

MANKIND EVOLVING

THE EVOLUTION OF THE HUMAN SPECIES

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New Haven and London, Yale University Press, 1962

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Set in Baskerville type and
printed in the United States of America.

First published, April 1962
Second printing, May 1962
Third printing, August 1962
Fourth printing, December 1962

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Library of Congress catalog card number: 62-8243

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tion today. Individuals and populations cannot be shifted from one place or occupation to another after an appropriate period of training to fit the convenience of some master planner, any more than hill farmers can be turned into deep-sea fishermen or habitual criminals can be turned into good citizens.

Despite all the inadequacy and uncertainty of our knowledge of human genetics, there is plenty of evidence contrary to Darlington's view, and this evidence is conclusive.

History abounds in proofs that individuals and populations can successfully be shifted from one place or occupation to another. Industrial revolutions in many countries throughout the world have amply shown this. The near ancestors of millions of industrial workers have been mostly "timeless" peasants tilling the soil. The movement from the soil to industrial cities is even now under way, and on a grand scale, in some "underdeveloped" countries. Granted that this movement may in some instances be genetically selective; it is even more often due to social causes which defy genetics. Are we to believe that millions of rustics happened to have been genetically pre-adapted to stand at factory benches and operate lathes and solve engineering problems? Does this not strain one's credulity? Pre-adapted they were, indeed; but what pre-adapted them was a process of natural selection extending for many millennia, which fostered educability, and did so in all classes and races of people, in short, in the species *Homo sapiens*.

10. Race

And I say unto you, that many shall come
from the east and west, and shall sit
down with Abraham, and Isaac, and Jacob,
in the kingdom of heaven.

MAT. 8:11

THE SCIENTIFIC STUDY of human races is at least two centuries old. There are nevertheless few natural phenomena, and probably no other aspect of human nature, the investigation of which has so often floundered in confusion and misunderstanding. And this is only partly due to the biases and passions engendered by race prejudices and consequent defense reactions. The situation is aptly described by Washburn (1953):

During the last fifty years, although excellent descriptive data were added, techniques improved, and problems clarified and defined, little progress was made in understanding the process and pattern of human evolution. The strategy of physical anthropology yielded diminishing returns, and, finally, application of the traditional methods *by experts* gave contradictory results.

Birdsell (1951a) is no less emphatic: "The present methodological approaches utilized in race studies are bankrupt."

These harsh words are not to be construed as a denial of the value of the information so painstakingly collected by several generations of physical anthropologists. The body of data which they gathered will remain the basis of further work on human racial variation. It is the interpretation of these data that has proved troublesome, because they were not always collected as they should have been in the light of our present understanding. The problem that now faces the science of man is how to devise better methods for further observations that will give more meaningful results. This requires a better understanding of the biological basis of the phenomenon of race.

Vicissitudes of the Race Concept

A detailed review of the history and the present status of human race studies would be out of place in this book. Much of the early work has been conveniently summarized in anthology form by Count (1950). Blumenbach (1752-1840), who classified human races, was a younger contemporary of Linnaeus (1707-1778), who classified all natural objects. In his dissertation of 1775, Blumenbach divided mankind into five races—Caucasian (white), Mongolian (yellow), Ethiopian (black), American (red), and Malayan (brown).

However, skin color is obviously not the only trait in which people differ. Some people have straight and others wavy or curly or frizzly or peppercorn hair; some have prominent and thin and others broad and flat noses, thin or thick or everted lips; some are tall and others short or pigmy, some have long, others intermediate, and still others round heads, etc. If the variations in all these traits paralleled each other, race classification would be strengthened. But they frequently do not: for example, some people in southern India have very dark skin but straight or wavy hair, and the Bushmen in South Africa have peppercorn hair but yellowish skin. A race classification made on basis of the hair shape would be different from that based on skin color or height or head shape.

Attempts were also made to characterize races by complexes of traits. Such peoples as the Australian aborigines, the Melanesians of New Guinea and neighboring islands, the Polynesians of the wide Pacific, the Ainu of northern Japan, and many others cannot be fitted into the fivefold Blumenbachian classification; they were made separate races. But where was the multiplication of races to stop? One author proposed to recognize more than two hundred races. Toward the end of the nineteenth and in the twentieth century the number of different race classifications proposed was almost as great as the number of classifiers. Indeed, the more you subdivide races the more difficult it becomes to delimit them, because some intermediate populations will be found.

For a time it was fashionable to divide the inhabitants of Europe into Nordic (tall, blond, long-headed), Alpine (medium height, brown-haired, round-headed), and Mediterranean (medium height, brunette, long-headed) races. This seems to make sense if one compares the inhabitants of, say, Sweden with those of Austria, Sicily, or Spain, although even here some "troublesome" individuals and

families are found. Some Swedes have brown or black hair and some Spaniards are blond and blue-eyed, and yet they cannot validly be excluded from the race to which their brothers or sisters or their neighbors belong. Furthermore, if one studies, district by district, the inhabitants of Germany or France or northern and central Italy, one finds every conceivable intermediate between the Nordic, Alpine, and Mediterranean "races."

It seems not unreasonable to guess that the presence of so many intermediate and unclassifiable individuals and groups results from hybridization. History records numerous migrations of people, and in modern times mobility has become greatly accelerated and intermarriage of persons of different origins increased. Perhaps, then, neatly distinct "pure" races existed in the past, although they are at present submerged in a mass of hybrids, mixtures, or "mongrels," except, perhaps, a few that survive in some isolated places. This idea was first advanced, apparently, by Kant in the eighteenth century (see Count 1950) and has lingered ever since. That hybrid populations exist is, of course, evident. The Tartars were Mongoloids when they settled in eastern Russia, but seven centuries of occasional intermarriage with their white neighbors has made them a decidedly intermediate group. New races are emerging in tropical America (alloys of Indian, Mediterranean white, and Negro), in Hawaii (Polynesians, whites, and Mongoloids), in parts of the United States (Negroes and whites), and elsewhere. But a closer look at the theory of ancient pure races discloses fatal weaknesses.

How does one go about tracing the presumed ancestral races? One way is to choose among living people a few tribes, clans, or even individuals with a convenient combination of traits, and to declare them the original "types" and the sources of the blends observed in people elsewhere. One may, for example, select some very tall, blond, straight-haired, round-headed, straight-nosed, and thin-lipped persons and some other short, black, frizzle-haired, long-headed, broad-nosed, and thick-lipped ones to be the pure races. Everybody else, then, may be represented on paper as derived from the recombination of traits that resulted from mixtures between the chosen prototypes. Alas, there is no reason to think that mankind ever consisted of uniform races with requisite combinations of traits (or any other pure races), or that the people now living came from such a mixture.

Ancestral races have also been devised by attributing to them certain characteristics found in fossil skulls and skeletons, which

are at any rate remains of people who actually lived. This can, of course, be done the more easily since one is not handicapped by any knowledge of the external characteristics (pigmentation, hair, shape of the soft parts of the face and the body) of the people whose skeletons are preserved. And living individuals whose head and body proportions agree reasonably well with those in the fossil specimens can usually be found and photographed.

Racial Typologies

Such outstanding nineteenth- and early twentieth-century anthropologists as Broca, Topinard, and Ripley declared race to be "an abstract conception." So abstract it became that "at the present time rarely, if indeed ever, we discover a single individual corresponding to our racial type in every detail. It exists for us nevertheless" (Topinard). Obviously, under this system, every anthropologist can manufacture racial types to suit his taste. Then when biometrical techniques came into fashion, Czekanowski, Stolyhwo, and their successors in Poland, and Hooton and his pupils in America, tried to subdivide populations into racial components or "morphological types" characterized by a series of measurements. Hooton and Dupertuis (1955) examined a large sample of adult males in Ireland and divided them into the following "types":

Pure Nordic	55	Dinaric	1,728
Predominantly Nordic	649	Nordic Mediterranean	2,747
Celtic	2,408	Pure Mediterranean	33
East Baltic	105	Nordic Alpine	1,754

The fatal flaw of racial typologies is that the morphological types are arrived at by a sort of intuition, which means that they are picked out arbitrarily, even when chosen by experienced investigators. No amount of mathematical statistics can overcome this defect. (See a thoughtful critique by one of Hooton's ablest pupils, Hunt 1959.) Coon (1939), selecting his types chiefly on the basis of similarity with fossil specimens, distinguished about ten types among the populations of Europe. Coon recognized, however, that "typical" individuals are more or less rare and that the actual populations consist chiefly of intermediates. In most parts of Europe two or several of these types occur in the same population.

Race typologies draw no distinction between intra-populational variability or polymorphism, and inter-populational differences,

those between Mendelian populations (see p. 219). For example, do Celts marry Celts and Dinarics marry Dinarics in Ireland? Are the Irish families in which one parent is a Celt and the other a Nordic or Mediterranean to be regarded as race crosses? It is unlikely that in Ireland or anywhere else the choice of a spouse is ordinarily made on the basis of a careful examination of the racial type. To be sure, the slight but significant differences in blood group frequencies that Fisher and Vaughan (1939) found among people with different surnames in England suggest assortative mating (see the foregoing chapter). But as long as no evidence is available of some kind of assortative mating affecting the Irish racial "types," they will have to be regarded as arbitrary slices of essentially continuous phenotypic variability.

Distribution of Blood Group Genes in Human Populations

Race differences may be large or small. We have seen in the foregoing chapter that populations of the fly *Drosophila pseudoobscura* which live at different elevations a few miles apart in the Californian mountains differ in the relative frequencies of certain chromosomal forms (Table 20). These populations are, therefore, racially distinct, but the distinction is small and purely quantitative. Populations of the same species in California and southern Mexico, some two thousand miles apart, differ more strongly—chromosomal forms common in southern Mexico do not occur or are rare in California, or vice versa. One could seal the distinction by giving the Californian and Mexican races official names in Latin. But it has not seemed expedient to do so, since the names of the places of origin of the populations serve as labels just as well as Latin names would. Moreover, geographically intermediate populations are, by and large, intermediate in genetic composition, so that what we have is really a chain of racially distinct populations.

Human populations present a similar state of affairs. We have seen that the populations of Wales, geographically almost as close as the *Drosophila* populations mentioned above, show a slight but nevertheless significant diversity in the incidence of the genes responsible for the A-B-O blood groups (Figure 8). These are small, minor, or microgeographic races. Consider now the data in Table 22 which deals with the major or macrogeographic races. This Table reports the frequencies of the so-called "Rhesus" (or Rh)

of different kinds. Murrayians, Ainus, Negritos, Bushmen, Carpentarians, and perhaps some others are relics of ancient populations, which were more widely distributed in the past than they are at present. Some of them are being submerged and assimilated by intermarriage with their neighbors or becoming extinct. The new races mentioned above are still in formative stages; their gene pools, not clearly separated from those of their neighbors, are still without internal coherence. For example, Ladinos are in reality a social class in some Latin American countries, and in different countries they constitute genetically different populations, which have few or no genetic ties between them. Hindus are a complex mosaic of caste populations which scarcely interbreed. North Chinese, Classic Mongoloids, and Southeast Asiatics (8, 9, 11) are huge masses of humanity forming numerous geographically separated Mendelian populations which could as well be treated as different races or placed in a single race. The same is true of the populations of Europe (races 1-4), which are well on the way to fusion into a single race.

Races, Subspecies, Varieties, Breeds, and Ethnic Groups

Boyd has recognized five, and Coon, Garn, and Birdsell nine or thirty or thirty-two races. Does it follow that some of these classifications are necessarily wrong? No, all may be right; it should always be kept in mind that while race differences are objectively ascertainable facts, the number of races we choose to recognize is a matter of convenience.

Race studies serve a double purpose. Just as zoologists observe a great diversity of animals, anthropologists are confronted with a diversity of human beings. Classification and systematization are devices used to make diversity intelligible and manageable. Classification in biology and in anthropology is as indispensable, and for the same reason, as in a large library: A book misplaced may be as useless as a book lost. Race studies serve a practical purpose—to facilitate communication among students of man, who must be able to indicate which peoples they have observed. But race is also the subject of scientific study and analysis simply because it is a fact of nature. We wish to understand, in Washburn's words, "the process and the pattern of human evolution," and the place of human evolution in the evolution of life as a whole. Pragmatic and theoretic race studies should be complementary and not rival. Unfortunately,

instead of serving a double purpose they have at times been at cross purposes.

Ideally, a race classification should take into consideration all variable traits. Blood types happen to be the traits genetically best understood; the more easily perceived traits, such as skin color, hair or nose or lip shape, etc., are polygenic and their analysis has not progressed anywhere nearly as far as that of the blood types. Classification is an art as well as a science, because, as pointed out above, different traits do not vary as accommodatingly together as a classifier might wish: classifications based on blood type or skin color or hair form will not coincide completely. A good classifier is one who can make the racial divisions in such a way that the least possible violence is done to any trait. Mathematical statisticians (Pearson, Fisher, Mahalanobis, and others) have devised techniques, called coefficients of racial likeness, discriminant functions, and generalized distance, which should decrease the art component and increase the scientific component in classification. These techniques are hopeful, but up to the present they have accomplished about as much for classification as the mechanical piano has for music.

It will, I think, be generally admitted that the ideal classification of the races of man is yet to be proposed. The existing ones are tentative, but they serve as cataloguing devices. Yet it does not follow that races are arbitrary and "mere" inventions of the classifiers; some authors have talked themselves into denying that the human species has any races at all! Let us make very clear what is and what is not arbitrary about races. *Race differences* are facts of nature which can, given sufficient study, be ascertained objectively: Mendelian populations of any kind, from small tribes to inhabitants of countries and continents, may differ in frequencies of some genetic variants or they may not. If they so differ, they are racially distinct.

With careful study most populations will be found to differ, at least slightly, in the frequencies of some genes. It does not, however, follow that we should multiply and subdivide races indefinitely. *Race names* are arbitrary; it is a matter of expediency how far a student of man wishes to go in naming the racially distinct populations. To recognize only the five Blumenbach races is not convenient because the fivefold division ignores some very distinctive populations; to have hundreds of named races is unwieldy.

Human races are neither more or less objective or "real" than

races in other species, although they are more difficult to study. This fact should be stressed because it is obscured by terminologies. Darwin used "variety" in preference to "race," and the crux of his argument in *Origin of Species* was that species are merely strongly diverged and distinctive varieties. Darwin did not, however, stress as much as his successors that the varieties which may become incipient species are, at least in sexually reproducing and outbreeding organisms, those living in different territories. A polytypic species is a species differentiated geographically into local varieties or races. But "variety" is sometimes applied (or misapplied) also to distinctive forms within a population, in other words to polymorphs, as well as to strains (clones, pure lines) of asexually reproducing or self-fertilizing forms (e.g., "varieties" of fruit trees propagated by grafting or of wheat and barley which are mostly self-fertilizing). Because of this ambiguity, modern systematists generally avoid the term "variety" and refer to geographically separated, allopatric, races as "subspecies."

Human races are, then, subspecies of the species *Homo sapiens*. Subspecies of animals and plants are designated by Latin trinomials; thus also one might invent such names as *Homo sapiens africanus*, *Homo sapiens mongolicus*, etc., but this is not customary in studying man. Human subspecies are much more difficult to study than the zoological ones because the latter are practically always allopatric, while human races may also coexist in the same territory, social isolation replacing the geographic one. Nevertheless, zoologists often face quandaries with their subspecies very similar to those which anthropologists face with their races.

Into how many subspecies should a species be split? The little pocket gopher, *Thomomys bottae*, has some 150 named subspecies, which many zoologists regard as inordinate. It has been suggested (Mayr 1942) that describers of subspecies should abide by the so-called 75 per cent rule, i.e., that no subspecies are nameable unless one can classify 75 per cent or more of the individuals in one or the other subspecies. Wilson and Brown (1953) caused a storm in a teacup by pleading that no subspecies should be named at all. This set other systematists to arguing, at times passionately, the merits and demerits of naming subspecies. (See Edwards 1954 and Pimentel 1959 for further references.) Anthropologists will find these polemics not unfamiliar. But it must be kept clear that the dispute is about the advisability of naming subspecies, not about the existence of race differences!

Races of dogs, horses, cattle, and other domestic animals are usually referred to as "breeds." Like races of man and subspecies of wild animals and plants, breeds are Mendelian populations differing in frequencies of certain genes. The salient fact about breeds of domestic animals is that their reproduction is controlled by man: a puppy of a color "wrong" for a given breed will be "culled" in order to maintain the breed visibly distinct (in some breeds of horses a variety of coat colors is, however, permissible). Human control makes possible sympatric coexistence of several breeds of the same species without mixing. Replacement of geographic isolation by human control of reproduction in domestic animals has been likened to the social factors controlling human reproduction, which permit sympatric coexistence of two or more human races, but the analogy should not be stretched too far.

The term "ethnic group" was suggested for human races in the thirties, when anthropologists and biologists were anxious to dissociate themselves from the Hitlerian prostitution of the race concept. Whether a new name is of much use in combating race prejudice is questionable: one may hate an ethnic group as virulently as a race. But the propriety of using such subterfuges in science is questionable. Speak of ethnic groups if you like, but a statement such as "man has no races, he has only ethnic groups" is misleading. Ethnic groups are biologically the same phenomenon as races, subspecies, and breeds. To imply that if man had races, then race prejudice would be justified is to justify race prejudice.

I do not wish to maintain that all races of all species can be considered on an equal footing. Some species are more strongly and others weakly polytypic, and man is more likely in the latter than in the former category. Races may be incipient species, but man has preserved his specific unity ever since the australopithecine stage, at least in the sense that no more than one hominid species ever lived in any one place at any one time. Civilization causes race convergence, due to gene exchange, to outrun race divergence. In this sense, human races are relics of the precultural stage of evolution.

Races as Products of Natural Selection

If the classification of human races is in an unsatisfactory state, the understanding of their origins and biological significance is still more so. These problems seemed simple to the pioneers of the study of man. Buffon, Blumenbach, and other eighteenth-century

authors thought that people are modified by the environments in which they live and that the modifications are inherited. A Negro is a "child of the African sun"—his skin got dark because he was sun tanned for many generations. This is an attractively simple theory, and it was accepted explicitly or implicitly even to our day by many anthropologists who were oblivious of the unfortunate fact that the theory assumes inheritance of acquired modifications and thus contravenes modern biology.

Race differences might have arisen through natural selection as adaptations to the environments, physical and social, in which people lived. If so, the distinguishing characteristics of each race must be directly or indirectly helpful for survival and/or reproduction in the respective environments of these races. This is not obviously so at any rate. For example, what difference does it make whether your hair is straight or wavy or curly? Darwin hesitated to ascribe human race differences either to natural selection or to the Lamarckian inheritance of acquired modifications. But there is still another possibility—sexual selection. Gentlemen may prefer curly-haired blondes or straight-haired brunettes; ladies may have preferences for tall and slender or for smallish and pudgy gentlemen. If tastes were unlike in different countries, and if those whose figures and features were popular with the opposite sex produced on that account more surviving progeny, then races could have become different in appearance even though the race "stigmata" were not in themselves useful or harmful. And finally race differences may be due to genetic drift—accidents of sampling from the gene pool (see p. 279).

Now, at present we unfortunately do not have the evidence that is required to discriminate between the above possibilities. To obtain it much painstaking work is doubtless needed. The really startling fact is that this work was not initiated until recently and even now not on a scale commensurate with its significance. This can only be explained by a failure to appreciate the importance of the issue. To believers in Lamarckian inheritance, any form of selection, natural or sexual, is rather inconsequential. To some anthropologists the classification must be based on traits which are neutral, i.e., neither useful or harmful to their possessors, in order to truly reflect the descent relationships of the races. The characteristics induced by the environment, either through natural selection or in a Lamarckian manner, are too labile to be dependable. The question of how neutral racial traits could have appeared

and become established in the first place did not seem to have arisen or at least was not pressed.

Last but not least, the idea that human races differ in adaptively significant traits is emotionally repugnant to some people. Any inquiry into this matter is felt to be dangerous, lest it vindicate race prejudice. This attitude almost invariably goes hand in hand with the misunderstanding of the nature of biological heredity repeatedly dealt with above. To be different is not tantamount to being superior or inferior. Furthermore, the differential adaptations of the races of man are most probably concerned with environments of a remote past, largely superseded by the environments created by civilization, to which all races may be equally adapted or unadapted.

Skin Color

Shocking though this may be, solid and conclusive evidence concerning the adaptive significance of racial traits in man is scant in the extreme, and the best that can be offered are plausible speculations and surmises! Speculations and surmises are necessary, however, if solid evidence is ever to be produced; such evidence will not appear without working hypotheses to stimulate observations and experiments. Coon, Garn, and Birdsell (1950), Schwidetzky (1952), Newman (1953), Coon (1954b, 1955, 1959), and Weiner (1954), among others, have provided such hypotheses.

Skin color is the most conspicuous, though not necessarily physiologically the most important, of race differences. The geographic distribution of heavily and lightly pigmented races is on the whole consistent with the assumption that dark skins are adaptive in climates with strong sunshine and clear skies and light ones in lands with cool and cloudy climates (Schwidetzky 1952, Reche and Lehmann 1959). The darkest people live in the savannas of Africa, south of the Sahara Desert but north of the equatorial rain forests. The forest-dwellers are lighter, and the aboriginal populations of South Africa (Bushmen) have yellowish-brown skin. Very dark people live also in Melanesia, New Guinea, and parts of southern India. Some of the Australian aborigines, though believed to be remote relatives of the white race, are also dark.

The center of "blondism" or "leucodermia" is northern Europe, with its notorious paucity of sunshine, and particularly that part of Europe which was covered by the Pleistocene ice sheet (Schwidetzky 1952). American Indians, however, fail to conform to the

Levels of Technology and Gene Frequencies

Hulse (1955, 1957) has pointed out that in 1600 there were some three million persons of British stock, while at present there are at least 150 million, a fiftyfold increase. World population has increased only about sixfold during the same period. The parts of Europe containing high proportions of blond people held about three per cent of the world population in 1600, while at present people originating from this area comprise about twelve per cent of mankind. Hulse correctly points out that, racists to the contrary notwithstanding, these figures do not necessarily prove either a biological superiority of the Blond Beast, or a genetic excellence of the British stock. Technological progress or stagnation may enhance or reduce the frequencies of the genes of culturally active or sluggish groups of people no less effectively than more strictly biological advantages or defects.

Hulse calculates further that between 1600 and 1950 the populations of Eastern Europe (Russia and Poland) increased from 15 to 180 million, i.e., 1,100 per cent, while those of Central and Western Europe from 85 to 375 million, i.e., 341 per cent. Most of the former populations contain above 15 per cent of the gene for the B blood group and the latter usually less than 15 per cent. B blood has thus become increased in frequency. Hulse interprets the differential population growth in this case as a consequence of improvement of agricultural techniques and particularly the introduction of a new staple food—potatoes. Conversely, oppressed castes and races may fail to perpetuate their genes. Between 1792 and 1861 about 571,000 Negro slaves were imported in Cuba, and yet in 1861 there were only 603,000 persons of African descent on that island. The situation in Chile was even more extreme; Negro slaves were imported during the eighteenth and early nineteenth centuries, yet at present African genes are virtually nonexistent in that country. The chief reason is apparently that, because of the remoteness of the country from slave markets, almost exclusively male slaves, considered more valuable, were imported, and they were unable to find mates either among the white or the native Indian population.

Cultural factors have thus changed and continue changing the genetic composition of mankind. Caution is called for in interpreting these changes as due to natural selection of the usual biological sort. Such an interpretation would only be correct if it were shown

that cultural and technological changes are in turn set on foot by genetic differences among populations. This is, of course, a widespread assumption, pleasing to some people but certainly not scientifically validated or even particularly probable on theoretical grounds. We must face the fact that the causes of genesis, advancement, and deterioration of civilizations remain unsolved, despite the efforts of some of the best intellects that mankind has produced. The possibility that genetic factors are involved in these phenomena should not be dismissed dogmatically, but it seems certain that they were not the only and not even the most potent determining factors involved.

Race Equality vs. Sameness

That people may be equal without being alike has repeatedly been stressed in this book. Equality is a precept, similarity or dissimilarity a percept. Strictly speaking, science does not tell us whether people should or should not be equal, but it does show what consequences result from equality or inequality of opportunity, given the human diversity observed. We have faced this problem in the foregoing chapter in connection with the genetic polymorphism and caste and class distinctions. We concluded that denial of equality of opportunity stultifies the genetic diversity with which mankind became equipped in the course of its evolutionary development. Inequality conceals and stifles some people's abilities and dissembles the lack of abilities in others. Conversely, equality permits (or rather, may permit, since a complete equality of opportunity has never existed except on paper) an optimal utilization of the wealth of the gene pool of the human species.

Race differences present really the same problem, albeit on a larger scale. Race bigots contend that the cultural achievements of different races being so obviously unlike, it follows that their genetic capacities for achievement must be just as different. And from this follows the moral that the nations and races who choose to consider their own capacities superior have the right and even duty to govern and lord it over those whom they regard as inferior to themselves. It is remarkable how many people have either welcomed this view or acquiesced in it. Those who found it abhorrent went too far to the other side in their protest: they countered with the suggestion that all people are as similar in their abilities and potentialities as identical twins.

The decisive point is, however, that nobody can discover the cultural capacities of human individuals, populations, or races until they have been given something like an equality of opportunity to demonstrate these capacities. Wisely or otherwise, most people prefer self-government even to good government. In the foregoing chapter arguments have been presented that educability, the capacity to learn and to profit from experience, is not concentrated in any one caste or class. It is not concentrated in any one race either. Members of yesterday's "inferior" and "subject" races now attend universities together with sons and daughters of the *ci-devant* masters, and many of the former do not do badly at all. It does not follow, however, that to demonstrate "equal" capacities for cultural achievement all races will have to reproduce copies of the civilizations and polities regarded as quintessences of enlightenment and discernment in Washington or Moscow. Given the opportunity, they may arrange their lives in different ways. One does not need to adopt the viewpoint of extreme cultural relativism, that any culture is as good as any other, to hope that mankind may eventually profit by this diversity more than it might have gained by monotonous sameness, even of the most "advanced" kind.

11. Evolution in Process

Considerate la vostra semenza:

Fatti non foste a viver come bruti

Ma per seguir virtute e conoscenza.

DANTE, *Inferno*

MAN HAS not only evolved; for better or for worse, he *is* evolving. Our not very remote ancestors were animals, not men; the transition from animal to man is, on the evolutionary time scale, rather recent. But the newcomer, the human species, proved fit when tested in the crucible of natural selection; this high fitness is a product of the genetic equipment which made culture possible. Has the development of culture nullified the genes? Nothing could be more false. Culture is built on a shifting genetic foundation. It is fairly generally admitted that genetic changes in the human species are influenced by culture. But many people are reluctant to credit that genetic changes may influence culture. The reluctance comes from an almost obsessive fear that biological influences on culture are somehow incompatible with democratic ideals; social sciences must be guarded against the encroachment of biology. Admittedly, most of the biologists' forays into the realm of sociology warranted distrust. But the estrangement must be overcome. Man's future inexorably depends on the interactions of biological and social forces. Understanding these forces and their interactions may, in the fullness of time, prove to be the main achievement of science.

Normalizing, Diversifying, Balancing, and Directional Selection

Mutations continue to arise in man, even as they have been since the dawn of time. They were the raw materials from which natural selection gradually built the genetic endowment of the human species. Beneficial mutants are, however, a minority; a great majority of the mutants are harmful. The simplest and most