

# Stamping Out Syphilis

## Can the United States finally vanquish this sexually transmitted disease?

By KATHLEEN FACKELMANN

Federal health officials have targeted an age-old enemy: *Treponema pallidum*, the spiral bacterium that causes syphilis. U.S. health officials have declared war on syphilis before, but this time the battle may be winnable. The Scandinavian countries have already conquered the disease.

In the July 17 *SCIENCE*, Michael E. St. Louis and Judith N. Wasserheit of the Centers for Disease Control and Prevention (CDC) in Atlanta argue that now is the time to eliminate syphilis from the United States. Although the disease has been beaten back to an all-time low of just 3.2 cases per 100,000 people, that statistic doesn't adequately convey the threat that syphilis still poses, the researchers say. Only a decade ago, the number of cases spiked to 20 cases per 100,000 people, and it could rise again.

A recent scientific advance promises to speed up the work on a vaccine. Public health workers, however, do not plan to wait for vaccine development.

The currently low incidence of syphilis represents "a small window of opportunity that we cannot [afford to] lose," says Charlie Rabins, chief of the sexually transmitted disease section of the Illinois Department of Public Health in Springfield.

Like a forest fire that continues to smolder in a few isolated areas, syphilis remains a threat in the southeastern United States and some urban areas. CDC officials note that in 1997, just 31 U.S. counties reported more than 50 percent of all syphilis cases. If left unchecked, those pockets of disease could ignite a public health disaster.

"We're sitting on a potentially massive bonfire," St. Louis warns.

In the 1940s and again in the 1960s, public health programs substantially reduced syphilis rates in the United States but failed to eliminate the disease. Untreated, syphilis can lead to fatal heart disease and brain damage. Now, the AIDS epidemic is lending additional urgency to defeating syphilis.

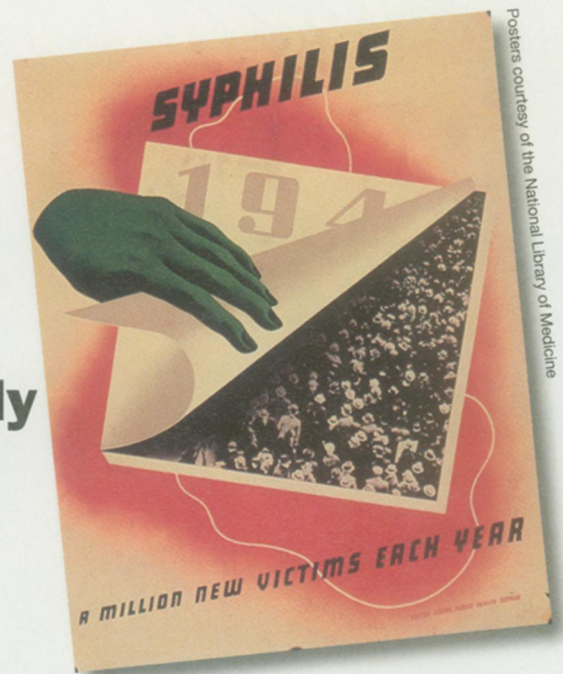
People with sexually transmitted diseases face a greater threat of contracting HIV, the virus that causes AIDS, says Edward W. Hook III, who studies sexually transmitted diseases at the University of Alabama at Birmingham. Infection with *T. pallidum* causes an ulcerlike sore, called a chancre, on the genitals. Because that wound can serve as a portal of entry or exit for HIV, someone infected with syphilis can more easily contract HIV infection and also readily pass the deadly virus on

to another person.

Indeed, researchers have noticed a number of links between syphilis and HIV infection. For example, the outbreak of syphilis in the southeastern United States contributed to the spread of HIV in that region, according to CDC research.

"We now have evidence that HIV transmission, particularly heterosexual HIV transmission across the South and in a few large cities, essentially echoes the syphilis epidemic of the late 1980s and early 1990s," Wasserheit says.

A syphilis outbreak that hit Baltimore in 1995, and continues to spread, also shows



Posters courtesy of the National Library of Medicine

Posters show how U.S. health officials have targeted syphilis throughout the decades. This time, the CDC wants to finish the job.

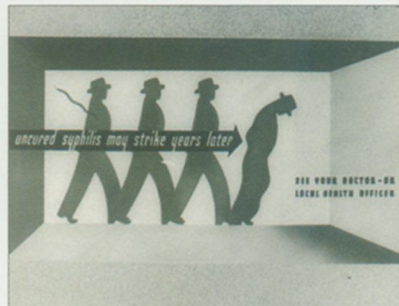
deadly ties with HIV. People in inner-city Baltimore who have been diagnosed with syphilis have a one-in-five chance of being infected with HIV, says Jonathan M. Zenilman of Johns Hopkins Medical Institutions in Baltimore. That's about four times the incidence found even in the high-risk group of people treated in clinics for a variety of sexually transmitted diseases, he says.

Aside from the AIDS concern, researchers note that a pregnant woman infected with syphilis can pass the disease to her fetus. During the most recent syphilis epidemic, from 1987 to 1993, 3,000 U.S. infants were born with this disease per year. Babies with syphilis can die from the infection or suffer blindness or lifelong neurological problems, St. Louis says.

At first glance, syphilis seems like an ideal candidate for elimination. The spirochete that causes the disease lives only in humans. The relatively long incubation period means that public health workers have enough time to identify potentially infected sexual partners before symptoms appear and provide them with injections of penicillin or other antibiotics.

Although antibiotics cure the infection, public health experts remain cautious about their chances of abolishing syphilis in the United States. "The most important barriers to eliminating syphilis are not biomedical," Wasserheit says.

To appreciate the difficulty of the task, consider that most people don't even want to talk about syphilis, colloquially known as bad blood or the pox. "As a society, we









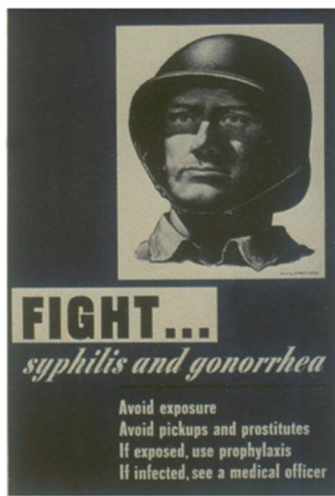
crack cocaine, the practice of exchanging sex for drugs, and the breakdown of the public health system.

The report notes that the number of city health workers charged with the notification of sex partners of infected people has declined from 14 to 8 during the syphilis epidemic.

An epidemic, like that in Baltimore, of this easily treatable disease is a "sentinel public health event," Wasserheit says. "It means that the system is not functioning adequately."

Indeed, parts of the United States resemble less developed countries when it comes to sexually transmitted diseases. "We have to begin to address the question of why sexually transmitted diseases are 5 to 15 times higher in our nation than in any other developed country on Earth," Hook says. "In Scandinavia, the only way that people get syphilis is by leaving their country," he says.

Hook looked at the scope of sexually transmitted diseases in the United States as part of a committee appointed by the National Academy of Sciences' Institute of Medicine in Washington, D.C. In a 1997



report, that group concluded that an effective national system for preventing sexually transmitted diseases does not exist in the United States. The report estimates the direct and indirect costs associated with sexually transmitted diseases other than HIV infection at about \$10 billion a year. It called sexually transmitted diseases "hidden epidemics of tremendous health and economic consequences."

**A** recent scientific advance may help pave the way toward CDC's goal of syphilis elimination. In July, Claire M. Fraser of the Institute for Genomic Research in Rockville, Md., and her colleagues reported the genetic sequence of *T. pallidum* (SN: 8/1/98, p. 79). With the blueprint for the molecular secrets of this bacterium in hand, researchers finally may be able to develop a vaccine against syphilis, Wasserheit says.

Scientists have been unable to create a vaccine in large part because they haven't found a way to culture *T. pallidum* in the laboratory. The spirochete can only be

grown in mammals, usually rabbits, which makes it difficult to study, says St. Louis.

A vaccine for syphilis would go a long way toward stamping out the disease. "Public health disease eradication has never been successful without a vaccine," Hook says.

In addition to facilitating a vaccine, the genetic sequence of *T. pallidum* may also help medical investigators track a syphilis epidemic, St. Louis notes. Researchers could distinguish, or type, different strains of syphilis and use the information to trace an infection back to its origin. Now, investigators must ask each patient to recall recent sexual partners, a process that is often fraught with poor memory.

"You can almost never connect all the dots in these outbreaks," St. Louis says. With genetic typing, researchers might be able to quickly track an emerging syphilis flare-up, he says.

**P**ublic health experts argue that there may never be a better time to launch a strike against syphilis. "In 1997, 85 percent of new syphilis cases were in just 6 percent of counties," says Wasserheit. "That means we can go in in a very targeted way and focus our efforts."

"CDC is demonstrating a level of commitment that hasn't been seen in the past," Hook says. Previously, he notes, funding was cut when the national syphilis rates dropped to low levels, an error that may have led to more outbreaks of this disease.

CDC is vowing to correct the mistakes of the past. The agency has proposed that Congress set aside \$25 million per year for 5 years to help with the effort to erase syphilis.

Wasserheit notes that the federal government plays only one part in the campaign to achieve victory over *T. pallidum*. "At the federal level, we can try to help lead the charge, but the commitment will have to be at the state and local level," she says.

Baltimore is a case in point. "There has to be a serious commitment to looking at public health in this city," Zenilman says. "Eradication is not on the horizon here."

What happens if the move to quash syphilis in the U.S. fails? "The alternative to moving to elimination now is the resurgence of another epidemic of syphilis with its attendant consequences," Wasserheit says. History suggests that without a strong control program, syphilis breaks out every 7 to 10 years, Rabins adds.

"This disease is not going to sit still while we decide whether or not we really want to deliver a good knockout blow," Wasserheit says.

## Another infection rages silently in young adults

Two new studies highlight the importance of another sexually transmitted disease. Caused by the bacterium *Chlamydia trachomatis*, this infection is common among teens and young adults.

Public health officials say there are more than 4 million new cases of chlamydia diagnosed each year—making it the most common infectious disease in the United States. Most infected people experience no symptoms. If left untreated, however, the disease can cause serious problems. Women can suffer from pelvic infections that lead to infertility.

In the past, a pelvic exam was required to diagnose the disease. However, in the mid-1990s, a highly accurate urine test for the infection became readily available. Thomas C. Quinn of the National Institute for Allergy and Infectious Diseases in Bethesda, Md., and the Johns Hopkins University in Baltimore and his colleagues used the test to study the prevalence of *C. trachomatis* in young women.

The team gave some 13,000 female Army recruits a urine test that relies on a polymerase chain reaction to home in on and make copies of the DNA of *C. trachomatis*. The scientists found that nearly one out of 10 recruits was infected with chlamydia. The disease was particularly prevalent in recruits from the southern states. The team details its findings in the September 10 *NEW ENGLAND JOURNAL OF MEDICINE*.

Another study by the same group discovered an alarmingly high rate of chlamydia infection among teenagers in Baltimore. The researchers tested more than 3,000 females, ages 12 through 19, who said they were sexually active. Some of the subjects had visited a family planning clinic, and others had gone to the school nurse for an unrelated health concern. None had symptoms of any sexually transmitted disease.

Twenty-four percent of the teens had a positive urine test for chlamydia. Sexually active 14-year-olds had the highest chlamydia rates. The team reports its findings in the Aug. 12 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*.

Quinn urges regular chlamydia testing for all sexually active teenagers. Without such a test, this silent disease may lead to an epidemic of pelvic inflammatory disease and infertility in years to come, he says.

Unlike those fighting syphilis, public health researchers trying to control the burgeoning chlamydia infections are nowhere near the point where they can talk about eliminating the bacterium. "We've got a long way to go," Quinn says.

—K. Fackelmann

