

Book Reviews

Stature, Living Standards, and Economic Development: Essays in Anthropometric History. By John Komlos. xv + 247 pp. Chicago: University of Chicago Press, 1994. \$35.50 (cloth).

The papers in this volume demonstrate the usefulness and importance of the studies of human height for understanding the causes and consequences of economic and social change. This is a paraphrase of the opening sentence of the "Comment" by Stanley Engerman, which is the penultimate chapter in this book. About 20 years ago a few brave hearted economists and historians, including several of the authors of chapters in this book, pioneered a new field of research called "Anthropometric History" (see Fogel, 1995 and Steckel, 1995 for reviews of the development of this field). In the ultimate chapter of the book editor John Komlos identifies the goal of Anthropometric History as understanding economic development in the broad sense. The book reviewed here shows how far Anthropometric History has come in the last 20 years.

A connection between stature and standard of living will come as no surprise to biological anthropologists who have been researching that connection for a century or more. Franz Boas made the connection as explicitly as possible with his classic studies of migrants from various parts of Europe to America. What may come as a surprise, however, is the wealth of published research by historians and economists that make use of stature as their primary data for reconstructing economic development in the 18th and 19th centuries. These analyses are published in journals and books with the words "History" and "Economic" in their titles, and therefore may not be commonly read by biological anthropologists. Nevertheless, these papers and their bounty of data for height, and sometimes weight, from past centuries are out there and should be read by anthropologists, epidemiologists, and auxologists.

The book reviewed here is a good place to start such reading. There are ten main papers that present results from specific studies, followed by the two commentaries cited

above. The ten main essays include five chapters on the heights of Europeans from many countries, four chapters on the heights of Americans (both free and slave), and one chapter on heights of Japanese from 1885 to 1938. Professor James Tanner provides an Introduction to all of this entitled, "Growth in Height as a Mirror of the Standard of Living." It is the determination of "standard of living" that motivates the research presented in each chapter. As Ted Shay, author of the chapter on Japan notes, the General Assembly of the United Nations in 1952 endorsed Resolution 527 which called for an international consensus on the meaning and measurement of the standard of living. Sounds simple, but economists, who apparently were the ones expected to develop the consensus, have not been able to do so. Measures of economic well being for industrialized nations, such as "gross national product" and "real wages," have no meaning for most of the world's cultures or are unavailable for most of human history. Height, however, is a human universal, is available in abundance both synchronically and historically (military recruits, students, slaves, and others were measured regularly for all sorts of reasons), and reflects living conditions, at least nutrition and health, quite nicely. The anthropometric historians argue that height is, then, one measure of choice to establish the standard of living. To be more exact, Komlos and colleagues use height to establish the "biological standard of living" to make the distinction between the conventional economic measures and the research agenda of the anthropometric historians.

The anthropometric historians have confirmed some well known facts about differences in well being, between human groups during the last 200 years. For example, they show the effects of social class and rural, versus urban living quite handily—higher classes are taller and rural populations are also taller, until the beginning of the 20th century when the urban populations became the taller. The historians have also discovered some new information, such as the early (18th century) attainment of nearly modern height in the Americas, the fact that adult male slaves of African origin were nearly as tall as their European mas-

ters, and the fact that all Americans, both free and slave, were much taller than their counterparts back in Europe or Africa. But here also lies the central problem, that is, how to interpret these findings. Did all American-living people, both free and slave, enjoy a higher standard of living than populations back in the "old country?" If one equates stature with living standard (biological or economic) then the answer is yes. Slaves on an American plantation may have disagreed. Furthermore, it is at least possible to argue that the "short" aristocrats of Europe may have lived at a higher material standard than the "tall" free farmers of rural America.

Despite the problems of interpreting the relationship of stature to standard of living, the potential of anthropometric data to reveal the recent history of human adaptation to social, economic, and political change is tremendous. To unlock that potential, however, will require a deeper understanding of the biology of stature than is currently evidenced by most anthropometric historians. These scholars have a solid grasp on the meaning of amount of growth, but a limited appreciation of normal variation in rates of growth, rates of maturation, and population variability in stature and other anthropometric traits. They use biological constructs, such as the body mass index, but do so in ways that are at times curious and at odds to the interpretation that human biologists give to these constructs. The main reason for these gaps in their knowledge is that just as biological anthropologists do not read the journals and books of the historical economists, they do not read ours. A quick count of the literature cited for this book finds 329 references of which only 27 are to works that this reviewer recognized as human biology or biological anthropology. Few references are made to important works on public health, epidemiology, and nutrition that would greatly aid in the interpretation of the historical data for stature. Thus, the biological base of Anthropometric History is rather small.

Fortunately, the anthropometric historians want to expand their knowledge of human biology and some seem most willing to work with human biologists to do so. Such exchange will also benefit human biology as the historians can provide both a wealth of data and a time depth that are often missing from human biological research. Thus, I

recommend to my colleagues that we read this book and also the Economic History journals (eg. *Journal of Economic History* and *Journal of Interdisciplinary History*). When we find overlaps to our own research or areas where our special talents can improve the scholarship, we should contact the historians and economists and offer to cooperate and assist.

LITERATURE CITED

- Fogel RW (1995) Anthropometric history: notes on the first two decades of a new field of research. In: Hauspie R, Lindgren G, Falkner F (eds) *Essays on Auxology*. Welwyn Garden City: Castlemead, pp. 271-284.
 Steckel RH (1995) Stature and the standard of living. *Journal of Economic Literature*, 33:1903-1040.

BARRY BOGIN

*Department of Behavioral Sciences
 University of Michigan-Dearborn
 Dearborn, Michigan*

Breastfeeding: Biocultural Perspectives. By Patricia Stuart-Macadem and Katherine A. Dettwyler. xi + 430 pp. New York: Aldine de Gruyter, 1995. \$31.95 (paper), \$65.95 (cloth).

This book provides enough space for anthropologists to make the arguments they are normally precluded from making in the arenas where breastfeeding battles are normally fought: the doctor's office, the medical literature, domestic, and international health policy meetings, and wherever it is that popular culture is defined in the United States. The readers of this journal will likely not mind that the volume is longer on biology than culture, and that culture is essentially left at a phenomenological level. The book tilts towards advocacy (with seven papers and three commentaries providing evidence to support a particular position) in contrast to the five papers which present a neutral analysis.

Chapter 1 (Stuart-Macadem) summarizes the book, and introduces the argument that breastfeeding is the ultimate biocultural phenomenon. Quoting Eaton et al (1988), the author points out that for 99% of our existence as humans, there have been no alternatives to breastfeeding (i.e. no domesticated plant or animal sources) for feeding infants. In Chapter 2, Dettwyler challenges medical "rules of thumb" for determining

appropriate age for cessation of breastfeeding. Most pediatricians in the U.S. suggest that breastfeeding should continue until the infant has tripled her birthweight, or for a period equivalent to gestation. Dettwyler examines the primate and large mammal literature, concluding that quadrupling of birthweight is a more defensible period. Her highest estimates for age of weaning come from the one-third adult body-weight model, which depending upon the size of the adult population, predicts weaning at 4–6 years for girls and 5–7 years for boys. In Chapter 3, Stuart-Macadam reviews the paleodietary evidence coming forward from Fogel et al's (1989) work establishing that living breastfed infants' tissues are enriched in ^{15}N relative to their mother's. An enrichment in ^{15}N of total collagen was measured in almost all the bones tested from 1-year-old infants, from several sites in North America (oldest 5500 B.P., youngest 100 A.D.), while a sharp decrease was noted between 18 and 20 months, corresponding presumably with the consumption of food sources other than breastmilk. Strontium-calcium data, ethnographic analogy, genetic tracking of lactose intolerance, and demographic data are also briefly reviewed.

Fildes (Chapter 4) provides a few snapshots from her extensive work on the recorded history of infant feeding, which while not original in this collection, is conveniently located. Quandt's paper (Chapter 5) provides an explanatory model to link environmental factors to breastfeeding behaviors, to lactational and associated physiology in the mother, and to the risk of infant ill health. The key intervening variable she names "breastfeeding style." She reviews cross cultural examples using this model. Van Esterik (Chapter 6) notes that this is the first time in history that industries have profited through decisions that place more and more substances other than breastmilk in the infant's mouth. The relative harm caused by this substitution on a global basis compared to the good is enormous. Van Esterik traces the growth of the grass roots, and eventually international organizations behind the boycotts, and development of the code for marketing breastmilk substitutes. As one who has been attacked for taking a position, Van Esterik reminds anthropologists that it is a viable alternative to professional self-reflection. Dettwyler's second chapter (Chapter 7) destroys every argu-

ment concerning the "sexuality" of breastfeeding, and for that matter, the sexuality of breasts. Why can't women breastfeed in public? Why must only tiny babies be nursed? Why can't women say they enjoy nursing without being accused of being perverts? Dettwyler looks to the "nipple confusion" of the American (generalized to western) public as the root of these problems. While agreeing in principle with the author, I suggest that just as breastfeeding serves multiple functions in children, human breasts themselves probably serve multiple evolutionary functions. Communicating something about procreational readiness is probably one of them. We might say this signal has been blown out of proportion, but "western" cultures were not the first to do so, unless the Song of Solomon and ancient Indian temple figures can be considered western.

Woolridge (Chapter 8) suggests that it is fat intake, not calories and volume, that regulates intake during breastfeeding. Fat is the most variable component in breastmilk, and on an individual basis, it varies with pre-feed intervals, feeding frequency, and most of all, breast emptying. Woolridge suggests that infants would regulate their overall nutrient intake if they were simply allowed to feed when they wanted to (baby-controlled breastfeeding), with mothers principally insuring that the baby was correctly positioned on the breast. Cunningham (Chapter 9) reviews the international studies on infant morbidity and mortality, immunology, and overall health related to breastfeeding. Bottle feeding is associated with a 10 fold increase in risk of mortality in developing countries, while the US data associate breastfeeding with 4 per 1000 fewer deaths. This is a good summary of studies for disorders of immune regulation, and shows why humans are neither cows, llamas, nor rats in terms of life-span and the protein content of milk (inverse relationship).

In an excellent review of factors associated with Sudden Infant Death Syndrome (SIDS), McKenna and Bernshaw (Chapter 10) provide some compelling evidence for why infant-parent co-sleeping may be protective. Infants who sleep with their mothers, which normally occurs only when the infant is breastfeeding, are awakened more often, sleep less overall, and spend less time in the deep quiet stages of sleep when ap-

nea and death occur. Infants also position themselves to be able to nurse, and therefore spend more time on their backs. This chapter is particularly well referenced. Ellison (Chapter 11) summarizes the historic and current literature linking breastfeeding to fertility regulation, showing how each "hypothesis of the day" was replaced in the quest for the "critical nursing variable," whether it is inter-bout intervals, total time nursing—measured in conjunction with hormonal fluctuations—finally using a longitudinal design. After in-depth reviews of many studies, Ellison concludes that in the present day, variation in breastfeeding behavior appears to more powerfully determine natural fertility than does variation in maternal condition, which undercuts some of the argument of lactation as a natural birth spacer. The collection is rounded out by Micozzi (Chapter 12) with a well-referenced overview of the data demonstrating a protective effect of breastfeeding on breast cancer in both the breastfed infant and the mother. The weaker argument is that formula fed infants are exposed to higher caloric, fat, and protein intake than those who are breastfed, and hence, more susceptible to cancers throughout the life span. The stronger argument is the same one linking higher estrogen, associated with the ovulatory period, to breast and uterine cancers. The prolonged interruption of ovulation by full breastfeeding is consistent with this hypothesis.

Any one of the three commentaries at the end could have been used for this review. Kitzinger (Chapter 13) raises a few social and cultural issues that were under evaluation; Lawrence (Chapter 14) tidies up a few loose ends in terms of breastfeeding science basics; and Fredrickson (Chapter 15) takes a wack at the sloppy definitions of breastfeeding in most studies, discusses SIDS and suggests that a large part of the US burden of disease, particularly fiscally, is caused by bottle feeding.

LITERATURE CITED

- Eaton SB, Shostak M, Konner M (1988) *The Paleolithic Prescription*. New York: Harper & Row.
 Fogel M, Tuross N, Owsley D (1989) Nitrogen isotope tracers of human lactation in modern and archaeological populations. Annual Report of the Director, Geophysical Laboratory. 1988–89, 2150:111–17.

*Emory University
 Atlanta, Georgia*

The Enchanted World of Sleep. By Peretz Lavie (translated by Anthony Berris). xi + 270 pp. New Haven: Yale Press, 1996. \$27.50 (paper).

This book is about what has been learned about sleep during the contemporary exploration of this topic. It is a technically sound book that weaves facts, with case studies and personal reflections. Written by an author who has been in the midst of these times, it expresses the excitement of discovery within a historical perspective. Free of technical jargon, this book tells the reader what has been found out, what this implies, and does it, in an interesting way.

In the late 1950s sleep research emerged as an exciting interdisciplinary area of research. The initial research was spurred on by the discovery of a unique "third state" of consciousness within sleep. This state was identified by a highly active electroencephalographic state and rapid eye movements, (REM sleep) and was closely associated with dreaming. In the late 1960s our understanding of sleep as a biological rhythm began to be incorporated in research. In the 1970s, with the recognition of the clinical importance of sleep apnea, the era of sleep medicine emerged. Today, from its neurophysiological and neurochemical substrata to its role in problems of shift work, automobile accidents, and clinical disorders, the dark kingdom of sleep is being further illuminated.

Peretz Lavie is the highly qualified author of this book. He received his Ph.D. in sleep research at the University of Florida. He is currently the Dean of the Faculty of Medicine at the Technion-Israel Institute of Technology and the head of an active sleep research laboratory. He has been an innovative and skilled researcher and continues as a major contributor to both the basic research and clinical areas. From this background and a thorough grasp of the literature, he has written a book which captures the sense of adventure of being in the midst of a developing field.

The basic aspects of sleep are considered; the measurement of sleep, the brain centers involved, the rhythmic characteristics of sleep, the changes of sleep associated with aging, the wide ranges of animal sleep, and

the individual differences of sleep. There are four chapters on the mysteries of REM sleep and the associated phenomena of dreaming.

The need for sleep is detailed in a discussion of the effects of sleep deprivation. This chapter reviews the effects of prolonged and partial sleep deprivation in humans and the extended deprivation in rats to the point of death. It illustrates some of the effects of sleep deprivation from Israeli army studies.

The last third of the book is devoted to "disordered sleep." These chapters include the topics of insomnia, childhood disorders, rhythmic disturbances associated with shift work and jet lag, and the disorders of excessive daytime sleepiness associated with sleep apnea and narcolepsy.

The book is enriched by vignettes about the early pioneers of sleep research such as Von Economo's search for the sleep center, the remarkable life time contributions of Nathaniel Kleitman whose work extended from the early 1930s through his discovery of REM sleep in the 1950s. It is enlivened by his own relationships with contributors to the contemporary scene and fascinating case studies of his own.

The book was originally published in Israel and is now in seven translations, deservedly so. It is a technically sound and thoroughly readable introduction to the enchanting world of sleep.

WILSE B. WEBB
Department of Psychology
University of Florida
Gainesville, Florida

What's Love Got To Do With It? The Evolution of Human Mating. By Meredith F. Small. xx + 259 pp. New York: Doubleday, 1995. \$25.95 (paper).

Small's latest exploration of human evolution has an Introduction, seven chapters, a bibliography, acknowledgments, notes, and an index. Chapter 1 is entitled "The Sexual Animal," Chapter 2 "The Essential Urge," Chapter 3 "The Female of the Species," Chapter 4 "Men at Work," Chapter 5 "Mate Choice," Chapter 6 "The Natural History of Homosexuality," and Chapter 7 "Sex Beyond the Twenty-first Century." The tone is informal and often chatty. The intended audience for the book is the general reading public.

In the introduction Small indicates that this book is about the evolution of human mating and addresses issues of culture, human nature, monogamy, concealed ovulation, homosexuality, parental care, love, etc. The basic premise of the book is that humans are genetically program to reproduce. She begins her exploration in Chapter 1 with a discussion of such topics as monogamy, pair-bonding, concealed ovulation, and penis size. She concludes that "we tend to exaggerate our sexuality . . . [which] defines so much of our culture and our lives" (p. 31). Chapters 2, 3, and 4 examine the biology of human sexuality.

There are, indeed, no surprises in the three chapters on the biology of human sexuality. The discussion I found most interesting concerned the quality and quantity of human sperm. Because they have low sperm counts compared to the more promiscuous primates, Small concludes that human males are "one of the species adapted to a low level of sexual activity. . ." (p. 112). She notes that men are, however, at risk for cuckoldry and discusses the research of Baker and Bellis (1989) which indicates that when "couples spent hours or days apart, the man responded by releasing a higher number of sperm; somewhere in his unconscious he knew she had had opportunities to be filled with someone else's sperm" (p. 118). Small suggests that sperm competition such as that described by Baker and Bellis exists in humans because our species is not strongly monogamous.

In Chapter 5 on mate choice she argues that for both men and women there is conflict between establishing and maintaining long-term relationships to improve the chances of offspring survival and enjoying the sexual possibilities of short-term encounters. In Chapter 6, Small reviews the literature on homosexuality. She concludes that it is better to understand the totality of human sexuality and avoid creating a dichotomy or trichotomy that necessitates the need to explain the divisions we create.

Small, like others before her, discusses male-female pair-bonding (i.e., falling in love) and high paternal investment in offspring as both aspects of our evolution and a necessity for infant survival. Contrary to Small, men are not involved in the care of offspring in all cultures. In many cultures,

infant caretaking in the broadest sense is left to wives, other women in the household, and older children. Likewise, in all cultures men and women do not "pair off, two by two, establishing a family unit" (p. 12). In many cultures (probably most cultures) marriages are arranged and the bride is added to a household of co-wives and/or mothers- and sisters-in-law. In many households, especially large households, husbands and wives rarely spend private time alone. Anthropologists have shown that there is great variability in marriage patterns, divisions of labor based on gender, and childrearing practices. This does not mean that men and women never fall in love as we know they do. Humans obviously have a great capacity to love other people and even their pets. However, this capacity to form bonds with other individuals is an aspect of our primate heritage that resulted from our ancestors living in well integrated social groups rather than specific selection for monogamy and childrearing. In some cultures, such as our own, men and women use this capacity to fall in love and raise a family. This is not, however, a universal human pattern. The lesson to be learned is that we should not mistake our own culturally derived behaviors and attitudes for a pan-human pattern of behavior.

In the final chapter she makes an appeal for a better understanding of our place in nature and how we came to be what we are. We should not, she argues, think we are better than nature, least we cease to exist.

Because it is both interesting and well referenced, this volume could be used in a graduate seminar on the evolution of human behavior. I found this book an interesting read and recommend it to anyone who enjoys contemplating the evolution of our species.

LITERATURE CITED

Baker RR, Bellis MA (1989) Number of sperm in human ejaculates varies in accordance with sperm competition theory. *Animal Behav.* 37:867-869

LINDA D. WOLFE
Department of Anthropology
East Carolina University
Greenville, North Carolina

Ache Life History: The Ecology and Demography of a Foraging People. By Kim Hill and A. Magdalena Hurtado. xix + 561 pp. New

York: Aldine de Gruyter, 1995. \$32.95 (paper), \$69.95 (cloth).

This book represents the state of the art in the burgeoning field of human life history and evolutionary ecology. As the authors review in the first chapter, life history theory is a branch of evolutionary biology that examines the timing of development, reproductive events, and mortality, the very stuff of standard demographic analysis. While demographers often simply describe, Hill and Hurtado stress that life history theory provides a foundation on which to predict and explain. Based on the fact that resources used for one purpose cannot be used later for another, life history theory assumes natural selection will produce organisms that allocate effort through their life's course in optimal ways, given constraints.

The study population consists of Ache who, until recently, lived as full time foragers in the rain forests of Paraguay. The data presented in the book were collected over the course of 19 years, and the Ache are now among the best studied foraging groups in the anthropological literature. The second chapter provides a wealth of background data on the Ache, their history, and ecology.

Chapter 3 is a detailed discussion of methods and the sample of Ache from which the data were extracted. Readers interested in deriving age estimates in preliterate societies will find the authors' critique of Howell's methods in her 1979 monograph (*Demography of the Dobe !Kung*. New York: Academic Press) extremely interesting. Hill and Hurtado develop and use what they call the age-difference chain method in combination with polynomial regression on age-ranks to estimate Ache ages.

The remainder of the book is divided into two general sections. Chapters 4-9 are thick with description. The chapter titles aptly describe their content—age and sex structure—causes of mortality—rates of mortality—development, marriage, and other life course events—female fertility—male fertility. Hill and Hurtado present data for the precontact, full time foraging period, the chaotic and tragic contact period, and the post contact settlement period. The demographic data from the precontact period are among the best available for a hunting and gathering population living under traditional conditions. In addition, the devastat-

ing impact of disease associated with the contact period is well documented.

These chapters are fascinating in their detail as well as their implications. For example, the Ache age-specific mortality curves are not described by commonly used model life tables based on modern nation-state populations. They differ because of the high rate of death caused by accidents and homicide among the Ache. In fact, homicide was the leading cause of death for precontact Ache, suggesting to the authors that perhaps conspecific violence was also a major selective force shaping human life history in our evolutionary past.

Another interesting result is that precontact Ache fertility was very high compared to other foraging groups. With a growth rate of 2.5% a year, such levels of fertility are not sustainable and could not have been the norm for our hunting and gathering ancestors. One possibility is that human foraging populations in the past may have displayed a pattern common to r-selected colonizing species—periods of rapid growth interspersed with population crashes.

Chapters 10–13 are the most analytically dense as well as the most interesting theoretically. The authors use the extensive demographic data presented in the previous chapters to test various hypotheses generated from life history theory. Chapter 10 establishes the critical relationship between resource availability and Ache fertility and mortality rates. The authors use the manifest variables of male hunting skill and female body weight as estimators for the latent variable of resource availability in the precontact and contact period. An estimate of SES is used for the settlement period. While the results are not as strong as perhaps the authors expected, the data show that more resources do increase fertility and decrease mortality for the Ache. The variation is interesting as well. For example, resources have a greater effect on fertility than mortality, and on males than females.

In chapter 11, the authors use life history theory to examine the tradeoff between survivorship and physical growth, to model the optimal age at first reproduction for the Ache. The data show that higher fertility is associated with larger body size for both Ache men and women. While growing to a larger size has positive fertility benefits, it also means a decrease in total lifetime fertility because of the shortened reproductive

span. By modeling this tradeoff, Hill and Hurtado were able to successfully predict an optimal age at first birth that was within one year of the mode for the Ache.

Chapter 12 examines the costs of reproduction and the expected tradeoff between the quantity and quality of offspring. While resources invested in the production of offspring cannot be invested in subsequent quality, demonstrating that tradeoff is difficult because of the problem of phenotypic correlations. Addressed at some length in the book, phenotypic correlations occur because individuals with abundant enough resources to produce many offspring, for example, will often have enough to invest heavily in each as well, confounding the expected tradeoff. Hill and Hurtado use discrete-time logistic regression hazard models to attempt to control for phenotypic correlation among the Ache.

The most interesting result of the book is that the Ache do not seem to maximize their reproductive success. Hill and Hurtado were unable to show that the Ache pay any appreciable costs of reproduction as predicted from life history theory. Current fertility was positively correlated with subsequent fertility. Higher fertility was not associated with lower offspring survivorship. In fact, increased offspring quantity seemed to have little impact on quality. The Ache model interbirth interval of 30 months did not maximize fitness, but rather the shortest (~15 months) did.

In the last analytic chapter number 13, the authors examine kin effects on mortality and fertility rates. Considering the importance of kin relationships, the result that only parents had a strong influence on Ache child mortality came as a surprise. Fertility, on the other hand, was found to be significantly influenced by the number and composition of a variety of close kin. Hill and Hurtado also test the “grandmother” hypothesis to explain menopause, but could not find any support that kin selection was maintaining female reproductive senescence in the Ache.

The success of *Ache Life History* is guaranteed by the addition it makes to the small number of high quality demographic data sets on hunting and gathering people. The authors' ability to predict the optimal age at first birth for the Ache demonstrates the

power of a life history approach. The ultimate contribution of the book really lies, however, with the new theoretical questions it raises. The failure of the life history models to show reproductive costs, must be taken seriously and this presents a tremendous challenge for human evolutionary ecologists.

LITERATURE CITED

Howell, Nancy (1979) *Demography of the Dobe !Kung*.
New York: Academic Press.

MICHAEL S. ALVARD
Department of Anthropology
State University of New York at Buffalo
Buffalo, New York