Biology Past and Biology Future: Where Have We Been and Where Are We Going?

Bruce Alberts
UCSF MC 2200, Genentech Hall Room N312, 600-16th Street, San Francisco, CA 94158-2517

OUR view of the chemistry of life has changed dramatically over the course of the past 40 years. At any moment of time, we have always vastly underestimated the sophistication of cellular mechanisms, and it is certain that we still have an enormous number of surprises ahead of us. This is therefore an exciting and challenging time to be a biological scientist, and there are enormous opportunities for discovery.

My role in writing or revising a cell biology textbook every five years since 1980 provides a useful perspective. From our work on the 5th edition of The Molecular Biology of the Cell, I shall discuss some of the challenges created by three quite recent surprises:

1) The recognition that positive and negative feedback loops underlie nearly all of cell chemistry.

2) The recognition that extensive scaffold networks produce biochemical sub-compartments in the cell, without requiring a membrane.

3) The recognition of the enormous numbers of functional DNA sequences in the human genome that do not encode proteins.