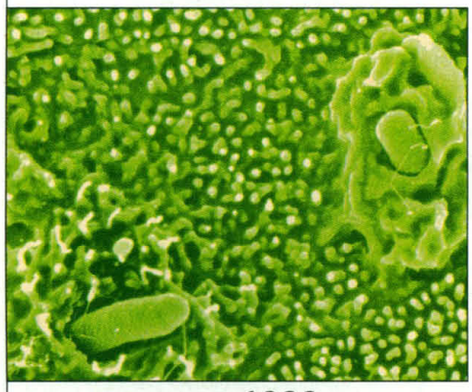
Microbe Management

Examining the volume of literature and news reports heralding therapeutic advances for microbial infections raises expectations that science is on the verge of understanding all manner of pathogenic microbes and their associated illnesses. Although advances are certainly being made, appreciation of the amazing variety and complexity of our microbial co-inhabitants continues to grow. This special issue on Microbes, Immunity, and Disease details some recent advances in understanding the microbial world.

One problem that hinders efforts to study disease-causing microbes is the inability to grow the vast majority of microbes in laboratory cultures. But as Relman explains in his Viewpoint, molecular techniques for analyzing the genetic material are providing a solution, allowing microbiologists to identify microbes directly or to infer their association with a disease from genetic "profiles" the organisms leave in infected tissues. Just identifying disease-causing microbes is not enough, however. Also needed is a public health infrastructure to respond to emerging infectious diseases such as HIV/AIDS and tuberculosis. Binder *et al.* provide a Viewpoint that details the necessary elements involved in detecting, controlling, and preventing emerging infectious diseases.



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Great strides are also being made toward understanding what makes some microbes virulent—information that could help thwart the microbes' ability to cause disease. For example, Costerton *et al.* review what is known about biofilms, matlike bacterial aggregates that are often resistant to antibiotics and have been implicated in a variety of hard-to-treat infections.

Two other articles describe bacterial secretion systems that are used to transfer virulence factors to the host's cells. Galán and Collmer survey what is known about a so-called type III secretion system that is used by bacteria as diverse as those causing food poisoning and dysentery in animals and those causing blights and wilts in plants. Covacci *et al.* review *Helicobacter pylori*, a common cause of stomach ulcers and cancers, which uses a related secretion system, type IV.

Hosts are not helpless in the face of onslaughts by microorganisms, however, and Hoffmann *et al.* describe the various components of the host's initial line of defense, "innate immunity," which includes molecules and cells set on a hair trigger to destroy microbial invaders.

And last, the News component of this special issue includes two articles. One deals with quorum sensing, a communication system that allows bacteria to coordinate their activities. The other describes how the information provided by the newly sequenced microbial genomes is confounding—rather than helping—efforts to understand microbial evolution.

Researchers have learned much about microbes and disease, but many perplexities and challenges remain. Communication and cooperation among researchers, clinicians, and public health specialists will enable further advances to be made, leading to a better understanding—and subjugation—of the microbial world.

–BEVERLY A. PURNELL AND JEAN MARX

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