tools, language and intelligence: evolutionary implications' (Cascais 1990).

Davidson/Noble 1998
I. Davidson/W. Noble, Two views of language origins. Cambridge Arch. Journal 8, 1998, 82–88.

d'Errico et al. 1989
F. d'Errico/C. Gaillard/V. N. Misra, Collection of non-utilitarian objects by *Homo erectus* in India. In: Hominidae. Proc. 2nd Int. Congress of Human Paleontology (Milan 1989) 237–239.

d'Errico et al. 2001
F. d'Errico/C. Henshilwood/P. Nilssen, An engraved bone fragment from c. 70,000-year-old Middle Stone Age levels at Blombos Cave, South Africa: implications for the origin of symbolism and language. Antiquity 75, 2001, 309–318.

d'Errico/Nowell 2000
F. d'Errico/A. Nowell, A new look at the Berekhat Ram figurine: implications for the origins of symbolism. Cambridge Arch. Journal, 10, 2000, 123–167.

d'Errico/Villa 1997
F. d'Errico/P. Villa, Holes and grooves: the contribution of microscopy and taphonomy to the problem of art origins. Journal Human Evol. 33, 1997, 1–31.

Eitzman 1958
W. I. Eitzman, Reminiscences of Makapansgat Limeworks and its bone-breccial layers. South African Journal of Science 54, 1958, 177–182.

Gamble 1993
C. Gamble, Timewalkers. The prehistory of global colonization (Cambridge, Mass. 1993).

Gargett 1989
R. H. Gargett, Grave shortcomings: the evidence for Neanderthal burial. Current Anthr. 30, 1989, 157–77.

Goren-Inbar 1985
N. Goren-Inbar, The lithic assemblages of Berekhat Ram Acheulian site, Golan Heights. Paléorient 11, 1985, 7–28.

Goren-Inbar 1986
N. Goren-Inbar, A figurine from the Acheulian site of Berekhat Ram. Mi'tekufat Ha'even 19, 1986, 7–12.

Goren-Inbar/Peltz 1995
N. Goren-Inbar/S. Peltz, Additional remarks on the Berekhat Ram figurine. Rock Art Research 12, 1995, 131–132.

Goren-Inbar et al. 1991
N. Goren-Inbar/Z. Lewy/M. E. Kislev, Bead-like fossils from an Acheulian occupation site, Israel. Rock Art Research 8, 1991, 133–136.

Günther 1994
H. Günther, Paläolithische Funde aus dem mittleren Unstruttal bei Oldisleben, Lkr. Artern. Arch. Deutschland 1, 1994, 4.

Hodgson 2000
D. Hodgson, Art, perception and information processing: an evolutionary perspective. Rock Art Research 17, 2000, 3–34.

Howell 1966
F. C. Howell, Observations of the earlier phases of the European Lower Palaeolithic. Am. Anthropologist 68, 2, 1966, 88–201.

Keeley 1980
L. H. Keeley, Experimental determination of stone tool uses (Chicago 1980).

Kumar 1996
G. Kumar, Daraki-Chattan: a Palaeolithic cupule site in India. Rock Art Research 13, 1996, 38–46.

Laidler 1933
P. W. Laidler, Dating evidence concerning the Middle Stone Ages and a Capsio-Wilton culture, in the South-East Cape. South African Journal of Science 30, 1933, 530–542.

Leakey 1971
M. D. Leakey, Olduvai Gorge. Vol. 3: excavations in Beds I and II, 1960–63 (Cambridge 1971).

Lumley 1966
H. de Lumley, Les fouilles de Terra Amata à Nice. Premiers résultats. Bull. Musée d'Anthr. Préhist. Monaco 13, 1966, 29–51.
McBrearty 2001
S. McBrearty, The Middle Pleistocene of East Africa. In: L. Barham/K. Robson-Brown (eds.), Human roots: Africa and Asia in the Middle Pleistocene (Bristol 2001) 81–92.
Mania 1983
D. Mania, Die Molluskenfauna des mittelpleistozänen Travertinkomplexes bei Bilzingsleben und ihre ökologisch-stratigraphische Aussage. In: D. H. Mai/D. Mania/T. Nötzold/V. Toepfer/E. Vlček/W.-D. Heinrich (Hrsg.), Bilzingsleben II (Berlin 1983) 131–155.
Mania 1990
D. Mania, Der Mensch vor 350 000 Jahren: Bilzingsleben (Artern 1990).
Mania 1991
D. Mania, The zonal division of the Lower Palaeolithic open-air site Bilzingsleben. Anthropologie 29, 1991, 17–24.
Mania 1991a
D. Mania, Zur Paläontologie der mittelpleistozänen Travertine von Bilzingsleben. In: K. Fischer/E. W. Guenther/W.-D. Heinrich/D. Mania/R. Musil/T. Nötzold (Hrsg.), Bilzingsleben IV (Berlin 1991) 9–28.
Mania/Mania 1988
D. Mania/U. Mania, Deliberate engravings on bone artefacts of *Homo erectus*. Rock Art Research 5, 1988, 91–107.
Mania/Vlček 1987
D. Mania/E. Vlček, Homo erectus from Bilzingsleben (GDR). His culture and his environment. Anthropologie 25, 1987, 1–45.
Mania/Weber 1986
D. Mania/T. Weber, Bilzingsleben III: *Homo erectus*–seine Kultur und seine Umwelt. Veröff. Landesmus. Vorgesch. Halle 39 (Berlin 1986).
Marshack 1981
A. Marshack, On Paleolithic ochre and the early uses of color and symbol. Current Anthr. 22, 1981, 188–191.
Marshack 1991
A. Marshack, A reply to Davidson on Mania and Mania. Rock Art Research 8, 1991, 47–58.
Marshack 1996
A. Marshack, A Middle Palaeolithic symbolic composition from the Golan Heights: the earliest known depictive image. Current Anthr. 37, 1996, 357–365.
Marshack 1997
A. Marshack, The Berekhat Ram figurine: a late Acheulian carving from the Middle East. Antiquity 71, 1997, 327–337.
Mellars 1996
P. Mellars, The Neanderthal legacy (Princeton 1996).
Mithen 1998
S. Mithen (ed.), Creativity in human evolution and prehistory (New York 1998).
Moog 1939
F. Moog, Paläolithische Freilandstation im Älteren Löß von Wyhlen (Amt Lörrach). Bad. Fundber. 15, 1939, 36–52.
Mottl 1951
M. Mottl, Die Repolust-Höhle bei Peggau (Steiermark) und ihre eiszeitlichen Bewohner. Arch. Austriaca 8, 1951, 1–78.
Noble/Davidson 1993
W. Noble/I. Davidson, Tracing the emergence of modern human behavior: Methodological pitfalls and a theoretical path. Journal Anthr. Arch. 12, 1993, 121–149.
Noble/Davidson 1996
W. Noble/I. Davidson, Human evolution, language and mind: a psychological and archaeological inquiry (Cambridge 1996).
Nowell 1995
A. Nowell, Comment on Bednarik 1995. Current Anthr. 36, 1995, 621–622.
Oakley 1981
K. P. Oakley, Emergence of higher thought, 3.0–0.2 Ma B.P. Philosophical Transactions of the Royal Society of London B 292, 1981, 205–211.
Pei 1931
W. C. Pei, Notice of the discovery of quartz and other stone artifacts in the Lower Pleistocene hominid-bearing sediments of the Choukoutien Cave deposits. Bull. Geolog. Soc. China 11, 2, 1931, 109–146.
Pelcin 1994
A. Pelcin, A geological explanation for Berekhat Ram figurine. Current Anthr. 35, 1994, 674–675.
Prestwich 1859
J. Prestwich, On the occurrence of flint-implements, associated with the remains of extinct mammalia, on undisturbed beds of a late geological period. Proc. Royal Soc. London 10, 1859, 50–59.
Raynal/Séguy 1986
J. P. Raynal/R. Séguy, Os incisé acheuléen de Sainte-Anne 1 (Polignac, Haute-Loire). RACF 25, 1986, 79–80.
Schwarcz et al. 1988
J.-P. Schwarcz/R. Grün/A. G. Latham/D. Mania/K. Brunnacker, The Bilzingsleben archaeological site: new dating evidence. Archaeometry 30, 1988, 5–17.
Smith 1894
W. G. Smith, Man the primeval savage (London 1894).
Steguweit 1999
L. Steguweit, Intentionelle Schnittmarken auf Tierknochen von Bilzingsleben – Neue lasermikroskopische Untersuchungen. Praehist. Thuringica 3, 1999, 64–79.
Stringer/Gamble 1993
C. Stringer/C. Gamble, In search of the Neanderthals: solving the puzzle of human origins (London 1993).
Thévenin 1976
A. Thévenin, Les civilisations du paléolithique intérieur en Alsace. In: H. de Lumley (ed.), Le préhistoire française, Vol. 1: Les civilisations paléolithiques et mésolithiques de la France, Centre National de la Recherche Scientifique (Paris 1976) 984–996.
Valoch 1987
K. Valoch, The early Palaeolithic site Stránská skála I near Brno (Czechoslovakia). Anthropologie 25, 1987, 125–142.
Ziegert 1995
H. Ziegert, Das neue Bild des Urmenschen. Uni-hh-Forschung 30, 1995, 9–15.

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