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Book Reviews

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Abstract
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The Foundations of Human Genetics, By Krishna R. Dronamraju. 211 pp. Charles C. Thomas, Springfield, Illinois, 1989. $40.75. (Reviewed by Dennis O.Rourke, University of Utah)

The Fabric of Mind. By Richard Bergland. 202 pp. Penguin Books Australia, Victoria, Australia, 1985 (reprinted 1988). $9.95 (paper). (Reviewed by Ted A. Rathbun, University of South Carolina)

The Colonization of the Pacific: A Genetic Trail Research Monographs on Human Population Biology, No. 7. Edited by A.V.S. Hill and S.W. Serjeantson. pp. Oxford Science Publications, Oxford, 1989. $ 97.50 (Australian). (Reviewed by R.J. Mitchell, La Trobe University, Australia)

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Reconstruction of Life from the Skeleton. Edited by MEHMET YASAR ISCAN AND KENNETH A.R. KENNEDY. 315 pp. A.R. Liss, Inc., New York, 1989. $49.50.

Much as Stephen Jay Gould turned to the scientific and statistical study of fossil mollusks to help elucidate evolutionary biologic principles that might be applied to vertebrates, Iscan and Kennedy begin their enlightening edited volume on reconstruction of life from the skeleton by describing how the seashell's shape is determined both by inner biologic structure and ecologic environment. Understanding how the human skeletal form is shaped by its inner biologic structure and the external environment is a more difficult task that is masterfully undertaken in this book. The editors' interesting introductory chapter takes us through the historic arguments of form and function from Wolff's law of transformation to the Bauhaus movement in architecture.

The next two chapters provide the standard information needed to assign age to immature and adult skeletons, largely utilizing many classic illustrations and data from earlier books. Iscan and S.R. Loth's chapter on adult aging is noteworthy for providing equal emphasis on older and new aging techniques and systemically covering the information that can be derived from all skeletal elements and regions of the body, thus providing a uniquely integrated approach. In chapter 4, on histomorphometric analysis, S.D. Stout provides current information on the use of bone histomorphometry to estimate age and on remodeling dynamics in ancient skeletal populations.

Chapter 5 has the difficult task of assignment of "race" when there is more variation within than between population groups for many if not most specific genetic factors. In the forensic setting law enforcement agencies are looking for a missing person who was "known on the street" as a member of a certain sex and population group. T. Edward Reed demonstrated that an individual in North America who is culturally identified as black, for example, may have up to 85% Causasian genes, there may be a serious problem in identifying skeletal remains, stripped of culture and flesh, in a way that will be helpful to legal authorities. Habitual transvestism, a practice whose frequency may be somewhat higher in cases of forensic interest, may on occasion even cast doubt on the utility of the usually more straightforward assignment of sex to skeletal remains. The section "Decisions as to Sex" provides a presentation on the actual complexity of this subject worthy of Hamlet

and at a level equally applicable to behavioral choices in the age of HIV/AIDS. L.E. St. Hoyme and Iscan's treatment of determination of sex and race is an anthropologic and osteologic tour de force on a difficult subject.

In chapter 6 S.R. Saunders provides an enlightened and thorough treatment of the binary catalogue of skeletal features usually observed and recorded as being either present or absent. Chapter 7 by S.J. Turkel is rich in clinical and epidemiologic information on congenital skeletal anomalies and appropriately identifies the lack of anthropometry in medical studies as contributing to the clinical inability to view congenital malformations within the context of population variability. In Chapter 8 co-editor Kennedy is right on the mark in describing adaptive responses to environment that cause structural changes in bone. Again, the focus is on the skeleton proper and a systematic survey of the changes that may accrue to each skeletal element and anatomic region because of occupational stress. C.F. Merbs provides a comprehensive traditional treatment of trauma in chapter 9. Chapter 10 by M.A. Kelley addresses evolutionary and adaptive aspects of infectious disease focusing on those that leave evidence in bone. Determining cause of death in skeletons without lesions that represent the "normal, healthy but dead" are also important and presents challenges for reconstruction of paleodemography and paleoepidemiology.

Chapter 11, by P.L. Stuart-Macadam, covers the assigned task of reviewing three standard nutritional deficiency diseases that leave evidence in the skeleton and bone. The editors have thus perpetuated the common narrow emphasis on paleo*mal*nutrition rather than true paleonutrition, missing an opportunity to include information on the effects of macro- and micronutrient intake on the morphology of the skeleton within the normal range of variation. However, chapter 12, by W.F. Keegan, presents approaches to reconstruction of human dietary sources through stable isotope analysis of bone. Rather than focusing on skeletal morphology, Keegan illustrates the information that can be derived by literally reducing bone to its elements. This theme is continued in chapter 13 by A.C. Aufderheide, who provides a comprehensive catalogue of trace element analysis, paleoserology, amino acid, and other chemical analytical techniques. Whether many of these techniques tell us more about life experience or postmortem diagenetic transformation remains unresolved. J.R. Lukacs provides in chapter 14 an exuberant description and classification of dental paleopathology that stands on its own.

The last chapter, by F.P. Sauls, on the Maya fittingly returns us to the early concept of osteobiography, for what is osteobiography

after all but reconstruction of life from the skeleton? The focus of this chapter is the reconstruction of the life of one particular population group, the ancient Maya, from their skeletal remains. The upcoming Columbus quincentenary will observe the five-hundredth anniversary of the appearance of Columbus and the disappearance of the Aztec and Inca civilizations in the New World. The Maya are exceptional, however, in that their decline occurred in A.D. 900–1000. Reconstruction of the life of this population provides important information on the development and decline of complex civilizations. This chapter integrates the approaches described throughout the volume and illustrates the importance of reconstruction of life from the skeleton to understanding the fundamental character of human life itself.

The entire volume is generally rich in historical perspective, although the range of depth of this perspective includes co-editor Kennedy's discovery of useful information on skeletal markers of occupational stress reaching back to Agricola (chapter 8) and F.F. Johnston and L.O. Zimmer's (chapter 2) no-nonsense claim that studies of human growth began to appear in the scientific literature only in the 1960s! Missing throughout the book is appropriate emphasis on taphonomic processes that systematically alter skeletal remains postmortem. Great consideration is given to understanding antemortem factors that influence features and distributions of skeletal remains, but all these findings may be subject to modification after death, at the gross, microscopic, and molecular levels. This limitation is not confined to this recent volume but is common to nearly all texts that have appeared on identification and interpretation of skeletal remains. It is hoped that my forthcoming book, *Taphonomy of Human and Animal Remains: Systematic Study of Post-Mortem Change*, will be a useful complement to this and other important volumes.

Iscan and Kennedy have completed a well-illustrated, well-organized, well-informed, and generally literate treatment of reconstruction of life from the skeleton. This volume breaks new ground both in its coverage and synthesis of biologic and osteologic information. It belongs on your bookshelf.

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The Foundations of Human Genetics, By KRISHNA R. DRONAMRAJU. 211 pp. Charles C. Thomas, Springfield, Illinois, 1989. $40.75.

From the title you might suspect that this volume is yet another introductory textbook covering the basic principles of human inheritance. You would be wrong. Indeed, there is little in the way of basic genetics here. Rather, the book is a historical treatment of the origins and course of development of human genetics as a scientific discipline. This historical treatment is presented in the context of a debate in what is really the philosophy of science.

The author's thesis is that Kuhn's well-known depiction of the progress of science as a series of revolutions, where new paradigms rapidly replace their predecessors, is inappropriate as a descriptor of the origin and growth of human genetics. Instead, Dronamraju argues that the discipline is more accurately viewed as a hybrid paradigm, where new hybrid research foci grow alongside the continuing paradigms, or parental disciplines, whose merger has given rise to the diversity of specialties in human genetics. This argument is effectively and convincingly presented. The casual reader, however, may well become disenchanted, if not confused, with the plethora of common terms that are frequently not defined relative to the concept of a paradigm. For example, following Kuhn, a paradigm is defined as a recognizable group of specialists sharing common goals, methods, standards, and values. Yet, in arguing that human genetics is really a hybrid paradigm, the author treats the reader to a description of not only paradigms and hybrid paradigms but also disciplines, subdisciplines, specialities, fields, areas, and branches of human genetics. How these entities relate to a, or the, paradigm per se is not always obvious. A case in point is the discussion of medical genetics. Dronamraju states that the definition of paradigm "is applicable to medical genetics as a whole but also to different subgroups within medical genetics at several levels" (p. 117). The hierarchical treatment of paradigms makes it a less useful concept than it might otherwise be. This, of course, may be the point; paradigms are not easily defined discrete entities, and the apparent continuity must result in a view of evolutionary, rather than revolutionary, change in science.

The analogy to evolution is appropriate here. As developed by Dronamraju, the contrast between the Kuhnian process of scientific revolution (paradigm replacement) and his own view of gradual change, or hybrid paradigms, is akin to the contrast between punctuated equilibrium and the gradualist position in evolutionary biology. In fact, the author occasionally contrasts his view of evolving paradigms with Kuhn's more static view of normal science.

Genetic aspects of evolution receive rather less attention in this volume than might be expected. This is not an oversight or a serious deficiency in the book. The author notes early in the introduction that not all aspects of human genetics have been reviewed in the volume. Only "certain major lines of investigation that took place since the rediscovery of Mendel's laws" are examined. Thus, after a brief chapter on natural selection and mutation that touches on human population genetics, the bulk of the volume is concerned with the origin of biochemical, bacterial, medical, clinical, and cytogenetics. Given less attention are substantial areas of inquiry, such as human population and quantitative genetics, genetic epidemiology, behavioral genetics, and some areas of physiologic genetics to name a few. It would be unreasonable to expect all aspects to be treated in a single work. I hope that the subsequent volume alluded to in the introduction will be forthcoming and will deal with some of these additional areas. It will be a valuable companion piece to the present volume.

The historical development of the areas of human genetics examined and the personalities that help shape them make interesting and informative reading. The author makes a convincing case that human genetics has multiple origins and owes much to the work of geneticists and biologists working with nonhuman organisms. The theme of hybridity, or multiple parentage, carries through in the presentation of nineteen intellectual pedigrees of many of the major figures of human genetics in North America that constitute the final chapter of the book. As the author notes, founder effect is clear from the influence of a comparatively few individuals, but "the importance of selection in these pedigrees is only too obvious" (p. 171). In sum, this is a valuable addition to the literature on the history of human genetics that deserves a wide readership among geneticists and human biologists.

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The Fabric of Mind. By RICHARD BERGLAND. 202 pp. Penguin Books Australia, Victoria, Australia, 1985 (reprinted 1988). $9.95 (paper).

This is an odd book! Bergland, a neurosurgeon, repeatedly makes the point that the brain is a gland that secretes hormones and in turn is

influenced by those produced by other organs. In order to discredit other paradigms of brain function, which he terms "mismemes," especially the electrically driven computer model of the brain and nervous system, he traces the historical development of thought and research methods from Pythagoras, through Empedocles, Socrates, Plato, Aristotle, Galen, Vesalius, eighteenth- through twentieth-century research with electricity, to the enlightened neuroendocrinologists who recognize the effects of drugs and hormones on the brain. Throughout the volume Bergland blasts reductionism and claims to be "an avowed holist," but then he emphatically states, "Hormones, not electricity, determine all brain/body and brain/behavioural relationships" (p. 80). His final argument is that only through ventricular catheterization, which he is currently prohibited from performing, will hormone-related brain illnesses be understood.

Perhaps it is only my left brain dominating, but this volume has limited value for human biologists or our students. The bibliography, however, is annotated and cross-referenced to major points made in the text. The historical coverage and drawings are interestingly presented, and some clever catch phrases (e.g., constipated nerve fibers) and chapter sections ("Shoreline of Wonder") are produced, but these do not justify even the modest cost.

The publishers appear more interested in sales to the lay community, as indicated by the cover classification (Science: General Philosophy) and teaser blurbs ("Some thinking goes on outside the brain—in the ovaries and testicles, for example"). Perhaps it depends on where your head is.

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The Colonization of the Pacific: A Genetic Trail. Research Monographs on Human Population Biology, No. 7. Edited by A.V.S. HILL AND S.W. SERJEANTSON. 298 pp. Oxford Science Publications, Oxford, 1989. $97.50 (Australian).

The aims of this monograph are stated quite explicitly by the editors in the preface. They present, to the widest possible audience, the advances made in and the enormous potential of using genetic markers (in par-

ticular those revealed at the DNA level) to enhance our understanding of population relationships and the retracing of prehistoric migrations within the Pacific region. The monograph is composed of seven contributions on different genetic systems by experts in their fields and an attempt at a synthesis by the editors.

The first chapter, by P.S. Bellwood, provides a succinct review of the major findings and the current controversies in Pacific prehistory and linguistics. Bellwood sets the appropriate context for the other contributors and stresses that, because of the geography of the Pacific, one should not expect to find evidence of the same processes occurring in every population. R.L. Kirk's contribution updates his previous reviews of the distribution of the well-known blood polymorphisms, red cell antigens, enzymes, and proteins in this region but also includes unpublished material. This is a thoroughly comprehensive contribution, and the data are subjected to genetic distance analyses on local, regional, and world levels. When estimating divergence time between populations, Kirk found that the split between the Australian Aborigines and the Eastern Highlanders of New Guinea occurred at least 144,000 years ago. The time of divergence between these two groups is also an issue in both HLA and mtDNA distributions. S.W. Serjeantson's contribution is similar to that of Kirk but covers the HLA system. In addition to summarizing the database using the standard serologic techniques, she brings the reader up to date with the inclusion of material on the HLA-DR, DQ RFLPs (restriction fragment length polymorphisms). This latter evidence clearly has major ramifications for the understanding of Pacific population affinities and migration rates.

P.R. Ranford's chapter on the variability in some of the serum complement components lists the available data, which are somewhat sparse compared with other markers, for the Pacific region. However, the dendrograms based on C4A and C4B gene frequencies highlight the extreme caution required before suggesting affinities on the basis of any single marker, for these two markers produce very different population clusters. Data on Gm and Km allotypes are given in D. Propert's chapter. He stresses that the relative paucity of data on these systems, especially from Polynesia, makes interpretations somewhat preliminary in nature. Propert suggests that the future use of DNA RFLPs could be of particular importance in examining population relationships.

The next two chapters deal with DNA polymorphisms in both the nucleus and mitochondria, and these will probably be the most interesting to workers in other disciplines because of their topicality. M. Stoneking and A.C. Wilson's paper on mtDNA is an excellent presentation for a general audience, covering those issues raised by nonmolecular biolo-

gists about mtDNA types. They present published and some unpublished material on mtDNA types in the region and employ them to show that at least 15 mtDNA lineages colonized Australia some 50,000 years ago. Also, mtDNA results confirm that geography, not language, is the primary factor influencing the distribution of genetic variation in Papua New Guinea. The contribution by A.V.S. Hill, F. O'Shaughnessy, and J.B. Clegg focuses not only on the distribution of the hemoglobin variants and the various deletions that produce the different forms of thalassemia but also on the importance of the restriction site polymorphisms at the globin genes for unraveling the prehistory of the Pacific regions.

This volume is an excellent addition to the Oxford series of monographs on human population biology. The stated aims are achieved, for each contributor has attempted to make his or her particular specialty accessible to a wide audience. Each chapter is accompanied by a comprehensive reference list, and readers are directed to further reading on particular topics. The price is unfortunately expensive but anyone studying Pacific populations would be negligent if unfamiliar with the contents of this book. It contains a wealth of data and ideas otherwise scattered in many journals.

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