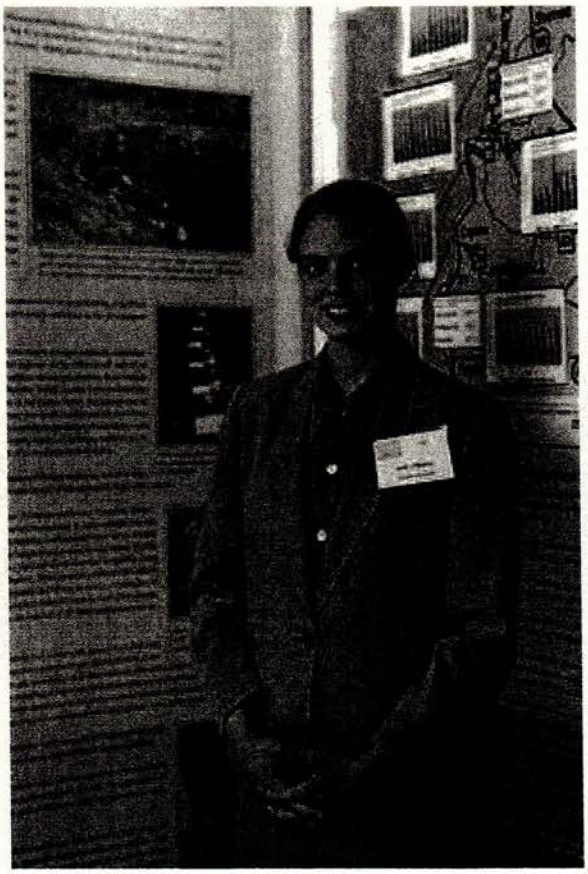
2000

Ashley Mulroy, USA

Correlating Residual Antibiotic Contamination in Public Water to the Drug-Resistance of *Escherichia coli*

Click here to see RealPlayer video from the 2000 SJWP Ceremony. (2106 KB)



Once controlled by medical science, microbes have reemerged as agents of infectious diseases, evolving into drug-resistant pathogens that threaten to overpower all but the newest and strongest antibiotic drugs. It is not that science's allies, the antibiotics, are weakening, but that the bacteria have become stronger. Misuse and overuse of the pharmaceuticals are usually cited as culprits when acquired resistance becomes an issue. However, documentation of antibiotics present in lake water in Berlin, Ohio, and other sites raises the question whether widespread environmental antibiotic contamination contributes to the development of drug-resistant pathogens.

In her study, Ashley found the presence of three antibiotics, Penicillin, Tetracycline and Vancomycin, in trace levels in five Ohio River sites, two tributary sites and in drinking water in three municipalities adjacent to the river. She determined that filtration of the drug-contaminated water through activated charcoal removed most of the antibiotics, but filtration through sand, the most common wastewater filtration method used, did not remove any of the three antibiotics from water samples. *E. coli*, common bacteria, which was isolated from each of the seven outdoor sites, demonstrated resistance to the antibiotics with which it formerly coexisted in nature. This resistance was proportional to the antibiotic concentration present at each water site.

This issue becomes more complex considering that bacteria easily exchange genetic material. A relatively harmless bacteria living at the

water's edge could easily be transported - by human, animal or mechanical means - to a site into which it comes into contact with, and transfers its acquired resistance to, a potentially deadlier pathogen. The contact and transference of acquired resistance between nonpathogens and pathogens becomes more likely as drug-resistant microbes become common to our daily habitat.

Ashley's study called for judicious distribution and use of existing, as well as new, pharmacology. She also points out that the failure to do so could perpetuate the condition in which pervasive, low-level antibiotic contamination would provide just the right environment in which the world's microbes actively train to outpace new antimicrobial drug development.

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