Book Reviews

Natural Populations

Dynamics of Populations. An Advanced Study Institute, Oosterbeek, The Netherlands, Sept. 1970. P. J. DEN BOER and G. R. GRADWELL, Eds. Centre for Agricultural Publishing and Documentations, Wageningen, The Netherlands, 1971. 612 pp., illus. Dfl. 65.

This 1970 conference on the dynamics of populations of plants and animals is the heir of an illustrious 1957 symposium on animal ecology and demography (*Cold Spring Harbor Symposia on Quantitative Biology*, vol. 22). The burning question of 1957 was, "To what extent are populations 'regulated' by 'factors' that are 'independent' of the 'density' of the population?" A sterile and largely semantic controversy arose, pitting students of social birds and mammals against students of tiny beasts upon whom the weather imposes gross indignities. Although many of the studies reported at the 1970 conference were originally motivated by this controversy, the papers focus on more intriguing problems. Unfortunately, few of the speakers have stated their goals clearly enough for an audience more general than the participants in the institute.

There are 41 papers, of which 18 are highly empirical with only a few being soporific, 8 are excellent reviews of primary data published elsewhere, 6 are barely intelligible simulations of nature, 5 are seductive but immature philosophy, 2 are interesting but overly formal analytical models, and 2 stress applications to human resources. I judge at least 20 of the papers to be of higher quality than most of those currently published in the ecological journals; so I shall mention only those that most struck my fancy.

Several papers blur the traditional distinction between botany and zoology. J. L. Harper and J. White review a large literature documenting the effect of the density of plants on various phases of their life histories, which in turn influence reproduction. Critical data from plants are applied to questions that zoologists routinely ask but can answer only by inference. J. H. Connell discusses the conditions under which predators prevent competitive exclusion between species of their prey. He cites original studies of intertidal barnacles and of rain-forest trees. E. van der Meijden concurrently studied populations of the cinnabar moth and of ragwort, the moth's sole host plant.

Long-term field studies of bird populations, unheard of in 1957, are reported with a casual air that belies their novelty and difficulty. H. N. Kluyver artificially reduced the clutches of a population of great tits by about 40 percent and noted a near doubling of their subsequent adult survival. He suggests that most of the autumn mortality was socially induced rather than being due to a shortage of food. Similarly A. Watson found that winter mortality of red grouse fell heavily on those individuals who failed to secure exclusive territories during the previous autumn.

Almost every paper stresses the fact that populations and their environments are not nearly as homogeneous as current theories assume them to be. Many papers draw new insights from a study of heterogeneity per se. Qualitative changes, presumably with a genetic basis, accompanied population cycles in field mice studied by C. J. Krebs and in larch bud moths studied by W. Baltensweiler. In both cases, changes related to dispersal were adaptively correlated with the cycle, but the adaptive significance of the cycle itself remains tantalizingly obscure. A negative influence of local density on dispersal is noted or strongly inferred by S. Iwao for a population of lady beetles, by P. Gruys for the pine looper moth, and by M. J. Way and M. E. Cammell for diverse aphid species. L. C. Birch cites a variety of examples in which a heterogeneous environment provides refuges for animals in adverse seasons, whence they repeatedly colonize seasonally favorable areas. H. G. Andrewartha discusses statistical problems for sampling such populations. P. J. den Boer discusses, but unfortunately never specifies, a model in which fluctuations of density are restricted by various sorts of environmental heterogeneity. Models of populations in a heterogeneous environment should prove exciting in the near future. Data are available, and current models seem to rest on an obscure dictum by a benevolent Creator, that eggs should be put in several baskets.

The editors have done an excellent job. Misprints are scarce and trivial. Unusually concise and cogent discussions follow each paper. Appropriate papers are cross-referenced, and there is a useful index, a rarity indeed among such volumes.

Few of the authors speculate beyond their immediate work. The participants in the conference seem to have searched vainly for a monolithic synthesis rather than for a classification of the adaptive relations between the dynamics of various populations and the conditions imposed by the spatial and temporal pattern of their particular environments. In spite of, or perhaps because of, the failure to infer and to synthesize, this book should provide an excellent source for a graduate seminar on natural populations.

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Roots of Geology

The History of British Geology. A Bibliographical Study. JOHN CHALLINOR. Barnes and Noble, New York, 1972. 224 pp. $11.25.

This is a rather strange book. Its avowed purpose is "to provide a short introduction to a great and hitherto entirely neglected subject: the general history of British geology" through a bibliographic review of "works of the first importance." It may come as a surprise to others, as it did to me, to learn that the general history of geology in the science's cradle land has been so neglected. I can think of no other region for which historical studies of the science are so far advanced. Moreover, the bibliographic approach used may leave readers uneasy, for unless they know the British literature well they may not be sure how balanced the treatment is (and if they can judge this they probably do not need a book of this sort anyway). The scope is ambitious, yet the list of sources is of modest size, suggesting