

Book Reviews

Building a New Biocultural Synthesis: Political Economic Perspectives on Human Biology. Edited by Alan H. Goodman and Thomas L. Leatherman. xxii + 486 pp. Ann Arbor, MI: University of Michigan Press. 1998. \$19.95 (Paper).

In this volume, which developed out of a Wenner-Gren Conference held in Cabo San Lucas, Mexico, in 1992, the editors and chapter authors advocate a political-economic approach to human biology. They suggest that this approach is a more powerful model for understanding human biological variation than an adaptability approach, and also argue that it has the added advantage of potentially acting to reintegrate biological and cultural anthropology. The political-economic approach emphasizes inequalities in access to resources and how these can be explained in terms of global and historical factors. The authors of almost all of the chapters in the book thus urge human biologists to move beyond simple measurements such as socioeconomic status to more fully characterize the circumstances in which humans find themselves in terms of social processes and power relationships. As advocated by the authors in this book, the political-economic approach also urges political action on our part and involves consideration of the scientist as a product of a specific set of social circumstances.

The volume contains 19 chapters, divided into four sections. The first four chapters provide a historical and theoretical overview. After the first chapter, in which the editors lay out the basics of the political-economic perspective, Thomas discusses the biology of poverty. He argues that a political-economic model, incorporating the factors that result in differential access to resources and how this differential access constrains adaptive ability, can lead to better understanding of the biology of poverty. Roseberry advocates examining social categories not as static entities, but as social fields of web-like connections. This idea may be useful to biological anthropologists as they try to provide richer descriptions of the

populations they are studying, although this chapter seems somewhat out of place since it makes no attempt to relate the idea to biological anthropology. Singer reviews critical medical anthropology, with its emphases on viewing disease as a result of social inequalities, on resisting acceptance of a purely Western biomedical view of disease, and on combining research with political action, and presents it as a possible model for human biology.

The second two sections of the volume contain case studies employing the political-economic approach. These chapters represent the real test of whether this perspective can lead to new insights and a better understanding of human biological variation. The chapters on past populations illustrate several contributions of the perspective. Saitta discusses how health differences in prehistoric populations could have been the result of class differences more subtle than simple haves and have-nots, and raises the important point that ideological factors have to be taken into account for the role they play in determining inequalities in access to resources. In his analysis of health changes at Dickson Mounds, Goodman points out that changes in subsistence alone cannot explain the deterioration of health indicators from the Woodland to the Mississippian periods, but that alterations in local power arrangements may also have played a crucial role. The inability to fully explain biological variation based on a simple relationship with local resource availability is also a theme of Martin's chapter. Comparing two sites in the U.S. Southwest, she finds that traumatic injury was much more frequent in the site in the richer ecological zone, and suggests the more abundant resources may have made possible a situation of greater inequality in access to resources and an exploited underclass of females. Illustrating the activist theme of the political-economic perspective, Martin also stresses the need for bioarchaeologists to interact with descendant communities. The idea that research questions are socially constructed is shown in Swedlund and Ball's chapter, discussing how the thinking of the times influenced the explanations of the high rates of infant mortality among the

children of immigrant factory workers in the late 19th century Massachusetts.

Leatherman's chapter on the effects of illness on household production in Nuñoa, Peru is the strongest of the chapters on contemporary populations. This is not surprising since much of the thinking applying the political-economic perspective to human biology grew out of the Nuñoa project. Leatherman emphasizes how health is affected by inequality in access to land and labor, and also how circumstances can result in failure of adaptation. Three of the other chapters in this section also examine the generally negative effects of the intrusion of market-based economies: Santos and Coimbra on the effect of European contact on the Brazilian Tupí-Mondé, DeWalt on the effects of "development" in southern Honduras, and Daltabuit and Leatherman on the effects of the tourist economy on Mayan communities. In the final chapter of the section, Crooks discusses undernutrition in eastern Kentucky. As noted by the editors in the introductory chapter, human biologists have a several decades long tradition of documenting the results of social change and the detrimental consequences of poverty, so these chapters less obviously break new ground. What all the authors do, however, is enrich their data by placing the local circumstances in a larger historical and social context.

The last section of the volume contains several suggestions for action. Armelagos and Goodman argue against the utility of race to explain human biological variation, but recommend a renewed emphasis on teaching about race as a means to counteract its misapplication for racist ends. Blakey encourages the development of a more critical and humanistic human biology. By this he means a field that is more socially engaged, more aware that its assumptions are a product of culture, and more open to the voices of nonscientists in its analyses. Morgan presents Latin American social medicine, with its activist examination of inequalities in health and health care as another possible model for a political-economic human biology. In a chapter that many biological anthropologists will find unnecessarily jargon-filled, Hvalkof and Escobar discuss how the realization that ecological categories are socially constructed can be an important adjunct to po-

litical action. The volume ends with Smith and Thomas's very nice summary of the political-economic perspective.

The political-economic perspective presents many challenges for human biologists and has the potential to enrich how they plan their research and look at their data once it is gathered. There is also much in this volume that is controversial, and the approach has the potential to be divisive if positions are taken to extremes from which there is little ability to compromise. This volume would be excellent in a graduate seminar, and should be read by all human biologists who are trying to understand the social forces that shape human variation.

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American Indian Population Recovery in the Twentieth Century. By Nancy Shoemaker. xiv + 156 pp. 1999. Albuquerque: University of New Mexico Press. \$39.95 (Cloth).

The demographic history of American Indians has received considerable scholarly attention in recent years. However, much of this attention, including significant controversy, has focused on the timing and magnitude of population decline following European contact and the size and health of the population prior to European contact. Most scholars agree that: 1) population size reduced substantially following European contact; 2) the date of nadir varied regionally but was approximately 1900 for North America in general; and 3) following the nadir, most communities experienced significant population growth. The magnitude of the post-1900 recovery is such that by some counts the total numbers today approximate those in 1492.

In this book, Shoemaker discusses all of these issues, but concentrates her scholarship on the complexities of 20th century recovery. To examine the dynamics of the issues involved, she selected five tribes: the Seneca, Cherokee, Red Lake Ojibway, Yakama, and Navajo as a varied sample of the American Indian experience. Following a general introductory overview of the demographic issues involved, she presents detailed information on population histories of

these five groups. All five of the populations studied show post-1900 size increases, but in varying proportions. For example, a comparison of percentage increase for each tribe from the 1860s to about 1930 varied from only 17% among the Yakama (residence) to 388% among the Navajo.

The remainder of the book focuses on the varied factors among these groups that help explain this demographic variation. This aspect of the work examines tribal patterns of mortality, fertility, disease resistance, marriage patterns, economic and other cultural factors, and their likely effects on demographic structure. Discussion appropriately includes the variable practice of marriage outside of the group and the complexities of tribal definitions and census procedures.

The text is followed by an appendix discussing the nature of the census data utilized in the study. Two types of census data were principally used, the "individual-level census data" drawn from the 1900 federal census manuscript forms, and those from the 1940 through 1980 U.S. Census Public Use Samples. The former data were used to compare the five tribes and the latter to examine recent trends for American Indians and to compare them with those for other groups in the United States. The text is further supplemented by 15 figures, 37 tables, an extensive bibliography, and a useful index.

The result of all this is a sophisticated look at the complex factors driving the varied population recoveries of these five groups. The study demonstrates that the dynamics of population growth after 1900 represents an intriguing problem fully deserving of scholarly attention. The complex factors regulating this growth are as interesting as the numbers in 1492 and the magnitude and timing of the initial population reductions. In this well-written and carefully researched volume, Shoemaker has opened the door to some intriguing questions relating to the demographic experience of the American Indian. I recommend this volume as a solid contribution to the growing literature on American Indian historical demography.

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Sex and Gender in Paleopathological Perspective. Edited by Anne L. Grauer and Patricia Stuart-Macadam. xii + 192 pp. New York: Cambridge University Press. 1998. \$54.95 (Cloth).

This book is based on a symposium that the editors organized for the annual meeting of the American Association of Physical Anthropologists in 1995. A group of well-respected paleopathologists addressed a specific question from his or her respective area of expertise, providing a range of different perspectives. The question, "Can sex and gender differences in past disease experience be determined, and if so, what does this tell us about past peoples?" requires consideration on several levels. Differential burial practices, differential preservation, frailty, expression of disease as bony lesions, and differential immunity are all relevant to evaluate sex differences in disease experience. Differential access to food, occupational differences, activity patterns and socioeconomic considerations are all important in determining what different disease experience might tell us about past peoples. All of these topics are included in this book, which is well-balanced and thought-provoking.

George Armelagos wrote the introduction to the book. He discusses the growing use of the term "gender" in place of "sex." The intent is to be politically correct. However, as Armelagos and others (see especially Walker and Cook, 1998) have pointed out, in biology it is not appropriate to confuse the use of these terms. One wonders if he intentionally chose the word "seminal" to refer to the book "Women in Prehistory" (see Zihlman, 1987, for the alternate "oogonial"). He also highlights earlier studies that point out sex differences in disease and diet. This sets the stage for the chapters that follow.

Jurmain and Kilgore present evidence for sex differences in trauma among African apes and humans. The curious mix of samples is drawn from Sudanese Nubia, northern California (humans), and lowland gorillas, bonobos, and chimpanzees. Presumably they are seeking to determine if there is a universal pattern in trauma between the sexes. They conclude that with a few exceptions there are no significant differences between the sexes for postcranial trauma and that cranial trauma is more prevalent in males. Facial trauma, in par-

ticular, occurs more frequently in males in the California sample and in African apes. The authors conclude that such studies indicate that male–male aggression might have an evolutionary basis.

Weaver considers the subject of bone loss in earlier human groups. He discusses methods of evaluating bone density and possible postmortem changes that may make it impossible to assess lifetime bone density. He integrates much of the current research in human biology on topics such as bone loss in women and the possible preventative effects of phytoestrogens from consumption of soy and maize. *Habitus* (defined by Weaver as a suite of personal, cultural, and biological behaviors), also affects bone mass. Here the practice of comparing peoples of the past with modern populations is particularly problematic. Today's sedentary lifestyles as well as the preponderance of smoking, alcohol consumption, and drug use provide very different stressors on the skeleton in comparison to the more active lifestyles of past peoples.

Stuart-Macadam discusses iron deficiency anemia and the possibility of assessing sex differences in occurrence in the past. She also looks at the evidence for iron deficiency anemia throughout prehistory. Since most evidence shows up in subadults and since there is at present no easy way of determining the sex of subadults, her task is a difficult one. Much of the chapter addresses the evidence for sex differences in the incidence of iron deficiency anemia among living peoples. There is also quite a bit of information on breast-feeding practices as they apply to iron needs and iron metabolism. The presentation is extremely well-organized and very clear.

Cook and Hunt examine the subject of sex differences in past diets by focusing on studies of trace elements in bones. After discussing the various problems with this approach and covering the studies in which the question has been addressed, they move on to the more general topic of sex differences in diets of living peoples and nonhuman primates. This discussion makes the important point that those who study human osteology are not immune from following trends. Specifically, Cook and Hunt note that an interest in sex differences in past diets is largely a product of our current interest in such differences, and in gender issues. This theme

is brought out in the discussions of trace elements and sex differences in diet.

Ortner considers the subject of sex differences in immune reactivity and how this might bias the paleopathologist's view of disease experience in the past. He develops a model to illustrate how such differences will alter the occurrence of bony lesions. Data from the clinical literature are reported showing male–female prevalence ratios for some of the infectious diseases of interest to paleopathologists (e.g., tuberculosis, leprosy, and syphilis). Data on the male–female prevalence of periostitis from a number of archaeological sites are also presented. Complex factors that might account for sex differences include occupation differences, which might either be enhanced or buffered by differences in immune reactivity.

Roberts and colleagues explore the subject of differences in infection by considering evidence of maxillary sinusitis in four British archaeological samples, two from rural settings and two from urban settings. Despite the fact that the samples are large, by the time they consider adults for whom sex can be determined and who have at least one intact maxillary sinus, sample size is considerably reduced. The results are suggestive of differences, which may be explained by such factors as environmental pollutants, housing styles, and differential immunity. This study is carefully designed and the lack of more conclusive results points out the difficulty of attempting to compare sex differences in specific disease incidence in archaeological samples, even when the samples are large.

Leatherman's chapter provides a look at sex differences in illness among two modern populations, one from the Peruvian highlands and one from the Yucatan peninsula. The latter, Maya group is more affected by modern, outside influence, although wage labor is a factor in both groups. One might question the relevance to the theme of the book (paleopathological perspectives). However, the conclusions nicely tie the findings into analogous circumstances that may have affected earlier peoples. These include the greater workloads of women compared to men, illnesses associated with the demands and risks of childbearing, and differences in occupation and exposure to illness (topics also discussed by Ortner).

Storey uses three indicators of childhood

stress that appear on adult skeletons to see if there were sex and status differences among the Late Classic Maya of Copan. Her initial sample sizes are smaller than those in the chapter by Roberts and colleagues, so the problem of sample size of individuals for whom sex can be determined and for whom the elements of interest are well preserved are most pronounced. The results indicate that while there were status differences in childhood stress indicators, the sexes appear to have had similar health. Possible caveats such as those brought out in the "Osteological Paradox" (Wood et al., 1992) are considered. This is a nicely designed study that tests a specific hypothesis about preferential treatment of male children.

Grauer and colleagues discuss the results of their study of skeletons from a 19th century Chicago poorhouse. They looked for a number of general stress indicators (porotic hyperostosis, periostitis, linear enamel hypoplasia, and periodontitis) on 52 skeletons for which sex and age at death could be determined. Their results are interpreted in the context of historical sources, which indicate that men and women stayed in the poorhouse for differing lengths of time, at different ages, and for different reasons. This study is an excellent example of the complementary information that comes from historical records and skeletal analysis.

The final chapter by Larsen touches on subjects discussed in most of the previous chapters. He considers sex differences in a long temporal span of Native American sites from the coastal southeastern United States. The survey includes pre-agricultural, agricultural, post-contact, and mission samples. Variables considered are dental caries, periostitis, and osteoarthritis, representing diet, disease stress, and activity patterns. The combination of such diverse variables in a large number of sites representing different types of social adjustment provides a wealth of information, which Larsen summarizes well.

This monograph will be of interest to biological anthropologists and archaeologists interested in human osteology and those in the medical profession interested in the history of disease. There are a few minor but obvious editorial errors. However, the more important task of presenting provocative and well-integrated information has been

done very successfully. This volume should stimulate researchers to go further.

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Atlas of Occupational Markers on Human Remains. Journal of Paleontology, Monographic Publication 3. By Luigi Capasso, Kenneth A.R. Kennedy, and Cynthia A. Wilczak. 184 pp. Teramo, Italy: Edigrafital S.p.A. 1998. \$40.00 (Paper).

Most who work with skeletal material eventually encounter unusual morphology and wonder, "What kinds of behavioral activity would result in this particular morphology?" For guidance in compiling a list of possibilities, this book is the place to start.

This atlas is an up-to-date compendium of the published (and some unpublished) examples of the effects of habitual activity stresses on the more durable body tissues. Although nails and hair receive some mention, the great majority of attention is focused on bones and teeth. Examples are pulled from archaeological, historical, paleontological, forensic, and even clinical contexts. Entries are arranged according to location on the skeleton, and most are illustrated with high-quality photographs and/or drawings. Although a few of the illustrations are a bit mysterious, most are clear depictions of the trait in question.

The text accompanying each marker lists any synonymous names, presents a detailed anatomical description, details the specific stresses that would produce the marker, and surveys the occupational activity(ies) known or suspected to have been responsible for the trait, ending with a listing of the bibliographic references. The purpose of the atlas is not to provide a "quick and

dirty" occupational answer to a "stressful" question; it is the analytical reasoning of functional morphology that comprises the real value. Frankly, it would be very rare, if ever, that most workers would encounter a literal Musher's Knee or Hooker's Elbow (the latter refers to hooking fish). However, other activities requiring a similar repetitive movement will produce a similar stress marker; it is then a matter of coming up with a list of reasonable possibilities that could mesh with the circumstances at hand. It is a strength of this book that the authors do not overstate the evidence for their conclusions. When the occupational activity that produced a marker is presumed, but not known, that is made explicitly clear. When opinions differ about the causal activity, that is made explicit. When there is evidence that does not support a suggested mechanism, that too is made clear. A couple of the explanations for occupational stress markers on archaeological remains seem a bit strained, and some readers may prefer their own modifications. The book will not spare the worker from tough analysis, it will simply aid the process.

The authors aim at an audience already initiated in human osteology and paleopathology. Beginners may not be aware that the musculoskeletal explanations given for several conditions do not exhaust the list of possible causes for the condition. For instance, many other things other than habitual mechanical stress may be responsible for kyphotic spine. While this may be understood by those with a background in the field, it could be misinterpreted by the casual user. Familiarity with anatomical landmark terms, some not all that common, is also assumed.

In reviewing books, everybody's a critic, and I have a few quibbles. Although the production quality is high, it could have benefited from more careful proofreading. It suffers from more frequent than average typos, spacing errors, and incomplete sentences. A couple of figure captions confuse radius and ulna. A few of the descriptions are too convoluted for clarity—for example, the anatomical description of sternoclavicular ginglymoid joint begins, "Robusticity of the sternoclavicular joint surface with the greatest elongation of its medial articulation in the direction of the axis of rotation that extends from above in an inferioposterior direction" (p. 51). Huh?

Does the usefulness of this atlas overshadow its few annoyances? Absolutely. Those working in bioarchaeology and forensic anthropology will find it especially useful. Moreover, the book is affordable for both professionals and students. This valuable paperback addition to the bookshelf can be purchased by sending a return mailing address and a check for \$40.00, payable to Associazione Antropologica Abruzzese, to: Associazione Antropologica Abruzzese—Journal of Paleopathology, Via Arniense, 162-66100 Chieti, Italy.

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Nitric Oxide in Bone and Joint Disease. Edited by M.V.J. Hakkunen, J.M. Polack, and S.P.F. Hughes. xvi + 191 pp. New York: Cambridge University Press. 1998. \$85.00 (Cloth).

This is a timely and interesting monograph by a group of authors who are experts in their fields. The focus is on the role of nitric oxide in bone and joint diseases. The monograph is composed of 17 chapters divided into three sections. The first section focuses on nitric oxide and cytokines and has an outstanding introductory chapter by Patrick Vallance and Salvatore Monaco which overviews the biology of nitric oxide. As those who have any familiarity with nitric oxide will understand, in nearly every field in which nitric oxide is involved there are extremely complicated and often juxtaposed phenomena. These authors have managed to compile a great body of knowledge into an extremely simple and understandable introductory chapter. I would recommend this chapter to anyone who has an interest in nitric oxide.

The following chapters review nitric oxide in the immune response in bone and joint disease. In these chapters, and in many subsequent chapters, the going becomes a little less clear. This is certainly not the fault of the authors, as they have tried to clarify a very novel area. It is merely that nitric oxide has not been evaluated to any great extent in bone. In arthritis there have been many studies, but without many "take home" messages. Hence, one is left with

many unanswered questions. The authors do, however, provide a very careful and complete overview of what is known in the field. I particularly enjoyed the chapters by Christopher Evans and colleagues on arthritis.

The three isoforms of NOS, iNOS, eNOS, and bNOS are expressed in a number of bone cell types and in whole bone preparations. Their role, however, is most unclear at this time.

There is an interesting chapter on mechanical strain-associated nitric oxide production by bone cells by Andrew Pitsillidis and Lance Lanyon and one on the response of bone and bone cells to mechanical stimulation by Tim Chambers and colleagues.

In summary, readers will find this monograph a very interesting review of the literature on the areas of nitric oxide in arthritis and nitric oxide in bone and may well be stimulated to follow the literature or undertake research in these areas themselves.

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Advances in Exercise Immunology. By Laurel T. Mackinnon. xii + 364 pp. Champaign, IL: Human Kinetics Books. 1999. \$49.00 (Cloth).

When Laurel Mackinnon's *Exercise Immunology* was published in 1992, as the second volume in the *Current Issues in Exercise Science* series, it was the first thorough text dedicated to what was then considered a relatively new field of scientific inquiry. Since then, as noted by the author in the preface to her latest book, *Advances in Exercise Immunology*, interest in this area has flourished. She describes that exercise immunology research has progressed from primarily a descriptive science to investigations aimed at providing broader clinical applications, and a more thorough understanding of the basic regulatory mechanisms. The general organization of the book has not changed from the first edition, with nine chapters, including exercise and resistance to infectious illness, overview of the immune system, exercise and leukocytes, exercise and innate immunity, exercise and humoral immunity, exercise and cytokines,

exercise and cytotoxic cells, potential clinical applications, and current knowledge and future directions. This substantially expanded, graphically illustrated text presents, in a highly readable format, many of the most relevant advances in this dynamic field over the last 6 years.

Chapter 1 provides the reader with a good historical perspective of the basic and clinical relevance of exercise immunology research. Mackinnon cites both anecdotal and laboratory findings spanning the 18th to 20th centuries, describing the relationship between vigorous exercise and the incidence of infectious episodes in competitive athletes as compared to nonathletes. Today, it is increasingly apparent that the immune system responds to physical training and possibly adapts to regular exercise in a manner analogous to other physiological systems. It is concluded that prolonged intense exercise can compromise some aspects of host defense, thereby increasing susceptibility to minor infectious illnesses. Practical recommendations aimed at reducing the risk of upper respiratory tract infections are offered, including a possible reduction in training volume and intensity, especially during times of febrile illnesses.

Chapter 2 gives a simplified overview of the workings of the human immune system as it relates to exercise and stress. Differences between innate vs. adaptive immunity, along with cellular and humoral immune reactions, are discussed. The functional significance of the major leukocyte and lymphocyte subsets are presented and the importance of soluble mediators, including cytokines, in cell-cell communication is introduced. A lack of mention of interleukin (IL)-10 and IL-12 is, however, conspicuous. Also, given the advances in understanding the role of cellular adhesion in lymphocyte trafficking, a more thorough description of specific cellular adhesion molecules and their cognate ligands would have been useful.

Acute exercise elicits a variety of mostly transient alterations in several distinct immune indices, involving both natural and specific arms of the immune system. Chapter 3 provides a comprehensive description of the contemporary literature on exercise-induced changes in leukocyte subset redistribution patterns. Marginated leukocytes are rapidly mobilized to the peripheral

blood from various tissue reservoirs, producing a profound, often biphasic increase in all the major immune cell types. The kinetics of such changes are complex, but generally, the degree of leukocytosis is proportional to the intensity and duration of the activity. The mechanistic association between the physiological leukocytosis and stress-elicited sympathoadrenal hormonal and cytokine fluctuations is examined. Natural killer (NK) cells are perhaps the most responsive of all lymphocyte subsets to exercise stimuli; both their numbers and cytolytic activity increase manifold with acute exercise and drop significantly below baseline in recovery. Moreover, evidence suggests that moderate endurance training can increase resting NK cell number and activity.

Chapters 4 and 5, covering innate and humoral immunity, have been substantially updated. Phagocytic function is reported to increase, decrease, or remain unchanged in response to exercise. Acute exercise can trigger a marked neutrophil recruitment and activation in response to the release of chemotactic factors. Heavy training can reduce neutrophil activity, while moderate training is not associated with such decrements. Serum immunoglobulin (Ig) levels do not appear to change significantly with acute exercise, or after moderate exercise training, and the ability of athletes to mount an antibody response to antigenic challenge appears normal even during periods of intense training. By contrast, salivary IgA secretion, a marker of mucosal immune status, is reportedly reduced following intense or prolonged exercise. Such decrements may be linked to a higher incidence of upper respiratory tract infections in endurance athletes.

In Chapter 6, Mackinnon describes the central role of cytokines in the initiation and coordination of immuno-inflammatory reaction. This chapter focuses attention on exercise-elicited changes in IL-1, IL-2, IL-6, interferon (IFN) α/γ , and tumor necrosis factor (TNF)- α concentrations. The reader is reminded of the complexities of cytokine networks and the inherent difficulties in accurately quantitating these potent and ubiquitous mediators. Although barely detectable at rest in healthy persons, circulating cytokinemia (notably IL-6 and TNF- α) following strenuous exercise indicates non-

specific activation of immuno-inflammatory cascades. Furthermore, above-normal cytokine levels observed in resting endurance athletes suggests a persistent inflammatory response. Cytokine gene expression by circulating leukocytes does not appear to be significantly affected. However, posttranscriptional modifications cannot be excluded at present. Unfortunately, the kinetics, biological significance, triggering mechanisms, and source(s) of cytokine production remain poorly characterized. A possible link between skeletal muscle damage and repair processes is discussed.

The response of NK cells to exercise is among the most extensively studied phenomena in exercise and immunology literature. Chapter 7 gives a thorough account of the putative mediators and mechanisms contributing to exercise-induced changes in NK cell activity. NK activity displays a complex response to exercise, varying with intensity, duration, mode, and training status. Moderate training may or may not affect cell numbers and function. Exercise-evoked changes in sympathoadrenal hormones, cytokines, β -endorphin and prostaglandins are associated with such changes. Despite substantial research on NK cells, outstanding issues abound. One example is the debate over whether or not changes in NK activity reflect alterations in per-cell cytolytic capacity or simply reflect shifts in lymphocyte subset redistribution, the relative contribution of individual mediators to changes in NK activity, and the possible clinical relevance of such changes.

In Chapter 8 Mackinnon discusses the potential clinical applications of exercise in the prevention, treatment, or control of conditions ranging from cancer to HIV infection. Nutrient modulation, immune senescence, and adaptation to microgravity are also considered. Findings from epidemiological and laboratory studies using both human and animal models are presented. Regular exercise appears to reduce the risk of certain cancers, although the immune mechanisms remain largely unresolved. Moderate exercise training may also be beneficial as adjunctive therapy in the treatment of AIDS. Exercise and nutrient supplementation can be effective countermeasures to limit the immunosuppression associated with aging and spaceflight.

Future directions suggest a need to generate a more integrated model, focusing on the issues of immunocompetence in athletes, downregulation of nonspecific immunity, and molecular mechanisms of exercise-induced changes in immune function. The book concludes with a useful glossary, a current bibliography, and short author biography. Overall, this is an excellent multidisciplinary text, providing a comprehensive compendium of the dynamic state-of-the-art in exercise immunology. Its appeal is not limited to those directly involved in exercise immunology research, but also extends to coaches and to a broad immunology and medical audience.

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Epidemic Modelling: An Introduction. By Daryl J. Dailey and Joe Gani. xii + 213 pp. New York: Cambridge University Press. 1999. \$49.95 (Cloth).

The mathematical modeling of infectious diseases has a history of about three centuries. The work of Daniel Bernoulli (1700–1782) on the spread of smallpox marks its beginning. The article of Kermack and McKendrick (1927) formed the starting point of modern research in epidemiology. Their concept of describing the evolution of an epidemic by a system of differential equations proved to be very successful. From 1950, the number of scientific publications in this field grew steadily, with results that are interesting not only from a theoretical point of view but also for the practice of public health serving the goal of suppressing outbreaks of diseases among humans, animals, and plants. The importance of this work for the well-being of the human society (health and food supply) justifies the attention to the topic.

Using a mathematical model one may deduce whether an epidemic may start. A formula can be determined for the basic reproduction ratio, R_0 , being the expected number of secondary cases produced by a typical infected individual during its entire infectious period in a susceptible population (Anderson and May, 1991). For a model with individuals behaving identically this

can be easily understood, but the value of the reproduction ratio can be computed also for heterogeneous populations within which there are differences between the groups of susceptibles and infectives. The study of epidemics in heterogeneous populations was begun in the last decade. (See Isham and Medley, 1996). Societal confrontations with new infectious diseases such as human immunodeficiency virus and bovine spongiform encephalopathy strongly stimulated the mathematical research in this field. Health projects to eradicate diseases also do so, but in a different direction. Then one has to deal with low numbers of infectives and susceptibles not being vaccinated, meaning that the chance of transmitting a disease plays a role. For this purpose stochastic models are employed. Reed and Frost did pioneering work on this probabilistic application of mathematics around 1925 (see Abbey, 1952).

In this direction lies the contribution to epidemic modeling of the authors of the present book. As can be expected, it takes a prominent place. Markov chain models and jump processes are described in a mathematically correct way with interesting results. This discussion is preceded by deterministic models and the history of epidemic modeling and followed in the last part of the book on fitting epidemic data and the control of epidemics. This final section could have been elaborated on more. Least-square methods do not suffice to estimate a large number of parameters in a model with much detail.

All together, the presentation of the material is well-balanced and readable for scientists with a good background in mathematics. For others it may be more difficult. It is an introduction for specialists, although written in a respectable style reflecting the backgrounds of the writers. It can be viewed as a follow-up to the book by Baily (1975).

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In the Blood: Sickle Cell Anemia and the Politics of Race. By Melbourne Tapper. 163 pp. Philadelphia: University of Pennsylvania Press. 1999. \$22.50 (Cloth).

This book is a history of our knowledge of sickle cell anemia and an attempt to understand it by network discourse analysis, which “as a strategy . . . has the potential to examine and problematize the political pertinence and signifying cultural expressions of such phenomena as sickling, AIDS, and the Human Genetic Diversity Project” (p. 11). Foucault is cited frequently and is the patron saint of discourse, but I have difficulty seeing how it leads to greater understanding.

Scientific knowledge, like any area of human understanding, is influenced by its socio-political environment, and ideas about sickle cell anemia are no exception. Early in the investigations of sickle cell anemia, there was the suggestion based on two studies that the trait and disease were more common in light-skinned African Americans, and consequently that the severity of the disease was due to White admixture. This was supported by British investigators in Africa emphatically asserting that sickle cell anemia was very rare in Africa. But the Lambotte-Legrand’s, (1951) in a large sample of infants from the Belgian Congo, found the frequency of sickle cell anemia to accord with that expected by the hypothesis of a single recessive gene (q^2), and Neel (1953) in a careful study found no association between the severity of the anemia with skin color or other racial features. It was simply that in the conditions of the African bush, babies with sickle cell anemia were dying young and not seen by any medical person.

The author also discusses other ways the

colonial environment influenced medical care. Many ideas held by colonial administrators have not withstood the test of time. But science has a self-correcting process, and all of these wrong ideas are no longer believed.

As far as I can tell, a discourse is just some area of ideas or facts that are analyzed by simply discussing them. For example, “by the mid-1950s, there were two predominant discourses on sickling. One presented the phenomenon as shedding light on migration and miscegenation issues; the other articulated sickling as an instance of natural selection in humans. This bifurcation of the anthropological discourse on sickling did not disrupt what had clearly become the tenacious metanarrative of sickling as a means of cataloguing and regulating African social relations (tribes) and assessing in (absolute) serological terms the origin and racial composition of Modern Africans” (p. 87). But the forces of evolution, mutation, selection, gene flow, and gene drift act together to produce genetic variation, although some particular genetic difference may be due predominately to one factor. To consider them as separate discourses does not lead to greater understanding.

Finally, much of the politics comes in the last chapter, which deals with attempts in the last 40 years to manage sickle cell anemia in the United States. Far less money has been spent on this disease than on comparable ones in other ethnic groups, such as cystic fibrosis or muscular dystrophy. This is due to a variety of reasons, but there is some concern as to the consequences of large-scale screening. Insurance companies have denied coverage and jobs have been lost. Perhaps discourse analysis can contribute to the problems associated with the management and prevention of sickle cell anemia as it becomes more of a socio-political issue.

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