ANTHROPOLOGIE * XXVI/2 * 1988

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NEW REALITIES, PREADAPTATIONS AND COMMUNICATION IN BIOCULTURAL EVOLUTION

ABSTRACT — A unified biocultural evolutionary process is considered. The changes from the preadaptive stage to the broad adaptation are described with the help of some archaeological and biological examples. The important role of communication as the catalysator of the process is stressed.

KEY WORDS: Biocultural evolution — Mosaic model — Preadaptation — Communication.

Biological mutation and cultural discovery, such as e.g. a novel technology, are *new realities*, the former biological and the latter cultural. The difference lies in the fact that the cultural discovery is not hereditary. The capacity for it is being transferred through learning. To what extent the genetic transfer is also a result of a characteristic way of learning by the living cell is to be seen. In fact it is quite possible that the difference between the biological and the cultural transfers is far from being so strong as it may appear today.

New realities occur usually as *preadaptations* and as such are part of the *preadaptive capacity* of an individual or of a population. In biology such preadaptive potential of populations rests in the gene pool and forms the basis for a possible successive adaptation. It constitutes the platform for natural or cultural-social selection to work on. One of its important factors is communication.

One of the well known examples of a biological preadaptation is the upright stature of hominids appearing — according to the palaeontological finds — 4.000 000 years ago. This new reality, however, remains at its preadaptation degree during the following two million years, being only marginally used to gain a better outlook, to carry various things, youngs etc. The situation changes 2 million years later and the hitherto preadaptational situation develops into a more evident form of adaptation when hands are used for the manufacture of tools and other-similar manual activities. Communication and selection favour its spreading and its broad evolutionary expression. Anyhow each adaptation constitutes a potential preadaptation for a further process of development.

As examples of cultural preadaptation and adaptation can serve the discovery of stone grinding, of pottery making and the discovery of cattle breeding.

1. The discovery of the stone grinding technology is known in Europe already in the Gravettian culture 27 000 years B.P., as documented by the stone discs cut from stone and ground, found in the Gravettian burrial Brno II (Makowsky 1892, Valoch 1959). It is a rare and seldom repeated Gravettian feature. Similar technology appears e.g. in Věstonice-Pavlov, where small ground marble discs were used as trimming tool (retoucher) (Klíma 1983). The rare frequency of such finds within the framework of the rich Gravettian material culture is typical for the preadaptative stage. A broad adaptation of stone grinding technology appears only much later, in the Neolithic times when it becomes the main method of processing most important stone tools.

Very instructive is the fact, that stone grinding technology was convergently discovered in Northern Australia 23 000 years ago (White 1967). This fact

well illustrates the uneven mosaic pattern of the distribution of these cultural-evolutionary changes. However this discovery in Australia remined restricted to grinding only stone axes, especially their cutting edges but it never became a generally applied technology of processing stone tools.

This mosaic pattern of the evolutionary changes and their occurence geographically (horizontally) and in the course of time (i.e. chronologically — vertically) may be traced not only in the cultural but also in the biological development. The respective biological or cultural complex consisting of various components shows in a three-dimensional model that in different populations, i.e. in populations with various degrees of isolation, the components are of various values i.e. they take place at various rates and often at various modes.

Important for understanding this cultural and biological mosaic model of changes is to know that the changes of the preadaptations into adaptations (influenced by a differing degree of isolation, i.e. by a different degree of communication) are connected with human behaviour. Both the biological new reality e.g. the upright posture (bipedal locomotion) and its adaptation, and new cultural reality e.g. the discovery of stone grinding and its adaptation, represent human behaviour.

2. Another interesting example of a new cultural reality is the discovery of pottery making. In the Moravian sites it begins already in the Gravettian (namely in Věstonice). Klíma found here two simple kilns and rich fragments of small animal and human sculptures made of fired clay. People living in this period discovered that the quality of the clay is changing through firing, but the exploitation of the discovery remained restricted to the production of these sculptures, probably for ritual-religious purpose. The new reality here, too, remained in its preadaptive stage and its common use started later, in the Neolithic (i.e. some 5 000 years ago), namely as the adaptation for pottery making. Naturally this extended adaptation occurs in a changed situation on the basis of new social needs by means of selection from the then existing adaptive fund.

3. The third example is concerned with the cattle breeding. It originated as a cultural preadaptation, e.g. in the Sahara as a preadaptive stage at which man kept live animals of various species (antelopes, giraffes, aurochs) for sacrifices, i.e. for religious-ceremonial purposes. We can see in ancient Egyptian reliefs men leading antelopes with a sling around their necks. There are other ceremonial scenes with living bulls pictured in the Saharan rock paintings (Jelínek 1982). Some rock engravings show wild cattle (Jelínek 1985) or giraffes (van Noten 1978) cought and tied to a pole. This relation of man to wild animals represents the preadaptive stage enabling later adaptation as the domestication of those species in which domestication was biologically possible. The bear, worshipped in many places of the northern hemisphere (in Northern Europe, Northern Asia and North America) was not domesticated, although in North-eastern Asia the Ainu, Nivches and others kept the bears in cages for religious feasts. The non- social, solitary character of the bear made the domestication impossible. The external conditions were the same, or even better than those enabling the domestication of the aurochs. In aurochs the preadaptive stage had grown into full adaptation: the wild animals occasionally kept for rituals and feasts were domesticated, marking an important developmental and cultural change.

Important factors changing preadaptation into adaptation are the communication and isolation. In fact the two are one factor, the degree of communication. Isolation represents only a limited communication. Communication is never absent totally,with a total stop of the exchange of biological and cultural information the continuity of life would stop. Isolation as a limiting factor of biological or cultural communication can be of various types determined by the distance, geographical barrier (e.g. insular isolation), cultural, linguistic, religious, social or other sort of isolation. Its biological and cultural consequences are the same. It does not mean of course that under the conditions of isolation new realities (mutations and discoveries) cannot originate. It is only the limiting factor, which of course supports the existing traditions. Communication brings the possibility of the combination of the preadaptations and their application in the process of adaptation. Isolation by limiting the communication limits the degree and spread of the developmental change.

The whole process of the origin of new realities and of their application through preadaptation and adaptation has a uniform character for the biological and cultural evolution. The difference is only in the way how the selection operates. The evolutionary process in biology and culture is one, operating according to a uniform law.

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