SCIENCE

22 DECEMBER 1989
VOLUME 246
NUMBER 4937

The Molecule of the Year

Historians tend to personalize history. They use political leaders to symbolize war or peace, freedom or slavery, abundance or starvation. Political systems represented by these individuals may be essential, but political leaders cannot cure disease without medicine, cannot improve crops without fertilizer, and cannot encourage the literacy on which democracy depends without communications technology. The great advances of the past have been profoundly influenced by science and technology, and our present standard of living depends on them. Political systems can be designed to encourage advances in science and are essential to the fair distribution of its products. Wealth must be created before it can be distributed.

Sometimes, in the rush of daily events and the ease of describing personalities instead of analyzing issues, the fundamental causes of progress can be obscured. To symbolize that scientific progress and to honor the structure that creates it, *Science* has decided to name a Molecule of the Year. The molecule will symbolize a discovery or technique that may actually involve many molecules, but the award will be singular to force us to choose one such discovery each year that is likely to have the greatest influence on history. We will not require that the initial discovery has to be made in the year of the award because many discoveries are not recognized immediately or require refinement for optimum value. The award will, however, reflect the fact that the particular discovery has reached in the year of the award a stage of development and understanding sufficient to establish its long-term significance.

This year's award goes to the DNA polymerase molecule and to the technique called polymerase chain reaction. PCR, as it is called, has developed into one of the most powerful tools of modern biology since its discovery several years ago, and its applications are burgeoning. One of its first applications allowed an Indian mother to establish the identity of her son for immigration purposes. It has this year served as the basis for making human antibodies in a bacterium. It is revolutionizing the approaches researchers are taking to many problems in biology. Other properties and potentials of PCR are discussed in the section that follows, as are many other discoveries that could easily have been chosen in a year that has seen major advances of science in almost every discipline.

Some who look into the mirror darkly see the waste disposal problem and forget the great numbers of people alive today, see the pesticide problem and forget the availability of food to many, or see the acid rain problem and forget the popularity of the automobile. Each widely adopted technical advance generates new problems that themselves cry out for technical solutions. The problems are real. So, is this progress?

To answer that question I propose a simple objective test: the era swap experiment. Each person could choose to be transported back to some previous time but only on condition that he or she adopt all the features and restrictions of that era. In the 1800s, for example, the globe was less crowded, the air was clearer, the water cleaner, and there were no plastics. However, life expectancy was half of what it is today, transportation was by horseback or on foot, and medical operations were performed without anesthetics. Even a few years ago a high proportion of women died in childbirth, and pneumonia was one of the major causes of death for middle-aged people. Faced with such realities, who would choose to live even a few years in the past?

Our Molecule of the Year is a symbol that we are honoring the process of progress rather than a personality. Most of the discoveries of science (and probably much of political history) result from the actions of many individuals, one of whom may contribute slightly more than others. Each person who moves the discovery one step further contributes to the benefit of all. Science is an international enterprise; its practitioners and those who benefit from the knowledge it creates are located throughout the world. The new knowledge—which translates into living standards—can be used for good or evil, can be distributed fairly or unfairly. The challenge to science is to generate the new discoveries. The challenge to society is to use those discoveries for the betterment of all.—DANIEL E. KOSHLAND, JR.