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METHODOLOGICAL PROBLEMS OF THE CONTEMPORARY SYSTEMATICS OF THE FAMILY HOMINIDAE

ABSTRACT. — Methodological problems of the contemporary hominid systematics are pointed out and briefly discussed from the point of view of general systematics. The necessity is stressed (1) to distinguish between the evolution (of organisms) and phylogeny (of taxa), (2) to distinguish between the phylogenetic and identification diagnoses, and (3) that taxonomic decisions should be made within properly arranged groups only, i.e. here within the Hominoidea, not within the Hominidae.

KEY WORDS: Systematics — Methodological problems — Hominidae.

Besides evolutionary morphological and functionally morphological studies, the contemporary anthropology pays a great deal of attention to systematics. In spite of the relatively great scientific potential (as compared e.g. with zoology) devoted to this research, our knowledge is still surprisingly minute. When trying to analyze the causes of this situation we can see that hominid systematics was completely isolated from the zoological one for a long time and has developed its methods independently. The attemps of zoologists to surpass this state were viewed negatively by the anthropologists, and it resulted in a sceptical opinion of zoologists on the anthropological systematists and their efforts. There were even suggestions to exclude hominids from the field of zoosystematics (e.g. Simpson, 1945: 188).

In the last years this situation has markedly changed to the better. The anthroposystematists have begun to be interested in the methods of zoological systematics and even in the methodology of general systematics, and, on the other hand, the zoologists (especially primatologists) have increasingly begun to deal with hominids which ceased to be a strict taboo for them, though a mistrust towards zoologists and their methods from the anthropologists side still continues.

The exact reasons for this change of opinion could be explained only by a detailed historic analysis (I am sure a very useful one). The chief factors of this change were probably on the one hand the general trend of the contemporary biology to synthesize all available information (see e.g. Čepikov, 1975, Novák, 1979, Fedorov, 1979), and on the other the crisis of the anthroposystematics which forced this scientific field to join that general process. Due to this development, a mixture of different and often contradictory opinions and trends occurs in the contemporary anthroposystematics which the non-specialist can hardly grasp. I tried therefore to analyze this complicated situation from the viewpoint of the general systematics.

The analysis of methodology of the contemporary systematics discovered a number of methodological shortcomings responsible for the complexity of this situation.

Apparently the basic difficulty is the inconsequent distinguishing among the problems of phylogeny, evolution, and identification. We should keep in mind that not all of the methods of study of the evolution of organisms (or their characters) may be used for the study of the phylogeny, i.e. the historical development of taxa (or their characters), and vice versa. Unfortunately, a detailed discussion of this problem which is necessary for any exact understanding of the given differences is not possible here because it would exceed the limits of the present paper and because the solution of this problem has not been reached even from the point of view of the general systematics till now. On the other hand, the identification deals with the determination of individual finds using diagnoses of taxa for these purposes. However, these identification diagnoses considerably differ from the phylogenetic ones by their significance and content. Unfortunately, neither do the zoological and botanical

systematists realize this difference for the present. The phylogenetic diagnosis should define the phylogenetic position of the given taxon while the identification diagnosis is concerned with the identification of individual finds.

The problem of the diagnosis of taxa is connected with the problem of nomenclature which is common for both the anthroposystematics and the systematics of other groups of organisms. Systematists conceive the taxa as classical sets (cf. e.g. Gregg 1954, Buck and Hull 1966) the denotation of which is sufficiently elaborated, but which are inconsistent with the taxonomic continuum which in turn is characteristic for the phylogeny. A number of investigators attemted to solve this inconsistence without breaking the paradigm of transformation of the taxonomic continuum into the classical sets. Various systems were proposed, as e.g. the overlapping taxa (Michener 1963), bigeneric names (Tobias 1969, 1973), successional species (Imbrie 1957), sister groups (Hennig 1950, 1966), etc. A new approach to the problem of taxonomic continuum represents only the punctuated equilibrium theory (Eldredge and Gould 1972, Gould and Eldredge 1977). As compared with the classical gradualistic theory this theory brings some significant improvements, though some details are questionable. Together with the fact that taxa represent fuzzy sets, not classical ones (see Mlíkovský 1979, 1983, in prep.), this theory suggests an escape from the discussed dilemma. However, new problems arise because direct application of the systematic nomenclature to the fuzzy sets is not possible. Consequently a new method of biological denotation of taxa conceived as fuzzy sets will have to be elaborated. Although this problem has not yet been solved, some analyses indicate (Mlíkovský in prep.) that such a solution is possible and that the currently used nomenclature will need not to be substantially changed. In connection with these deliberations the necessity of a strict adherence to the International Rules of Zoological Nomenclature should be stressed; there are anthropologists who often do not observe these Rules consequently.

The next general problem of the systematics is the problem of categories, i.e. the problem of an ascription of taxa to categories. This problem is especially acute in the anthropology due to the discussion as to which organism can be and which cannot be denoted as the man, i.e. from the paleoanthropological point of view, which fossil taxa can be and which cannot be classified into the genus Homo. This discussion, however, deals with a pseudoproblem because there is no sense in ascribing objects to the sets (i.e. taxa here) in the case when these sets are not explicitely defined, and that are the genera of hominids not. The anthropological taxonomy should therefore first solve the problem of phylogenetic definitions of its taxa, then introduce identification diagnoses on the basis of these definitions, and finally it may ascribe individual finds or phena to the individual taxa on the basis of these indentification diagnoses. Yet from the point of view of the general systematics there should be the highest possible equivalence of the definition of the anthropological categories and taxa with the definitions of these units in other biological disciplines (Mlíkovský 1979, in prep.).

The last methodological problem of the general systematics which shall be discussed here and which leads to the problems of special systematic methods is the relation between similarity and affinity. This problem is based on the fact that an observable quality is similarity while relationships (affinity) could be assessed only indirectly on the basis of similarity and the analysis of its causes (Mlíkovský 1979, in prep.). All attempts to solve these problems could be divided into 3 groups: 1. the classical ("evolutionary") systematics, 2. the cladistic ("phylogenetic") systematics, and 3. the numerical ("phenetic") systematics.

Classical systematics (Plate 1914, Rensch 1934, Schilder 1952, Mayr et al. 1953, Simpson 1961, Blackwelder 1967, Mayr 1969, Smirnov 1969, Bărănescu 1973, Ross 1974, Zarenkov 1976, Mertens and Lines 1978) is based on a subjective decision as whether the similarity of two taxa expresses their relationships or whether it is brought about by convergence. Many rules were introduced later in order to make the decision-making process more objective (see the literature cited above, and further especially Remane 1956). This trend, however, resulted rather in a standartization than in the objectivization of the process.

A breakthrough in this convention was attempted only by Hennig (1950, 1965, 1966) with his cladistic systematics (see also Schlee 1971, Dupuis 1979, and Wiley 1981), in which he supposes that there exists a correlation between the evolutional splitting of the given line and the time of the scientific fixation of groups which arose from it, and that the relationships can be derived directly from the evolution of individual characters. Although this method is often used in zoology (but almost unknown in botany — see Bremer and Wanntorp 1978) for many reasons it cannot be accepted (cf. e.g. Inger 1967, Mayr 1969, 1974, Van Valen 1978, Eichler 1978, Thenius 1979). Fortunately it is used very infrequently in anthroposystematics (e.g. Eldredge and Tattersall 1975, Delson 1978, Schwartz et al. 1978). However, interesting results could be provided by the so-called character compatibility analysis (Estabrook 1972, McMorris 1975, Estabrook et al. 1975, 1976a, b, 1977) which was derived from the cladistic analysis using numerical methods. However, this method has not been used either in the anthropology or in the primatology, yet.

The third group of the systematic methods is the so-called numerical systematics (Sokal and Sneath 1963, Jardine and Sibson 1971, Sneath and Sokal 1973, Leuschner 1974, Clifford and Stephenson 1975). It is based on the presumption that the general similarity is directly correlated with the relationships (provided that a sufficient number of characters was analyzed). It was, however, experimentally shown that this presumption is incorrect (e.g. Boyce 1964, Eades 1965, Minkoff 1965, Mayr

1965, 1969, Sokal and Michener 1967, Kendrick and Weserup 1967, Crovello 1968, 1969, Rohlf 1972). Despite this evidence the numerical systematics is very popular in biology, perhaps owing to its seeming exactness and scientific value. In anthropology this method is dealt with by, e.g., Oxnard (1968), Bilsborough (1971), Kowalski (1972), Corruccini et al. (1976, 1979), Corruccini (1978), and Corruccini and Henderson (1978).

Consequently, none of these systematic methods is fully satisfactory, and this fact should always be kept in mind during the interpretation of results. Some significant improvements should be introduced by a new systematic method denoted as logical systematics (Mlíkovský 1979) which I am elaborating at present.

But none of the systematic methods could yield correct results unless the two following conditions are met: 1. the proper delimitation of phena, and especially 2. the proper arrangement of the group, in which phylogeny is studied. Every analyzed group should be monophyletic and its elements should be real. In the case of hominids I presume, e.g., that it is not entirely correct to analyze the phylogeny or the evolution within the framework of the family Hominidae because this family is not clearly separated from other families of the superfamily Hominoidea. Consequently there is a possibility that some taxa and/or phena included in this family at present are not members of it, whereas some other taxa (phena) which have been included in another family of the superfamily Hominoidea belong to this group, as it may be shown in the discussion about the genera Gigantopithecus (Frayer 1973, Eckhard 1975, Simons 1978), and Ramapithecus (Conroy 1972, Vogel 1975, Aguirre 1975, Conroy and Pilbeam 1975, Simons 1976, 1978, Frayer 1978, Greenfield 1979). On the other hand the superfamily Hominoidea is separated from other superfamilies of primates clearly enough so that the possibility of the complications mentioned above is not too high and the systematic studies within this group could therefore be made with a hope to some purpose.

At the end I would like to stress the necessity of a synthetic approach to the solution of the anthroposystematic problems. For a succesful development of the anthroposystematics it is necessary to interconnect organically its paleontological and neontological parts (as happens now in zoology) and to remove the barrier between the anthroposystematics and the systematics of other organisms, because despite every plant and animal group (i.e. consequently also the hominids) has its own concrete specific features, the principles of the general systematics hold for all of them.

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