Book Reviews

The Population Biology of Man

The Demographic Evolution of Human Populations. R. H. WARD and K. M. WEISS, Eds. Academic Press, New York, 1976. xii, 158 pp., illus. Paper, $12.25.

It is hardly necessary to point out that human evolutionary studies have been extraordinarily successful in that genetic variability within and between a wide variety of human populations has been amply demonstrated. In addition, some plausible mechanisms for maintenance of this variability have been proposed in a few cases. Without intending to belittle these accomplishments, however, one may call attention to a certain similarity among the population surveys and among the various measures of differentiation that make up the bulk of the literature published during the past half decade. There are a number of reasons, some of which are legitimate enough, for these similarities; but one can be led to the impression that current theoretical models have been rather thoroughly exploited without having raised questions that are thought to be answerable.

It seems to me that despite the apparent stasis in the field terminal pessimism is not warranted. There are at least two fundamental questions which are crucial for our understanding of human evolution and which are at the same time tractable: first, given present data and methods, what are the limits to what we are likely to be able to know? That is, what kinds of models are likely to be testable in human evolutionary studies? Second, in what ways and to what extent is human evolution different from evolution in other organisms? Both of these questions lead quite naturally to the development of evolutionary models which incorporate demographic and social structures that are typical of human populations.

Many of the contributors to this collection of ten papers, which has also been published as volume 5, number 1, of the *Journal of Human Evolution*, are known for their efforts toward these ends. Some of the papers included are of interest chiefly because they suggest methodologies for investigating demographic aspects of evolution (Wobst on locational analysis; Swedlund *et al.* on demographic patterns in colonial New England; Skolnick *et al.* on genealogical reconstruction in the Parma valley), or demonstrate demographic effects on the evolutionary process (Roberts and Mohan on "gene-independent" fitness on Fiji; Ward and Jacquard on the genetic effects of the demographic transition).

Of particular interest, however, are four chapters which, taken together, provide an excellent theoretical justification for the inclusion of demographic parameters in models of human evolution, and in effect propose some general strategies for their construction. The first of these, by Ward and Weiss, is, like the volume itself, somewhat ambiguously entitled "The demographic evolution of human populations." A more precise title might be "Demography and the evolution of human populations." In the chapter, the authors argue convincingly for the incorporation of demographic parameters into evolutionary models, describe the constraints on estimation of these parameters in the populations of interest to anthropologists, and outline some of the evolutionary implications of demographic changes that are thought to have occurred in our past. Because this chapter was prepared as an introduction to those which follow, it does not stand well by itself. It is, however, a very good essay indeed.

In the second chapter, Howell asserts that *Homo sapiens* early evolved a basic biological pattern that has remained largely unchanged to the present. It is thus possible to take information from large modern populations and apply it to the smaller, often nonliterate populations which are of primary interest for evolutionary studies. My only reservation has to do with her heavy reliance on the somewhat questionable "critical fat hypothesis" (a threshold ratio of fat volume to lean body weight) as setting lower limits on age of fertility. Nonetheless, this is one of the best and most explicit statements I have seen of a fundamental assumption which, after all, gives us the justification for constructing human evolutionary models.

Weiss and Smouse present a model that shows that small populations which have high growth potential but whose size is regulated by feedback ("fertility damping" or "mortality damping") do not exhibit the magnitude of stochastic distortions in the age structure that is predicted by nonregulation, low-growth models. This is an encouraging result, because it implies that in some cases the statistics of small populations may be more reliable than was previously thought.

Finally, Jorde and Harpending suggest a fertility-damping mechanism that could lead to the result predicted by Weiss and Smouse, and, more important, they present a technique by which such a mechanism might be measured. The authors have adapted spectral analysis to show the relationship of periodicities in seasonal rainfall and fertility. Unfortunately, those readers who are unfamiliar with the technique and its terminology are likely to find that the intuitive justifications of the method in the paper are less than illuminating. The possibilities of the method are very rich, however.

The significance of this volume lies not so much in the presentation of novel concepts as in the general, highly productive approach to human evolutionary studies. There is much work to be done in genetic and evolutionary demography, and we will no doubt see an increase in effort and in publication in this area. This collection should provide considerable challenge and stimulation to those who are interested in human evolution, and in particular to those who will construct and test more realistic models.

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Social Interactions

Nonverbal Communication of Aggression. Proceedings of symposium, Missisauga, Ontario, March 1974. PATRICIA PLINER, LESTER KRAMES, and THOMAS ALLOWAY, Eds. Plenum, New York, 1975. x, 196 pp., illus. $17.50. Advances in the Study of Communication and Affect, vol. 2.

This is the second volume of what could be a very useful series. The title of the volume, however, is rather misleading, since only four of the eight chapters are actually about aggression—"Nonverbal communication of affect and interpersonal attitudes" would be more accurate. Each chapter reports a small number of studies by its author, most of them previously published; the result is that there is a somewhat random sampling of

a few interesting lines of research, while many others are omitted, and there is no general account of theory or of the wider research literature. I suggest that a format more like *Advances in Experimental Social Psychology* and *Progress in Experimental Personality Research* would be more useful.

Topics within the terms of reference of the title, or of my amended title, which are omitted are: the evolution of nonverbal signals—gaze, facial, vocal, and others—for aggression; the meaning of those signals in different social contexts (discussed by Ellsworth for gaze); the combination of elements simultaneously or in sequence to make up larger signals, and whether there are "syntactical" principles involved; the similarities of nonverbal communication and language, the combination of verbal and nonverbal signals, and what happens when they conflict; and why nonverbal communication is used by humans at all.

There is almost no discussion of research methods in this volume, although there are at the moment sharp disagreements between research workers about whether or not we should use laboratory experiments, role-playing, or field studies of different kinds. Within animal studies there is disagreement about how far animal social systems should be interfered with—how far provisioning primates affects group behavior, for example. Some research workers use behavior only—frame-by-frame analysis of film or ethological statistical methods—whereas others emphasize the importance of subjective meaning. Some think that there is a sharp separation between the causal laws that govern animal and simpler human behavior on the one hand and human behavior governed by plans, rules, and reasons on the other.

To turn to some of the contents of this book, there is an excellent chapter by Exline, Ellyson, and Long; this reports the Exline experiment showing that low-power members of human hierarchies look more. Ellyson found later that subjects given high power in an experimental situation or rated as having a control orientation according to the FIRO (Fundamental Interpersonal Relations Orientation) scheme looked more when talking, whereas low-power subjects looked more while listening. This makes an important contribution to our knowledge of the tricky relationship between power and gaze. Phoebe Ellsworth reports her well-known experiments showing that the stare can act as a threat; new experiments show that in other social settings a stare can lead to the giving of help, and can inhibit aggression. It is concluded that the stare is an arousing stimulus, but that it can have a wide variety of meanings.

Carroll Izard reports a number of excellent experiments on the expression of emotion—showing that adopting a facial expression results in experiencing the emotion, that fewer shocks were given to an apparently angry victim, and that cutting the facial nerves of rhesus monkey mothers and their infants led to more agonistic and less prosocial behavior.

Several chapters are about animal communication. E. W. Menzel reports a number of studies of a group of young chimpanzees, where there was very little aggression because the animals observed each other very closely and achieved a high degree of coordination of behavior. For example, a less dominant animal gave way to a more dominant one before any aggressive signals were needed. Robert Miller also reports observing very few fights when two monkeys were competing to avoid electric shocks; he was able to reverse dominance relations by conditioning a dominant animal to fear a submissive one, and found that social isolates were poor senders of nonverbal signals and that good senders were poor responders and were of lower status; those at the top of the hierarchy were intermediate senders and receivers. The full implications of these fascinating results have yet to be worked out.

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The Early History of Optics

Theories of Vision from al-Kindi to Kepler. DAVID C. LINDBERG. University of Chicago Press, Chicago, 1976. xii, 324 pp., illus. $20. University of Chicago History of Science and Medicine.

The early history of optics has all too often seemed to be either a recital of one damn thing after another or a tangled mass of esoteric threads. Lindberg's excellent new book brings much intelligibility to the subject. And it is a particularly welcome intelligibility for being open-ended and suggesting further problems for investigation. For instance, what if any difficulties arose from the use of discrete rays to represent essentially continuous radiation?

As the title indicates, the book ranges from the 9th to the early 17th century; there is also a fine, succinct chapter devoted to the essential ancient background. Those whose interest lies in major theoretical turning points may feel that too much space is devoted to the Latin Middle Ages and the Renaissance, and those with more contextualist concerns will wish for greater attention to how optics fitted into the Arabic cultural ambit. But perfect balance is not a high virtue for a work of this kind. Lindberg cuts a (by no means narrow) swath that excludes psychology and epistemology, but this limitation is tempered by his awareness of the perils of Whiggery: virtually never did I get a feeling of historical distortion. Although ample attention is given to optical anatomy and its meager development during the period, the book deals mainly with views of what was happening between the visible object and the optic nerve. Kepler himself did no optical anatomy, but relied on the work of others. By a happy choice one of these was Felix Platter, who had asserted the sensitivity of the retina and denied that of the crystalline humor. This could give justification for calling the crystalline humor by the theory-laden term "lens."

In the development of Lindberg's theme the pivotal figures are Ibn al-Haitham (the Alhazen of the Latins) and Kepler. Alhazen's work is characterized by his taking seriously all three of the dominant approaches to optics—philosophical, mathematical, and medical. He argued for the position (maintained by Aristotelianism but rejected by Stoicism) that vision was a passive process, but this did not square well with the established mathematical treatments, according to which visual rays were emitted from the eye. At a first approximation we may think of Alhazen's solution as reversing the direction of the rays. "Forms" of light and color proceeded from the object to the eye, where they were "fixed" in the crystalline humor and then transmitted, by a process that Lindberg calls quasi-optical, to the brain. But this scheme had serious difficulties. Alhazen asserted that to avoid perceptual chaos there had to be a one-one correspondence between the points of the surface of the object and the points of the anterior surface of the crystalline humor. But he also conceived there to be radiation from all superficial points of visible objects in all directions. (This conception, which Lindberg regards as representing an important step, had been maintained by al-Kindi, but he held an extramission theory of vision.) The result was that each superficial point of the