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BIOLOGICAL SUBDIVISIONS OF THE INDIAN ON THE BASIS
OF PHYSICAL ANTHROPOLOGY

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Prepared by Dr. Juan Comas, Sección de Antropología, Instituto de Investigaciones
Históricas, Universidad Nacional Autónoma de México, México, D.F., México

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When I accepted the kind invitation of Dr. Abraham Horwitz, Director of the Pan American Health Organization, to participate in this Special Session with Dr. James V. Neel as Moderator, I was guided primarily by the great interest this subject has always had for me. I well realize however, that my knowledge of the problem and my information both direct and indirect, leave much to be desired and for this reason I present my excuses in advance and ask for lenience on the part of the readers of this report.

For a better understanding of the value and scope of the principal biological subdivisions of the Indian on the basis of physical anthropology, I believe it necessary to first pose three questions and from this point present some provisional conclusions:

1) Do the American Indians constitute a biologically homogeneous population or, on the contrary do they present a certain variability which permits thinking in terms of subdivisions?

2) To what cause or causes may we attribute the biological variability of the American Indian?

3) What attempts have been made for a racial taxonomy of the American Indian?

Let us examine these questions consecutively.

I. The biological variability of the American aborigines as against the classical conception of the 'American Homotype'.

The excellent works of Newman (1951) and Stewart-Newman (1951) make it unnecessary to devote too much space to this question. Discrepancies regarding this theory have a long history. Antonio de Ulloa's affirmation towards the end of the XVIIIth century to the effect that "If we have seen one American, we may be said to have seen all, their

color and make are so nearly alike", and the consequent acceptance as a definitive fact of the somatic unity of the pre-Columbian population of the New World, soon received the support of such renowned anthropologists as: Samuel G. Morton (1842), Timothy Flint (1826), Ales Hrdlicka (1912), Arthur Keith (1948), etc.

The opposite camp composed of those who recognized the existence of obvious biological differences among the Indian groups, describing them as 'races', 'varieties', or 'sub-species', included among many others, Humboldt (1811), Desmoulins (1826), D'Orbigny (1839), Retzius (1842), Aitken Meigs (1866), Topinard (1878), Deniker (1889), Virchow (1890), Ten Kate (1892), Haddon (1909), Biasutti (1912), Wisler (1922) Dixon (1923), Rivet (1924), Eickstedt (1934), Hooton (1937), Imbelloni (1937-58), Count (1939), Neumann (1952), Schwidetzky (1952), etc.¹

It is interesting to point out that while the supporters of the criterion of the somatic unity of the Indian remained a minority, in the foreground was Morton of whom Stewart-Newman (1951:22), say shrewdly:

"Indeed, so great was his influence that he was responsible in large measure for the wide acceptance of the generalization embodied in Ulloa's words and for the conversion of Ulloa's words into an 'adage'".

Morton's influence lasted for more than half a century until Hrdlicka arose as the new champion of the homogeneity of the Amerindian. In summarizing his arguments the latter author said in 1912: "The conclusions are that the American natives represent in the main a single stem or strain of people, one homotype": he reaffirmed this thesis years later (1928), attempting to refute those who supported the racial plurality of the American Indian:

"We find that the various differences presented by the Indians are often more apparent than real; that actual and important differences are in no case of sufficient weight to permit of any radical dissociation on that basis."²

This position furthermore, had the able support of Sir Arthur Keith:

"Certainly the American Indian differs in appearance from tribe to tribe and from region to region, but underneath these local differences there is a fundamental similarity. This, too, is in favour of descent from a single, small, ancestral community."³

Nevertheless, little by little, the physical variability of the American Indian had shown itself to be an undeniable observed fact, molded into differing and even contradictory descriptions and systematizations.

Laughlin (1951:V), presents the situation very clearly and objectively in summing up the various works presented and discussed during the Summer Seminar in Physical Anthropology held at the Viking Fund, New York, September 1st to 3rd, 1949:

"Much progress has been made since the early days of anthropology in America when it was assumed that all Indians were essentially alike. The diversity of the New World populations has been well established. The significance of the diversity in terms of the evolution or development of types there or of the importation of preformed types from the Old World remains to be clarified."

Stewart-Newman (1951:33), expressed the same opinion at the conclusion of their article:

"This review of opinions regarding Indian variability has re-

vealed the fact that the principle of Indian racial unity rests almost solely upon the outer appearance of living Indians. In so far as the Indians exhibit in common such physical characters as straight, black hair, copper-colored skin, dark brown eyes, high cheek bones, scanty beard and a relatively long trunk, they can be said to be uniform." "That the Indians, on the other hand, are quite variable within this racial pattern, and especially when comparisons are made in measurable dimensions, also has been shown."

The excerpts cited and the information given would lead one to think that from 1951 on, the theory of the American Homotype had been definitely discredited. While the great majority of anthropologists is of this opinion we must not overlook the fact that some distinguished ~~investigators~~ investigators, Ashley Montagu for example, differ; on this point Montagu wrote (1960:465):

"The American Indians exhibit a certain basic homogeneity but at the same time are evidently characterized by an equally certain diversity of types. Owing to the lack of the necessary data it is impossible to say quite how many diverse types there may be. General impression based on sporadically measured and photographed individuals from various groups provide an insufficient basis upon which to erect a satisfactory account of the American Indian."

Some years later the same author (1964:79) does affirm that the Eskimos of the Arctic coast of North America form part of the group of Arctic Mongoloide while the other American Indians constitute another group composed of "an undetermined number of ethnic groups of North, Middle, Central and South America."

Coon in his important volume on human races (1965:152) devotes barely two pages to the racial characteristics of the American Indians and says:

"The American Indians are more uniform racially than any other group of people occupying an equally vast area. In fact, they are more uniform than many peoples who occupy an area a tenth as large. All of this indicates that a relatively small number of peoples crossed the Bering Strait during the last part of the Wisconsin glaciation, and that their descendants gradually filled the uninhabited regions of the New World. They are Mongoloid in general and despite some of their peculiarities in blood groups do not necessarily merit classification as a subspecies of their own". And, concluding this chapter, adds:

"The American Indians differ from the Asiatic Mongoloids mainly in that they have less facial flatness, particularly in the nasal skeleton, and a more variable skin color. There is no valid evidence that the Indians were derived from more than one source or that they came into the New World by a route other than the Bering Strait."

In spite of these sporadic cases, quite possibly not the only adherents of this theory, we believe we can affirm that the beginning of the second half of the 20th century coincides with the end of the "myth" of the "Indian homotype" and that we can reaffirm on the other hand the explicit recognition by the great majority of anthropologists of the existence of somatic and osteological variability and heterogeneity amongst the aboriginal groups of America. It is then necessary to establish the origin and the causes of this variability, bearing in mind that this variability in no way exceeds the limits of characterization of Homo sapiens.

Do we have at our disposal sufficient and adequate information, posterior to 1951, to be able to determine if the differences of physical types among the Amerindians are due to prehistoric immigration from the Old World or if they are the result of adaptive evolution to the new habitat? This is what we must try to analyze.

II. To what cause or causes can be attributed the biological variability of the American Indian?

At first glance it seems easy to distinguish two ways of explaining this phenomenon:

A) That proposed by those who accept the immigration of diverse human types each of which represents one of the existing Amerindian "races". Stewart and Newman (1951:29) define very clearly this form of interpretation which they attribute above all to those who have been concerned with American racial taxonomy:

"...the classifiers of Indian types operated with a strongly hereditarian bias, out of keeping with the main stream of biological thought. If explanations were given for their classifications, they were usually to the effect that each Indian 'race' represented a separate migration from the Old World". "Implicitly, such explanations disavowed the possibility that physical changes could have occurred among New World peoples".

However, Newman himself indicates the different shades of emphasis which each author concedes to the hereditary aspects of the primitive, prehistoric immigrants, to cross-breeding with each other and to the environmental influence of the new habitat, to explain the presence and existence of distinct Amerindian "races". In this sense he evaluates the greater or lesser importance due to the intervention of each of these factors conceded by some of the most conspicuous "polyracialists",

for example, Dixon, Griffith Taylor and Hooton (Stewart and Newman, 1951:30). We must note that even Imbelloni, one of the most devoted defenders of the most complicated polyracialism, refers only to 7 distinct migratory waves and on the other hand describes and localizes eleven Amerindian "races"; which implies acceptance that in the new habitat new racial types were formed. Imbelloni (1958:127) even tries to localize "the sectors and zones where the effects of mixture and hybridization occurred", although he rejects every explanation for what he called the "environmentalist creed".

B) The somatic variability of the Amerindian as the principal consequence of environmental influences is explained as follows:

"Interpretations of this sort were made largely by Americanists who had no classifications to justify, and accordingly were more willing to admit that anthropometric determinations were not always stable in changing environments. As a group, these Americanists did not deny the migrationist postulates of the classifiers, but seemed to believe that hereditarian and environmental explanations could be harmoniously blended in overall interpretations" (Stewart-Newman, 1951:31).

But actually what seems essential to us is the somewhat more careful analysis of Newman's own conception which he expresses thus (1953:324):

"The adaptive responses of bodily form to environment in warm-blooded animals have led, largely in the last century, to the formulation of several ecological rules". "Extensive testing of these rules on human materials, however, has not been performed. For this reason, I have examined the applicability of two of the best validated of these rules - Bergmann's and Allens's - to the body forms of New World aborigines"⁴

"The principle behind both rules is that the maximum retention of body heat in cold climates occurs when the radiating skin surface is small relative to body mass. Since this ratio can be achieved by larger body size, Bergmann's rule holds that within a wide-ranging species, the subspecies in colder climates attain greater size than those in warmer climates.

Allen's rule holds that in addition the cold climate subspecies have reduced extremities and appendages, thus further reducing the body surface. In warmer climates, following Bergmann's rule, easier dissipation of body heat goes with the low body mass body surface ratio achieved by smaller body size."

Newman presents a series of facts with the greatest objectivity, some of which we wish to mention because the interpretation which he makes with respect to these seems to us in certain cases to be doubtful, erroneous and even contradictory with respect to the final comment:

a) Newman states (1953:312): "In mammals and birds there are a number of exceptions to these rules: 10 to 30 per cent for Bergmann's rule, calculated only from subspecies in the most contrasting climates of the species range (Rensch, 1938:282)".

Actually the percentage of exceptions shown by birds and mammals to Bergmann's rule is larger than indicated. Rensch (1960:109) mentions "for palearctic and nearctic birds I calculated 20-30% of exceptions on the average"; "for palearctic and nearctic mammals 30-40%".

b) Newman declares (1953:313): "I am aware that in certain parts of the Old World they do not seem applicable" (Bergmann's and Allen's rules). "Upon superficial examination, the rules do not appear operative in Africa south of the Sahara. Yet, in Europe and the Near and Middle East and in East Asia and Malaysia, there seem to be north-south body size clines conforming to Bergmann's rule. The explanation of these

discrepancies in Africa and perhaps elsewhere is not yet apparent".

To admit that Bergmann's rule is not operative in Africa south of the Sahara indicates the impossibility of generalizing such a rule in support of human variability. And besides its application seems doubtful in Europe, Near and Middle East, Eastern Asia and Malaysia. How does one explain, for example, the differences of stature and body proportions in different regions of Europe, in complete disagreement with the consequences of Bergmann's rule. And the same question arises with respect to the Veddas and Brahmans of Bengal or the Sikhs of the Punjab, amongst the Tapiros and Papuans, etc.

c) In support of his thesis Newman includes 9 maps showing the distribution in America of stature, sitting height (living), head size (living), cranial module (skeleton), upper face size (skeleton), morphological facial index (living), upper facial index (skeleton), nasal index (living and skeleton); but he adds (1953:315): "the categories used in these maps are arbitrary, and in some areas the data are inadequate, but probably *[Italics mine]* the maps represent reasonable approaches to the real distributions".

Then he notes that the small stature of the Eskimos constitutes an exception to Bergmann's rule, but as "the Western Eskimo are not inferior in sitting height to the tallest Indians, their shorter stature, then, is attributable solely to their short legs. This reduction of extremity length is in accordance with Allens's rule, and probably *[Italics mine]* represents an adaptation fostering body-heat retention."

As to the Eastern Eskimo whose stature and sitting height are less than those of the Indians who live further to the south, he attempts to explain this by saying: "Possibly *[Italics mine]* the use of heavy tailored clothing in combination with factors of uncertain food supply and periodic undernutrition may cancel out the selective advantage of

larger bodies in colder climates, but this cannot be demonstrated".

Newman continues to note exceptions to the supposed applicability of Bergmann's rule to man in America, and mentions groups of small height "surrounded by taller groups" such as the Yuki of Northern California, the Lillooet of southern British Columbia, the Yahgan and Alakaluf of the Magellanic archipelago; with respect to the last two groups he further indicates that the sitting height has not been calculated "but other measurements indicate they are not particularly shortlegged".

Neel and Schull say: "In the simplest terms we may conceive of stature as being the cumulative effect of a number of genes whose actions are similar and whose effects are additive". "We may surmise, therefore, that under the environmental conditions in which this study was conducted, the primary cause of variation in stature is genetic."⁵

Barnicot (1964:203-204), referring to geographical variations in stature, says:

"There is a great deal of information about stature variation ^{not} throughout the world, but [^]infrequently it is based on samples which are either very small or were selected in a way which may render them unrepresentative of the general population"... "On the whole the pattern of stature variation throughout the world shows no very striking regularities. Both tall and short peoples are to be found in most of the major regions". And after specifying different cases of geographical distribution of stature, concludes: "This distribution of stature has been interpreted as an example of a cline with adaptive significance in relation to climate (Bergmann's rule). A substantial negative correlation between body-weight and mean annual temperature has been demonstrated for various regions of the world."

Harrison also (1964:144-45) in treating of environmental interaction, writes:

"Differences in stature are inherited, but they are also environmentally determined, since growth is profoundly affected by nutritional state, and probably by climatic factors as well. Further, the nature of the variation produced by both types of factor tend to be the same."

We can see from this how opinions differ with regard to the problem Newman presents.

d) Farther on Newman writes (1953:323): "Of the remaining standard dimensions, only *[Italics mine]* head form and relative head height show distributional patterns not readily interpreted as adaptive ones. Indeed, the earlier and marginal distribution of long heads and the apparently late arrival of low heads seems best explained by migrations of people differing in these regards. But since the diagnostic criteria of most racial classifications of New World aborigines are principally the body size and proportion traits shown here to be adaptive, it is most curious that if explanations of these classifications are attempted at all, they are in terms of a separate migration from Asia to account for each race".

The "head form and relative head height" are hereditary characteristics because head breadth (dominant) and head length (recessive) enter into their determination. The same is true with respect to face height (dominant) and face breadth (recessive), broad nose (dominant) and narrow nose (recessive), characteristics to which Newman also refers in the course of his argument.

On the other hand the most discussed racial classification of the American aborigines (Birdsell, 1951; Newman, 1951) is that of Imbelloni, who uses as his basis ~~those~~ of Biasutti, Eickstedt and Schwidetzky; in the classifications

its elaboration there are taken primarily into account in addition to stature, cranial, facial and nasal indices, all of them hereditary characteristics. Therefore, the statement made by Newman in the preceding paragraph does not exactly reflect the real facts.

f) Finally, Newman states (1953:323-24) "From the foregoing, it seems clear that body build is influenced by both hereditary and direct environmental factors". And "without denying that the New World was peopled by successive migrations or infiltrations of physically differing peoples it is very likely that the American races of the classifiers are at least partly the products of adaptive changes that took place in the New World."

The last conception in its general features seems acceptable; we have earlier made observations on this matter, above all in reference to the characteristics which are considered hereditary (stature, body proportions, and cranial and facial indices). Lastly the problem to be resolved should be to determine precisely, quantitatively and qualitatively the influence which heredity and environment (in their broadest sense) have exercised on the present somatic variability of the American aborigines.

However, in the Summary of his work Newman (1953:324-25) makes generalizations with respect to the applicability of Bergmann's and Allen's rules for the formation of the Amerindian "races" in disagreement with all the reservations and exceptions he makes in the course of his article and which we have specifically mentioned. And in a later work Newman (1956:104) reaffirms his opinion when he says:

"All these data should make it clear why anthropologists have paid serious attention to the application of the ecological rules to man. If anything, these rules seem to be more closely operative in man than in other species of homeotherms."

The fact is important since other anthropologists not only accept such a generalization, but tend to amplify it; Stewart (1960:262) for example says: "Thus Marshall Newman has demonstrated for the hemisphere at large that many elements of the Indian phenotype are primarily adaptive responses to environment and are distributed in accordance with Bergmann's and Allen's ecological rules." And in effect, Stewart, as expected (1960:269) recognizes that:

"When the first Asiatics crossed Bering Strait into America they entered a huge cul-de-sac offering every variety of environment and no forerunners to mix with. A reconstruction of what happened thereafter takes into account that the resulting population at the time of discovery constituted a major isolate that was homogeneous, both phenotypically and genotypically" [*italics mine*].

We wish, however, to present arguments which in the most categorical manner establish the true scope of this "geographical and climatic determinism". Reference has been made in amplifying what was stated by Newman, that according to Rensch the percentage of exceptions to Bergmann's and Allen's rules when applied to birds and mammals, is very high.

In an interesting work on the same problem Ch.G. Wilber (1957:332 and 335) states that "On the basis of our present knowledge the rules of Bergmann and Allen appear to be of historical or descriptive interest only and certainly are not valid generalizations for animals in the cold." And he presents a Summary which because of its importance we quote:

"This brief and rapid survey does not postulate that climate is without effect on man. At another time the ecological effect of this variable of man will be discussed. This presentation

attempted to show in a sketchy fashion the following:

1) The rules of Bergmann and Allen find little support as causal agents in modern studies of temperature regulation in homeotherms.

2) The various formal examples often cited in favor of these ecological generalizations do not support the case of the climatic determinists. One is forced to conclude that the rules just do not apply causally to animals.

3) In man the ecological forces supposed to be acting are not doing so; Eskimos were not cold, the skinny aboriginal Australians were.

4) The rules of Bergmann and Allen have no causal role in the formation of racial differences in man. Such use of these rules on the part of some anthropologists is a source of misinformation and confusion [italics mine].

5) Some human groups have met the demands of severe climate by technological and behavioral adjustments; the Eskimos are an example. Others have developed specific heat-conserving functional changes with no gross morphological changes; the Australian aborigines are an example."

Garn, on the other hand published (1958:339) a detailed criticism refuting the points of view sustained by Wilber, and concludes with the following concepts:

"I know of no anthropologist so rash as to claim that temperature and the radiant heat load are exclusive or even major causes of the differences between geographical races, or that the past-century formulations of Bergmann and Allen completely solve the problems of race formation in man. I know of none who adopt the Lamarckian approach that Dr. Wilber so gleefully

demolishes. But, when Wilber asserts that the "rules of Bergmann and Allen have no causal role in the formation of racial differences in man", I doubt very much that he intended such a sweeping and untestable counter-generalization".

Other authors confirm this clear divergence of criteria with regard to the applicability and importance that Bergmann's and Allen's rules could have had in the biological variability of the American Indian.

Roberts in an important contribution to this subject (1953:551) says:

"The weight/temperature relationships here demonstrated suggest that Bergmann's rule is applicable to man. Clearer definition of 'body size' is, however, necessary. Defined by reference to stature, although from the series here considered Bergmann's rule might seem to be applicable, this suggestion is refuted by more extensive material [*italics mine*]. Defined by weight, it is not only applicable but needs restatement to incorporate, with the postulated variation in size among subspecies, similar variation within the subspecies."

Ashley Montagu (1960:392; 1964:62-63) affirms that such zoological rules "are to some extent also applicable to man", but adds:

"The application of Bergmann's and Allen's rules to man have been seriously and cogently questioned (Wilber), on the ground that the inadequate data has been improperly interpreted, and that in any event man has never responded to his environment in a passive manner, but has always done everything within his power to control and shape the environment to his requirements. But while this is undoubtedly true, it should be remembered that ecological rules are generalizations to which exceptions can be found in every group, but that by and large they do apply to most populations of a species. The studies of Newman

and of Roberts on New and Old World human populations lend strong support to the view that ecological rules apply to man as well as to other animals."

Weiner on his part (1964:455) states that Bergmann's and Allen's rules are applicable to animal populations in general and continues; "That human body-size and shape tend to follow these rules has been demonstrated in several studies. The mean body-weight of populations in hot regions is demonstrably lower than that in temperate and cooler climates". But later on in the same work (1964:460), on examining genetic and non-genetic factors in climatic adjustments he points out:

"Twin studies indicate that variations in body-shape, size, fat deposition, growth pattern, skeletal and physiological maturation are all determined by genetic constitution to a larger extent than by purely environmental factors. Certain of the population differences rest undoubtedly on distinctive genotypes or multifactorial recombinations, e.g. nose-shape, or the ratio of limb length to trunk length since such characters remain unaffected on change of environment."

Baker also (1958:303), referring to the racial differences in heat tolerance says: "These results further suggested that the differences found were not a function of transient environmental effects and may be mostly genetic in origin". Some years later (1960:4) he arrived at the conclusion that: "However, it is not enough to find evidence of climatic adaptation. There remains the much larger question of how climatic selection would operate on man's genetic structure to produce these adaptations."

In general terms we believe that Dobzhansky (1960:408, 412, 413) best synthesizes the question:

"The environment thus instigates, foments, conditions and circumscribes evolutionary changes; but it does not decide exactly which changes, if any, will occur."

"The rules of geographic variation used to be a happy hunting ground for partisans of Lamarckism and selectionism, abounding in data interpretable as their predilections decreed. Nowadays these disputes may, I hope, be bypassed. The rules attest in any case that the environment is important as an instigator of evolutionary changes. At the same time, it must be emphasized that what has been observed are rules indeed, not laws". "Exceptions to the rules do occur, as Rensch who has contributed more than anyone else to their study, has duly stressed. And while these exceptions do not exactly prove the rules, they are in some ways as valuable as the rules themselves. The lesson to be derived from them is that, although the environment may guide the evolution of living things, it does not prescribe just what change must occur".

Waddington (1960:399) offers us an explanation of how this genetic-environment interaction is effected:

"We have, in fact, found evidence for the existence of a 'feedback' between the conditions of the environment and the phenotypic effects of gene mutations. The 'feedback' circuit is the simple one as follows: (1) environmental stresses produce developmental modifications; (2) the same stresses produce a natural selective pressure which tends to accumulate genotypes which respond to the stresses with co-ordinated adaptive modifications from the unstressed course of development; (3) genes newly arising by mutation will operate in an epigenetic system in which the production of such coordinated adaptive modifications has been made easy.

Recently, the problems of human adaptability to ecological and environmental conditions have greatly interested numerous biologists and physical anthropologists. A Human Adaptability Section has been incorporated within the International Biological Program (IBP), and several international meetings have been held (Burg Wartenstein, 1964; Warsaw, Kyoto and New Delhi, 1965) to discuss such subjects as "Human Adaptability and its Methodology", "Human adaptability to environmental conditions and physical stress", "A proposed regional study of high altitude adaptation", etc.

A detailed presentation of the topics of the Human Adaptability Section appear in the Guide of the Human Adaptability Proposals⁶; the results of the different meetings referred to above are given in three important works (1966) published respectively by Baker-Weiner, Malhotra and Yoshimura-Weiner.⁷

In November, 1967, a Conference on Man at High Altitudes took place. The Conference was sponsored jointly by the U.S. National Committee for the IBP and the World and Pan American Health Organization and 60 scientists from 12 nations participated. The Conference agreed that research on high-altitude peoples could also be applied profitably to populations living at sea level and to their medical problems. They recommended that coordinated studies be made on problems of growth, ageing, nutrition, fertility, natural selection and epidemiology".

As for investigations completed or in process of realization in America on human adaptability to different conditions of heat, humidity, altitude and latitude, there are a certain number of monographic works treating especially of peoples of the arctic regions (Eskimos) or of high altitudes (Quechuas and Aymaras). Continuing the research program so successfully initiated by Carlos Monge, Hurtado and other investigators in the Institute of Andean Biology in Peru in 1928, Paul T. Baker and collaborators are responsible for the most recent studies on acclima

tion and adaptability to different ecological environments.

Despite these positive advances the problem of human variability and its adaptation to different climatic conditions, that is an evaluation of interdependence^{of} nature-nurture, is still unresolved. In addition to the opinion of Dobzhansky cited earlier in this paper, (1960), Neel and Schull had already stated (1958:18-22):

"It is therefore practically impossible when one is dealing with human populations to create situations which throw a sharply critical light on the relative importance of heredity and environment".

III.- Efforts to establish the principal biological subdivisions of the Indian.

1. The variability of the living aboriginal populations, i.e. the presence of different sub-specific polytypical forms - regardless of origin and causes - once recognized and accepted, all efforts at a systematization or classification require a previous definition of the concept of "race".

This is not the place or time to analyze such disputable and controversial themes as the non-existence of human races according to Livingstone (1962) and Brace (1964), or the 'ethnic groups' of Ashley Montagu (1960:417-73; 1964:71-79) as substitutes for racial groups, or the skepticism of Barnicot (1965:91) regarding the possibility of defining with the necessary precision the human 'races'. The classical description of the 'human race' based on typologist criterion is of historical interest only. We will stick to the modern populationist orientation and for our objective accept any of the definitions which do not differ fundamentally: Dobzhansky (1957:152), Laughlin (1960:89), Garn (1964:6), Mayr (1965:126), Bielikki (1957:152), etc.

We transcribe here however, some considerations presented by Laughlin (1960:90), which for clarity and concision eliminate the necessity for major explanations in this respect:

"Race does not refer to an arbitrarily selected series of individuals, even though they may be similar in appearance, i.e., of the same type. Races may be continental or local, homogeneous or heterogeneous, large or small, ancient or recent, distinctive in appearance or non distinctive, sharply bounded or imperceptibly bounded and possess a high or low degree of genetic relationship between members. The term race can be used at different levels of abstraction from a continental race down to a local race or even their tribal subdivisions. Local races are composed of collections of family lines which constitute breeding isolates within the larger population. No arbitrary standard of magnitude exists for the size or number of differences which must exist for a group to be termed a race"... "For summary purposes and major contrast such high levels of abstraction are suitable. However, for research purposes it is necessary to compare the smaller, constituent subdivisions, the local races or breeding isolates of many authors"... "Consequently, though the actual number of races in the world exists apart from observers, the number recognized depends upon the aims of the observers".

2. The concepts of geographical, local and micro-races, initially expounded by Garn in 1961 and more recently in 1965, are thus comprehensible. However, before examination of these possible biological subdivisions or 'races' of the American Indian, it is convenient at this point to remind the reader of what was said at the beginning of this Report; that is, the opinion of certain contemporary anthro-

pologists that the existing variability and biological differences among the diverse groups of aborigines are not sufficient to justify a racial subdivision. We refer specially to Ashley Montagu (1960: 465, 1964:79) and to Coon (1965:152).

Coon, however, in referring to a work of Osman Hill on "The Soft Anatomy of a North American Indian," (1963) says: "...they are Mongoloids of a particular kind, just as they would be Caucasoids of a particular kind had the New World been peopled by a small band of Upper Paleolithic Europeans..." At this point I wish to state that the possible presence of Caucasoid elements of European origin had been concretely noted since 1928 by Cottevieuille-Giraudet⁸. Apparently, certain cultural features which Greenman cites persist on the eastern coast of North America, tend to confirm this supposition⁹.

3. The classical subdivisions of Mankind from the serological point of view proposed by Ottenberg, Snyder, Wiener and principally by Boyd (1963:1063) mention solely a Amerindian group, to which they concede a certain homogeneity; this, despite the fact that Mourant (1954:144) had noted evident serological differences between different populations of American aborigines.

During the last few years, as a result of the multiple investigations of Henckel, Layrisse, Lisker, Loria, Matson, Neel, Robinson, Reynafarje, Salzano, Sandoval, Sutton, Swanson, Zepeda, etc., we have available greatly increased data on diverse antigens, hemoglobins, transferrins and haptoglobins, demonstrating a clear phenotypic and genotypic variability in these aborigines, thus confirming the actual conception regarding the evolutive process of the human species and the formation of races according to populationist and dynamic criteria.

In this respect, we cite the latest conclusions of Matson and collaborators (1967:188) treating of South America:

"Yet as pertaining to the present study, it seems that a sensible position of equanimity, based on the available blood group data, would permit of an hypothesis that the American Indians are not completely Mongoloid, that the present Polynesian populations are a racial mosaic and that migrants from both west and east have contributed genes to present panmictic potpourri which is Polynesia."

Now then, this evident variability of blood groups observed among Indian populations, does not coincide with other morphological variations and this fact leads us to think that Garn's conclusion is correct. He says (1965:51):

"As with classifications based on morphological traits rather than on the populations themselves, artificial 'serological races' add nothing to human taxonomy. The major use of blood groups in classification is in the comparison and analysis of natural populations, and in the study of natural selection in contemporary races".

4. We will now review in some detail the racial taxonomy proposed by Garn with reference to geographical, local and micro-races, beginning with the definitions given by this author, and continuing with his subdivision of the aboriginal populations of America, according to this criterion.

a) The concept of geographical race was first used by Rensch (1929): Garn defines the term (1965:14), as "a geographically-delimited collection of similar races" and adds that "the existence of geographical races is due, of course, to the great geographical barriers, chief among them oceans, that formerly limited the expansion and migration of local races and protected them from introduction of different

genes". Garn's geographical race is equivalent to the concept of continental races. On this basis he divides mankind in 9 geographical races, only one of which he attributes to the New World, the Amerindian Geographical Race (1965:128). This he describes with some morphologically and serologically typical traits. Earlier however, (1965:120), he alludes to the fact that for some anthropologists the differences, morphological, serological and biochemical, between Mongoloids and American Indians are insufficient for separating them into two geographical races and join both in a single, polytypic geographical race. We estimate, in agreement with Garn, that there are slight grounds for this racial hypothesis.

b) As for Local races Garn writes (1965:16): "In contrast to geographical races which are geographically delimited population collections, local races correspond more nearly to the breeding populations themselves. Whether isolated by distance, by geographical barriers or by social prohibitions, local races are totally or largely endogamous, and the very small amount of gene-flow ordinarily comes from contiguous and related local races".

c) That which Dobzhansky (1954) defined as microgeographical races is what Garn calls micro-races (1965:18), and what Lasker prefers to call breeding populations; in these he makes manifest certain differences in the composition of a local race. And Garn adds: "Micro-races, though not isolated geographically or by extensive cultural prohibitions still differ from each other in numerous ways".

d) With regard to the value and usefulness of these concepts, Garn explains (1965:22):

"Geographical races, local races and micro-races offer opportunities for very different investigations in relation to race. One is not more real or more fundamental than the other,

but each provides the answer to different questions and the solution to different problems of ongoing evolution in man".

e) In referring concretely to the populations of the New World, that is the Amerindian geographical race, Garn mentions a series of Local races which "in strict contrast with geographical races are true evolutionary units. As populations such local races evolve or have evolved separately", but he recognizes that "with such a diversity of local races, it is clearly impossible to make a listing of all of them" ... "but it is possible to call attention to some local races that exemplify particular taxonomic, descriptive, or evolutionary problems" (1965:140). And before proposing a subdivision of the living aboriginal populations, he contends:

"In pre-Columbian America, there were hundreds of such local races, each with its own language. We still recognize the Penobscot, the Pima, the ^{Papago} ~~Arizona~~ and so on. Other local races, in the Americas, as in Europe and Asia, constitute a number of isolated or semi-isolated populations as is true for the several Apache and Navaho groups now".

Only after these admonitions does our author include five Amerindian groups of local races: North American, Central, Circum-Caribbean, South American and Fuegian. His description is quite poor when treating of biological characteristics (1965:144-46), and in the case of two of these local races he refers exclusively to cultural traits. And, we repeat, this in spite of the fact that he qualifies them as "true evolutionary units".

Incidentally, with reference to the origin of these local races Garn takes a firm position (1965:128-29): "Once, local differentiation in the Americas was attributed to successive waves of migrations. Today such diversity is generally accepted as the result of natural selection acting on generally small population isolates, some of whom may ~~qualify~~

~~populations of the~~ have a respectable antiquity of as much as 20,000 years, as shown by radio-carbon dating".¹⁰

We have emphasized Garn's concepts on which he bases his racial taxonomy, particularly with reference to the region under discussion, because we consider his concepts proper and his principles valid. However, we disagree on the subject of the five Local races he proposes ^{the} as a simple observation of some of the aboriginal populations inhabiting the areas in which he locates them, demonstrates the great biological heterogeneity (above all, somatic and serologic) of each of these.

In accordance with Garn's own definition, it is difficult ^{for us} to understand how it is possible to include in one sole Local race all the aboriginal populations of South America, from the Goajiro in the north to the Araucanians in the south (latitude 10° N. to latitude 40° S.), living at altitudes ranging from 0 meters to 4,000 m. And this applies as well to the North American Local race, which comprises the Athabaskan and Algonquian in the north, to the Mayas to the south (latitude 60° N. to latitude 18° N.).

IV.- Discussion.

We shall begin by reminding the reader that the Fourth Summer Seminar in Physical Anthropology (New York, September, 1949), devoted part of the agenda to an appraisal of new techniques developed in the interpretation of the physical anthropology of the American Indian.

We quote here part of that discussion:

"Washburn suggested that much of the confusion prevalent in the American Indian field today is a result of too many varying techniques being used on the same materials, each yielding different results and hence somewhat different interpretations. He indicated that some re-evaluation of the several morphologic,

metric and genetic techniques was in order if the best results were to be obtained from the available data".¹¹

This carefully weighed opinion expressed 19 years ago, to our way of thinking, still constitutes one of the principal, although not the unique factor, which may explain why even at this time contemporary attempts at a racial taxonomy of the American aborigines yield results that are so vague, lack precision and are even contradictory.

We agree with Baker (1967:21) when he indicates that the concept of race has two uses, as a pedagogic device for teaching human variation and as a research tool for investigating biological variation. And when he explicitly recognizes that:

"Indeed, racial classification systems are, at best, interim structures for dealing with genetic and phenotypic distances, and should be replaced by quantitative systems. It may be hoped that the comparative method will be replaced by the more accurate method of mechanism analysis. However, neither of these hopes are likely to ~~be~~ materialize in the near future and for decades race is likely to remain a useful scientific concept. As such, it appears that the race concept will remain in human biology for many decades even though it will, undoubtedly, be a constantly changing informational construct".

(1967:25).

We have expressed our point of view along the same lines, on various occasions, treating of the usefulness and importance of anthropometry and osteometry in any attempt to determine the variability between different groups of population. We reiterate this belief and in its support cite the well-documented opinion of Hunt (1959:82):

"As remote racial history has ceased to be the chief excuse for field anthropometry, microevolution -especially the

adaptive value of racial features in different environments— has become the core of recent studies. Schemes of measurement are being revised in terms of the 'hereditability' of somatic dimensions and factors of physical growth. Work on demography, new techniques of mapping, models of gene-flow, and racial physiology is proceeding rapidly. The unraveling of microevolution is a sufficient challenge to maintain the vitality of anthropometry for a long time to come. In particular, it offers many opportunities for the collaboration of physical and cultural anthropologists".

We have quoted in this Report excerpts from the works of many different workers. This was done consciously and with premeditation so as to present the most recent and contradictory opinions on the theme of discussion: principal biological subdivisions of the Indian. Possibly the reader may consider the quotes excessive but we wished to document as objectively as possible our personal criterion contained in the following provisional conclusions:

1°. We consider acceptable the proposal of various anthropologists for uniting all the aborigines of the New World under the denomination Amerindian Geographical Race.

2°. That the American Indian in diverse regions of the continent, presents biological variations that create perceptible differences within these populations thus necessitating a taxonomy, Local races, in accord with populationist and dynamic criteria, is a fact that has been fully proved and substantiated by multiple and varied investigations in different fields of human biology.

3°. It has been attempted to explain this biological heterogeneity of the American aborigine as a consequence of the diverse origin of

the immigrating contingents who peopled the New World some 40,000 years ago; and also as the result of a process of adaptability to different environmental and ecological conditions. At the present time, this is a point of controversy between different investigators. In all likelihood the biological differentiation of the Amerindian is due to the joint action of the two factors mentioned. However, in order to evaluate and establish the hierarchical importance of one and the other, more data are necessary.

4°. The most widespread and best-known subdivisions of the American Indian in Local Races we owe to Garn. If, as this author says, these "are true evolutionary units. As populations, such local races evolve or have evolved separately", it is then necessary to assemble a series of biological characteristics which permit the differentiation of the different Local races proposed for America.

5°. The Amerindian groups of Local races proposed by Garn, are not precisely defined and the author himself appears to recognize this when he writes (1965:121):

"Such differences in taxonomic opinion are both legitimate and salutary. They point out problem areas that need resolution. Areas of agreement on the other hand, may reflect problems long settled, or they may reflect a virtual lack of information".

What is absolutely indispensable in the immediate future is the organization on a continent-wide basis of biological investigations, (intensive, methodical and utilizing uniform techniques) of the different aboriginal populations (somatic, serologic, physiological, psychosomatic, etc.), which permit subsequent comparative studies, and finally the establishing of Local Races which have an evident and indisputable biological differential base.

Mexico, April, 1968.

References

- BAKER, P.T.- Racial differences in heat tolerances. American Journal Physical Anthropology, n.s., 16:287-305. 1958.
- BAKER, P.T.- Climate, culture and evolution. Human Biology, 32:3-16. Detroit, 1960.
- BAKER, P.T.- Ecological and physiological adaptation in indigenous South Americans. In: Baker, P.T. and J.S. Weiner (editors). The biology of human adaptability: 275-304. Oxford, 1966.
- BAKER, P.T.- The biological Race concept as a research Tool. American Journal Physical Anthropology, n.s. 27:21-26.-1967.
- BAKER, P.T., E.R. BUSKIRK, E. PICON-REATEGUI, J. KOLLIAS and R.B. MAZESS.- Regulación de la temperatura corporal en indios quechuas nativos de la altura. Anales del Instituto de Biología Andina, (5): 286-298. Universidad Nacional Mayor de San Marcos. Lima, 1966.
- BAKER, P.T., E.R. BUSKIRK, J. KOLLIAS and R.B. MAZESS. Temperature regulation at High altitude: Quechua Indians and U.S. Whites during total body cold exposure. Human Biology, 39, (2):155-169.-1967.
- BAKER, P.T. and M.A. LITTLE.- Bone density with age, altitude, sex and race factors in Peruvians. Human Biology, 37 (2):122-136. Detroit 1965.
- BAKER, P.T. and J.S. WEINER (Editors).- The Biology of human adaptability (Burg Wartenstein Symposium, 1964). Oxford University Press, 1966. 541 pp.
- BARNICOT, N.A.- The size and shape of the body, In: Human Biology: 197-216, by G.A. Harrison, J.S. Weiner, J.M. Tanner and N.A. Barnicot. Oxford, 1964.
- BARNICOT, N.A.- Le problème de la race dans l'état actuel des connai-

- ssances scientifiques. Revue Internationale des Sciences Sociales, 17 (1):90-92. Paris, 1965.
- BENOIST, J.- Microraces et isolats. Revue Internationale des Sciences Sociales 17 (1):93-95. Paris, 1965.
- BIELICKI, T.- La genétique des populations et la formation des races. Revue Internationale des Sciences Sociales, 17 (1):96-98. Paris, 1965.
- BIELICKI, T.- Typologistes contre populationnistes et théorie génétique. Revue Internationale des Sciences Sociales, 17 (1):99-101. Paris, 1965.
- BIRDSELL, J.B.- The Problem of the Early Peopling of the Americas as Viewed from Asia. In: Papers on the Physical Anthropology of the American Indian: 1-68 a.- The Viking Fund, Inc. New York, 1951.
- BOYD, W.C.- Blood Groups of American Indians. American Journal Physical Anthropology, 25: 215-235. 1939.
- BOYD, W.C.- Genetics and the Human Race. Science, 140 (3571): 1057-1064. 1963.
- BRACE, C.L.- On the Race concept, and Comments. Current Anthropology, 5 (4):313-320. 1964.
- COON, C.S.- The living races of Man. Alfred A. Knopf. New York, 1965. xxxii + 344 + xx pp.
- DOBZHANSKY, Th.- Human diversity and adaptation. Cold Spring Harbor Symposia on Quantitative Biology, XV: 385-400. New York, 1950.
- DOBZHANSKY, th.- Evolution, Genetics and Man. John Wiley & Sons, Inc. New York, 1957.- 398 pp.
- DOBZHANSKY, th.- Evolution and Environment. In: The Evolution of Life: 403-428. The University of Chicago Press, 1960.
- GARN, S.M.- A comment on Wilber's "Origin of Human Types". Human Biology, 30:337-39. Detroit, 1958.

- GARN, S.M.- Human Races. Second Edition. Springfield, Illinois, 1965.-
XIV+155 pp.
- HAMMEL, H.T.- Effect of race on response to cold. Federation Proceedings,
22, (3). 1963. In: Yearbook of Physical Anthropology, 11:
208-213.-1965.
- HANNA, B.L.- The biological relationships among Indian groups of the
Southwest. American Journal Physical Anthropology, n.s.
20:499-508.-1962.
- HARRISON, G.A.- Environmental interaction. In: Human Biology: 144-149, by
G.A. Harrison, J.S.Weiner, J.M.Tanner and N.A.Barnicot,- Oxford,
1964.
- HIERNAUX, J.- Le concept de race en anthropologie physique. VI Congrès
International des Sciences Anthropologiques et Ethnologiques,
I:471-477. Paris, 1962.
- HIERNAUX, J.- Heredity and Environment; their influence on human morpho-
logy. A comparison of two independent lines of study. American
Journal Physical Anthropology, n.s. 21:575-589. 1963.
- HIERNAUX, J.- Applicabilité du concept de race à l'espèce humaine.
Revue Internationale des Sciences Sociales, 17 (1):117-119.
Paris, 1965.
- HIERNAUX, J.- Problèmes de definitions sur la race. Revue Internationale
des Sciences Sociales, 17 (1):120-122. Paris, 1965.
- HUNT, E.E.- Anthropometry, genetics and racial history. American Anthro-
pologist, 61:64-87. Menasha, 1959.
- IMBELLONI, J.- Nouveaux apports à la classification de l'homme américain.
Miscelanea Paul Rivet Octogenario Dicata, 1: 107-136, México,
1958.
- LASKER, G.W.- The evolution of Man. Holt, Rinehart and Winston, Inc.
New York, 1961. 240 pp.

- LAUGHLIN, W.S.- Introduction. In: Papers on the Physical Anthropology of the American Indian: v-vii. Edited by.... The Viking Fund, Inc. New York, 1951.
- LAUGHLIN, W.S.- Races of Mankind: continental and local. Anthropological Papers of the University of Alaska, 8 (2):89-99.-1960.
- LIVINGSTONE, F.B.- On the Non-existence of Human races. Current Anthropology, 3 (3):279-281.-1962.
- MALHOTRA, M.S. (Editor).- Human adaptability to environments and physical fitness (Delhi Symposium 1965). Defence Institute of Physiology and Allied Sciences. Madras, India, 1966.
- MATSON, G.A., H.E.SUTTON, R.ETCHEVERRY, B.J.SWANSON and A.ROBINSON.- Distribution of hereditary blood groups among Indians in South America, with inferences concerning genetic connections between Polynesia and America. American Journal Physical Anthropology, n.s. 27:157-194.-1967.
- MAYR, E.- Les races dans l'évolution animale. Revue Internationale des Sciences Sociales, 17 (1):126-27. Paris, 1965.
- MONTAGU, M.F.A.- An Introduction to Physical Anthropology. Third Edition. Springfield, Illinois, 1960. 771 pp.
- MONTAGU, M.F.A.- The Science of Man. Odyssey Press. New York, 1964. 158 pp.
- NEEL, J.V. and W.J.SCHULL.- Human Heredity. The University of Chicago Press. 361 pp. 1958.
- NEWMAN, M.T.- The Sequences of Indian Physical Types in South America. In: Papers on the Physical Anthropology of the American Indian: 69-97. The Viking Fund, Inc. New York, 1951.
- NEWMAN, M.T.- The application of ecological rules to the racial anthropology of the aboriginal New World. American Anthropologist, 55:311-327. Menasha, 1953.

- NEWMAN, M.T.- Adaptation of Man to cold climates. Evolution, 10:101-105. Chicago, 1956.
- NEWMAN, M.T.- Geographic and Microgeographic Races. Current Anthropology, 4 (2):189-192. Comments:192-207. 1963.
- RENSCH, B.- Some problems of geographical variation and species formation Proceedings of the Linnean Society of London, 150th Session, Pt. 4; 275-285. 1938.
- RENSCH, B.- The Laws of Evolution. In: The Evolution of Life: 95-116. The University of Chicago Press, 1960.
- ROBERTS, D.F.- Body weight, Race and Climate. American Journal of Physical Anthropology, n.s. 11:533-558.-1953.
- SALZANO, F.M.- The Blood Groups of South American Indians. American Journal Physical Anthropology, n.s. 15:555-579. 1957.
- STEWART, T.D.- A Physical Anthropologist view of the Peopling of the New World. Southwestern Journal of Anthropology, 16 (3):259-73. Albuquerque, 1960.
- STEWART, T.D. and M.T.NEWMAN.- An Historical Resumé of the Concept of Differences in Indian Types. American Anthropologist, 53:19-36. Menasha, 1951
- WADDINGTON, C.H.- Evolutionary Adaptation. In: The Evolution of Life: 381-402.- The University of Chicago Press, 1960.
- WEINER, J.S.- Climatic adaptation. In: Human Biology: 441-480, by G.A. Harrison, J.S. Weiner, J.M. Tanner and N.A. Barnicot. Oxford, 1964.
- WEINER, J.S.- Acclimatation et differences de climat: leurs effets sur les differences raciales. Revue Internationale des Sciences Sociales, 17 (1):159-162. Paris, 1965.
- WIERCINSKI, A.- The racial analysis of human populations in relation to their ethnogenesis. Current Anthropology, 3 (1):2-46. 1962.

WILBER, Ch.G.- Physiological regulations and the origins of human types.

Human Biology, 29:329-336. Detroit, 1957.

YOSHIMURA, H. and J.S.WEINER (Editors).- Human adaptability and its methodology. Published by Japan Society for the Promotion of Sciences. Tokyo, 1966.

Footnotes

1. The majority of the works cited in this paragraph do not appear in the References as they treat of well-known general works. For additional information see: J. Comas, Manual of Physical Anthropology: 81-86 and 588-600.- Springfield, 1960.
2. Hrdlicka, A.- The Problems of the unity or plurality and the probable place of origin of the American Aborigines. American Anthropologist, 14: 11. Menasha, 1912.
Hrdlicka, A.- The Origin and Antiquity of the American Indian. Revised Edition. Smithsonian Report for 1923, p. 481, Publication 2778. Washington, 1928.
3. Keith, A.- A New Theory of Human Evolution, p. 218. Watts & Co., London, 1948.
4. Allen, J.A.- The influence of Physical Conditions in the Genesis of Species. Radical Review, 1: 108-140.- 1877.
Bergmann, C.- Ueber die Verhältnisse der Wärmeökonomie der Thiere zu ihrer Grösse. Göttinger Studien, 3: 595-708 -1847.
5. Neel, James V. and W.J. Schull.- Human Heredity: 107 and 110. The University of Chicago Press.- 1958.
6. Edited by Central Office of the IBP. (7, Marylebone Road. London, N.W. 1).
7. See References.
8. Comas, J.- Manual of Physical Anthropology: 633-35. Springfield, Illinois, 1960.
Comas, J.- The Upper Palaeolithic and the New World. Comments. Current Anthropology, 5 (4):321-22.-1964.
9. Greenman, E.F.- The Upper Palaeolithic and the New World. Current Anthropology, 4 (1):41-91. 1963.

10. Data actually available indicates that man's antiquity in America dates back 35.000 to 40.000 years (Krieger, In: Prehistoric Man in the New World, by J.D. Jennings and E. Norbeck, Editors; p.45. The University of Chicago Press, 1964.
11. Yearbook of Physical Anthropology, 4: 33. The Viking Fund, Inc. New York, 1949.