

THE CLASSIFICATION OF MAN

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CLASSIFICATIONS of human groups have an increasing social significance. Nevertheless, they continue to be affected by irregularities of interpretation and method, the latter being the subject of this note. Its shape has responded to consultations with Dr. S. L. Hora, Mr. A. Fraser Brunner and Mr. W. H. T. Tams, all of whom have particular experience in the fields from which apparent sanctions for confusing practices are sometimes drawn. I am also grateful to Dr. Kenneth Oakley for helpful discussion.

It would appear, to begin with, that the promotion of a useful classificatory science of man depends on the resolution of two seemingly different conceptions. The first assumes that it belongs to zoological taxonomy, the second that it is a matter for a special typology; and both views are complicated by a tendency amongst certain anthropologists to branch out into uncontrolled procedural directions. Annandale, observing this inclination more than thirty years ago,¹ warned those concerned that "Anthropology is fundamentally a branch of biology...perhaps the most complicated of all the branches of biology. To me it is inconceivable that a sound knowledge of anthropology can be obtained without a preliminary training in biological method." A few years later, Wood Jones² was still more precise: "The anthropologist should be a mammalogist who happens to be dealing with a particular mammalian type; and he should co-ordinate his procedure and weigh his hypotheses by the standards employed by workers in other mammalian groups."

But particulation has become so characteristic a feature of Western science in our generation that, in 1945, Simpson could justifiably complain³ that "much of the work on primates has been done by students who had no experience in taxonomy and who were completely incompetent to enter the field." Moreover, he felt that "many studies of this order are covertly or overtly emotional"; and that it would perhaps "be better for the zoological taxonomist to set apart the family Hominidae and to exclude its nomenclature and classification from his studies." The alternative, especially for zoologists who recognise the rôle of their own neglect in the situation deplored by Dr. Simpson, is to struggle with the confusions of Hominid taxonomy, even though they become somewhat overwhelming when "racial" classifica-

tions are reached. The magnitude of this task is indicated by the following passage⁴ from Trevor's recent abridgement on "race" in a standard work:

"Zoologically race is often equated with sub-species, although there is a tendency amongst some systematists to regard it as a more restricted category for intergrading populations of mammals and fishes. Most anthropologists would agree that all human beings who have lived during the past 10,000 years at least have belonged to a single but polymorphic⁵ species—and most again in endeavouring to distinguish the various forms of this have considered, explicitly or otherwise, a hierarchy embracing three grades of different degrees of inclusiveness. The first and widest may be thought of as a constellation of races and has been designated 'variety', 'sub-species', 'primary group', 'major group', 'trunk', etc. The second and more restricted is in general termed simply 'race' and the third and narrowest 'sub-race'."

Dr. Trevor's own involvement in this peculiarly intricate synthesis is expressed⁶ elsewhere in the comment that he is "in sympathy with some recent mammalogists, ornithologists and ichthyologists in regarding 'race' as a lesser category than sub-species or variety, a practice which Hubbs feels will come to be widely adopted in vertebrate zoology." Dr. Trevor has also said at meetings of the Royal Anthropological Institute and UNESCO that "variety" can be regarded as a higher category than sub-species.

Such taxonomic heresies could be abundantly elaborated from still more authoritative sources: it was not so long ago, for example, that a renowned anthropologist created the family *Homo-simiidae* for the reception of *Australopithecus*. But, since they concern the concept of subspecies, it might be more useful to indicate the nature of its applications in zoological taxonomy. Its employment was first clarified as follows by Rothschild and Jordan⁷ in their classic "Revision of the Sphingidae":

"Since Linné applied the term *varietas* to the forms which are not specifically different, we do not see any reason against the use of this very convenient word in the same sense for all the components of a species which differ from one another. We understand, therefore, under *variety* not a particular category of the components of a species, but employ the term for all the different members of a species indiscriminately. The different categories of varieties must receive special terms in a precise classification, and special formulæ must be employed for them in a precise nomenclature."

In accordance with this logic, they distinguished three kinds of varieties—individual, generatory and geographical—of which the geographical variety or sub-species “is the highest category of varieties.” They added that:

“As the term *varietas* includes also other varieties, it cannot be employed as such for the geographical variety except in a precise nomenclature; either a specifying attribute must be added (*var. geog.*), or an abbreviation of another term chosen (*subsp.*). But...we can do without the abbreviation...by simply mutually agreeing that a sub-species is designated by its name added to that of the species without any abbreviation before the sub-specific name.”

This formulation subsidised the growth of the trinomial system and its regulation by the International Commission on Zoological Nomenclature;⁸ but its acceptance had a deeper basis than that of the authority of the Tring zoologists, or a codified agreement upon a systematic convenience. The environmental thinking influencing it has always been deeply rooted in biological philosophy; communities were regarded as potential species, and subspecies as communities well on the way to specific status. The vigour of this idea, during the years when the binomial system was being transformed, was emphasised by Tate Regan:⁹

“My own work on the structure, classification and geographical distribution of fishes, has led me to certain conclusions. I believe that the first step in the origin of a new species is not a change of structure, but the formation of a community, either through localization, geographical isolation, or habitual segregation.”

This opinion was emphasised by the brilliant researches of Annandale,¹⁰ Hora¹¹ and others who believed that “evolution is no more than the adaptation of organisms to environment” (Hora); and the advance of genetics has by no means eliminated it.¹² Supporting experimental evidence was also available, which found a new but neglected significance in the remarkable studies of the American Negro cytologist, E. E. Just.¹³ He offered the first major proofs for placing “the determination of characters in the cytoplasmic reactions”; and the independent continuation of similar enquiries in Soviet Russia¹⁴ will only be ignored by those whose scientific vision has become clouded by the “cold war”.

Yet the environmental view did no more than create a part of the philosophical atmosphere for the trinomial system and its attendant standards. The functional stimuli came na-

turally from the actual materials under analysis—and not the least of these arose from the morphological phenomenon of isomerism characteristic of animals in general and the higher vertebrates in particular. These repetitions of similar parts narrow down from the supra-specific unities to the species level; and, by confounding structural diagnoses, compel reference to geographic or ecologic criteria. In botany, on the other hand, the task is somewhat simpler. Anisomerism (or marked changes of emphasis on a fundamental pattern) amongst the flowering plants facilitates the morphological separation of nearly related species and infra-specific categories.

It often happens that the extension of a system urges further extensions, but taxonomists have resisted the creation of a quadrinomial nomenclature, partly because it would provide a warranty for multinomial exercises that would soon reduce systematics to an unworkable mass of names. Compliance with the Commission's austerities is accordingly almost universal in zoology, even when lesser varietal names are logically employed for bionomic or other purposes. Calman's statement¹⁵ on this point is the accepted law: “The only infra-specific category which is recognised by the International Commission on Zoological Nomenclature is the subspecies.”

Certain conclusions of basic importance to “racial anthropology” follow inevitably. They are that (1) there can be no varietal category higher than that of subspecies, which is “the highest category of varieties”; (2) a necessary corollary of the determination of a subspecies is the definition of its territory, whether geographic or otherwise; (3) the admission of contemporary subspecies of *Homo sapiens* would concede their potentialities as species and would actually promote “doctors' disagreements” (of profound social significance) about their rank;¹⁶ (4) the acceptance of subspecies or races in man must restore the correlation between race and culture which most liberal scholars now deny; and (5) the term “race” has no currency in zoology, except as a colloquial synonym for subspecies: the latest compendium of biological terms¹⁷ does not even include it.

The procedures involved in separating subspecies support these conclusions. They have been exhaustively covered by the works of Huxley¹⁸ and Mayr,¹⁹ but it might be useful to quote Lack,²⁰ who incidentally provides a typical example of the permissible use of the word “race”:

"Subspecies (of birds), as the term implies, differ from each other to a smaller extent than do full species, the differences chiefly involving shade of plumage and size. But a more important criterion is that of geographical distribution. Subspecies of the same species always breed in separate geographical regions, and where their respective breeding zones adjoin, they often interbreed freely and intergrade in characters. On the other hand, two forms which breed in the same region without normally interbreeding are always classified as separate species, however similar they may be to each other in appearance.... Difficulty occurs chiefly in regard to related forms which occupy separate geographical regions, like subspecies, but which differ from each other more markedly than is usual among races of the same species."

The views of the American ichthyologist Carl L. Hubbs,²¹ to which reference has been made, remain to be considered in this connection. The literature provides no indication of the popularity claimed for them; and it is noteworthy that, in the reviewing section edited by Dr. Hubbs himself for *The American Naturalist*, the well-known ornithologist Alden H. Miller insists²² that Hubbs' use of "the term 'race' for minor categories should not be pressed upon other workers who for long have used 'race' and subspecies' as synonyms." It need hardly be added that Dr. Hubbs makes no claim for altering or extending the rules governing the trinomial system.

The fact that zoologists know forms (mostly host-varieties) that can be called "biological races" or "ecological races" does not justify racial definitions of categories below that of subspecies, whether in man or otherwise. Anthropologists who seek proofs by analogy in these circumstances usually lack the working experience of taxonomy which inhibits such enthusiasm. For the discussion of biologically isolated populations of a species in *qualified* terms of "race" has a logical pattern in that it stresses environmental separation just as subspecies or "geographical race" does; and, as the "accepted meaning of subspecies" includes host-variations,²³ such categories are equally synonymous with subspecies when the forms included in them are adequately established. Moreover, where definitions of particular populations of subspecies are necessary, other terms are available which avoid the confusions of "race".

It should be noted, too, that the unfortunate use of the term "sociological race", for distinguishing human groups that are "socially supposed" to be racially different, derives no

sanction from ecological usage as is often supposed: it is indeed difficult to visualise more in the parallel than a resemblance of form and sound. Biological races are the products of interaction with relatively stable habitats beyond their control, but human groups cannot respond racially to the temporary influence of the most stable social situations. Therefore, "sociological race" is an incompatible proposition which cannot be accepted within the same body of knowledge. It would actually be impossible to incorporate a statement carrying the unalterably biological meaning of innate qualities (*race*), and its negation (*sociological*), in the precise language of an axiomatic system.²⁴

A word now about the view that the classification of recent mankind is not the business of zoological taxonomy. It postulates no more than simple "lumping", augmented perhaps by typological discriminations, and its backgrounds are evident in the work of all cautious zoologists. They believe, as Darwin did, that certain cases, "precisely like that of Man", require the grouping of "all the forms which graduate into one another, under a single species"; for no one has the "right to give names to objects which they cannot define."

This diffidence lies behind the virtual abandonment of the classification of mankind by zoologists to-day. Their attitudes are typified by the work of Simpson, who regards the Hominidae as a monogeneric family, except for the possible inclusion of *Pithecanthropus* and *Eoanthropus*; and of Huxley and Haddon,²⁵ who reject the racial ideology and offer the neutral term "ethnic group" as an instrument for classifying living men. The underlying assumptions seem to be that, "since man has control over nature, the question of human 'races' must be considered on different bases to those we are accustomed to in taxonomy." In fact, according to ordinary zoological standards, there are no human races.

This is the opinion of Dr. Sunder Lal Hora in commenting upon the first outline of this paper. He attached some remarks by his colleague Dr. B. Biswas, an ornithologist, with which he was in "complete agreement". They are worth quoting:

"The classification of living mankind on the same principles as those regulating the taxonomy of other animal forms would be a futile attempt, because the criteria for grouping animals below species are practically indiscernible in human groups. For example, separate breeding territories—the chief criterion for geogra-

phical subspecies of animals—are not a characteristic of man, at least in the 'civilised' state. Mass movements and migrations, sometimes involving whole populations, have transformed *Homo sapiens* into a species consisting only of intergrades, with mere traces here and there of the original subspecies, if there were any. For these reasons, it is my contention that...if the human species is to be classified at all, it should be along the lines of the classification of the different breeds of domesticated animals. And different terminologies, to avoid the use of such terms as 'race', would, of course, have to be devised with the help of systematists in biology."

The growth of a similar approach in the social sciences has found much nourishment in recent years, particularly from outstanding cultural anthropologists such as Melville J. Herskovits.²⁶ Its practice would require a reorientation of the scope and methods of anthropology, which would hasten the reabsorption of physical anthropology by zoology, just as other "special sciences", created by new techniques, opportunities and pressures (microscopy and microtomy, for instance), have lost the status they once possessed.

It must be expected that such a reorientation will be contested, especially when vested interests are involved, but it is not beyond the capacity for academic adjustment. In America and elsewhere, as Hager reports,²⁷ "this shift in emphasis...has already begun...and there has been a steady decline in the publication of descriptive racial studies, studies of 'race mixture', constitutional typing and anthropometry." Indeed, the process has gone so far that, at several major American universities, the courses in physical anthropology "have been entirely re-structured: many no longer bear that name." These changes, it should be added, are socially based; they are much more influenced than is generally recognised by the falsification of racial thinking²⁸ pioneered by Huxley and Haddon; and they are encouraged by the absence of any demand for a taxonomic background to cultural anthropology.

It would seem, then, that anthropology can function without a foundation of zoological taxonomy. But the organisation of every science depends on classification; and, if anthropology is to set up typological conventions of its own, the separation from taxonomy cannot be absolute: the systematics of extinct forms and the typology of living men must necessarily complement each other. For the definition of modern man is continuously affected by new discoveries and interpretations concerning his predecessors—and this know-

ledge must remain grounded in taxonomy. Nor can any scientific discipline ignore the elementary principle of unity of usage: common concepts, terms and definitions must keep their interchangeability; new ones should be new and logically related; and borrowings should be borrowed whole and without confusing redefinitions by inventive reformers.

It follows that any reasonable classification of man must depend upon confident familiarity with the theory and practice of zoological taxonomy; and, for this reason, Huxley's cline typology might offer a workable method—at least to those who believe that the types of mankind can be clearly differentiated. But, whatever the method, it should have the flexibility which has allowed taxonomy to contain extremes of "splitting" and "lumping" without damage to its structure.

Finally, the indications are that individual refinements of the classificatory study of man, particularly when they follow the neo-classical rituals of limited metric analyses or express personal idiosyncracies, are unlikely to produce more than further controversy. Revised approaches and wide co-operation, sufficiently rooted in objective realities to resist the pressure groups which have vitiated recent pronouncements on "race", are now imperative. And Indian zoologists and anthropologists are uniquely circumstanced, since they are little impeded by Western racial ideologies, for promoting the new directions that are necessary. They can provide, in these ways, another substantial contribution from India to the welfare and wisdom of humanity.

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1. Annandale, N., *Nature*, 1921, **108**, 370.
 2. Wood Jones, F., *Man*, 1930, **30**, 61.
 3. Simpson, G. G., *Bull. Amer. Mus. Nat. Hist.*, 1945, **85**, 181 & 188.
 4. Trevor, J. C., *Chambers' Encyclopædia* (Newnes, London), 1950, **11**, 428.
 5. Dr. Trevor's dictionary usage of the word "polymorphic" reveals that he is unaware that in zoology a "polymorphic species" is one in which there are set kinds of individuals associated with biological phenomena—e.g., the different females of mimetic butterflies. *H. sapiens* is a polytypic species.
 6. Trevor, J. C., *Journ. Roy. Anthropol. Inst.*, 1950, **77**, 63n.
 7. Lord Rothschild and Jordan, K., *Nov. Zool.*, 1903, **9** (Suppl.), 43. Also Tams, W. H. T., *Entom. Rec.*, 1927, **39**, 25.
 8. Schenk, E. T. and McMasters, J. H., *Procedure in Taxonomy* (Stanford Univ. Press, California), 1936.
 9. Regan, C. T., *Ann. Mag. Nat. Hist.*, 1923, **12** (9), 167.
 10. Annandale, N., *Proc. Roy. Soc.*, 1924, **96B**, 76.
 11. Hora, S. L., *Phil. Trans. Roy. Soc.*, 1930, **218 B**, 172.
 12. Tokens of its contemporary persistence will be

found in *Lectures on the Development of Taxonomy*, edited by G. R. de Beer (Linnæan Society of London, 1950) and S. L. Hora's Address on Adaptation and Evolution in *Proc. National Inst. Sci. India*, 1952, **18**, 161-70. 13. Just, E. E., *Amer. Nat.*, 1936, **70**, 267-312; and *The Biology of the Cell Surface* (Blakiston, Philadelphia), 1939. Also F. Wood Jones, *Proc. Linn. Soc. Lond.*, 1945, **157**, 11-14. 14. Morton, A. G., *Soviet Genetics* (Lawrence and Wishart, London), 1951. 15. Calman, W. T., *The Classification of Animals* (Methuen's Biological Monographs), 1949. 16. Dobzhansky, T., *Amer. Journ. Phys. Anthropol.*, (n.s.), 1944, **2**, 251-62; and Gates, R. R., *ibid.*, 279-92. "A subspecies," says Mr. Tams in this connexion, "is a species of which we know the geographical history." 17. Abercrombie, M., Hickman, C. J. and Johnson, M. L., *A Dictionary of Biology* (Penguin Reference Books, London), 1951. 18. Huxley, J. S., *et al.*, *The New Systematics* (Oxford Univ. Press), 1940. 19. Mayr, E., *Systematics and the Origin*

of Species (Columbia Univ. Press, New York), 1942. 20. Lack, D., *Darwin's Finches* (Cambridge Univ. Press), 1947. 21. Hubbs, C. L., *Ann. N. Y. Acad. Sci.*, 1943, **44**, 111. 22. Miller, A. H., *Amer. Nat.*, 1943, **77**, 552. 23. Bethune-Baker, G. T., *et al.*, *Proc. Entom. Soc. Lond.*, 1925, lvr. 24. Kaufmann, F., *Methodology of the Social Sciences* (New York), 1944; and Woodger, J. H., *The Axiomatic Method in Biology* (Cambridge Univ. Press), 1937. 25. Huxley, J. S. and Haddon, A. C., *We Europeans* (Cape, London), 1935. In the U.S. particular credit for advancing the views of Huxley and Haddon belongs to M. F. Ashley Montagu (for example, see *Psychiatry*, 1945, **8**, 27-33). 26. Herskovits, M. J., *Man and His Works* (Knopf, New York), 1948. 27. Hager, D. M., *Man*, 1951, **51**, 54. 28. Dover, C., *Ibid.*, 1951, **51**, 55.

Note.—An essential statement by S. L. Hora on the taxonomic assessment of a species will be found in *Journ. Zool. Soc. India*, 1949, **1**, 91-100.

PAPYROGRAPHIC STUDIES ON PEPTIDES

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RANGA RAO AND SREENIVASAYA¹ have shown that the non-protein nitrogen (N.P.N.) fraction of the body fluids of the lac insect (*Laccifer lacca*) contains simple crystalloidal peptides, non-precipitable by trichloroacetic acid. Milks obtained from different types of mammals² and pulses³ have also been shown to be associated with high percentages of N.P.N. whose presence therein is believed to be responsible for the ease with which they are assimilated. Peptides are widely distributed and are intimately associated with all active and proliferating tissues—both plant and animal—and owe their existence to the continual breakdown and resynthesis of proteins which characterise living tissues and body fluids. Particularly rich is their concentration in the body fluids of animals and the saps of plants, since their role is one of providing tissues with an easily mobilisable source of nitrogen exceptionally adaptable for rapid tissue formation.

Special physiological significance is attached to some of the peptides; they have been found to act as co-enzymes or activators, essential growth factors or antibiotics. Glutathione,^{4,5} the well-known tripeptide, for example, is a co-enzyme of methyl glyoxylase, an activator of papain⁶ and an effective stabiliser of ascorbic acid.⁷ Its unfailing presence in actively proliferating tissues is suggestive of the suspicion that glutathione may have other functions

yet undiscovered. More recently, glutathione, γ -glutamyl, and acyl peptides have been shown to participate in the enzymatic transpeptidase reactions.^{8,9} Strepogenin¹⁰ which was discovered by Woolley in 1944, and which has been shown to be present in most of the proteins of high biological value,¹¹ stimulates the growth of certain bacteria. Subsequently other investigators have sought to isolate other peptides from enzymatic digests of proteins and determine their growth-promoting potency. Ågren¹² has found significant increases in the growth of children fed with peptides resistant to the action of catheptic enzymes. Dunn¹³ has recorded the stimulating effect of partially hydrolysed digests of casein and of the albumin of bovine plasma, on *L. casei* resulting in a higher rate of acid production. It was shown that the organism utilised the essential amino acid more readily when provided in a peptide-bound form. Simonds and Fruton¹⁴ have also observed that a mutant of *E. coli* utilises for growth peptides of proline at a faster rate than proline. A genus of "alcaligens" utilised leucine peptides only when leucine was present at the amino end of the unsubstituted peptide.

Another entirely new group of peptides, which has received considerable attention, is derived from the culture filtrates of bacteria, e.g., polymyxins, gramicidin, tyrocidine and Tyrothricin.¹⁵ The structure of these antibio-