

Race and Humanity

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PROBABLY NO OTHER SCIENTIFIC CONCEPT has been so notorious for vagueness and ambiguity as that of race. Certainly none has been more unceremoniously exploited as a cloak for prejudice and malevolence. And this despite the fact that anthropologists and biologists have studied races in man and in other organisms for more than a century and a half. A very heartening break in this situation has, however, become apparent within the past decade or two. The rapid advances in population genetics have shed new light on race as a biological phenomenon and as a stage of the evolutionary development of sexually reproducing species. It was, then, only a question of time when the study of races of man would be revised and revived under the impact of modern population genetics. This reformation of the raciological thinking in anthropology is now at hand. The first and the second of the three books¹ under review are the harbingers of a new era. The third is a useful anthology of raciological writings covering the late eighteenth century up to the modern era.

Professor Count's anthology provides a historical perspective and a contrasting background against which the modern reform will stand out in bold relief. From its very inception, the race concept has suffered from an inner contradiction (not to speak of its perennial misuse for political propaganda purposes). Race has been a practical and convenient category of classification, with the aid of which the diversity of human types could be efficiently described and neatly pigeonholed. For this purpose it is useful to set up so-called racial "types." The types are arrived at by estimation, or by calculation, of averages of various traits observed in the samples of individuals examined. No objection could be raised against this procedure if it were used solely as a technique of cataloguing. But a type once created has an insidious way of dominating its maker. It becomes "the race," a sort of noumenon of which the existing individuals are only imperfect representatives. Needless to say, such a race concept is basically antievolutionist, as well as incompatible with Mendelian genetics. And yet the idea of change and development has been a part of anthropological thinking since the times of Buffon, Kant, and Blumen-

bach. Darwin entitled his great work *The Origin of Species*; origin of races would have been no striking novelty either to anthropologists or to biologists.

An uneasy compromise was arranged between the contradictory concepts of race as an abstract but stable type and race the ineluctably changing biological reality. This compromise involved the assumption that there existed at some obscure time in the past so-called primary races, which were supposedly "pure" and conformed to their ideal types. The primary races engaged, however, in long-continued miscegenation; the miscegenation has not only resulted in numerous "mixed" or "secondary" races, but also engulfed and largely obliterated the pure primary ones. The latter can be discerned at present, in the words of an outstanding living anthropologist (Howells), only "by a process of personal estimation which is reminiscent of divination." Another trouble with the pure primary races is that a pure race makes no sense at all from the standpoint of genetics, except in asexually reproducing organisms. In sexual and cross-fertilizing species such as man, no two individuals are likely to have the same genotype; parents and offspring, as well as brothers and sisters, are genetically different. Nevertheless, the compromise has continued down to our day, long after it has lost every semblance of justification. Professor Count might have saved a not-inconsiderable number of pages of his anthology by deletion of some of the more recent lucubrations concerning this topic.

Professor Boyd's book contains a detailed, in places caustic, and altogether devastating critique of the abuses of old-fashioned raciology. But Boyd is certainly not one of those who need to conceal their intellectual sterility by being severely critical of the work of others. His book is primarily constructive. The central idea is that every human being is a member of a biological community within which marriages are concluded. Such a community, termed Mendelian population or isolate, possesses a gene pool, from which the genes of the individuals are drawn, and to which some of them are returned unless the individual dies childless. Mankind, the human species, is the most inclusive Mendelian population. It is, however, a very complex system of isolates, kept apart by geography or by social forces. It happens that these subordinate populations often differ in relative frequencies of genes for various traits in their gene pools. Such different populations are races. Boyd defines (p. 207) "a human race as a population which differs signifi-

¹ *Genetics and the Races of Man. An Introduction to Modern Physical Anthropology.* W. C. Boyd. Boston, Mass.: Little, Brown, 1950. 453 pp. \$6.00; *Races: A Study of the Problems of Race Formation in Man.* C. S. Coon, S. M. Garn, and J. B. Birdsell. Springfield, Ill.: Thomas, 1950. 153 pp. \$3.00; *This Is Race. An Anthology Selected from the International Literature on the Races of Man.* E. W. Count, Ed. New York: Schuman, 1950. 747 pp. \$7.50.

cantly from other human populations in regard to the frequency of one or more of the genes it possesses. It is an arbitrary matter which, and how many, gene loci we choose to consider as a significant 'constellation'."

The way to describe races is, then, to study the frequencies in human populations of variable genes. In the present state of human genetics, only a few traits are analyzed into clear-cut genic elements. Such traits become particularly important in race studies. The best known among them are inherited variations in some components of the blood—the blood groups. Boyd is one of the outstanding authorities on blood grouping, and his synthesis of the available data is a masterly one. He summarizes his conclusions by proposing a division of mankind into the six following races: (1) Hypothetic Early European, (2) European or Caucasoid, (3) African or Negroid, (4) Asiatic or Mongoloid, (5) American Indian, and (6) Australoid. Boyd shows further that the information available on the genetics of other human traits, scanty though it is, supports his classification, which is, of course, quite similar to what some classical anthropologists inferred from their measurements and observations.

It may come as a shock, then, that Coon, Garn, and Birdsell assume thirty human races, not one of which coincides with any of the six proposed by Boyd! Although these authors have concentrated their attention on quite different traits, and have ignored the blood group genes particularly, they are aware of the fundamentals of modern genetics (despite some minor slips in their book). A dissonance of this kind would have been exasperating to old-fashioned taxonomists, but the genetic race concept has removed the sting from such discrepancies. The human species is compounded of numerous subordinate Mendelian populations, which form an intricate hierarchy, beginning with clans, tribes, and various economic and cultural isolates, and culminating in "major" races, and finally the species. Now, not only the major but also the minor populations often differ in gene frequencies. They are "races" by definition. Just how many races we recognize by giving them names is purely a matter of convenience. It is quite natural that some students may find their purposes served best by distinguishing only the major population groups, whereas others may prefer finer subdivisions. In fact, Coon, Garn, and Birdsell distinguish among their thirty races six "putative stocks": Negroid, Mongoloid, White, Australoid, American Indian, and Polynesian. The similarity between their stocks and Boyd's races is evident.

Human populations exist by virtue of the reproductive bonds that give them biological reality. Genetic differences between such populations exist regardless of whether anthropologists choose to attach racial labels to them. What is not arbitrary is the recognition that a certain group of individuals constitutes a Mendelian population, and that this population differs from others in the frequencies of certain genes. One must, however, be on guard not to invent a "population" by hand-picking a "group" of individuals who

do not belong to a common gene pool. For example, people with O blood group, or long-headed people, or criminals are not Mendelian populations and cannot reasonably be called races. Such mistakes were not infrequently made in the past.

Description and genetic characterization of races are, however, only the first steps toward their understanding. Racial differentiation is a product of the evolutionary development of the human species. What forces have brought it about, and what changes are likely to be wrought by these forces in the future? Amazingly little attention has been given to the problem of mechanism of origin of human races in classical anthropology. The genetic theory of evolution recognizes four principal agencies of change: mutation, gene recombination (hybridization), genetic drift, and natural selection. Boyd's book gives perhaps the first systematic consideration of the possible roles of these agencies in the differentiation of human races. His analysis is admirable, but in the end the conclusion is inescapable that far too little is known at present about the causal aspects of human evolution to permit a clear picture to be drawn. This is a task for the future.

The fact does stand out, however, that selection is in all probability the key to understanding of human evolution. And yet it has been customary in anthropology to assume that most of the distinctions between human races are adaptively neutral. This assumption has even been made a part of some definitions of race. The reason for this situation is simply that no attention has been given, and no experimental work undertaken, to test the influence of genetically variable human traits on the adaptive value (Darwinian fitness) of their possessors. It is the considered opinion of this reviewer that this is the most urgent problem of physical anthropology and of human genetics.

For those who would attack this problem, the short book of Coon, Garn, and Birdsell will be invaluable. It contains a collection of hypotheses, inferences, and plain conjectures about the possible adaptive values of human traits. Such hypotheses and conjectures are necessary to stimulate and to guide the experimenter, and they are especially valuable when they are inspired by the firsthand experience with many and diverse human populations which the authors possess. A few examples of the hypotheses will suffice here. The body build of most arctic peoples, characterized by long trunks, short extremities, and low body surface in relation to the volume, is viewed as adaptive in cold climates. Conversely, the linear, skinny body build, with long extremities, found in inhabitants of hot deserts, is interpreted as adaptive under conditions of dry heat. Darkly pigmented eyes are supposed to give higher resolving power under intense illumination than do blue eyes. The characteristic Mongoloid facial structure may be an example of "climatic engineering" which gives the greatest protection in cold and windy climates.

The books of Boyd, and of Coon, Garn, and Bird-

sell, show that the stage is now set for important developments in our understanding of human evolution, and particularly of the mechanisms of race formation. New and powerful methods of investigation can readily be evolved through cooperation of anthro-

pologists and population geneticists. Whether our generation will or will not see the realization of these possibilities will depend on how quickly a majority of anthropologists and geneticists perceive the opportunities that are within their grasp.



Technical Papers

Minerals from Pumiceous Tuff in Japan

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In Japan tuffaceous rocks predominate, especially in the young Tertiary beds. These tuffaceous rocks commonly alter to clays, especially in the case of pumiceous tuff. The writer carried on detailed mineralogical studies on the alteration products, among which several clay minerals have been identified. These data may offer some contribution to the problems of crystallization of natural glass in various geological environments and also to the knowledge of the clay mineral resources in Japan.

In the study of the alteration products of the pumiceous tuff mineralogy, optical, chemical, and thermal properties, x-ray powder patterns, and, in some cases, electron micrographs were taken into account. Although the original rocks appear essentially homogeneous, several alteration products are found, including minerals of the montmorillonite and glauconite-celadonite groups, kaolin, and allophane.

Montmorillonite alteration. The minerals of the montmorillonite group comprise the main mineral component of the bentonites and acid clays in the northeastern part of Japan, where pumiceous tuff is distributed over a wide area. These clays are important as raw materials in certain nonmetallic industries. The color of the montmorillonite is commonly white or gray. The x-ray powder lines of cristobalite often mingle with those of montmorillonite. Rarely, zeolite crystals are associated with the clay. The clay from Yokote-machi, Akita Prefecture, is notable for its strong absorptive properties.

The green-colored montmorillonite has been found in two localities: one is in the clay zones surrounding one of the ore bodies of the Hanaoka Mine, Akita Prefecture, and the other is an alteration product from the inclusions in "Oya-ishi," a tuffaceous rock which is an important building stone in Japan. The green-colored clay from the Hanaoka Mine occurs in the clay zones enclosing the ore bodies. Sericite immediately surrounds the ore masses, and montmorillonite encloses the sericite. The green clay, which partly tarnishes to brown color in daylight, has been identified as montmorillonite containing about 6% ferric iron. The inclusions in "Oya-ishi" are volcanic rock

fragments in the tuff. Some of them exhibit flow structure. The inclusions may turn brown, black, yellow, or white upon exposure, but unweathered specimens are normally green. The green-colored part quickly tarnishes in daylight, to gray to black (within 1 hr) and finally to brown (in a few weeks). The clay forming the inclusion swells and becomes pasty when wet. Under the microscope, the altered part of the inclusion appears as an aggregate of very fine clay flakes; the aggregate shows the vesicular texture of the pumiceous volcanic rock; the centers of some vesicles are filled by limonitic matter. Unweathered green-colored inclusions contain about 13.4% ferric iron, part of which may be limonite; but it is clearly shown from the mineralogical studies that the green mineral is a peculiar variety of montmorillonite high in iron.

Kaolin and allophane alterations. Some pumice beds alter to allophane—for example, the "Kanuma Soil," which forms the surface material in much of Tochigi Prefecture. Limonite commonly imparts a brown color to the clay, which is composed mainly of silica, alumina, and water, but the ratio of silica to alumina is not constant. Some pumiceous rocks alter to hydrated halloysite. The clay near Schichino-machi, Aomori Prefecture, is one example. Such clays are abundant in northeastern Japan, and they are characteristically associated with carbonaceous material. The Schichino clay is white and isotropic. Its mineralogical properties approximate those of hydrated halloysite, but never agree perfectly with those of typical halloysite. Unlike typical hydrated halloysite, this clay is very easily dissolved in sulfuric acid; the absorptive water content is somewhat larger than that of typical hydrated halloysite; the powder lines are extremely diffuse; the electron micrograph shows mainly irregular and round grains; the differential thermal analysis curve suggests that a small amount of montmorillonite is contained in the interstratified lattice with hydrated halloysite. Apparently the clay is composed of hydrated halloysite mixed with small amounts of allophane and montmorillonite.

Alteration to glauconite-celadonite. Some tuffaceous rocks are very bright green in color. The green tuff is mainly composed of alteration products from pumice. The mineralogical properties of the green mineral approximate those of the mineral glauconite-celadonite, but the alkali content is less; the water content is higher, and the refractive indices are lower. The mineral may be a variety of glauconite and celadonite,