STAPHYLOCOCCUS AUREUS: THE KING OF RESISTANT BACTERIA

The most alarming of resistant bacteria, in either farm or hospital, has been *Staphylococcus aureus.* Over the past decades, this particular staph species has learned resistance to one antibiotic after another. (Several researchers believe [and have demonstrated *in vitro* to prove their point] that *S. aureus* learned resistance from benign *E. coli* in the human gut.) Not so long ago, staph was still susceptible to two antibiotics: methicillin and vancomycin. Inevitably, methicillin-resistant staph (MRSA) emerged. Physicians and researchers were worried but tried to hold the line, to stop any further adaptation by *S. aureus.* Given the nature of bacteria, they were doomed to failure; on August 2, 1998 *The New York Times* reported the first four world cases of vancomycin-resistant staph. There are *no* antibiotics that can successfully treat vancomycin-resistant *S. aureus.* On December 28, 1998, *USA Today* reported that in response, physicians and hospitals in Washington, D.C., were being urged to severely reduce or cease their use of vancomycin. It is hoped that thereby the bacteria will "forget" how to resist the drug, and it can thus be saved for use to protect the nation's capital in the event of severe epidemic.

Bacteria learn resistance in an inexorable exponential growth curve, and using mathematical modeling researchers had predicted with uncanny accuracy, almost to the month, when vancomycin-resistant staph would appear. It will now proceed into the general population of the world at that same exponential rate. Though scientists hope to stop it, there is in actuality little they can do. Stuart Levy observes that "some analysts warn of present-day scenarios in which infectious antibiotic-resistant bacteria devastate whole human populations."

We do in fact have a serious problem. We have meddled with the microbial world and created bacteria more tenacious and virulent than any known before. They will have effects on both the ecosystem and the human population that can only be guessed at. What is sure, however, is that the antibiotic era is over. The degree and rate of bacterial evolution is so extreme that new antibiotics (of which few are being developed) generate resistance in only a few years instead of the decades that it took previously. It is a frightening future. But there are rays of hope.