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BOOK REVIEW

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Ronald M. Atlas, Richard Bartha: Ecología Microbiana y Microbiología Ambiental (Spanish version of the 4th edn)

Addison Wesley, Madrid, 2001. 608 pp, 24 × 18.5 cm (ISBN: 84-7829-039-7) Euros 31.55

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The face of the Earth viewed from celestial space is unique in its appearance, different from all other heavenly bodies. The surface that separates the planet from the cosmic medium is the biosphere. The face of the Earth can be seen as an evolutionary phenomenon, the result of a metabolic process connecting living organisms, energy flow, and the cycling of chemical elements, in a process that has continued essentially unchanged since the early Archean, almost 4 billion years ago.

No individual exists as an isolated entity. All life is dependent on its surroundings. Microbial ecology is the field of science that studies relationships between microorganisms and their biotic and abiotic environments. The existence of mixtures of microorganisms in natural habitats was demonstrated by van Leeuwenhoek, who distinguished different morphological types of bacteria in the scurf of the teeth. His reports also included descriptions of the microbes in rainwater (microbes in their natural habitats) and of the effects of pepper on microbes (environmental influences on microbes), thus providing not only the first descriptions of bacteria but also the first studies on microbial ecology.

The vast array and variety of activities that constitute contemporary microbiology are dominated by one practice, the study of pure or monospecies cultures. In fact, most of our knowledge of the properties and behavior of microorganisms derives from the examination of isolated simple species, a legacy of Robert Koch work. This approach, however, has distracted attention from one important fact: most microorganisms naturally inhabit environments containing more than one species of organisms.

Ecology has been the subject of a remarkable surge in interest in the last few years. Part of this increased interest has undoubtedly resulted from a greater appreciation of the critical role that microorganisms play in a wide range of environments which in turn is due to the discovery of unknown microbial processes, the finding of novel organisms, the greater understanding of biological changes of geochemical importance, and the development and application of new techniques to study microorganisms.

This textbook provides a comprehensive teaching tool designed for one-semester courses at the advanced graduated level. The organization of the book is from the basic to the applied. The book consists of 16 chapters grouped in four parts. Part I contains a short historical introduction to microbial ecology and recent studies of 16S (18S) rRNA homologies, which have revealed a fascinating story of microbial evolution and diversification along three distinct lines: Archaea, Bacteria and Eukarya. The ecology of microorganisms has changed dynamically during this evolutionary process and this has modified Earth's environment. Part II describes population interactions including interactions between microorganisms, either positive (benefit or cooperation) or negative (competition, par-

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asitism and predation). Interactions of microorganisms with plants, as well as commensal and mutualistic interactions may occur in the rhizosphere; in addition, the interaction of certain viruses, bacteria, and fungi with plants cause diseases in the latter that can result in great economic losses and even severe food shortages. Finally, interactions between microorganisms and animals are also described. While negative interactions, i.e. involving agents that cause animal disease, are perhaps the most well-known, there are also beneficial interactions, such as those of intestinal symbionts, and associations with chemoautotrophic bacteria in deep-sea thermal vent environment. Part III deals with microbial communities and ecosystems. The ecological hierarchy of microorganisms ranges from individuals to an integrated community within an ecosystem. Populations of microorganisms have functional roles (niches) within communities that permit their survival, but various abiotic factors (nutrients, temperature, salts concentration, pressure, water activity, etc.) strongly influence the ecological distribution and functioning of microbial populations. One chapter describes microorganisms in their natural habitats: water, air and soil. Another important ecological topic, discussed extensively, is the biogeochemical cycling activity carried out by microbial communities. Part IV deals with applications of microbial ecology. Preventing the deterioration of foods and materials, maintaining fertile agricultural soils, ensuring the supply of healthful drinking water, and finding acceptable means for the disposal of liquid and solid waste materials are longstanding problems of human societies that can be solved through an understanding of microbial ecology and the ability to control microbial growth and activities for the benefit of humankind. Microbial ecology can also provide us to with acceptable solutions to current problems, such as xenobiotics (compounds resistant to biodegradation) and inorganic pollutants (including pollutants due to human activities) accumulation, control of biodeterioration, water and food sanitation, soil conservation, and bioremediation.

Each chapter concludes with a summary, followed by a study-questions section and a list of references and suggested reading. The accompanying illustrations are extremely helpful in understanding a process, structure or abstraction; there are also tables that condense information discussed in the chapter. The chapters also contain ''boxes'' which highlight items of interest, such as exciting areas of research and the practical impact of microbial activities.

Ecología microbiana: Fundamentos y aplicaciones is the Spanish version of the 4th edition of *Microbial Ecology: fundamental and applications*. The text was translated by an experienced team and coordinated by Prof. R. Guerrero. Spanish and Latin American students may now further their knowledge regarding the microbial world, and especially the role of microbial organisms, how they work to maintain life on Earth and the health of the planet. Microbial ecosystems have many attractive features and provide exceptional possibilities for extending our understanding of structure and function in nature.