The lasting impression that I obtained from this reading must not be obscured by a list of such points. This is unequivocally a book that will give many readers an insight into what is going on in the study of human morphological evolution; further, this book, introduction though it may be, is necessary reading for the original investigators themselves.

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A Heterogeneous Subject

The Genetics of Human Populations. L. L. CAVALLI-SFORZA and W. F. BODMER. Freeman, San Francisco, 1971. xviii, 966 pp., illus. $27.50. A Series of Books in Biology.

Human population genetics is a heterogeneous subject combining data and techniques from medicine, biochemistry, anthropology, demography, and statistics with those of genetics. Cavalli-Sforza and Bodmer have attempted to cover this wide area. It is a testimony to the breadth and depth of their combined knowledge that they have been able to carry it off.

This is an important book because it is the first comprehensive textbook of human population genetics. As of now it defines the field.

The book starts with a review of basic concepts of genetics—probably not necessary for most readers who are otherwise prepared for the book. It ends with two very useful appendices, one on statistical methods and the other dealing with some of the practicalities of segregation, linkage, and gene frequency analysis. Between these is material on randomly mating populations, inbreeding, assortative mating, mutation, sexual dimorphism, polymorphism, polygenic inheritance, population structure, human evolution, and eugenics. To include so many subjects in detail requires a big book (nearly 1000 pages, 4 pounds).

There is an appropriate balance of mathematical theory and empirical information. There are numerous tables and graphs, showing either actual data or numerical examples illustrating mathematical principles. The authors have clearly taken considerable pains to make the material understandable. One device is to include meticulously worked problems at the ends of most of the chapters. At the end of the book are 81 questions taken from final examinations in the medical genetics class at Stanford. If Stanford medical students master the full contents of this book along with the conventional medical wisdom of a crowded curriculum they are indeed the geniuses they are reputed to be.

The book requires no specialized knowledge not ordinarily possessed by upper level science majors or medical students. Considerable mathematics is used and this is not always easy, but it is not advanced. The more sophisticated parts of population genetics theory—for example, that dealing with stochastic processes—are largely omitted or are summarized verbally. The book is interesting to read, partly because it contains so much information from diverse sources. I found myself reading it avidly, almost like a novel. One can skim the book and is greatly aided in doing this by occasional summarizing sentences that are set off as italicized paragraphs. A proper reading, of course, involves following the algebra, and this requires pencil and paper.

The subjects are highly diverse, as is expected in a field that is still being defined. Some topics represent special interests of the authors: migration matrices, measures of genetic distance, histocompatibility and leukocyte typing, and the demography of African Pygmies. But I hasten to say that this is not overdone. In general there is a proper balance of experimental, demographic, and mathematical content.

The final chapter is entitled "Eugenics, euphenics, and human welfare." Here the authors begin to express their own views on social issues. They are anything but crusading eugenicists. They place great emphasis on the futility of phenotypic selection against rare traits and the slowness of genetic change under moderate selection for quantitative traits even when heritability is high. They also note the naiveté and racism of some of the early eugenicists. There is an extensive discussion of the heritability of intelligence and of racial differences. They argue that it is difficult, if not impossible, at present to determine whether any substantial part of the average IQ difference between Blacks and Whites is genetic. I agree. They go on to discourage further research in this area. Here I tend to disagree, and wonder if they are not overreacting to their Stanford colleague Shockley.

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The Construction of Classificatory Systems

Mathematical Taxonomy. NICHOLAS JARDINE and ROBIN SIBSON. Wiley, New York, 1971. xviii, 286 pp., illus. $15.95.

This volume constitutes the first publication in a secondary source of a considerable body of theoretical work in numerical taxonomy by Jardine and several co-workers. It will be particularly valuable as a reference text, since much of the original material was published in journals not widely read in North America.

The major theme of *Mathematical Taxonomy* is that biological numerical taxonomic methods should be chosen on the basis of their formal properties, rather than empirically. Jardine and Sibson suggest selecting methods by first specifying a set of conditions that any acceptable method must meet, then deducing which possible methods meet all the conditions. Rather than attempting a comprehensive analysis of taxonomic problems within this framework, the authors restrict their attention to two areas of taxonomic methodology: measurement of dissimilarity between pairs of OTU's (operational taxonomic units), and clustering by phenetic similarity.

Two types of measurement of dissimilarity between OTU's (considered as classes of individuals) are considered. "I-distinguishability" comprises measures of the degree of non-overlap between the (usually multivariate) probability distributions describing OTU's. "D-dissimilarity" is characterized as the gain in information realized when a class X of individuals is identified as one of A or B, given initially that X is either A or B. A generalized measure of I-distinguishability is derived, rather elegantly, from purely statistical and information-theoretic considerations. Jardine and Sibson suggest as the most desirable measure of D-dissimilarity a quantity, "K-dissimilarity," whose value between a pair of OTU's is established by summing over characters the univariate I-distinguishability terms obtained from the marginal distributions of the two OTU's. As the authors in-