Bookreviews

D. M. GATES and R. B. SCHMERL (Eds.)

PERSPECTIVES OF BIOPHYSICAL ECOLOGY

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A symposium on biophysical ecology, held at The University of Michigan in 1973, reviewed achievements to date in this field and showed which problems are to be solved in the near future.

After a broader introduction, the book is divided into six parts. The first three parts are devoted to the ecology of plants, the other three deal with the ecology of animals. In the Introduction, D. M. GATES has summarized the advances attained by his research group during the past 15 years. A complete bibliography of their work is included. Problems mentioned include the use of fundamental principles of physics and chemistry along with mathematics in ecology. Basic analytical models are presented of the interaction of plants and animals with the environment.

Part I — Analytical Models of Plants — shows an attempt to understand the plant-environment interaction by means of modeling and subsequently testing the hypotheses that enter the model. Separate papers deal with photosynthetic and respiratory processes, and with leaf morphology.

Part II — Extreme Climate and Plant Productivity — contains papers on evolutionary conditioned physiological refinements and phenological adjustments of plants growing in extreme habitats. During the past few years, interest has sharply increased in systems by which plants may take up CO₂. Interesting examples of pathways of CO₂ assimilation are presented. Physiological efficiency in CO₂ assimilation is shown to be an important factor in plant adaptation.

Part III — Water Transport and Environmental Control of Diffusion. Models of interactions between plants and environmental factors are presented. Regulation of water transport in the soil-plant-atmosphere continuum is one of the most puzzling problems in plant physiology. Researches try to attain quantitative data on the response of a whole individual plant to a specific environment.

Parts IV, V, and VI — Theroetical Models of Animals, Observation of Animal Body Temperatures, and Energy-Transfer Studies of Animals — discuss the difficult problems of the ecology of animals. Because of the complex interaction of so many environmental variables and animal properties, authors are searching for an appropriate theoretical framework to tie them all together. The energy relationship of an animal with its environment is believed to be the appropriate model by which to understand some aspects of animal ecology.

The book gives excellent examples of the solution of ecological problems in a complex manner. At present, there is much concern about the urgent need to understand ecosystems as a whole. Man is subjecting his environment more and more to stresses through the drain of calories in the potential energy flow. The ultimate challenge for man is whether or not he can maintain a productive global ecosystem and simultaneously sustain a highly consumptive technological society. Biophysical ecology can provide the knowledge necessary for understanding the complexities of ecosystems. A productive, healthy civilization could last for a long time only if based on reasonable ecological policy.

JAROSLAV DOBRÝ