Origin of the Human Races

A new thesis of mankind's ancient unity and of a corresponding antiquity of racial diversity in man.

Ernst Mayr

The diversity of human races has posed social and political problems as long as there has been recorded history. To science it became a problem only after the rise of evolutionary biology. The word *race* means many things to many people. How difficult it is to approach this subject objectively is apparent to all of us who have witnessed in our lifetime the crimes of the racists, on one hand, and, on the other hand, the follies of those egalitarians who try to deny even the existence of races. Actually there is no sense in being outraged by the fact that races exist in nature. Zoologists and botanists have long been accustomed to describing the distribution of races of animals and plants and even to following them through time when this was possible. Carleton Coon's new volume—**The Origin of Races** (Knopf, New York, 1962. 724 pp. $10)—which tries to do the same for man, is a milestone in the history of anthropology. The theme is stated in the introduction, in which Coon tells that he "could see that the visible and invisible differences between living races could be explained only in terms of history. Each major race . . . had been molded in a different fashion to meet the needs of different environments, and each had reached its own level on the evolutionary scale."

Living mankind is a polytypic species, as the zoologist would call it, consisting of a number of major races. Most anthropologists have assumed, without giving much thought to the problem, that these races evolved only after the hominid line had reached the *Homo sapiens sapiens* stage, indicated by the appearance of Cro-Magnon man some 30,000 to 40,000 years ago. This assumption of the recency of human races created, however, such formidable problems of distribution and racial divergence that Coon decided to replace it by a radically different one, a theory once previously suggested by the late Franz Weidenreich and supported by a minority of other authors. Why not assume that fossil man was already a polytypic species (with limited gene exchange between local populations) as far back as the level of Java Man and perhaps even earlier? Could not these races, exposed to similar selection pressures, have undergone a parallel and partially correlated evolution from the *Australopithecus* stage through the *Homo erectus* stage to the level of *Homo sapiens?*

Coon's volume is his bold and imaginative attempt to prove the correctness of this thesis of mankind's ancient unity and of a corresponding antiquity of racial diversity in mankind. The size of the volume is testimony for the mass of evidence that Coon has succeeded in bringing together in support of his theory. One may not always agree with Coon's interpretation, but one can not fail to be stimulated by the consistent and challenging story into which he has woven his abundant material. Every effort is made to present as complete a setting as possible; genetic, climatic, geographic, and cultural factors are equally considered in the reconstruction of the causes responsible for human evolution and diversification, and all of it is eminently readable. Coon is at all times a superb storyteller. Whether he describes the way of life of the Tiwi on Melville Island, the population size of primitive food gatherers, selection pressures among the first tool makers or the inventors of speech, he always holds our attention. The treatment is essentially impressionistic; it is nowhere dulled by excessive detail, even though there is a wealth of documentation, 39 tabulations, 26 pages of bibliography, a glossary, and numerous illustrations.

Origin and Adaptation

The first seven chapters lay the groundwork. The first ("Problem of racial origins") deals with many of the problems of the new systematics and of speciation, an area in which great advances have been made in the last generation. The evolution of *Homo sapiens* as polytypic species cannot be fully understood without this foundation. The second chapter ("Evolution through environmental adaptation") deals with this important question: Which of the physical characteristics of races—particularly body proportions, skin coloration, and configurations of skull—can be interpreted as adaptations to heat, cold, or humidity? The third chapter deals with the highly important role of social factors in evolution. Communication, occupation (hunting and agriculture), sexual biology, tools and fire, mortality factors, and many similar potential selection pressures are interpreted, frequently in a highly original manner. The fourth chapter deals with the primate ancestors and collateral relatives of the hominids, the fifth with man's place among the primates, the sixth with the fossil record of the primates, and the seventh with the fossil hominids up to and including the Australopithecines. The eighth chapter lays the final foundation for the detailed analysis, the tracing back in history of the living races. In this chapter, entitled "An introduction to fossil man," Coon discusses the temporal and spatial distribution of fossil sites and of various kinds of tools and analyzes the evidence supplied by morphological characteristics accessible in fossils.

Fossil Evidence

The task confronting Coon is formidable. The usual diagnostic characters of race—such as skin color, hair, and blood groups—are not present in fossils. Few, if any, of the other characters —such as size, proportions of the skull (including the face), and form of the teeth—are absolutely diagnostic. Typologists would reject, indeed have rejected, such characters, or they have misused them by assuming such characters to be absolutely diagnostic. Coon realizes that all races are variable pop-

The reviewer is Alexander Agassiz professor of zoology and director of the Museum of Comparative Zoology at Harvard University.

ulations and that most of their characters and character combinations have only probabilistic value. A single character, under these circumstances, would be meaningless. However, if a given fossil is closer to one than to all the other main modern races in a whole set of characters, then—so Coon suggests—it is probable that it belongs to the same evolutionary stream. The argument is strengthened if the fossil comes from the same geographic region as the modern race. The argument, then, hinges on finding enough characters with which to establish the continuity between fossils and the races of living man. This is where Coon's great experience with the living races of man pays off. He is the first to utilize a considerable number of characters of fossils that until now have been used only for the comparison of living races. This includes Flower's index, facial flatness (expressed in four indices), and various characteristics of tooth form and skull shape. This array of characters could well be diagnostic if we had complete fossils, which—alas—is only rarely the case. A few teeth, pieces of jaw, mandibles, and skull caps is what we actually have when we talk of Heidelberg Man, Meganthropus, and Man of Ternefine, or of many of the other famous kinds of fossil man. Fortunately, some other fossil men are better represented, but, regardless of whether the evidence is scanty or ample, Coon nearly always succeeds in casting new light on them. The firm removal of Rhodesian Man and Solo Man from the Neanderthal group to the *Homo erectus* group is a case in point. That Coon has personally inspected and measured much of the original material and that he attempts to place even "inconvenient" or obscure specimens, adds to the value of his treatment. The breadth of Coon's interests, ranging from human artifacts to the polymorphism of living races, guarantees a broad basis for his discussions.

Living Races and Their Ancestors

The essential evidence for his main thesis is presented in chapters 9 through 12. In living man, Coon recognizes five races: the australoids, the mongoloids, the caucasoids, the congoids (Negroes), and the capoids (Bushmen and relatives). A reevaluation of pygmy populations has greatly helped in arriving at this simplified classification. Coon now admits (contrary to his former belief) that pygmy stature is a comparatively recent development and that the pygmies of the eastern tropics are most likely repeatedly derived from the australoid race, the Congo pygmies from the negro complex, and the Bushmen from larger-sized capoid ancestors formerly living in North Africa. Like Weidenreich before him, Coon assigns the various types of fossil Java men to the ancestry of the australoid race, Peking Man to the mongoloid line, Heidelberg to the caucasoid line, and so on. As persuasive as Coon's treatment is, it does not always convince me of the validity of the lines of descent that he postulates. For instance, after discussing the Java fossils (Java Man, Solo Man, and Wadjak Man), Coon concludes "the Pithecanthropus-Wadjak evolutionary line has been established." Yet, a detailed study of the evidence that he presents leaves the reader somewhat unsatisfied. That successively higher grades are involved no one will question. Yet, Java, Solo, and Wadjak Man could, just as well, represent three different invasions of a peripheral isolate rather than a single "evolutionary line." At that, of course, they might be derived from a common gene pool in South East Asia.

Coon quite rightly emphasizes again and again how important it is to have a full understanding of the various alternatives of racial change. Three different kinds of events can account for the replacement of an earlier race by a newer one: (i) the extinction of the earlier race and its replacement by a new one immigrating from elsewhere, (ii) the absorption of the earlier race by intermarriage with an invading race, and (iii) the evolutionary change of an earlier into a new race. The analysis of individual cases is severely handicapped by the fact that all three processes may occur simultaneously in the replacement of a single race. The Neanderthal problem is a case in point. Coon sees in the Near East a smooth transition from pre-Neanderthals through Neanderthals to modern caucasoids. This interpretation can well be challenged in spite of, or perhaps because of, the populations of the two Mount Carmel caves, but even if it were substantiated, it would still leave us with the problem of western Europe. Was Neanderthal extinct when Cro-Magnon entered western Europe? Coon presents evidence that he was not; so we must ask to what extent did Cro-Magnon absorb Neanderthal. It is a widespread assumption that victorious invaders kill the men of the vanquished tribe but spare the women. The general validity of this thesis still remains to be established. It is not supported by the interactions of the white invaders of North America with the Indians or by that of the white Australians with the aborigines. The proportion of absorbed genes is extremely small in both cases. The greater the cultural difference between victor and vanquished the smaller, presumably, the amount of gene flow.

The rapid advance of research in the area covered by the book is indicated by the amount of new information added in footnotes to the original text. Important among it is the evidence that the African apes are in numerous biochemical characters more similar to man than they are to the other great apes. Coon accepts in part and rejects in part the new argon-potassium chronology. This has lead to some inconsistency. It would be picayune to point out the minor errors (there are quite a few!) that have crept into Coon's treatment. None of those I discovered affects his main thesis.

Proof and Inference

There is little doubt that this volume will stir up more than one controversy. Not only does it challenge all sorts of currently held beliefs, but the conclusions throughout are based on inference rather than being established by incontrovertible proof. The truth here, as in so many other areas of science, is "that which on the basis of the available evidence is most probable." To me, at least, it seems that the basic framework of Coon's thesis is as well, or better, substantiated than various possible alternatives. As Coon himself emphasizes again and again, any interpretation may be invalidated by the very next skull excavated in Africa, India, or China. The highly controversial dating of many findings is crucial to his thesis. "If the Florisbad fragment is older than I think it is, I shall be surprised, and my reconstruction of the origin of the capoids will be dealt a serious blow." But it is just such honesty, such willingness to tie loose ends together and to try for a consistent story that has led

to great advances in the history of science. And Coon never conceals situations where the evidence is contradictory or where there are serious gaps in our knowledge.

There was a long period when physical anthropology seemed to be intellectually stagnating. Its typological approach had reached the end of usefulness, and the numerous new approaches were still in the data-gathering stage. Coon's great new synthesis is one in a number of recent publications that signal the arrival of a new period. Regardless of how controversial it may be in parts, Coon's synthesis has an invigorating freshness that will reinforce the current revitalization of physical anthropology. The number of individual investigations that will have to be undertaken to test the correctness of Coon's inferences is legion. When a volume of such major scientific importance is at the same time highly readable, it is something for which to be truly thankful.

Economic Geography

A Geography of Manufacturing. E. Willard Miller, Ed. Prentice-Hall, Englewood Cliffs, N.J., 1962. xiv + 490 pp. Illus. $12.65.

The study of manufacturing is of growing importance and interest in the world today. There seems to be no doubt that manufacturing has been a major contributor to the economic growth of the economically advanced countries since the end of the 18th, or the early part of the 19th century. Manufacturing also seems to enshrine the hopes of rapid economic growth and of fast, substantial rises in per capita incomes and levels of consumption in the economically lesser developed parts of the contemporary world. There is so much we need to know about the pattern of world manufacturing—such things as its distribution and structure and the levels of activity within it, the bases of its existence, the processes and causes of changes in its location, nature, and size in various parts of the world. More precise and detailed information is required on the relationships and interdependence linkages that exist between manufacturing and other sectors of the economies of all regions, as well as on those that exist between manufacturing and other societal phenomena. One feels that greater knowledge and understanding of the nature of world manufacturing would provide the bases for much academic satisfaction and much necessary information for better economic and social planning, but to my knowledge, this is the first book to present a geographical survey of the world's manufacturing.

In a short but interesting introduction the editor discusses several definitions of the geography of manufacturing and his views on the nature and scope of various kinds of geographical studies of manufacturing. Factors that influence industrial localization and criteria and methods used in the measurement and mapping of manufacturing are also briefly reviewed.

Part 1, which accounts for about one-third of the text, deals with the world pattern of manufacturing. Chapter 1 is very short, and in it an attempt is made to describe the general location of world manufacturing. Chapters follow on the geographical pattern of manufacturing in each of the following areal units: Anglo-America; Europe; the Soviet Union; the Far East; and the southern continents. The chapter on Anglo-America (approximately one-fifth of the book) presents a detailed description and areal breakdown of manufacturing, especially of the United States.

Part 2 accounts for the remainder of the text, except for a few pages at the end entitled "Perspective," and contains nine chapters, of which one is devoted to each of the following industries: iron and steel, aluminium, machine tool, motor vehicle, merchant shipbuilding, agricultural machinery, petroleum refining, Portland cement, and cotton textiles.

Miller states that the primary purpose of his book "is to serve the needs of students of geography and economics by describing and analyzing the complex areal patterns associated with manufacturing in the world." In my opinion the book is not concerned with the "complex areal patterns associated with manufacturing" but rather with a description of the distribution of manufacturing in general, and of some industries in particular, in selected political units in the world. The emphasis is on distributional patterns of contemporary manufacturing, although brief historical statements are often provided. An attempt is made, at a general level, to indicate some of the main factors that have influenced the localization of manufacturing in the world today. The book is short on analysis and interpretation, probably necessarily so when a subject as vast and complex as world manufacturing is dealt with in a volume of this size. However, some of the brief general statements, given at the beginning of many chapters, on changes now under way are integrative, intriguing, and suggestive; these may very well inspire more detailed and deeper research.

This book, which is suitable for use as a textbook in a freshman or sophomore course on the world distribution of manufacturing as well as for use as a reference volume in various regional courses in geography, provides much information and many insights on manufacturing that I consider important and significant.

MORGAN D. THOMAS
Department of Geography, University of Washington

Russian Text in Probability

The Theory of Probability. B. V. Gnedenko. Translated from the Russian *Kurs Theorii Veroyatnostei*, ed. 2, by B. D. Seckler. Chelsea, New York, 1962. 472 pp. Illus. $8.75.

This textbook in probability theory is suitable for first-year graduate students in mathematics (and mathematical statistics) and for superior mathematics students in the senior year. There is no assumption that the reader has a previous knowledge of probability theory; however, a certain amount of mathematical maturity is required. The book is extremely well written, and it is suitable for individual study, if the student is reasonably prepared. Although the book is designed for the mathematically oriented person, the author attempts to draw his readers close to problems in science and technology by supplying many examples of an applied nature.

Instead of covering the entire table of contents in a uniform manner, let me list just what to me are the highlights of this book. Chapter 3 contains an excellent introduction to Markov chains. In chapter 6 several weak and strong laws of large numbers are proved, including the celebrated theorems of Bernoulli, Khinchine, Borel, and Kolmogorov. The subject of characteristic functions is covered in a rigorous fashion in chapter 7. This chapter