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TOOL-MAKING AND FIRST STAGES OF LABOUR-FACTORS AND THE RESULTS OF HUMAN EVOLUTION

ABSTRACT. — The so far insufficient fossil record of human ancestors of the period of anthropogenesis and hence the high degree of subjectivity in the views of various authors is emphasized. The reductionist approach of non-Marxist authors overestimating continuity and denying the natural qualitative difference between man and animals is criticized. The process of anthropogenesis which started with beginnings of labour is divided into the following four main periods: 1. The biological branching of the human species (the HD-epoch) — 1.8 to 0.8 million years ago. It is characterized by transition to regular production of tools (artifacts), the growth of brain to about 775 cc and the beginnings of sensory thinking and sound communication (semi-human form, the ape-man). Period of *Homo habilis*. 2. The period of anthroposociogenesis (800,000 to 350,000 years). The tool making became dominant. Fire was used and labour began to be a process. The brain increased to more than 1000 cc. Spreading to new climatic regions. Period of *Homo erectus*. 3. The socio-economic formation. 350,000 to 40,000 years. Social cooperation and a new type of thinking: Differentiation of the working process. Bone carvings and tooth amulets. The development of social forms of life and social consciousness. Marked increase in volume of the brain. The Neanderthal man period. 4. The ancient society — 40,000 to 20,000 years.

The necessity of cooperation of various disciplines of both natural and social science is emphasized.

KEY WORDS: Anthropogenesis — Anthroposociogenesis — Labour — Tool making — Brain growth — Thinking — Speech — Subhuman phase — *Homo habilis* — *Homo erectus* — Neanderthal man.

Apart from obvious ideological views which apply certain questions to the history of mankind and its investigation, there are very objective reasons for differences of opinion. This includes primarily the comparatively coarse-meshed registration of concrete biologically-historical sources, i.e. of direct remains of the human evolution itself.

From the critical phase of separation of the evolutionary line leading to man from that of the animal world, which falls within the period of the *Australopithecus*, remains of about 150 individuals from southern Africa and of about 150 individuals from eastern Africa have been found (Mann, 1976,

pp. 182). These individuals spread between the period of 3 millions to 0.5 million years before today, i.e. over 2.5 million years. According to some evidences, they existed even for a longer period. That means that on the average of intervals of 25,000 years at the most, the remains of one individual each are known, often only some teeth or cranial bone fragments. Populations, i.e. the skeletons of whole groups have never been registered. The situation in the following periods is similar. From the period of the *Homo erectus*, not more than 100 fossils are known, i.e. from a time covering 0.7 to 1 million years. Not more than one-to-two finds

can be registered for every 10,000 years. And even from Neanderthal man not many more than 300 individuals have been recorded which cover a period from a duration of some 250,000 to 200,000 years, so that on the average there is one find for every 800 years. In fact, however, the actual period of time for which no finds have been registered, is much longer, as there are periodical and regional accumulations.

These factual circumstances must be pointed out in order to understand that the subjective view of the researcher and his ideological basis is of great significance.

Such differences in opinion concern the classification of certain hominids in the evolutionary line leading to man or their assignment to a collateral line. They concern questions of the so-called side branches including the Neanderthal man, who — in the opinion of some specialists — are supposed to have died out before the transition to *Homo sapiens*; they concern the problem of the development of the main human races, of the development of the brain etc. Even the periodization of anthropogenesis is determined in different ways. (Foerster, 1976; Gur'ev, 1976 with lit.).

These problems cannot be solved on the basis of anthropological materials alone. Certain conclusions and facts can only be deduced when other human remains, especially the tools and remains of the living-sites, are included in the investigation. It would be impossible to determine the threshold which stood between man and animal, without such a connection. An example of how the separation of anthropological fossils and the human evolution from the development of labour activities can lead to far-reaching — but in my opinion false conclusions, — was given by Christian Vogel in his paper at the annual meeting of Leopoldina in Halle. The evolution of man is treated by Ch. Vogel (1975, 264) by devaluating labour activities as an essential factor of evolution. In addition there is a remarkably wrong assessment of facts, as far as they are based on archaeological and physical methods of dating. On such a foundation it is comparatively easy to erect new and far-reaching theses about the history of human evolution, due to which e.g. the development of man is seen as the result of polytypical evolutionary lines. Vogel says, "die alte, durch Tradition schon fast 'tabuisierte' Theorie [sei] vom Sockel gestoßen worden, die instrumentell-materielle Umweltbewältigung sei Haupttriebfeder der cerebralen Leistungssteigerung in der Evolution der höheren Primaten und bei der Hominisation gewesen. Anthropologen verkünden, daß die Bedeutung der materiellen Werkzeugbenutzung und — herstellung für die Hominisation 'has been greatly over emphasized' ..., ihnen assistierten zahlreiche Ethologen mit ihren neueren Befunden über die Schlüsselrolle des Sozialverhaltens für die kognitive Entwicklung" (Vogel, 1977, 249). The polemic against Marxism, which is connected with it, does not touch the nucleus of the problem. For neither Marx nor Engels have made responsible for anthropogenesis the "Technologie in der Homini-

denevolution" (Vogel, 1977, 248), but the dialectical interrelationship of the acquisition of nature in the social working process. With the shifting of the problem, as Vogel and others have done, the historical facts, which have been preserved in the shape of implements and tools, in the shape of evidence about the evolution of the working process (Andreev, I., 1976), are taken out of the discussion in the last analysis.

The position of man in the classification of the animal world, also with respect to his nearest relatives, has been adequately explained today, more than a hundred years after Charles Darwin (1871, 1874). The problem of further research and description of the early history of mankind is not in the first place to prove the direct roots of man in the animal world in general, but to examine how and by which processes man raised himself out of the animal world, how he became a human being, how human society originated, as a higher form of motion of matter, with new driving forces and with a new content. It is characteristic of a number of non-Marxist natural scientists and other non-Marxist authors, that this problem is not perceived or that it is concealed. The qualitative difference between animal and man is often reduced to a quantitative difference. During the festive session of the Leopoldina, Christian Vogel said, basing his conclusions on generalizations made by students of behaviour: "Die Fülle von sicheren Belegen für Werkzeugverwendung und Werkzeugherstellung bei nicht-menschlichen Primaten (auch in freier Wildbahn) macht eindeutig klar, daß hier kein grundlegender qualitativer Unterschied zwischen den Hominiden und nicht-menschlichen Primaten besteht, sondern zunächst nur ein sich im Laufe der Evolution kumulierender quantitativer Unterschied" (Vogel, 1975, 265).

One of the fundamental methodological principles of evolutionary research, the problem of discontinuity and continuity, is followed up in a one-sided way, i.e. so to speak only on the track of continuity. Under such an aspect of primary material analysis it is not very difficult for those with religious views to stress — on their part — the principle of "discontinuity in the mental field", but accepting continuity in the physical field, thus making it possible for creation, for the "Aufleuchten eines personalen Geistes" etc. to penetrate the evolutionary process (Kälin, 1952).

PERIODS IN THE EVOLUTION OF MAN AND OF HUMAN SOCIETY

When attempting to describe the periods in the evolution of man and of human society, the specific characteristics of man should be the starting point, i.e. the emergence and development of labour and the working process. The substance of this fundamental process has been set forth by Karl Marx in "Das Kapital": "Die Arbeit ist zunächst ein Prozeß zwischen Mensch und Natur, ein Prozeß, worin der Mensch seinen Stoffwechsel mit

der Natur durch seine eigene Tat vermittelt, regelt und kontrolliert. Er tritt dem Naturstoff selbst als eine Naturmacht gegenüber. Die seiner Leiblichkeit angehörigen Naturkräfte, Arme und Beine, Kopf und Hand, setzt er in Bewegung, um sich den Naturstoff in einer für sein eigenes Leben brauchbaren Form anzueignen. Indem er durch diese Bewegung auf die Natur außer ihm wirkt und sie verändert, verändert er zugleich seine eigene Natur" (Marx, 1867/1962, 192).

Anthropogenesis starts with the beginnings of labour and it is finished after the working process has prevailed as the fundamental factor of the history of society. The emergence of accomplished man ("des fertigen Menschen") and the formation of society form a unity, as compared with the development of labour and the working process. Referring to biological characteristics of skeletal remains, anthropologists often speak of collateral branches or of extinct branches of the evolutionary history of man. The most extreme attempt in this direction is to derive the *Homo sapiens* directly from the so-called *Homo habilis* and to delete all other types of man, such as the *Homo erectus* or the *Homo neanderthalensis* from the evolutionary chain leading to present-day man. Between the so-called *Homo habilis* and the *Homo sapiens* there are 2 million years of evolutionary history with its fossils of the *Homo erectus* and the *Homo neanderthalensis*. One or the other find can possibly be separated from the groups mentioned, but it cannot fill a new evolutionary chain over 1 to 2 million years. Space and time are self-evident methodical dimensions for historical research. Also neither can research aimed at systematics ignore them if it has any claims on making statements on evolutionary processes. But there are artifacts, tools and so-called "cultures". These cultures are nothing but remnants man has left with traditional and thus also historical homogeneousness. The chain of cultures does not break since the most distant times when man left material remnants — the oldest "culture" known up to the present day is the Oldovan — out of the nearly 2 million-year-old strata of KBS tuff at Turkana Lake (the formerly Lake Rudolf) in East Africa. It connects the limits set by some anthropologists on the basis of anthropological characteristics and leads over to the *Homo erectus* and *Homo sapiens neanderthalensis* to the *Homo sapiens sapiens*. This continuous tradition in the history of the human race has considerable weight in the formation of theories. The analysis of such traditions has e.g. also led to the fact that those anthropologist who speak of Neanderthal man becoming extinct, are in an unhappy position. Possible interpretations of this kind are faced by the continuous development in human culture, as was also claimed at the UNESCO symposium (Bordes, 1972).

The description of the periods of the evolutionary history of man cannot only proceed from fossils, but it must also endeavour to consider the working process and culture on an equal basis. According to the present state of our knowledge we

can distinguish four periods which are each characterized by essential steps in evolution and in the course of which new levels were reached in the evolutionary process.

The first period was the period of biological branching off of the human species; homo line "diverged" (Darwin); I proposed to call this period the period of Homo-Deviation ("Epoche der Homo-Deviation" or HD-Epoche). The main feature was the separation of the collateral line directly connected with anthropogenesis from other lines which are also — from biological aspects — similar to the human line of evolution (cf. below). This Homo-Deviation was connected with the origin of labour. In the first stage, the development of labour is understood to continue the older use of "stones and sticks... as implements" (Darwin, 1874, 79), now connected with the production of primitive artifacts, for obtaining food, and linked with the beginnings of thinking based on perception and activity. Karl Marx spoke of instinctive forms of labour. This epoch comprised — irrespective of considerable uncertainties in dating individual finds still prevalent at present — in any case a period of millions of years. The first evidence of the beginning of this epoch is about 1.6 to 1.8 million years ago, but a still more remote beginning must be reckoned with (Science, 1981; cf. below). The period of human biological divergence was concluded not later than 0.8 million years ago.

The second period was the period of anthropo-sociogenesis, the period of humanizing the pithecanthropus and his biological evolution into primitive man with the increasing effectiveness of the selective and evolutionary factor i.e. of labour. Labour existed in such a form that it had become the basis of existence, without yet shedding completely its primitive forms based on sensory and active thinking. This period began at least 1 to 0.8 million years ago and was concluded 350,000 to 250,000 years ago.

The third period was the period of socio-economic formation. Labour became working, i.e. it acquired social forms. The *Homo sapiens neanderthalensis*, the Neanderthal man in the widest sense — developed as a biological transitional form to present-day man. The period began 350,000 to 250,000 years ago and was concluded with the prevalence of the *Homo sapiens sapiens* 40,000 to 30,000 years ago.

The fourth period was the period of the development of primitive society as the first socio-economic formation. This period began with the prevalence of the *Homo sapiens sapiens*, the present-day human being. The laws of biological evolution become less important with regard to the shaping of man's way of life. They became subordinate in this decisive sphere of social existence. This period dates from about 40,000 years to 20,000 years ago.

Students of Evolution have often realized that — in order to determine the human species and its evolutionary stages — skeleton remains only do not suffice, or do not primarily suffice, but that the way of life founded on labour must be

behind this field. This relation results inevitably. For Heberer, biological criteria were decisive in defining the Tier-Mensch-Übergangsfeld, and not the criteria of the transition to labour. If any use of implements and production of artifacts was obvious, then the Tier-Mensch-Übergangsfeld had been passed through, according to Heberer. The driving forces deciding the happenings in the Tier-Mensch-Übergangsfeld have not been analyzed by Heberer particularly. As far as can be seen from his papers they were only such of evolution relating to natural history which he interpreted as radiations. The driving force "labour" played no part for Heberer. The Tier-Mensch-Übergangsfeld is not really such a transition field but only a preparation in the evolutionary history of man. The very different contents which were added to Heberer's interpretation of the Tier-Mensch-Übergangsfeld by some students (Ullrich, 1975) contradict — at least partially — the definition of the creator of this term. If we wanted to use this term, then a new definition should be made of it. The main feature of this field was the transition of the exclusive effectiveness of the regularities of evolution regarding natural history to the decisive effectiveness of the laws of development of society occurred, i.e. the transition of one form of motion of matter to another, higher form of motion. The period in which this took place is not at all identical with the period given by Heberer and his successors for the Tier-Mensch-Übergangsfeld. Even if we only fix the emergence of the labour process as the decisive criterion of the transition from animal to man, then this process also lies beyond the Tier-Mensch-Übergangsfeld in the definition as given up to now.

The description of the period disposed of many open issues both concerning the content and the chronology. The separation of the Homo line becomes clearer only there where modern research has enabled insights into the state of individuals and labour activity. And that is the case only 1.6 to 2 million years ago. The stratigraphies at Lake Turkana in Kenya show relatively clearly that before the so-called KBS tuff, finds of artifacts can hardly be reckoned with. From older layers we know quite a number of hominid remains, but hardly any tool. The KBS horizon yielded finds of tools in a larger number. Chronologically it is the early Pleistocene.

According to this the beginning of the period of Homo-Deviation can be fixed to a time about 1.8 million years ago. Up to now, there are no certain stratigraphic finds of a different kind which would contradict this. Any periodization or news even of spectacular character in the press in the last few years has been reduced to this period of time after a serious discussion and examination of dates (1). This deviation period has been dated at about 0.8 million years ago at the latest. Also the last find of a gracile *Australopithecus* cranium of Sterkfontein found in August 1976, lay in strata with stone tools which are 1.5 to 2 million years old, as Tobias reported. Some new evidence is reported by Johanson et al. (Science 1981). They put

the earliest artifacts from the Hadar somewhere between 2.5 and 2.7 million years. But this evidence seems to be preliminary. When we studied the Hadar region in 1980, we met artifacts of Oldovan type only in the upper beds, higher than Lucy and family site (Herrmann, 1981; Ullrich, 1981).

Three essential results began to characterize the Homo line, which differed from other hominid lines in this period:

1. The transition to a regular production of implements or artifacts for the purpose of obtaining food as an established form of behaviour (see Isaac, 1978). I would call this form of behaviour — with reference to Karl Marx (1867/1962, 193) — as the stage of limited consciousness in the development of labour, as an instinctive form of labour. This instinctive form of labour began to differ in the period of hominization from sporadic use of implements and accidental making of artifacts. A proposal has therefore repeatedly been made to describe the *Australopithecus robustus* and *A. boisei* as tool users, and the *Homo habilis* (cf. below) as tool makers (M. D. Leakey, 1976, 304 pp.).

2. The selection pressure emanating from this new way of behaviour caused a development of the brain and — measurable in fossils — of the brain volume. It grew to about 775 cubic centimetres compared to 400 cubic centimetres in the initial hominid forms and the collateral hominid lines. The changes in the brain became genetically fixed. The changes in the skeleton were obviously less significant in comparison. This explains the protracted discussion about the morphological and taxonomic classifications of skeletal remains of the different hominid finds of Olduvai fundamentally and to classify them anew (see Walker and Leakey, 1978). The changes of the brain were largely due to the differentiated use of the hand and the coordination of activities of the population, or within the population, which was connected with the transition to hunting. Hunting small wild animals was dominant, as the finds of Olduvai and from Lake Turkana show, but it must be considered that now and then, in favourable situations, also larger animals like antelopes, pigs and hippo-type animals were killed: possibly by driving such animals into swamps. The list of fauna of Lake Turkana and of the Olduvai Bed I. give relatively good information about it. They show simultaneously that hunting was still in the beginnings, that there can be no mention of a "hunting revolution" (examples in Harris and Bishop, 1976; Herrmann, 1974, with further literature).

3. The beginnings of sensory thinking based on perception and activity can be located here. Probably the intentional language of gestures was supplemented by sounds. Such sounds were available in the biological substratum as emotional sounds. They did not serve much for communication, although they must naturally have contained a certain degree of information, taking into consideration observations made with recent anthropoid apes. It is well-known that efforts to teach chimpanzees, which are nearest to man, to speak, have

failed. Chimpanzee Vicky, brought up by Mr. and Mrs. Hayes and trained to speak for six years, could only say the words 'mama', 'papa', 'cup' and 'up'. Thanks to his upright posture the chimpanzee disposes of some preconditions for developing an articulated language, but the preconditions of steering are absent in the brain (Wind, 1976, 626). On the other hand, Allen and Beatrice Wagner of the University of Nevada could teach the chimpanzee Washoe a sign language of about 100 signs. This corresponds to observations made in nature according to which chimpanzee communicate with gestures. (A critical evaluation of these experiments recently by Marx, 1980; Hediger, 1981).

The way of life of early *Homo* populations, separated from others, can be recognized more clearly in some places where finds have been made, especially in the Olduvai Bed I and also lately at Lake Turkana in Kenya.

On the north side of Lake Turkana near Ileret and Koobi Fora, several rivers flowed into Lake Turkana in the early Pleistocene; they came from the highlands of Ethiopia. They cut deep valleys which were dry outside the rainfall period. The sandy open grounds of the valleys under the woods near the lake were preferred as places to stay in. The swampy land between the lake and the delta offered favourable means of existence for small wild animals. The resting places of the hominids dispose of many finds of artifacts, and traces of making such artifacts in the early Oldowan. Some of the material for such artifacts had even been brought from quite a distance. The animals hunted were porcupines, pigs, gazelles, water buffaloes, and equides. Some of them were cut up and divided at the resting place (M. D. Leakey, 1971; Isaac, 1978).

General characteristics, confirmed in other sites, too, are the following:

1. Making artifacts from pebbles or flint, basalt, lava, and tuff (Williams et al., 1979, 29) with a limited amount of the direct activity.
2. Probable use of canine teeth of equids and pigs as implements.
3. Temporary life at a resting place.
4. Bringing at least a part of the killed animals to this resting place cutting them up and sharing them (Isaac, 1976/A, 17).
5. Looking after the children and bringing them up is probably connected with the life at such temporary living sites when the female members of the hordes had such a special role. The beginnings of a division of labour according to sex must be considered.

No matter how future research may make these considerations more precise, it does seem certain that labour in the simplest form had become the basis of obtaining food and of the way of life. Thus, the classification "*Homo*" is justified for the living beings who effected this in the evolution. Considering the close biological connection with other hominid lines which, however, did not lead to man, and their direct rooting in the animal world, I would call this human form ape man (*Affenmensch*) (2). Darwin thought about this form and called it semi-

human (1874, 45). This characteristic is the labour on the lowest stage as the mode of obtaining food, the increase in size of the brain capacity beyond the capacity of the anthropoid apes (Tobias, 1980) but still below the "Rubicon" to the real man. This "Rubicon" lies at about 900 to 1000 cubic centimetres (Jerison, 1976). The development of skeletal characters separating man from anthropoid ape, such as the development of the hand, changes in the position of the pelvis due to the upright posture, the development of prognathism due to changed nutrition. The later human forms from Java and China or of the pre-sapiens type are described as "*Homo erectus*" (upright man: "*Urmensch*"). The great variety of human forms of the middle Pleistocene has been covered by the term *Homo s. neanderthalensis*.

Among the criteria for the classification of the individual variations of human forms to the one or other *Homo* species we do not use biological criteria only, but this must be seen in unity with the stage of development of the working process.

The *Homo* deviation belongs to the beginning of the Pleistocene. Datings and suppositions which place it far back into the Pliocene have not found confirmation (see Boaz, 1979). Therefore we can see a direct connection between the change of the ecosystem and the environment at the beginning of the Pleistocene (Butzer, 1977; Sergin, 1980) and the beginnings of labour (Cerling, Hay, O'Neil, 1977).

After many very early and even sensational dates had been brought forward, the new dates — resulting from carefully examined stratigraphical evidence — point to the period between 1.5 and at most 2 million years for the appearance of labour. The oldest layers in which artifacts occur are situated at Lake Turkana and in Olduvai and are dated 1.6 up to 1.8 million years. Older layers with artifacts, which could be chronologically dated without any doubt, are not available. Earlier dates from Hadar are recently only "an educated guess" (Science 1981, 807), because the sedimentation is very complicated. Not quite clear are the dates of some artifacts from Omo/Ethiopia. The tools are coming from a sable-layer, higher than tuff E. This tuff E is perhaps 1.99 to 2.6 million years old (Chavaillon 1970).

Likewise there are no remains of the ape man or of "*Homo habilis*" which are older than two million years (Boaz 1979). The surface find of the cranium 1470 from Lake Turkana (Leakey 1973, 1975) — published in the press in a sensational way — laid in a fossil river bed cutting through the KBS tuff (cf. above). The dating of the KBS tuff has in the meantime been settled with 1.8 to 1.6 million years (Leakey still has advanced 2.6 million years). Whereas Leakey projected the cranium underneath the KBS tuff — thus creating the sensation as if it laid lower than the KBS tuff, his assistants have in the meantime corrected the classification. The KBS tuff gives the terminus postquem. The cranium 1470 with a capacity of 700–775 cubic centimetres thus belongs to the genus *Homo* known already from that time (3).

New questions have been raised by the early dating of some Homo finds of Java in the early Pleistocene. The so-called Djetis fauna, accompanying these remains is abruptly placed at the early Pleistocene due to some potassium argon dates (Jacob 1975). The specialists will investigate whether this is possible. Up to now it has been dated to the early Middle Pleistocene due to the faunal classification (Heekeren 1972, 12; Woldstedt 1969). No reason is given why the Djetis layer should belong to the early Pleistocene (Jacob 1975). (Discussion of the question by Boaz 1979; the author is convinced that *H. modjokertensis* is and Djetis fauna might be as old as Oldovan Bed I).

THE PERIOD OF ANTHROPOSOCIO- GENESIS 800,000—350,000/250,000 YEARS AGO

In this period labour began to mark man. This period is clearly distinct due to essential changes in the development of labour, of human phenotype, and the relation of man to nature. Seen historically it is characterized by the development of artifacts of developed Oldovan (Clark and Kurchina 1979), of Abbevillian, of Acheulean, of the use of fire, the spreading of man over the subtropical and temperate zones of the earth, and by the development of preconditions for social life. It is the period of *Homo erectus* (Jelinek et al. 1980). This epoch, too, comprised hundreds of thousands of years, the dates of its beginning and its ending being given differently according to the method of dating employed. Labour existed in a form in which it had become the basis of existence, without, however, having completely lost its instinctive character. In the course of evolution this fact is expressed by the continuation of the selective pressure — exercised by labour — on the physical shape, particularly on the brain, and on the development of the ability to speak. The *Homo erectus* from the beginning of this period — such as the finds on Java from the lower Middle Pleistocene and from Lantian in China — appear as primitive pre-forms compared with man at the end of this period who is using fire, making differentiated artifacts and tools. In this connection the finds in Vértesszőlős in Hungary or Bilzingsleben near Halle can be referred to (Mania, Grimm, Vlček 1976).

I would regard three essential achievements as characteristic of this period:

1. Labour has reached a stage in which artifacts or artificial implements were used to produce tools, i.e. tool-making became now dominant. What are implements ("Geräte"), what are tools ("Werkzeuge")? We could use the English word "tool" for both. But in fact there is a chain of development in history which we should also attempt to realize historically and to give relevant terms to. As a preliminary stage of this chain we have undoubtedly the use of natural materials as implements (Darwin 1874, 79 f.) for obtaining food. Such a partly instinctive utilization goes far back into the animal

world. It is not a distinctive feature of primates. Certainly it may have been more strongly linked with the learning processes within populations. In the period of deviation this distinctive feature became more marked in the *Homo* line in preparing artifacts by using natural materials. This was the first stage in the history of tools.

The second stage, reached by the *Homo erectus*, started off a new period in the development of labour. Artifacts were produced which did not directly serve to obtain food or other necessities of life, but they served to produce other artifacts, i.e. strictly speaking tools. The artifacts of the Oldovan type were limited to immediate purposes, they were direct supplements to anatomical organs for getting food. In comparison, the artifacts of the Acheulean type were more: they did not only serve to obtain food but were obviously sometimes made with the objective of producing other working implements. Thus the pattern of the labour process got a new link. Tools served in this chain to make other tools, to produce receptacles — including vessels or 'containers' (Isaac 1976/B, 278). Such a stage is no longer primarily instinctive labour based on sensory and active thinking, but labour with a higher degree of consciousness. According to our present knowledge the use of fire and its maintenance accord fully with this stage of existence and consciousness. The use of a natural energy and of labour to ensure its utilization correspond to the facts which the finds of implement give evidence of. Labour got rid of its instinctive forms and began to include further links between man and nature.

2. With the production of tools and with the utilization and the keeping up of fire, labour began to become a process. Labour in this form required the continuous and coordinated cooperation in groups as well as the development of communication. Therefore, a further development of language and speech, can be reckoned with. The increase in the volume of the brain from 780 to more than 1000 cubic centimetres of man in this epoch created the relevant possibility, although unequivocal statements concerning the scope and structure of the emerging articulated language are possible (Montagu 1976; Jerison 1976, 377).

The bases of this development of the *Homo erectus* were genetically fixed. The ecological system changed more quickly than man developed his ability to work — therefore it seems certain to me that — in this period — it is still not possible to speak of an effect of social laws and regularities. The beginnings had been expanded in the form of the development of labour, which raised labour to an effective factor for selection in the biological process of evolution. But these beginnings did not create any new laws or regulations, nor did they create — as is sometimes said — biosocial laws or rules. Rather, the effect of the factor of evolution — labour — and of its development resulted primarily in an acceleration of biological evolution and its adjustment.

3. The development of labour enabled human groups to extend into new ecosystems or climatic

regions. These groups were thus exposed to greater selective pressure; this probably occurred in times of radical changes in natural conditions, particularly in the periods of mid-Pleistocene glaciation. The resulting selective pressure was answered by man with the development of the evolutionary factor "labour". This factor on the other side developed man biologically, particularly by further development of the brain and by the biological foundations for the development of social elements. Those individuals had the best chance to pass on their hereditary dispositions which played an outstanding role in the social integration in the working process, be it as the best hunter or organizer of hunting. Those groups obviously, too, had the best chance to prevail, particularly in periods of ecological pressure, which achieved the most significant presentation in the working process. The development of skills, of intelligence and of language played a primary part in the grip of adaptation to the requirements of the working process as a common proto-social process. The ability to speak must be genetically acquired. The same is valid for intelligence. Ability to intelligence is hereditary. We can thus say of the period which is being dealt with here that this is a period of anthroposociogenesis in the real sense of the word.

Some social specifics of development had already become visible at this stage: They lie in the differentiated shaping of the working process according to the concrete natural conditions. The beginning differentiation of tool types after the Middle Pleistocene is obviously an expression of the differentiated struggle against various natural environments. The different adaptation to the natural environment by means of labour prevented the disintegration of the Homo line in individual species, the Homo line is now being distributed over three continents — Asia, Africa and Europe. But we can also assume that biological differentiations appeared which were certainly more noticeable, i.e. not less noticeable, than the later differentiation into the main races (Jelínek 1980). For the later epoch of the Neanderthal man this had been realized long ago.

THE PERIOD OF SOCIO-ECONOMIC FORMATION \approx 350,000/250,000 TO 30,000/20,000 YEARS AGO

The character of this period was determined by the differentiated development of the working process. It was marked more and more by conscious social cooperation and by thinking. This new quality in the relationship between individual and society can be seen e.g. in how the handicapped were looked after in the cave of Shanidar in the Zagros Mountains (Iraq) and how the dead were buried in Teshik Tash (Central Asia, Soviet Union) and at other sites (Harrold 1980). These are indications of a rational steering of social life. In the direct working process the effect of developed thinking is seen in the production of complicated implements in specialization in hunting, e.g. hunting bears in caves.

There are also a few indications that some thinking was done on the relations between man, animal and environment. These indications become more evident in the Würm glaciation period. Bone carvings and tooth amulets are also an expression of mental activities, the thinking process developing beyond the limited thinking based on perception and activity. We must take into account the fact that in the working process — and not only in the direct activities — foresight and planning began to play a certain part, that the working process, at least in some of its parts, was already mentally completed in thought in its basic aspects before it was realized and/or that it was prepared socially by the development of relevant communication in words. The more complicated the natural environment was — and during the period of Würm glaciation the natural surroundings became very difficult for some Neanderthal groups in the forefield of inland glaciers — the greater significance it gained due to the development of this social, planned and rationalized working process.

It is certainly not by chance that parts of the European and Asian Neanderthal populations show a very marked increase in the volume of the brain in the first half of the Würm glaciation (tab. see Herrmann 1974), which partly exceeded the brain volume of present-day man considerably. This evolutionary tendency was obviously not present in the zones far away from the ice (see Day, Leakey, Magori).

These rather meagre but indisputable indications and remains regarding the economic, mental and social processes and relations which have been preserved from the time of the *Homo sapiens neanderthalensis* point to the fact that socio-economic foundations were formed during the development of *Homo sapiens neanderthalensis*. This formation is characterized by:

1. the gradual transition to conscious labour, to labour as a unity of thinking and acting;
2. the development of social forms of life, the term 'social' being understood in the sense of social consciousness, not biological 'sociability'. Ethology, and also some of its users, unfortunately do not differentiate between both qualities in the final effects of their action (Lorenz 1963; Vogel 1977; Behrens/Padberg 1976; as already Darwin 1874, 126 did);
3. the beginning of a type of thinking that had as its object the relations between society and individual to their environment and to time (past, present, future).

These three new elements were obviously the determining elements which led to the formation of socio-economic preconditions of the development of the first economic formation of the society, at least of the Ancient Society.

NOTES

1. This dating of the KBS horizon on the basis of the potassium argon dating is of special importance with regard to the chronology of human

evolutionary history. In the beginning there were many who dated it back to 2.6–3.0 million years before today and not a few Marxist scientists followed this line. Leakey and others transformed them into sensational dates in terms of human evolutionary history. There was widespread negligence of the methodological objections which obviously had to be made with regard to the potassium argon data right from the beginning (J. Herrmann 1974, 17–20 with literature).

Meantime, the KBS horizon is not dated older than 1.8–2 million years, probably even younger (Z. W. K. Harris, W. W. Bishop 1976, 75 et al., I. McDougall 1980 et al.); studies on climatic trends have confirmed that age (Cerling and Hay 1977). The humidification which started 1.8 million years ago is likely to be attributable to the beginning of glaciation (resulting in more rainfalls in Africa).

2. As has been shown above, a taxonomic classification or determination of the individual fossils is still in a state of flux. There is greater number of terms which — very often on the basis of some skeletal features — are presented claiming taxonomic validity. *Australopithecus africanus*, *A. boisei*, *A. robustus* and *A. afarensis* (Johanson and White 1979; Discussion see Science 1980) are used for this purpose. For skeletal remains with a bigger cranial volume the term "*Homo habilis*" (able man) was introduced by Leakey. This proposal has not found complete recognition; it was recognized, for instance, by Heberer (1965). Some anthropologists reject such a species pointing to the almost imperceptible differences in the skeletons in comparison with various individuals of the *Australopithecus* group (Simon 1976).

In my opinion, only a broad definition of such first human beings can be made for the time being because of the existing significant uncertainties and the lack of definitions, which cannot be removed on account of the nature of the fossils and of the nature of the traces of labour activity.

3. Skull KNM 1470 is a surface find. It laid in grid square 131 (Leakey 1973) of the sediments of a dry valley of Karari at Lake Turkana (Harris and Bishop 1976, 104, 105) some 30 m deeper than the KBS tuff. However, this tuff does not outcrop at that place but only in grid squares 108 and 104. The valleys have been cut into KBS tuff (Harris and Bishop 1976, 108, 109), thus KBS tuff provides the terminus postquem but not antequem for 1470 skull, as Leakey supposed. The age of the KBS tuff is given by Leakey as being 2.61 million years (1973, 447) but this age is based on dating at remote sampling sites. Today the tuff is considered to be just under 2 million years old (Harris and Bishop 1976, 75). Apart from 1470 skull tuff remains have been found in grid square 131 — but also in a secondary position.

In dating the surface find KNM 1470, although it stems from an erosional channel, Leakey obviously made the methodological mistake of horizontally projecting the find into a series of strata at a distance of a number of kilometres and combining it with strata outcropping there.

Through an uncritical acceptance of some of the potassium argon data the sensation of a very old age seemed perfect.

If considered soberly, the KBS tuff (some 2 million years old) and the Karari tuff (1.2–1.6 million years old) seem to be the lower and upper limits between which the finding places are situated in the riverbeds and erosional channels of grid squares 130 and 131 near Karari.

4. The figure was already discussed at the meeting of the "Fachgruppe Ur- und Frühgeschichte" of the "Historiker-Gesellschaft der DDR", 9th–11th of May 1977 in Frankfurt/O. — See: *Die Entstehung des Menschen und der menschlichen Gesellschaft*, ed. by F. Schlette, Berlin 1980, fig. p. 28.

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