been staffed largely by students. By ending nurses' traditional isolation and giving them specialized skills and greater authority over patients, hospital work enhanced their confidence and linked them to other workers. The emergence of the feminist movement also gave nurses fresh vocabulary and new images that offered new opportunities. Nurses have learned increasingly that a group subordinated by class, gender, or race can effectively pursue autonomy only by altering the larger assumptions of society. Feminist thought does not claim nursing for women on the basis of inherent gender traits but rather seeks to place a higher value on caring generally.

This lucid and immaculately researched book adds immensely to our historical awareness.

JANE PACHT BRICKMAN
Department of Humanities, U.S. Merchant Marine Academy, Kings Point, NY 11024

Intrapopulation Differences

Population Ecology of Individuals. ADAM ŁOMNICKI. Princeton University Press, Princeton, NJ, 1988. xii, 223 pp., illus. $45; paper, $13.95. Monographs in Population Biology, vol. 25.

This monograph concerns itself with individual differences among the members of ecological populations. The topic is usually treated in categorical terms: castes, life stages, polymorphisms, discrete age classes, and so forth. However, Łomnicki glosses over these kinds of differences in favor of continuous or near-continuous variation in ecological properties. He is particularly interested in variation arising from differing degrees of success in resource acquisition. The properties that are affected include resource use, degrees of reproductive profligacy or restraint, and migration. Issues of special interest are the evolutionary origins and stability of these traits and whether they promote population stabilization in an ecological sense.

If individual differences play a role in population stability, their involvement may be subtle and hard to detect. Imagine this scenario: A seasonal population becomes overpopulated in relation to the supply of some vital resource. Indeed, all population members would die if each got an equal share. However, some individuals succeed early and with time become increasingly good at resource acquisition while others fall behind from the start. The gap typically widens through the season. Rather than extinction, which would surely occur as a result of competition in the absence of individual differences, a mere fraction of the population gives rise to a new generation. Numbers are reduced and there is an improved adjustment between population and resources. Individual differences have played a key role in the population limitation.

The scenario above is an abstraction and simplification of ones developed by Łomnicki and gives some idea of what to expect from him in the way of methodology.

In the sequence of events that leads to population limitation, the losers at resource acquisition may take on behaviors that are not seen among the winners. They may emigrate or withhold reproduction. If they did not already rank low on the scale of Darwinian fitness, such behavior would make them rank low. The population or the species may benefit because the behavior prevents overpopulation and subsequent extinction, but the harm done to the perpetrator assures that the behavior is opposed by natural selection. Hence the traits may be called acts of self-sacrifice or altruism. A few population biologists have long held the supposition that altruistic traits evolve by group selection: by natural selection acting through the differential proliferation and extinction of groups. Given the right genetic and ecological conditions, natural selection on groups can replace and effectively overcome natural selection on individuals.

There is a long history of controversy over the efficacy of group selection, and Łomnicki reveals himself as one of the most extreme anti–group-selectionists. Indeed, the straw man of this book is V. C. Wynne-Edwards, author in 1962 of *Animal Dispersion in Relation to Social Behavior*. Wynne-Edwards attributes much of population regulation, particularly in higher vertebrates, to social behavior group-selected for the benefit of social units above the individual level. Łomnicki tries to show that this is illusion and misinterpretation. He believes that the correct interpretation involves only individually selected adaptive behavior and that the illusion of altruism is brought about by failure to recognize the true significance of individual differences.

Łomnicki's interpretation probably will not encounter much resistance from readers. If being identified with conventional wisdom and standard explanation are what is required of a good straw man, then Wynne-Edwards will not do. Even some of the most ardent group selectionists find his claims for population regulation excessive. Ecologists have had a refreshing open-mindedness toward Wynne-Edwards, but they will probably jump for an alternative explanation now that one is available.

Łomnicki's method is typical of adaptationism in evolutionary ecology. He concocts a scenario, invents a simple arithmetic model, derives some artificial outcomes, and compares them to his experiences with nature. Plausibility is the sole criterion for the process. The models are not designed for hypothesis-testing. The book resorts to case histories that are few and scant. However, these deficiencies are not the outcome of necessity, and they would be inexcusable if perpetuated. Individual differences should be among the most amenable to experimentation of all topics in population ecology.

DAVID B. MERTZ
Department of Biological Sciences, University of Illinois, Chicago, IL 60680

Quaternary Adjustments

North America and Adjacent Oceans During the Last Deglaciation. W. F. RUDDIMAN and H. E. WRIGHT, JR., Eds. Geological Society of America, Boulder, CO, 1987. viii, 501 pp., illus., + maps in pocket. $43.50. Geology of North America, vol. K-3.

This volume in the Decade of North American Geology (DNAG) series is part of the celebration of the 100th anniversary of the Geological Society of America. It comprises not simply a series of summary articles but substantive papers on the latest thinking and developments presented by leading workers in the field. These papers contain new treatments or new permutations of the growing data base on glacial, periglacial, biological, and climatological faces of North America during the period of environmental adjustment from the height of the last glaciation (approximately 18,000 years ago) to the present day.

The theme of the volume is "the timing, cause, and mechanism of the wastage of the North American ice during the last deglaciation," that is, from 18 to 6 thousand years ago (ka), a period for which the details of the record have not been obliterated by subsequent glacial bulldozers and for which chronological control, especially by radiocarbon dating, is as good as it gets in the geological record. The volume begins traditionally with glacial history. The lead article on the Laurentide ice sheet quickly establishes that the authors were not constrained by the 18- to 6-ka limits; in it J. T. Andrews details the configuration of the strongly reduced ice sheet during Middle Wisconsinan time and the events preceding the 18-ka glacial maximum, for both the southern and the northern margins of the ice sheet,

before proceeding with the deglacial history. J. T. Teller follows with a minitreatise on the formation and sedimentology of proglacial lakes; then he recounts the history of such lakes from the Canadian Plains to New England, as well as analyzing the effects of their outflow on adjacent oceans.

In the second section W. S. B. Patterson and C. U. Hammer analyze curves of oxygen isotopes, dust content, and carbon dioxide from Greenland and Antarctic ice cores. A. C. Mix follows with a detailed treatment of the oxygen-isotope record in planktonic and benthic Foraminifera and comparisons with ice volumes and sea levels, giving special attention to the events during Termination I (the last-glacial-to-postglacial transition). W. F. Ruddiman then looks at the record of the northern oceans, concentrating on climatic modeling and relations to orbital parameters. Next, W. R. Peltier summarizes and extends arguments on geophysical modeling of glacial isostasy and mantle viscosity, stressing their essential and active role in climatic change. Glacial rebound may supply an important "missing link" in the Milankovitch astronomical hypothesis—namely a feedback mechanism that enhances the 100,000-year signal. Finally in this section, T. Hughes reconstructs the Laurentide ice sheet and traces its evolution during the last deglaciation in a series of maps (for 18, 14, 12, 9.5, 8.5, and 7 ka) of simulations of topography and flow lines of the ice sheet based on glaciological theory and geomorphic evidence. This is clearly an extension and refinement of Hughes's earlier models and improves the fit of such models to the field evidence.

In the next section the complex response of river systems, evidenced by braided versus meandering patterns and by terrace systems, is analyzed by S. A. Schumm and G. R. Brakenridge. Then the complicated climatic relations of closed basin lakes in the Great Basin are reviewed by L. Benson and R. S. Thompson, followed by an evaluation of the contribution of ostracode study to lacustrine paleoclimatology by R. M. Forester.

Approximately one-third of the book is devoted to the biological record—pollen, packrat middens, beetles, and mammals. This section is one of the highlights of the volume, and appropriately so, given the interests and long-term contributions of one of the editors, H. E. Wright, Jr. The individualistic response of taxons to past environmental change is now clearly recognized in both vegetation and faunal records. Color maps by G. L. Jacobson and others depict vegetation change in eastern North America on the basis of pollen records with a resolution of 100 years or less. Moreover, by means of "chord distances" in multivariate statistical space, rapid vegetational changes that appear to characterize all the eastern part of the continent at 13.5, 12.3, and 10 ka have been identified. These pervasive changes are related to "significant shifts in . . . atmospheric circulation on a continental scale." One has to be impressed by the assemblage of biological data presented in this section in the form of maps, pollen and plant macrofossil curves, and time-distance diagrams, as well as by the useful lists of Latin and common names at the end of each paper.

The archeological record is included as well. R. Bonnichsen and colleagues provide capsule descriptions of essentially all the PaleoIndian sites in North America, categorizing them by the pattern of tools present—bone artifacts, blades, and various kinds of projectile points. These authors, however, omit controversial sites, such as Meadowcroft, Pennsylvania, in favor of the mainstream sites that date from approximately 12 to 10 ka. In line with the theme of the volume, the 11-ka "threshold in human adaptive systems" is linked through vegetational and animal resources to climatic change and the orbital hypothesis.

In the final section J. E. Kutzbach, whose work seems to pervade all the preceding papers, applies atmospheric general circulation models to simulate temperature, precipitation, pressure, and winds at 18, 9, and 0 ka. Although the models are admittedly still too coarse and too simplified to "permit detailed comparisons with local geological records," much progress has been made toward bringing the modeled predictions in line with the essential conclusions of the natural record presented by others in this volume. The editors close the volume with summary chapters on the oceans and ice sheets (Ruddiman) and the land south of the ice (Wright). Abundant references at the end of each paper and a good index add significantly to the value of this source book.

This will be an essential reference for scholars of all persuasions who hope to grasp the complex essence of the Quaternary period. Throughout the volume a pervasive unity exists among Milankovitch theory, modeling, and mathematics. This is a quite different face of Quaternary science from that of a few decades ago. The traditional view of "ice ages" has given way to a much broader view involving all the earth sciences, and clearly it has led to a much greater understanding of the way the land-ocean-atmosphere system works and changes through time.

WILLIAM R. FARRAND
Department of Geological Sciences, University of Michigan, Ann Arbor, MI 48109-1063

Books Received

Astronomical Optics. Daniel J. Schroeder. Academic Press, Orlando, FL, 1987. xiv, 352 pp., illus. $45.

Behavioral Approaches to Crime and Delinquency. A Handbook of Application, Research, and Concepts. Edward K. Morris and Curtis J. Braukmann, Eds. Plenum, New York, 1987. xxvi, 625 pp. $65.

Biofuels, Air Pollution, and Health. A Global Review. Kirk R. Smith. Plenum, New York, 1987. xxiv, 452 pp., illus. $65. Modern Perspectives in Energy.

Centre and Periphery in the Ancient World. Michael Rowlands, Mogens Larsen, and Kristian Kristiansen, Eds. Cambridge University Press, New York, 1987. viii, 159 pp., illus. $39.50. New Directions in Archaeology. Based on a conference, Aarhus, Denmark, 1980.

Dynamical Evolution of Globular Clusters. Lyman Spitzer, Jr. Princeton University Press, Princeton, NJ, 1988. xii, 180 pp., illus. $35; paper, $14.50. Princeton Series in Astrophysics.

Dynamical Systems III. V. I. Arnold, Ed. Springer-Verlag, New York, 1988. xiv, 291 pp., illus. $59. Encyclopedia of Mathematical Sciences, vol. 5. Translated from the Russian edition (Moscow, 1985).

The Ecology and Management of Biological Invasions in Southern Africa. I. A. W. Macdonald, F. J. Kruger, and A. A. Ferrar, Eds. Oxford University Press, New York, 1986. xvi, 324 pp., illus. $39.95. From a symposium, Stellenbosch, South Africa, Nov. 1985.

Ecology of Estuaries. Vol. 1, Physical and Chemical Aspects. Michael J. Kennish, CRC, Boca, Raton, FL, 1986. x, 254 pp., illus. $117.

Ecology of Tropical Oceans. Alan R. Longhurst and Daniel Pauly. Academic Press, Orlando, FL, 1987. xiv, 407 pp., illus. $39.95. ICLARM Contribution no. 389.

Electromagnetic Fields and Waves. Including Electric Circuits. Paul Lorrain, Dale R. Corson, and François Lorrain. 3rd ed. Freeman, New York, 1988. xiv, 754 pp., illus. $42.95.

Encyclopedia of Mathematics. Vol. 1, A–B. M. Hazewinkel, Ed. Reidel, Dordrecht, 1987 (U.S. distributor, Kluwer, Norwell, MA). x, 488 pp. $149. Translated from the Russian edition (1977–1985).

The Ends of Science. An Essay in Scientific Authority. Harry Redner. Westview, Boulder, CO, 1988. xvi, 344 pp. $39.50.

The Environment of Life. Colin Tudge, Ed. Oxford University Press, New York, 1988. 256 pp., illus. $35.

Evolution of Size Effects in Chemical Dynamics. Part 1. I. Prigogine and Stuart A. Rice, Eds. Wiley-Interscience, New York, 1988. xii, 556 pp., illus. $100. Advances in Chemical Physics, vol. 70.

Experimental Techniques in Plant Disease Epidemiology. Jürgen Kranz and Joseph Rotem, Eds. Springer-Verlag, New York, 1987. xviii, 299 pp., illus. $89.50.

Fact and Method. Explanation, Confirmation and Reality in the Natural and the Social Sciences. Richard W. Miller. Princeton University Press, Princeton, NJ, 1988. xii, 611 pp. $65; paper, $14.50.

Granville Sharp Pattison. Anatomist and Antagonist, 1791–1851. F. L. M. Pattison. University of Alabama Press, University, AL, 1987. xvi, 284 pp., illus. $24.95. History of American Science and Technology Series.

Gravity Currents. In the Environment and the Laboratory. John E. Simpson. Horwood, Chichester, U.K., and Wiley, New York, 1987. 244 pp., illus. $61.95. Ellis Horwood Series in Environmental Science.

Gray's Manual of Botany. Merritt Lyndon Fernald. Dioscorides, Portland, OR, 1987. lxiv, 1632 pp., illus. $59.95. Biosystematics, Floristic and Phylogeny Series, vol. 2. Reprint, 1950 edition.

Health Risks of Radon and Other Internally Deposited Alpha-Emitters. BEIR IV. Committee on the Biological Effects of Ionizing Radiations, National Research Council. National Academy Press, Washington, DC, 1988. xviii, 602 pp. $42.50; paper, $32.50.

A History of Neurophysiology in the 19th Century. Mary A. B. Brazier. Raven, New York, 1987. xvi, 265 pp., illus. $69.

Homicide. Martin Daly and Margo Wilson. Aldine de Gruyter (Walter de Gruyter), Hawthorne, NY, 1988. xii, 328 pp., illus. $42.95; paper, $18.95. Foundations of Human Behavior.

The Human Macrophage System. Activity and Functional Morphology. Horst Michna. Karger, Basel, 1988. xii, 84 pp., illus. $62.75. Bibliotheca Anatomica, no. 31.

If We Can Keep a Severed Head Alive. . . . Discorporation and U.S. Patent 4,666,425. Chet Fleming. Polinym, St. Louis, MO, 1988. xxxiv, 461 pp. $12.95.