

Arthur L. Koch

Arthur Koch's more than two hundred publications have dealt with both experimental and theoretical biology. If there is a problem to be solved, Arthur Koch is right there with a fresh idea and an analytical approach. He has published in the areas of biochemistry, genetics, evolution, cell biology, animal behavior, and biophysics. His research interests have certainly not been narrow! R. J. Doyle and L. Daneo-Moore have called Arthur "one of the true Renaissance scientists of the past several decades." And so he is.

Arthur's publications describe rates of metabolic processes associated with cell growth, evolution of antibiotic-resistant gene function, cellular evolution, the mechanism of gliding motility, bacterial growth and cell division, surface stress and bacterial shape, solute transport, light scattering by bacteria (a theoretical analysis), the adaptive responses of bacteria to feast and famine existence, and even problems faced by migrating sea turtles! Provocative themes abound in his work. For example, among the dozen papers he is presently completing are "Stone-Age Diseases and Modern AIDS" and "Life for a Microbe Is Almost Always Tough." Because of his many talents and wide interests he has collaborated with scientists throughout the world, and through these collaborations and his publications he has influenced the research of a great many scientists. His publications have been widely cited. In the past nine years alone there have been close to eight hundred citations.

One of Arthur's most prominent achievements is his surface stress theory, which describes how surface-tension-like forces determine bacterial shape, and how bacterial cell walls can grow and yet still maintain the cell's integrity in the face of huge internal water pressures (turgor pressure). His theoretical analysis of cell-wall growth is based on equations developed by D'Arcy Wentworth Thompson in 1917. The surface stress theory applies not only to cell shape and growth, but also to the regulation of the activities of certain classes of enzymes in bacterial cell membranes (autolysins), the problem of how bacteria maintain a constant wall thickness, the method that a bacterium uses to segregate its newly divided chromosomes to daughter cells, flagellar movement, and gliding motility. "Koch has provided the only serious work to explain the morphologies of bacteria first described by van Leeuwenhoek over three hundred years ago" (Doyle and Daneo-Moore).

Arthur has recently written a book, *Bacterial Growth and Form*, that summarizes his ideas on the numerous aspects of microbiology that have fascinated him for a lifetime. In the preface he writes, "My most important goal in writing the book is to make accessible the relevant thinking from fields of science other than microbiology that are important to microbiology." This perhaps sums up Arthur's career quite well. He has been foremost a teacher who has expanded the perspective of microbiologists and helped to provide a theoretical basis for understanding important microbiological phenomena that have occupied their interest. Put more simply, he has helped and encouraged many in their research.

Arthur served in the U.S. Navy in the Pacific theater during World War II. After the war he completed a B.S. degree in chemistry at the California Institute of Technology. He then went on to earn a Ph.D. in biochemistry from the University of Chicago in 1951. From 1951 to 1956 he was an associate scientist at the Argonne National Laboratory. Arthur was a faculty member in biochemistry in the University of Florida's College of Medicine from 1956 to 1967, when he came to the microbiology department (now the biology department) at Indiana University to conduct research and to teach. At Indiana University he has taught courses in cell and microbial biology at both the undergraduate and graduate levels, as well as in human genetics for nonmajors. He has supervised four master's theses and seven doctoral dissertations.

During his tenure at Indiana University, Arthur has presented over one hundred invited seminars at university and industrial laboratories and at scientific meetings throughout North America and in nearly every country in Europe. He has won numerous awards, including a Guggenheim fellowship, a Rockefeller Scholar award, a Wellcome research travel grant, and a U.S. Public Health Service award.

A profile of Arthur Koch would be incomplete without reference to his broad interests in and support of various nonscientific events that take place in Bloomington. Whether it be a concert in the park, an exhibit at the Waldron, a seminar, a play, or a dance performance in the auditorium, there is a good chance we will run into Arthur. This interest in and exploration of all things, both scientific and nonscientific, reflect his humanistic as well as his scientific nature.

David White
Gene Weinberg