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THE CONCEPT OF  
RACE  
IN PHYSICAL  
ANTHROPOLOGY

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## "RACE" AS A SOCIAL CONSTRUCT

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The reader of an essay such as this will normally expect it to start with an acceptable anthropological definition of what "race" is considered to be. For many it will come as something of a surprise, then, to hear that "race" is whatever people think it should be, but that it has no basic biological reality. Since "race" holds such a prominent place in life in America and has done so since before the country gained its independence over two centuries ago, the reader can be forgiven for thinking that the statement that "race" does not exist amounts to a bit of academic double-talk or verbal sleight-of-hand. The practicing physician will query rhetorically, "What do you mean, race does not exist? I see it in my clinic every day!" One can be forgiven for being suspicious that the denial of the reality of "race" is just another manifestation of post-modern relativism where reality is defined as whatever people choose to believe and has no objective identity.

Actually, what is thought of as "race" is in fact a manifestation of cultural relativism, and each group will perceive it in a different way. In Hitler's Germany, Jews and Gypsies were perceived as distinct "races," while the English have often thought of the Irish and the French as racially distinct. Americans, on the other hand, use the term to apply to what they perceive as larger groupings such as Africans or Asians and assume somewhat simplistically that a single label can encompass the spectrum found in each continent. Europeans would agree that these qualify as "races," but they then go on to make finer discriminations under that term.

In saying that "race" does not exist as a biological category, I am not saying that human biological differences do not exist. These do, and can be productively studied, but only after the concept of "race" is rejected as a starting point. I shall return to that point later on. At the moment, it should be noted that the concept is relatively recent and basically did not exist prior to the Renaissance. It is of some interest to reflect that neither the concept nor any word that could be used to designate it is present in the Judaeo-Christian Bible. One could say that, of course, the Biblical accounts describe a relatively restricted portion of the Middle East, although the scope covered actually ranges all the way from the Mediterranean up the Nile to Ethiopia.

There is no trace of a "race" concept in the extensive accounts in Egyptian hieroglyphics even though sub-Saharan Africans are represented in the accompanying illustrations. The "Father of History," Herodotus (ca. 484–420 B.C.), described his travels all the way from the Black Sea north of Greece southwards and up the Nile to Nubia, but never used a term that could be construed as

“race” even though some of the translations insert that word where the original Greek used *anthropoi* or sometimes *ethnea*, “people.”<sup>1</sup> The medieval Venetian traveler, Marco Polo (1254–1324) went all the way from Italy to China by way of the “Silk Road,” and came back via Southeast Asia and the Indian peninsula. However, when he wrote about his travels and the people he encountered, he never used anything that could correspond to the concept of “race.”<sup>2</sup> The same thing was true for the even more widely traveled medieval Arabic geographer, Ibn Battuta (1304–1377), who not only duplicated Marco Polo’s west-to-east span but added a perspective that ran from the Atlantic coast of Europe southwards across the Sahara to Timbuktu in sub-Saharan Africa.<sup>3</sup>

The big change in the perception of how people differ from place to place came in the Renaissance. Prior to that time, travelers such as Herodotus, Marco Polo, and Ibn Battuta got from one place to another over land on foot or on horseback, one day at a time, and what they saw was the gradation of one population into the next without any discernible break. That means of seeing the world changed dramatically in the Renaissance because of the development of ocean-going ships that could set off from the shores of one continent and arrive at those of another without seeing anything in between. As a result, the sailors and their passengers perceived a world in which the people at the port of embarkation and the port of arrival appeared categorically different.

The marine technology and navigational skills that made such long-distance voyaging possible accompanied the emergence of the Renaissance in Europe and made possible the feats of Christopher Columbus, Vasco da Gama, and others. It also meant that European perceptions of other people were of categorical distinctions instead of the borderless gradations that were seen by Herodotus and his medieval successors. The modern phenomena of the jet plane and the television camera have simply reinforced the view that the world is inhabited by categorically distinct people. If this categorical picture of human differences was a construct that emerged from the circumstances of Renaissance Europe, it was still largely a vicarious view since it did not arise from the direct perceptions of the majority of the populace but rather from the second-hand reports of those who had actually been the travelers.

All that changed as a result of European colonization of other parts of the globe, in particular the western hemisphere. Colonization involved the actual movement of people from one relatively small segment of the world, western Europe, to other places such as the southern tip of Africa, Australia, and particularly to the western hemisphere. The western Europeans were then

installed immediately adjacent to the indigenous populations whom they perceived as being categorically distinct.

The western hemisphere was particularly important in the construction of this categorical view of human differences because the Europeans had come from a relatively restricted region at the northwestern edge of the Old World. As it happened, the Native Americans with whom they came in contact had also come from a relatively restricted area but at the northeastern edge of the Old World, although no one knew this at the time of first contact. As near as we can tell, the movement of northeast Asians into the New World does not go back much more than 15,000 years, and that is not a long enough stretch of time for significant biological differentiation to have taken place. There is no gradation in skin pigment among the Native Americans from the Arctic to the equator—unlike virtually all of the continuously occupied parts of the Old World. European immigrants, wherever they went in the western hemisphere, perceived the indigenous people as being categorically distinct from them in essentially the same sort of way.<sup>4</sup>

Subsequently, the European-derived population imported slaves by the thousands from a relatively restricted section of West Africa. The western hemisphere, then, presents a picture of people from three separate portions of the Old World, artificially brought together, and left to contemplate the meaning of their perceived distinctions. As such, it is the worst possible model to use in an effort to make sense out of the normal circumstances of human biological variation. At the same time, the issue of the meaning of those differences had an immediacy that was true for no other large segment of the world. Such has become the unwitting power that America has upon the way the world thinks about things that the concept of “race” that was reified by the circumstances of the settling of the western hemisphere is now being accepted as a matter of course in many parts of the world—China for example—where it had not previously existed.

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## *THE BIOLOGICAL NATURE OF HUMAN VARIATION*

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Curiously enough it is the biological part of anthropology that has been slow to accept the implications of the previous section.<sup>5</sup> Actually, the realization that human populations grade into each other without break and that “race” is a completely arbitrary appel-

lation was articulated before the outbreak of World War II,<sup>6</sup> and this was the basis for the approach taken by the late Ashley Montagu in his most significant contribution, *Man's Most Dangerous Myth: The Fallacy of Race*.<sup>7</sup> This was an important first step in showing that the concept of "race" has no biological basis, but there was one more development that was necessary before that realization could be nailed down. This was the development and application of the concept of "cline," defined as "a gradation in measurable characters."<sup>8</sup>

Ironically, although that idea was proposed by Julian Huxley—one of the two who influenced Ashley Montagu to realize that the concept of "race" was biologically indefensible—Huxley never fully realized why the treatment of clines provided the final demonstration of the nonexistence of that category. This was because he lacked the information demonstrating that clines are distributed without any relationship to each other in a species without reproductive boundaries. In the decade after Ashley Montagu's book was published, studies in field biology involving deer mice, leopard frogs, butterflies, red-eyed towhees, the American marten, and others showed that the traits under separate genetic control within each species had distributions that were completely unrelated to each other. Early in the 1950s, this led to the demonstration that the category of *subspecies* simply could not be used for forms that were reproductively continuous over large areas.<sup>9</sup>

Within another decade, it was realized that, since *Homo sapiens* also is a continuously distributed species without reproductive barriers between adjacent groups, the same logic should apply to the nature of human variation. This led one biological anthropologist, Frank Livingstone, to declare that "There are no races, there are only clines."<sup>10</sup> He had come to this understanding by noting that the distribution of hemoglobin S, the cause of sickle-cell anemia when present in the homozygous (SS) condition, is related to the distribution of a particular kind of malaria. When present in the heterozygous condition (AS), it conveys an ability to survive that particular form of malaria.<sup>11</sup> The distribution of the gene for hemoglobin S, however, is completely unrelated to the distribution of skin color, and if one tries to combine the manifestations of both in a single region, one can make biological sense of neither one. Add a third trait to the picture with a distribution unrelated to the others, and the pattern made by the intersection of those genetically separate traits becomes completely senseless. Adding further traits simply erases all indications of any pattern whatsoever. The only way to understand the biological meaning of the distribution of those traits is to treat the distribution of each one separately and compare it to the distribution of the selective force to which it represents a response.<sup>12</sup>

## SKIN COLOR

At this point, it will be instructive to look at the distributions of a few human traits that are inherited in straight-forward fashion and for which there is enough information to build up a world-wide picture. Actually I am going to restrict the portrayal to distributions in the Old World since the western hemisphere has not been inhabited long enough for many adaptive traits such as tooth size and skin color to have developed much in the way of differential gradients. The first such trait to be considered is skin color since it is so closely linked in the minds of the public with what is assumed to be "race." Skin color is produced by the pigment melanin, which blocks the penetration of the most damaging part of the ultraviolet component of sunlight. In high doses, ultraviolet rays with wave lengths between 280 and 320 millimicrons (UV-B) can penetrate to the lower levels of the epidermis and can contribute to the development of skin cancer. There is obvious survival value to the presence of melanin in the skin of the inhabitants of the tropics.<sup>13</sup>

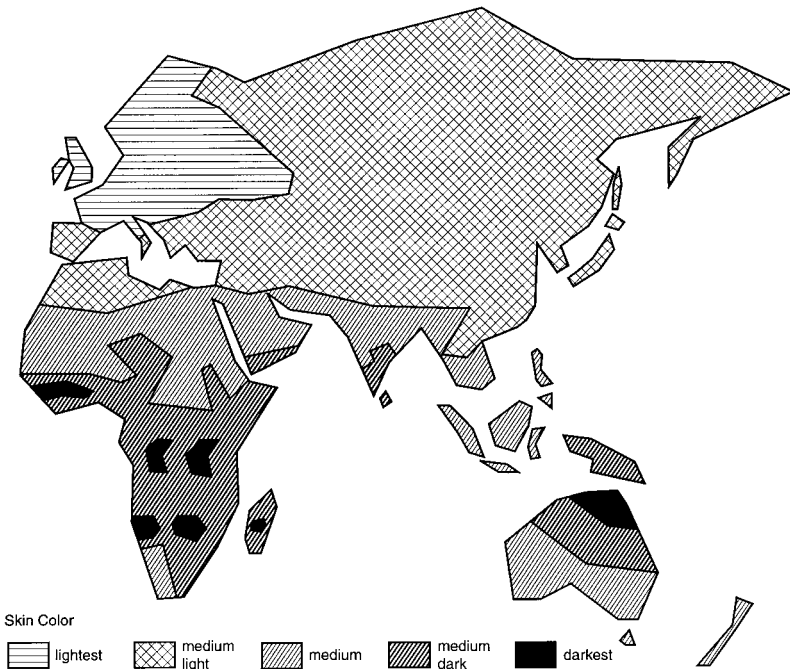


FIGURE 16-1 THE DISTRIBUTION OF VARIATION IN INTENSITY OF HUMAN SKIN COLOR IN THE OLD WORLD

The significance of maintaining epidermal melanin away from the tropics is of less evident importance, and it is not surprising to find that skin pigment tends to decrease in proportion to the distance of a given population from the equator. The reason for increased skin pigmentation in the tropics is clear enough, but why it should reduce to the north and the south is not agreed upon. One theory has it that the reduction allows enough UV penetration so that Vitamin D can be synthesized. Heavy pigmentation could lead to Vitamin D deficiency and rickets during growth in areas such as the north where the annual UV dosage is far less than in the tropics. Others have noted that enough Vitamin D is synthesized and stored for further use during the summer no matter what the amount of skin pigment so that there is no particular advantage to depigmentation in the north. Another theory suggests that when selection for skin pigment is relaxed, as it is in the north where the chances of UV-induced cancer are small no matter how little pigment there is in the skin, the accumulation of chance mutations affecting pigment production will result in an eventual failure to produce a full tropical amount of epidermal melanin.<sup>14</sup> The distribution of human skin pigment in the Old World is shown in Figure 16-1 (on page 244).<sup>15</sup>

As can be seen, there is a general association of skin color differences with latitude, but it is far from perfect. The maximum pigmentation occurs among tropical populations who have long been resident at the latitudes where they are now found. The greatest amount of depigmentation occurs where people have resided farthest away from the tropics for the longest period of time. The slightly lesser amount of depigmentation of people in the north temperate portions of Eastern Asia may be because they have not been resident at that latitude for quite so long as their counterparts at the northwestern edges of human habitation. Certainly the lack of fully tropical amounts of pigmentation of people in the tropics at the southeastern edge of the continental Old World—Southeast Asia—is because the current inhabitants have only come south from temperate latitudes within the past few thousand years.<sup>16</sup>

I have already mentioned that there is no pigment cline in the New World, so it is apparent that the 15,000 years or so that the western hemisphere has been occupied is not enough time for a pigment gradient to have developed in place. In Australia there actually is a north-south pigment cline with the darkest skin occurring in the tropical north. That gradient, however, is nowhere near so marked as the gradient from the Equator in Africa to the southern tip of the continent, and it is apparent that the 60,000 years that Australia has been occupied is long enough to have produced the beginnings of a north-south pigment cline, but nowhere near long

enough to have produced the kind of differences that you get ranging north from the African tropics to Spain, a latitude change comparable to the tropics to southern Australia. The time needed to have produced a spectrum such as that from West Africa to Spain would have required nearly 200,000 years, which is more than three times as long as Australia has been occupied.<sup>17</sup>

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## *TOOTH SIZE*

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If we are keenly sensitive to differences in human skin pigment, we are less so to differences in the size of the human dentition. Yes, we are aware that Africans tend to have larger teeth than Europeans, but it is not the uppermost impression in our minds when we compare the physical appearance of people from both places. If it has taken nearly 200,000 years to produce the differences in skin color that we see in the world today, the modern condition represented by the teeth we have has taken over 100,000 years to produce. No one has teeth as large as the common human ancestor had 130,000 years ago, but the reductions that have taken place during the past 100,000 years have proceeded faster in some places than in others. Throughout most of the two million years of the Pleistocene, our ancestors ate things as they found them, namely raw. When teeth wore out, that was it and life came to an end as it does today for aged elephants whose last teeth have worn to useless stumps. Now, of course, we cook things to mush or puree them in machines that reduce things to drinkable consistency. In the past, however, teeth had to last a lifetime, and they had to have enough durability to reduce the toughest of uncooked food substances to swallowable consistency.

Starting in the glacial period before the most recent one, that is, over 200,000 years ago, the control of fire enabled people to become permanent inhabitants of the temperate zone. Part of that use of fire of course was to keep people warm. Unlike wolves, bears, horses, deer, and the like, people are restricted by the tropical physiology they have inherited from their primate ancestors, so survival in the temperate zone in the face of increasing glacial chill was only possible with the warmth provided by clothing and the hearth. As creatures dependent on the products of the chase, there was the added problem of eating something that was left over from a recent hunt when it had frozen solid. The Pleistocene cow, or auroch, was quite a large animal, and it was unlikely that a given band of human hunters could have consumed the whole thing at a single sitting. A day later, its icy remains would have defied mastication without some reme-



dial treatment. The answer was the development of cooking.

While the control of fire had become a human universal well over 200,000 years ago, its use in the preparation of food was essential for survival in the northern stretches of human habitation (especially as glacial conditions intensified), in a fashion quite unlike that practiced farther south. This has been referred to as "obligatory cooking."<sup>18</sup> While this did indeed make it possible to eat what had previously been frozen, it had another incidental consequence. It meant that the food being eaten required less chewing before it could be swallowed, and this in turn meant that there was a reduction in the amount of tooth substance required to last a person throughout life. Relaxation in the selection maintaining tooth size meant that mutations affecting dental dimensions could occur with impunity, and, since the average mutation interferes with the development of the structure it controls, that structure—simple tooth substance in this case—can be predicted to reduce in the course of time. The argument is the same as the argument for the reduction of skin pigment among those people who have longest resided in areas where the selective forces maintaining skin color are less than in those regions subjected to the maximum amount of ultraviolet radiation. Both skin color and

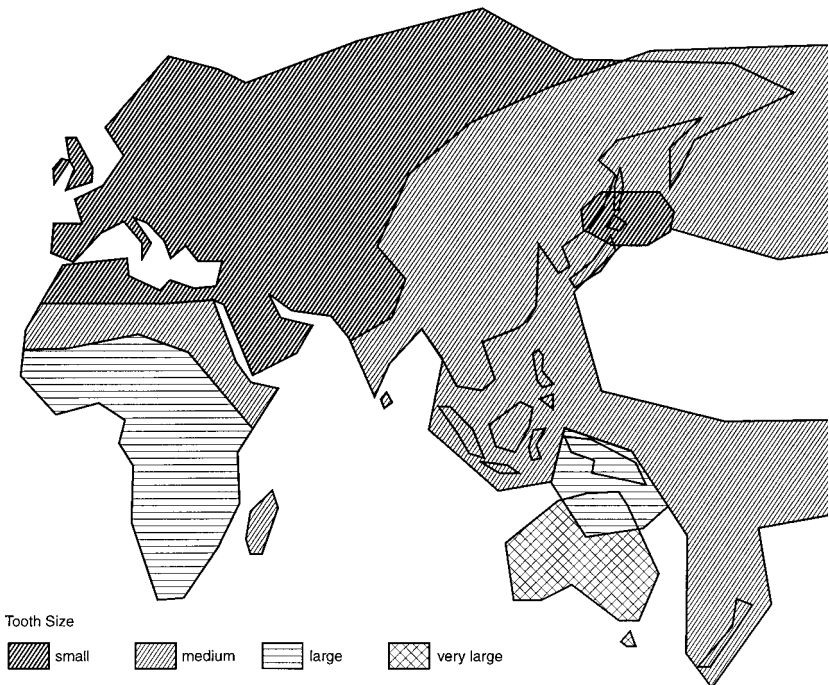


FIGURE 16-2 HUMAN TOOTH SIZE DIFFERENCES IN THE OLD WORLD

tooth size reduction are examples of evolution by entropy.

The maximum amount of dental reduction in the world, then, should occur in those areas where cooking has longest been used for the preparation of food. The archaeological record shows that this first occurred in a stretch running from the Middle East to the Atlantic shores of Europe, and it is not surprising to realize that the people in that area today, and their relatives just to the north, have the smallest teeth relative to body size of any of the peoples of the world. A simple version of the world distribution of human tooth size can be seen in Figure 16-2.<sup>19</sup>

Eventually the advantages of cooking spread elsewhere in the world. The spread to the south was not needed to thaw previously frozen food, but it was discovered that it made it possible to use as food something that had turned bad by being left out in the tropical heat for several days. It even made it possible to eat things that would have been indigestible raw: wheat, rice, yams, and the like, thus opening up a vast realm of potential foodstuffs that had previously been unavailable for human sustenance.

Cooking got into Australia last, and it is no surprise to discover that aboriginal Australian (non-European) teeth are closer to the size of the average human Pleistocene ancestor than are those of any other people in the world, and the farther south in Australia one goes, the less reduced are the teeth. Finally, the invention of pottery in the heart of those areas that first developed agriculture completely eliminated the selective forces maintaining any tooth substance at all. Yes, it is nice to be able to chew what we refer to as “toothsome” morsels, but, in the absence of teeth, sustenance can be ingested in the form of soups that need no chewing whatsoever. The smallest teeth in the world today occur among those in the area where pottery was first invented and has been in use for the longest period of time—the Near East.

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## *SICKLE-CELL ANEMIA*

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We can perceive differences in skin color and, to a lesser extent, tooth size, but there are many ways in which humans differ that we cannot see directly. Amongst these are differences in hemoglobin, a molecule whose principal function is delivering oxygen from the lungs to the tissues where it is used for metabolic purposes, and then taking the product of metabolism, carbon dioxide, back to the lungs where it is released into the atmosphere in exhaled breath. In addition to its primary role in oxygen transport, the

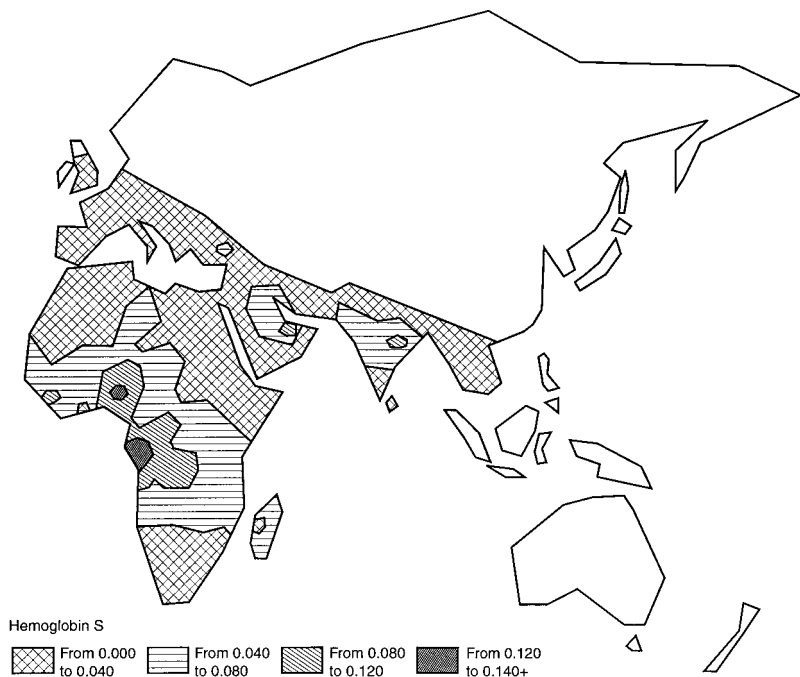


FIGURE 16-3 THE DISTRIBUTION OF HEMOGLOBIN S

hemoglobin molecule can affect the red blood cell that contains it.

One inherited hemoglobin variant, hemoglobin S, will tend to crystallize after it gives up its oxygen, and the crystals align themselves within the surrounding cytoplasm of the red blood cell as long stiff rods. These can change the shape of the softly rounded blood cell to an angular pointed affair that reminded microscopists early in the past century of miniature sickles: the famous “sickle-cells” of sickle-cell anemia. Those stiff, sickle-shaped cells get stuck in the capillaries at the peripheries of the circulatory system preventing blood from flowing through. The body, in response, dissolves the cells to restore circulation at the expense of the loss of those sickled cells, and the loss of red blood cells is what constitutes anemia—thus, sickle-cell anemia. The process also dumps immature malaria parasites into the plasma where they are sought out and destroyed by disease-fighting white blood cells before they can spread their infection to other red blood cells. This then reduces malaria although it does not eliminate it from the system.

The phenomenon of sickle-cell anemia was first identified by clinicians in the United States and noted to occur amongst Americans of African ancestry. Inevitably, sickle-cell anemia was

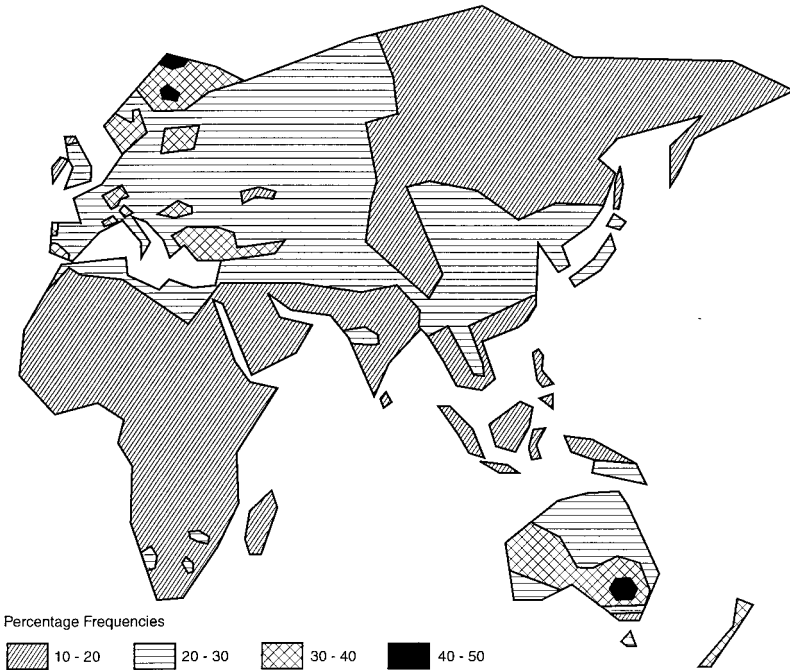


FIGURE 16-4 THE PERCENTAGE DISTRIBUTION OF THE GENE FOR BLOOD GROUP A IN THE ABO SYSTEM

regarded as an African disease and it is still thought of by many physicians and the public at large as an African “racial” marker. As it happens, although much of the sickle-cell anemia in America did come over with the Africans who were brought in as slaves, the genes that were responsible for the presence of that condition in Africa were not of African origin, ultimately having been brought in from the Middle East by traders down the African east coast or by caravan routes across the Sahara.<sup>20</sup>

Sickle-cell anemia is a single gene trait, and one needs to inherit the gene for hemoglobin S from each parent in order to show a full-scale manifestation of the phenomenon. Such a person is homozygous, which means having a double dose of the S gene (the SS condition), and that person has greatly reduced chances for survival. A person with one gene for normal hemoglobin and one gene for abnormal hemoglobin is a heterozygote exhibiting the AS condition. A homozygous normal is AA. In spite of the fact that the sufferers from sickle-cell anemia tend to have a sharply reduced life span and usually do not have children, the frequency of the gene is maintained from generation to generation in certain parts of the world. The reason is that the AS condition allows its posses-

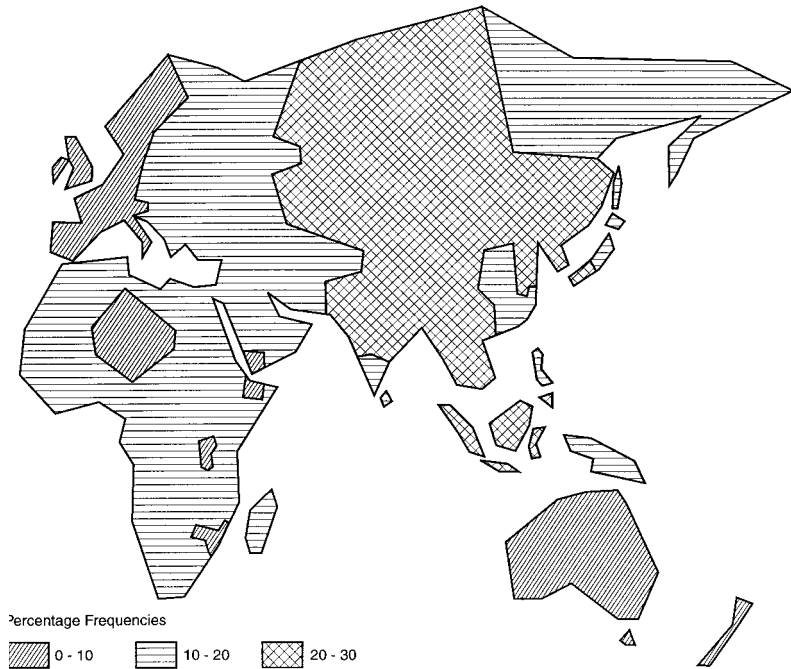


FIGURE 16-5 THE PERCENTAGE DISTRIBUTION OF THE B GENE IN THE ABO SYSTEM

sors to survive attacks from a particularly mean kind of malaria. They are not immune to malaria, but they have a much greater chance of surviving it than do AA people.

As it happened, when West Africans adopted agriculture a couple of thousand years ago, the changes in settlement patterns and the hewing out of farm lands from what had been forest altered conditions to such an extent that that particularly noxious kind of malaria flourished and became a major threat to human survival. When hemoglobin S was introduced, then, it achieved relatively high frequencies in a relatively short period of time among the people who already lived there. Figure 16-3 shows the distribution of the gene for hemoglobin S in the middle of the twentieth century.<sup>21</sup> Like the distribution of skin color and tooth size, it follows the distribution of the selective force to which it represents an adaptation, but that selective force does not have the same distribution as the selective forces that control those other traits, and none of them coincide with either a given locale or what constitutes "race" in the popular sense of the term. There are many other forms of abnormal hemoglobin, and some of them are systematically distributed in conjunction with the distribution of other kinds of malaria.

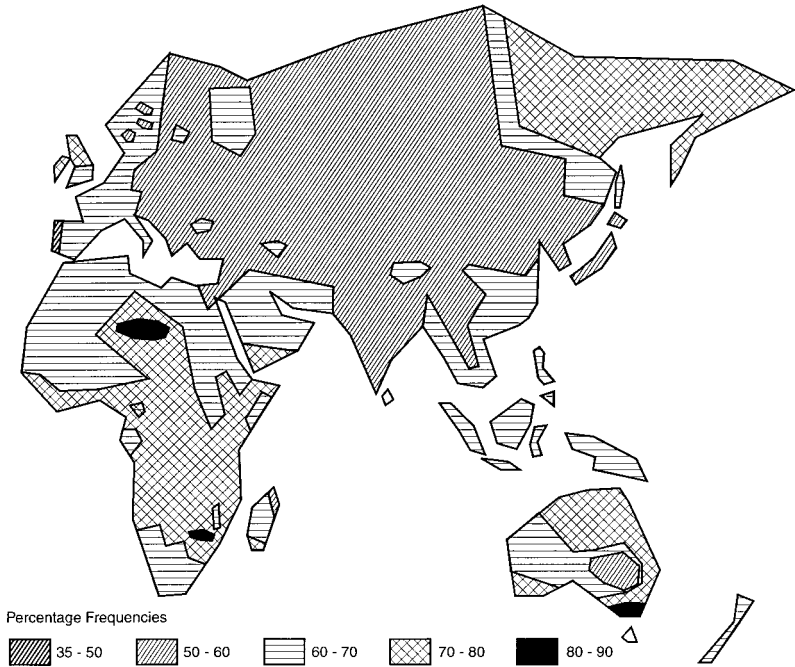


FIGURE 16-6 THE PERCENTAGE DISTRIBUTION OF THE O GENE IN THE ABO SYSTEM

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## THE ABO BLOOD GROUP SYSTEM

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The final clinically distributed trait I am going to consider is another one that we cannot see but which we all know about, namely the ABO blood group system. This is controlled by three genes at a single locus found on the long arm of chromosome 9. Every person inherits one gene from each parent. If one has an A from both parents or an A from one and an O from the other, one tests as A since O is recessive. Likewise, whether one is BB or BO, one tests as B since B is also dominant over O. If one has an A and a B, one tests as AB. To test as "O," one needs to be homozygous for the O gene, namely, OO. This is all very well known since it is vital information for blood transfusions. O is the universal donor and can be given to people with any of the other genes, but neither A nor B can be given to an O individual. This is essential medical information, but there has been much less interest in why there are differences in the ABO system in the first place. There has been some suggestion that the different genes have something to do with the

resistance or susceptibility to different diseases, but this is not well worked out. The system is inherited in simple and straightforward fashion, and the distributions of the A, B, and O alleles (i.e., genes that fit at the same locus on the chromosome) are well known, as shown in Figure 16-4 (on page 249), Figure 16-5, and Figure 16-6.<sup>22</sup> Once again, the distributions are evidently completely unrelated to the distributions of the traits plotted in Figures 16-1 through 16-3, and only confusion would result from having to force them all into a single interpretive framework.

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## *REGIONAL FEATURES*

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One could present many more traits in the format offered earlier, and none of them would show the same kind of distribution. Likewise, none of them can be associated with a particular region of the world. Yes, there are latitudinal changes in features such as skin color, but that is not the same as restricting a given feature to a particular segment of geography. That is because the selective forces that govern their distributions are not themselves restricted by local geography. However, there are human features that can be associated with particular regions. We can recognize particular nuances of cheek bone and eye opening formation as recalling the inhabitants of the Far East, or ear shape in Africa, or aspects in the shape of the nose as being peculiarly characteristic of Europe. Unlike the traits dealt with previously, however, there is no adaptive value in those nuances of eye, ear, and nose morphology. The only thing we can say about them is that they tend to resemble what can be seen in the regions from which the ancestors of those people came.

It seems evident that if traits can be identified with a particular region, then they have no adaptive significance, and no regional manifestation is either better or worse than any other. Clearly such regional traits are inherited, but they are just the inherited nuances of what was there and nothing else. At most this constitutes what I have labeled "family resemblance writ large."<sup>23</sup> As Marco Polo and Ibn Battuta recognized, those resemblances grade from one region to another without any break and are unrelated to survival capabilities. It is only when we see representatives out of context that we categorize them with "racial" labels, and these can only prevent us from a full understanding of the nature of human biological variation on a world-wide scale.

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14. The Vitamin D argument is outlined in Jablonski and Chaplin, see Note 13. The effects of mutations under conditions of relaxed selection are presented by Brace in "A Four-Letter Word Called 'Race'," see Note 12.
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21. The distribution pictured is adapted from Walter F. Bodmer and Luigi Lucca Cavalli-Sforza, *Genetics, Evolution and Man* (San Francisco: Freeman, 1976).
22. Figures 16-4, 16-5, and 16-6 are simplified from the information provided by A. E. Mourant, Ada Kopec, and Kazimiera Domaniewska-Sobczak, *The ABO Blood Groups: Comprehensive Tables and Maps of World Distribution* (Springfield, IL: C. C. Thomas, 1958).
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