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The Epidemiology Issue

The word "epidemic" conjures up a picture of the Black Death sweeping across Europe in the 14th century. That epidemic is estimated to have reduced the population by a fourth and destroyed economies and village life. Ironically, the disease was so devastating that it also stopped wars, lowered rents, and brought some fluidity to an ossified society. Epidemics in the Middle Ages were often facilitated by unsanitary water conditions, insect or animal vectors, and such human contacts as sneezing and sexual intercourse. Improved sanitation has made it possible to protect water supplies. Knowledge of insect and animal vectors and the use of insecticides have vastly reduced the second major route for spreading disease, and human interchange can be localized in the modern world. Thus the threat of another epidemic like the Black Death seems unlikely. Nevertheless, the ancient dangers still exist in much of the developing world, and new varieties of epidemics occur in the developed world. Epidemics may threaten a smaller fraction of the total population than in the past, but the increased world population today means large numbers of people are affected. This issue of *Science* focuses on some recent problems in widespread diseases and modern techniques for combating old enemies.

In the first article, Roger Glass discusses the basis of the new epidemiology, now defined more broadly to include all the major causes of death. In the traditional way of accounting for leading causes of death in the United States, heart disease and cancer are in first and second place, with practically no other cause in the same quantitative category. However, if one looks only at the causes of premature death ("premature" meaning any death before age 65), the list becomes unintentional injuries, cancer, heart disease, and violence (suicide and homicide), in that order.

AIDS is an epidemic in the classical tradition, affecting only a small fraction of the population at present, but growing steadily. It is already a major health problem, and it clearly figures in the premature death category. In this country its transmission has been identified predominantly with homosexual males and drug users, but Quinn, Mann, Curran, and Piot point out that, in Africa, AIDS is linked predominantly to heterosexual practices. The reasons for the difference are significant and may be important in helping prevent the spread of this quite terrifying disease.

A modern twist on an ancient battle is the emergence of drug-resistant bacteria. As one strategy in the unending warfare between the species, humans abandoned boiled water and developed antibiotic missiles. The bacteria then initiated a strategic defense based on an impenetrable—or almost impenetrable—shield of antibiotic resistance. As described by Cohen and Tauxe, this battle has been complicated by the widespread use of antibiotics in food animals, which has, in turn, led to new strains of *Salmonella* now resistant to the drugs needed to treat human infection.

Drug abuse would not have been considered a disease in ancient times, but the current widespread use and increasing number of innocent victims clearly justify study in epidemiologic terms. Kozel and Adams report that peak marijuana use among high school seniors occurred in 1978 when the perception of risk was low (35 percent saw great risk from regular use). Use in 1985 has declined significantly when the perceived risk has risen to 70 percent. Thus education campaigns can diminish drug abuse.

Classical epidemics exist today in the less wealthy tropical countries. Malaria is endemic—annual acute cases numbering about 100 million—in areas inhabited by 365 million people. Controlling it and the less prevalent leishmaniasis is hampered by difficulties in culturing the organism and laborious diagnoses. Wirth and her co-authors describe the development of DNA probes, which make it possible to diagnose directly from lesion tissue, a great advance.

The evolution of the science of epidemiology is probably no more dramatically illustrated than by comparing the topics in this issue with those that might have been funded by a Disease Control Foundation in the Middle Ages. They would illustrate how far we have come, not only in saving lives, but also in elevating the human spirit because the ravages of the Middle Ages generated mysticism, xenophobia, and prejudice. We have our problems today, but at least we are not burning witches to stop the spread of disease.

—DANIEL E. KOSHLAND, JR.