Man and environment in the Palaeolithic
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Introduction to "Man and environment in the Palaeolithic"

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"Man and environment in the Palaeolithic" is a subject eliciting more and more interest and gaining increasing importance in present-day human evolutionary research. Many papers and books (see references) are focussing on human ecology, on human-environmental relations and interactions in Palaeolithic times under the general and special aspects and disciplinary and interdisciplinary perspectives. Although the current confrontation with problems faced by the fossil hominids' relationship to their environments has to be viewed as a continued approach to research, the great number of new aspects and results is about to set off an interdisciplinary and multidisciplinary dialogue between scientists from different disciplines on a more specified level.

Human Evolution International Interdisciplinary Project

"Man and environment in the Palaeolithic" was the title of the 1st international interdisciplinary symposium of the **Human Evolution International Interdisciplinary Project *"Hominids in their environments"*.** This project is a continuation of the author's research on human evolution. The idea of this project was born early in 1990, immediately after the fall of the Berlin wall, but many problems and difficulties made it impossible to start earlier than in May 1993. It has been suggested that an interdisciplinary panel should be established to discuss the global problems of human evolution in relation to natural and cultural environmental changes and that a book should be prepared on foundations of life styles and survival strategies developed by Palaeolithic humans.

In 1977 an interdisciplinary working group "Probleme der Menschwerdung" (Problems of the origins and evolution of humans), headed by H. Ullrich, was founded at the former "Zentralinstitut für Alte Geschichte und Archäologie" at the Akademie der Wissenschaften in Berlin. About 30 specialists from various disciplines (physical anthropology, archaeology, ethnography, ethology, evolutionary biology, geophysics, history, palaeontology, philosophy, psychology etc.), all from Eastern Germany, started cooperating in this project. In more than 25 colloquia and symposia general and theoretical problems of the origins and evolution of humans were discussed under disciplinary and interdisciplinary aspects (Ullrich 1992, 1993). In 1981 an international conference *"Anthroposoziogenese - biotischer und gesellschaftlicher Entwicklungsprozeß der Menschheit"* was held in Weimar. Proceedings of this conference were published by Herrmann & Ullrich (1985). Another international congress *"Kontinuität und Diskontinuität in der Evolution des Menschen und der menschlichen Gesellschaft"* was organized in Wittenberg in 1988. The main objective of the interdisciplinary working group was to prepare manuscripts for the book *"Menschwerdung"* (eds. Herrmann & Ullrich 1991), an overall view on the hominization process from multiple and interdisciplinary perspectives, which was published in 1991 after many difficulties. In this book the problems of human-environment relations and interactions could only be briefly discussed.

Natural and cultural environments

Humans, more or less successfully, have adapted themselves physically to different natural environments in the Palaeolithic and they have created their own cultural environments by means of their

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cultural developments. Humans may have also actively influenced their natural environments and they have changed their cultural environments. Evolution of mankind has therefore been closely connected with two operating processes:
- adaptation to environments, and
- interaction with environments.

Adaptive and interactive processes have been influenced by both natural selection and cultural selection activities and they have been acting in different kinds of environments:
- natural environments, and
- cultural environments.

Environmental studies with respect to human evolution therefore have to consider factors that affect the natural as well as cultural environments.

The natural environments and their evolution have been determined by geological and biological regularities operating independently of the existence of humankind. Humans in the Palaeolithic were completely dependent on the natural environments and they had to adapt biologically to various natural environmental conditions and their changes. But by means of the man-made cultural environments humans in the Palaeolithic were also more and more able to develop survival strategies and to interact with their natural environments. The most important natural environmental conditions humans were dependent upon or had to adapt to in Palaeolithic times were the following:
- geological landscape with its vegetation, caves, shelters etc.;
- climatic conditions, the most important factor humans had to adapt to;
- food resourses (animals, plants, water resources), the most important factor humans were dependent on as scavengers, hunters and gatherers;
- raw material resources for artifacts etc.

The cultural environments are man-made environments, typical of humans only. These environments are based on tool making abilities, on the tool making behaviour and have developed step-by-step in close connection with the cultural and social behaviour of humans in the Palaeolithic. The cultural environments are mainly limited to home bases (caves, shelters, open occupation sites), where humans meet their material and mental requirements, but also to places of human activity outside the home bases (hunting and gathering areas, kill sites of animals etc.). As a result of the cultural environments humans enabled to adapt themselves culturally to the natural environments and accordingly to interact with them. The cultural environments are influenced by, or are dependent on biological, cultural and social factors.

The main biological factors affecting the social group and therefore also the cultural environments are as follows:
- natural selection activity on morphological adaptations to the natural environments, with previously important adaptive morphological features losing their former adaptive significance more and more in connection with the developing cultural environments;
- reproduction and fertility of human groups;
- life expectancy and mortality in human groups;
- nutrition and diseases.

The cultural environments are dependent on the following main cultural factors:
- tool making behaviour as the main basis for the whole cultural behaviour;
- nutritional behaviour, especially based on meat;
- hunting behaviour, especially based on large mammals, starting obviously with late *Homo erectus;*
- behaviour concerning the arrangements of the home bases with living areas (dwellings, tents, huts etc.), activity areas (working places), waste areas and special cultural areas;
- aesthetical behaviour;
- artistic behaviour.

Social factors affecting the cultural environments are as follows:
- system of social behaviour of human groups;
- neighbourhood behaviour to other human groups;
- magical, cult and, later, also religious behaviour;
- mortuary behaviour and reflecting behaviour on life and death, on the world humans living in and on the afterworld.

The cultural environments were the main basis for a successful adaptation to and interaction of Palaeolithic humans with their natural environments.

Adaptations

Adaptation is a process in human evolution that has mainly acted physically on the body building and on special traits of the human body via the adequately adapted morphological (and physiological) structures. The process has been a biological process and proceeding therefore very slowly and over a very long period. For human indivi-

duals this process of biological adaptation is completely inactive. In contrast to biological (physical) adaptation, the cultural adaptation to natural environmental conditions (e.g. climatical conditions by means of clothing, firing, dwellings) has been a process that acted more or less quickly over a relative short time. Cultural adaptations therefore enabled humans directly and actively to react to changes in natural environmental conditions. The results of cultural adaptations had to be passed on from one living social group to their descendents and these adaptations had to be renewed actively by the descendents. Between biological and cultural adaptation processes there were reciprocal influences and interactions mainly in the direction that some adaptive morphological (or physiological) structures more and more lost their former adaptive significance.

Cultural adaptation to natural environmental conditions did not actively influence the natural environments of Palaeolithic humans. If it were possibly done at all, it could have only affected, very limitedly, the resources of food and raw materials. The question has to be answered whether the impact of Palaeolithic humans on the herbivorous megafauna could have led to the extinction of species and genera in Palaeolithic times, the extinction of animals that provided humans with plenty of meat. If Palaeolithic humans had caused it this would have marked the first interference by humans in the natural environments in the history of mankind. On the other hand, Palaeolithic humans' life was so strictly dependent on the natural environment that it would be hard to imagine that Palaeolithic man destroyed the basis of his own existence.

Life styles and survival strategies

Interactions with the environments to the full could only be given with the cultural environments in Palaeolithic times. Palaeolithic human groups had to find out the optimal way of life under a given natural environment and under the given cultural environments on the basis of their biological equipment. Some groups will have experienced it with more, others with less success and some groups will have become extinct. The search for the optimal way of survival enabled Palaeolithic humans to develop survival strategies and on the basis of these strategies to interact with the natural environments. The reconstruction of these survival strategies should, in our opinion, become the main topic of current and future research on humans and their environments in the Palaeolithic. Many questions arise around the survival strategies in Palaeolithic times: When and where did they originate from? How did they evolve in the various regions under different conditions of the natural and cultural environments? How did life styles and survival strategies change in connection with changes in the natural and in the cultural environments? Many other questions could be asked in this way.

Many disciplines can contribute to the reconstruction of survival strategies in the Palaeolithic. Anthropology, archaeology and palaeontology are, of course, the main disciplines, but they have to focus on new aspects of Palaeolithic human's life. For instance, anthropologists should look not only for adapted morphological structures in fossil human remains, but they should also concentrate on the functional meaning of morphostructures of the postcranial skeleton with respect to special activities of Palaeolithic man. Knüsel (1992) had shown that there is an increasing amount of evidence suggesting that throwing and use of projectile weapons had influenced the more recent human skeletal anatomy and that the earliest osteological evidence for handedness and throwing appears to come in Neanderthal populations. Wheeler (1993) studied the influence of the body mass on hominid energy and water budgets and demonstrated the thermoregulatory advantages of large body size for early hominid's foraging in savannah environment. These are only two recent examples of new aspects in palaeoanthropological research that focus on human-environment relations. Ethology and ethnology can also contribute important results based on life styles and survival strategies of nonhuman primates, especially apes, and of recent hunter-gatherers.

Symposium
"Man and environment in the Palaeolithic"

The International Symposium ***"Man and environment in the Palaeolithic"*** was organized by the **Human Evolution International Interdisciplinary Project** and held by the Institut für Anthropologie der Medizinischen Fakultät (Charité) der Humboldt-Universität zu Berlin in cooperation with the Forschungsbereich Altsteinzeit des Römisch-Germanischen Zentralmuseums at Schloß Monrepos in Neuwied (Germany), May 2-7, 1993. About 40 participants from 13 coun-

tries (Austria, Belgium, Canada, Czech Republic, France, Germany, Great Britain, Hungary, Israel, Poland, Switzerland, U.S.A. and Vietnam) attended the symposium. The participants enjoyed very much the warm hospitality by Professor Dr. G. Bosinski and his colleagues from the Forschungsbereich Altsteinzeit and the Museum für die Archäologie des Eiszeitalters at Schloß Monrepos. About 30 papers were presented covering global topics, such as climate and the pattern of hominid evolution, ecology and hominization in the Pleistocene, human-environment relations in the early parts of the Palaeolithic, hominid evolution in perspective, the pattern of hominid evolution, vertebrate microfaunal and environmental changes in Pleistocene Middle Europe and hominid exploitation of larger mammals during the Middle Pleistocene. Many papers dealt with special aspects of human-environment relations and archaeological as well as palaeontological evidence of humans and their environments in the Palaeolithic. Anthropological papers focussed on morphological evidence of adaptive characters in the genus *Homo* and on models of adaptation in Palaeolithic and post-Palaeolithic times.

A full day excursion was organized and guided by G. Bosinski to Palaeolithic sites and exposures in the Eifel area (Kärlich, Schlackenkegel, Metternich, Miesenheim IV, Bimsprofile, Laacher See), where Bosinski and his colleagues had carried out excavations for a long period. We also have visited the Museum für die Archäologie des Eiszeitalters and the Forschungsbereich Altsteinzeit des Römisch-Germanischen Zentralmuseums at Schoß Monrepos. A public lecture was presented by Professor Dr. Y. Coppens (Paris) on "Le modèle insulaire, de l'origine des Hominidés au peuplement de l'Europe".

There was also a lively discussion by the particpants on the future activities within the **Human Evolution International Interdisciplinary Project *"Hominids in their environments"*** with suggestions for further symposia as well as for a book being prepared on foundations of life styles and survival strategies developed by Palaeolithic humans. Such a book should summarize the current results of foundations and analyse the life styles and survival strategies and their changes under special natural and cultural environments in different areas occupied by early hominids, early humans, *Homo erectus* as well as archaic and anatomically modern *Homo sapiens*. It would also be necessary to concentrate on information reflecting biological, cultural, social and behavioural changes.

Multi- and interdisciplinary approach

The Proceedings cover most of the papers presented at the symposium in Neuwied. The manuscripts have been up-dated to the level of ongoing discussions and extended by some authors. I am very pleased that O. Bar-Yosef, M.L. Butovskaya, G. Lebedinskaya, F. Smith and E. Vlček, who had submitted papers to the symposium but were unable to participate, have submitted manuscripts for publication. It was also possible to include some papers (some of them up-dated) from the 1988 Wittenberg conference (unfortunately the prepared proceedings of this conference were published neither in Eastern nor in Western Germany) that dealt with human-environment relations or were of general importance to this subject: papers by Y. Coppens, M.H. Day, H. Grimm, M. Kretzoi, F.G.G. Rose, G. Tembrock, E. Vlček and Ch. Vogel. I deeply regret that two of these authors who participated in the 1988 Wittenberg conference have died: F.G.G. Rose (✞ 1991) and Ch. Vogel (✞ 1994).

The papers of the Proceedings were written by anthropologists, archaeologists, ethnologists, ethologists, palaeontologists, zoologists. They have been grouped in five sections: 1. General aspects, 2. Natural environments, 3. Humans in their environments, 4. Cultural environment - archaeological aspects, 5. Cultural environment - human society.

General aspects

Turner in his paper stressed that the evolution of the Hominidae should be examined in a wider palaeontological context by considering the evolutionary changes in the other mammalian families in terms of massive climatical changes. Under these aspects the processes of speciation, extinction, patterns of dispersion and within-species changes in hominid evolution may appear in a clearer perspective. The Multiregional Human Evolution model is supported by Caspari & Wolpoff in that it provides also an explanation for the distribution of non-adaptive variants. History and adaptation, in their views, are important causes for modern human variation. The paper of Gowlett examined the ways in which time and entities were labeled and reviewed psychological ap-

proaches to evaluating early archaeological evidence. The paper addressed the following question: "How important should 'deliberateness' or 'intentionality' be in our assessment of the capabilities of early hominids? Kretzoi's paper focussed on the most important ecologiclal factors influencing adaptations in the hominzation process and dealt with the most important steps during adapation to ecological zones.

Natural environments

One of the most important Middle Pleistocene sites in Europe with archaeological horizons, which are appropriate for the reconstruction of former environments and of the recognition of human's relationship to these conditions, is Bilzingsleben in Germany. D. Mania's paper analysed the natural environment (geology, fauna and flora, climate, raw material sources etc.) and the cultural environment (wandering ranges, hunting districts, foraging, occupation site, archaeological culture etc.) as well as the reactive patterns on the natural environments. Conditions and changes in the natural environment during the last glacial in Central Europa are the topic of Jäger's paper. The environmental record within the interposing belt between the glaciated areas is reconstructable from fossil mammals and mollusc shells in correlation with the regional loess stratigraphy reflecting changes of faunal assemblages due to the variation of the environment. Man-animal relations in the Upper and Late Palaeolithic in Middle Europe were mainly related to reindeer and horse. In contrast to previous theories of long-distance following and loose-herding of reindeers a territorial model of animal exploitation was proposed by Benecke. A close relationship between man and horse has not been confirmed by archaeological data.

Humans in their environments

Many papers have contributed to the section "Humans in their environments". Coppens told the East Side Story of the origins of the Hominidae - the story of adaptation to an open habitat. He demonstrated that the origins of *Homo* between 3 and 2 m.y. ago was the result of powerful environmental selective pressures. The following two papers dealt with human morphology in relation to climatical conditions. Czarnetzki analysed the adaptive character to a special natural environment or activities of morphological structures in fossil hominids, especially of the nose, the femur and the cerebral cortex of the cerebrum. In Henke's paper a detailed excursus was provided on morphological adaptations of *Homo sapiens* to climatical conditions. Using discriminant function analyses for diachronical and regional comparisons he tested whether the observable uni- and bivariate differences between late Pleistocene and early Holocene populations of Europe and Northern Africa were in agreement with the published data as related to specific environmental factors and he was able to demonstrate that the differences in the cranial featurs seemed to be the result of a regionalization process in which climatic adaptations might have played a minor part. Two models of adaptive strategy were presented in Piontek's paper on human-environment relations in Palaeolithic and post-Palaeolithic times. This paper dealt with an estimation of opportunities for natural selection by differential mortality and differentiating fertility. According to Piontek it seemed that previously (in Palaeolithic times) important adaptive morphological features had "lost" their former adaptive impact when considering new cultural equipment of groups in post-Palaeolithic times. Grimm asked the question of genetic load and of the existence of culture-specific mutagenes in Palaeolithic human groups as a complex specific for the environment of man. Such mutagenes could have been breathed in from cooking-stones or inhaled from lamp soot. Biorhythms in *Homo sapiens* from Palaeolithic to modern times is the title of Sigmon's paper. Extrapolating from the biorhythms of modern peoples she suggested that similar patterns might have been present in Palaeolithic *Homo sapiens*. This would lead to a search for some causes of modern illnesses in disrupted biorhythmical patterns due to large changes in our everyday environment.

The second part of the section "Humans in their environments" covers papers, in which the aspects of human evolution were given special emphasis, yet they were of general importance to the subject of environmental relations. Vlček focussed on the evolution of human populations in the European Pleistocene with the coexistence of forms of erectoid features and of forms of typical *sapiens*-like characters prevailing in the penultimate interglacial. He also dealt with the coexistence of finds with a mixture of both characteristics, forms in the direction to early *Homo sapiens* and of basic forms of the Neandertals in the fol-

lowing glacial period (Saale complex). A set of morphological features of the femur and pelvis in *Homo erectus* from Asia, Europe and Africa over a time-span of 1.5 m.y. according to Day pointed to a morphological, geographical and temporal continuity in the postcranial parts that relate to upright posture and bipedal gait. Lebedinskaya presented the facial reconstruction of the *Homo erectus* Arago XXI and demonstrated the principal stages of the reconstruction process of the skull. The paper of Smith, Falsetti & Simmons favoured the Multiregional Evolution model and concluded that evidence was adduced for biological interconnections around the Mediterranean during the late Pleistocene and that *Homo sapiens* has been a single, polytypic species since the Middle Pleistocene. Vlček in his second paper demonstrated that specific features in the individuals from the Upper Palaeolithic triple burial Dolní Věstonice point to a close family relationship in the sense of siblings. He also referred to some palaeoethnographic aspects in the mammoth hunter population of Dolní Věstonice. Grimm's second paper touched upon the question of whether there were micro-evolutionary changes in the structure of the human hand since the emergence of anatomically modern humans and asked for facts and possibilities to answer this question.

Cultural environment - archaeological aspects

The section "Cultural environment - archaeological aspects" includes seven papers. Fiedler analysed the different kinds of stone-tools and showed that *Homo erectus* had well defined traditions with fixed symbols in the common mind of social groups. The utilisation of large mammal bones at the Lower Palaeolithic site of Bilzingsleben as a special variant of man's relation to his environment was the subject of U. Mania's investigations. She concluded that detailed anatomical knowledge as well as identification of the raw materials became evident in the manufacture of bone tools. The following two papers concern the Lower and Middle Palaeolithic in the Mediterranean Levant. Bar-Yosef's paper summarized the chronological framework and characteristics of the cultural entities and discussed adaptations to desert areas as well as Mousterian settlement patterns. Ronen & Tsatskin's geoarchaeological studies on the lowermost sediments at Tabun Cave allow a more detailed interpretation of the environmental changes in the Lower Palaeolithic. Aspects of stability of the settlement in the Middle and Upper Palaeolithic were discussed by Valoch. His conclusion that a certain stability in the links of Palaeolithic populations to settlement regions and even to individual sites existed was based on examples from Moravia, Austria, Ukraine and Russia. The environment and Upper Palaeolithic adaptations in Moravia are the subject of Svoboda's paper. It was concluded that the strategies in land-use and settlement pattern differ in the Aurignacien, Gravettian and Epigravettian. Comments on ethnoarchaeology, a very young subdiscipline of archaeology, and its significance for Palaeolithic research in terms of its application to recent hunter-gatherers conditions were given by Struwe.

Cultural environment - human society

This section starts with two papers from ethologists on primate societies as the basis for human social evolution. Tembrock demonstrated that primate societies had reached a high degree of differentiation with an unusual variation, diverse ways of expression and an unusual complexity. Modern data on primate socioecology (e.g. in-group and between-group competition, dispersal patterns, co-adaptiveness, diet, toolmaking, sexual dimorphism, hunting, territoriality, partner's choice) as the basis for the reconstruction of the social structure and relations in early hominids were presented by Butovskaya. The paper of Leonovicová stressed on the increasing complexity of the cultural environment in human evolution. She set out her position on the "concept of cultural environment" by dividing material artifacts and spiritual artifacts and by providing the necessity for an interdisciplinary investigation into the problem of man and environment in the Palaeolithic. In his second paper Kretzoi drew the attention to the role of some factors of human anatomy, archaeology and cultural history of early man not yet utilized in the models of anthroposociogenesis, e.g. the development of the bilabial and labiodental speech which resulted in the emergence of human culture and society. Otte in his paper pleaded for a return to a more integrated view on both ways of transmission of behavioural patterns, the biological and the educational (cultural) one. The ethnographical conception of diffusion of cultural traits and its relevance to the question of continuity and discontinuity in the evolution of man and the emergence of ancient human society was outlined by Rose, explained by man's main instrument of pro-

duction, the throwing spear, in Australia. The family in evolutionary perspective is the title of Vogel's paper. The human family is understood as a cultural institution on a biological basis and family organizations as the consequence of co-operative compromises between male and female reproductive strategies which originate deeply in our mammalian phylogeny. The woman in human evolution and in the earliest ancient society is underlined in Schlette's paper, that focussed on such questions as the sexual division of labour, mother-child bond, permanent female mating and prerequisites for monogamy, woman's role in cults, matrilinearity. Mortuary practices in the Palaeolithic and their connection with reflections on life and death, on the world in which humans were living and on the afterworld were the central subjects of Ullrich's paper. A new conception based on the patterns of skeletal representation, human bone modifications and their interpretations as well as archaeological data was presented, which resulted in the assumption that the great variety and complexity of mortuary practices and rites in the Palaeolithic reflect the many unsolved problems and inconsistencies between life and death, between humans and their natural as well as cultural environments, which were faced by the humans daily.

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