

in animals and man, their R plasmids, and human pathogens form a linked ecosystem of their own in which action at any one point can affect every other." So wherever pathogenic bacteria encounter the regular use of antibiotics, they learn, and adapt, and become resistant.

Places of Transmission

The worst offenders of antibiotic overuse have been hospitals, and it is here that the majority of bacteria have learned resistance and entered the general population. Many of the bacteria have learned to be population specific. In hospitals, resistant bacteria such as enterococcus, *Pseudomonas*, *Staphylococcus*, and *Klebsiella* take advantage of surgical procedures to infect surgical wounds or the blood (bacteremia). Some, such as *Haemophilus*, *Pseudomonas*, *Staphylococcus*, *Klebsiella*, and *Streptococcus*, cause severe, often untreatable pneumonia (especially in elderly patients in hospitals or nursing homes). *Haemophilus* and *Streptococcus* also cause serious ear infections (usually in day care centers), sometimes leading to meningitis. *Pseudomonas* and *Klebsiella* also cause serious urinary tract infections (usually in hospital patients and female nurses, who then spread them to the general population). Tuberculosis, long thought conquered, is increasingly resistant and is occurring more and more frequently in places where large numbers of people are confined for long periods of time, such as prisons and homeless shelters, and in large cities. Gonorrhea has emerged as a potent resistant disease throughout the world, learning resistance in brothels in Vietnam among prostitutes who were regularly given antibiotics. Malaria, spread by mosquitoes and usually considered a disease of the tropics, learned resistance in crowded Asia and is making inroads in the United States in such unlikely places as Minnesota and New York. Malaria, in fact, is becoming so serious a problem in the United States that in August 1997, the *Atlantic Monthly* featured an article on the disease as its lead cover story. But still other resistant bacteria have entered the human disease picture from a different and nonhuman source: huge agribusiness factory farms.