

Series Preface

The light of natural philosophy illuminates many subject areas including an understanding that microorganisms represent the foundation stone of our biosphere by having been the origin of life on Earth. Microbes therefore comprise the basis of our biological legacy. Comprehending the role of microbes in this world which together all species must share, studying not only the survival of microorganisms but as well their involvement in environmental processes, and defining their role in the ecology of other species, does represent for many of us the Mount Everest of science. Research in this area of biology dates to the original discovery of microorganisms by Antonie van Leeuwenhoek, when in 1675 and 1676 he used a microscope of his own creation to view what he termed “animalcula,” or the “little animals” which lived and replicated in environmental samples of rainwater, well water, seawater, and water from snow melt. van Leeuwenhoek maintained those environmental samples in his house and observed that the types and relative concentrations of organisms present in his samples changed and fluctuated with respect to time. During the intervening centuries we have expanded our collective knowledge of these subjects which we now term to be environmental microbiology, but easily still recognize that many of the individual topics we have come to better understand and characterize initially were described by van Leeuwenhoek. van Leeuwenhoek was a draper by profession and fortunately for us his academic interests as a hobbyist went far beyond his professional challenges.

It is the goal of this series to present a broadly encompassing perspective regarding the principles of environmental microbiology and general microbial ecology. I am not sure whether Antonie van Leeuwenhoek could have foreseen where his discoveries have led, to the diversity of environmental microbiology subjects that we now study and the wealth of knowledge that we have accumulated. However, just as I always have enjoyed reading his account of environmental microorganisms, I feel that he would enjoy our efforts through this series to summarize what we have learned. I wonder, too, what the microbiologists of still future centuries would think of our efforts in comparison with those now unimaginable discoveries which they will have achieved. While we study the many



Christon J. Hurst in Heidelberg

wonders of microbiology, we also further our recognition that the microbes are our biological critics, and in the end they undoubtedly will have the final word regarding life on this planet.

Indebted with gratitude, I wish to thank the numerous scientists whose collaborative efforts will be creating this series and those giants in microbiology upon whose shoulders we have stood, for we could not accomplish this goal without the advantage that those giants have afforded us. The confidence and very positive encouragement of the editorial staff at Springer DE has been appreciated tremendously and it is through their help that my colleagues and I are able to present this book series to you, our audience.

Cincinnati, OH

Christon J. Hurst

Volume Preface

Our goal as the authors of this book is to share a collective understanding that normally benign interspecies relationships do sometimes undergo changes whereby those relationships become detrimental.

Biologists have assigned a variety of definitions to each of the terms commensalism, symbiosis, and parasitism, with those definitions seeming to cross paths and disagree equally as do the biologists. We generally tend to view commensal relationships as being associations without inherent obligation, and for which there is no definable cost to any participant although some beneficial enticements can be involved. Symbionts are partners, by strict definition, with the organisms living together in a joint existence which seems more tightly involved and perhaps more mutually beneficial as compared to a commensal relationship. Symbiotic relationships often are so involved as to seem nearly obligatory for the participant species. But still, the principle assumption remains that both participants in a symbiotic association are deriving benefit from the relationship rather than receiving harm. In those cases where enticements are offered to favor the interspecies relationship, and often those enticements are nutritional, the term host may be used to help describe the major provider. Any energetic cost paid by the host to support presence of either commensal or symbiotic species presumably is outweighed by the beneficial and often protective nature of such relationships, with commensals and symbionts sometimes serving either to prevent or restrict the presence of other organisms that may be less favorably described as parasitic. Not all guests are welcome, and some initially may be considered benign but subsequently lose their welcome. The ecological definition of parasitism includes those less favorable situations that occur when a guest species obviously becomes deleterious. Thus, the dividing distinction between parasitism and these other types of interspecies relationships becomes a matter of detriment to the host.

Those microorganisms which normally might be considered either benign or even beneficial, but opportunistically become far more dangerous, very often are represented under the broad term 'opportunistic pathogens'. However, rather than simply relying upon that term as a general cliché, the purpose of this book is helping to explain the current state of knowledge regarding conditions and mechanisms

which either allow or facilitate opportunistic pathogenicity. The trigger which allows that change can come in many ways. Sometimes, the effect results from a change in the host's capacity for mounting an effective immune response due to factors such as nutritional deprivation and coinfections. At other times, virus species either may have changed the opportunist or attacked the host's protective natural microflora. Even seemingly subtle environmental changes such as the amount of available sunlight, temperature, water and air quality parameters, can be enough to trigger dramatic shifts in delicately balanced interspecies relationships. The result of those shifts can be perceived as either a temporary bonanza for the pathogen or a disaster for the host. Knowledge regarding the nature of interactions which represent opportunistic pathogenicity in any single host–guest relationship valuably may then assist us towards unlocking the mystery of opportunistic pathogenicity for yet other systems.

We hope that you, our audience, will continue to carry forward the goal and purpose of this knowledge and of these efforts.

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Cincinnati, OH

Christon J. Hurst

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Become Parasitic

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