

AIDS in Historical Perspective: Four Lessons from the History of Sexually Transmitted Diseases

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Introduction

It has become abundantly clear in the first six years of the AIDS (acquired immunodeficiency syndrome) epidemic that there will be no simple answer to this health crisis. The obstacles to establishing effective public health policies are considerable. AIDS is a new disease with a unique set of public health problems. The medical, social, and political aspects of the disease present American society and the world community with an awesome task.

The United States has relatively little recent experience dealing with health crises. Since the introduction of antibiotics during World War II, health priorities shifted to chronic, systemic diseases. We had come to believe that the problem of infectious, epidemic disease had passed—a topic of concern only to the developing world and historians.

In this respect, it is not surprising that in these first years of the epidemic there has been a desire to look for historical models as a means of dealing with the AIDS epidemic. Many have pointed to past and contemporary public health approaches to sexually transmitted diseases (STDs) as important precedents for the fight against AIDS.¹ And indeed, there are significant similarities between AIDS and other sexually transmitted infections which go beyond the mere fact of sexual transmission. Syphilis, for example, also may have severe pathological effects. In the first half of the twentieth century, it was both greatly feared and highly stigmatized. In light of these analogues, the social history of efforts to control syphilis and other STDs may serve to inform our assessments of the current epidemic.

But history holds no simple truths. AIDS is not syphilis; our responses to the current epidemic will be shaped by contemporary science, politics, and culture. Yet the history of disease does offer an important set of perspectives on current proposals and strategies. Moreover, history points to the range of variables that will need to be addressed if we are to create effective and just policies.

In these early years of the AIDS epidemic, there has been a tendency to use analogy as a means of devising policy. It makes sense to draw upon past policies and institutional arrangements to address the problems posed by the current crisis. But we need to be sophisticated in drawing analogues; to recognize not only how AIDS is like past epidemics, but the precise ways in which it is different. This article draws four "lessons" from the social history of sexually transmitted disease in the United States and assesses their relevance for the current epidemic.

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Lesson #1—Fear of disease will powerfully influence medical approaches and public health policy

The last years of the nineteenth century and first of the twentieth witnessed considerable fear of sexually transmitted infection, not unlike that which we are experiencing today. A series of important discoveries about the pathology of syphilis and gonorrhea had revealed a range of alarming pathological consequences from debility, insanity, and paralysis, to sterility and blindness. In this age of antibiotics, it is easy to forget the fear and dread that syphilis invoked in the past.

Among the reasons that syphilis was so greatly feared was the assumption that it could be casually transmitted. Doctors at the turn of the twentieth century catalogued the various modes of transmission: pens, pencils, toothbrushes, towels and bedding, and medical procedures were all identified as potential means of communication.² As one woman explained in an anonymous essay in 1912:

At first it was unbelievable. I knew of the disease only through newspaper advertisements [for patent medicines]. I had understood that it was the result of sin and that it originated and was contracted only in the underworld of the city. I felt sure that my friend was mistaken in diagnosis when he exclaimed, "Another tragedy of the public drinking cup!" I eagerly met his remark with the assurance that I did not use public drinking cups, that I had used my own cup for years. He led me to review my summer. After recalling a number of times when my thirst had forced me to go to the public fountain, I came at last to realize that what he had told me was true.³

The doctor, of course, had diagnosed syphilis. One indication of how seriously these casual modes of transmission were taken is the fact that the US Navy removed doorknobs from its battleships during World War I, claiming that they had become a source of infection for many of its sailors. We now know, of course, that syphilis cannot be contracted in these ways. This poses a difficult historical problem: Why did physicians believe that they could be?

Theories of casual transmission reflected deep cultural fears about disease and sexuality in the early twentieth century. In these approaches to venereal disease, concerns about hygiene, contamination, and contagion were expressed, anxieties that reflected a great deal about the contemporary society and culture. Venereal disease was viewed as a threat to the entire late Victorian social and sexual system, which placed great value on discipline, restraint, and homogeneity. The sexual code of that era held that sex would receive social sanction only in marriage. But the concerns about venereal disease and casual transmission also reflected a pervasive fear of the urban masses, the growth of the cities, and the changing nature of familial relationships.⁴

Today, persistent fears about casual transmission of AIDS reflect a somewhat different, yet no less significant, social configuration. First, AIDS is strongly associated with behaviors which have been traditionally considered deviant. This is true for both homosexuality and intravenous drug use. After a generation of growing social tolerance for homosexuality, the epidemic has generated new fears and heightened old hostilities. Just as syphilis created a disease-oriented

xenophobia in the early twentieth century, AIDS has today generated a new homophobia. AIDS has recast anxiety about contamination in a new light. Among certain social critics, AIDS is seen as "proof" of a certain moral order.

Second, fears are fanned because we live in an era in which the authority of scientific expertise has eroded. This may well be an aspect of a broader decline in the legitimacy of social institutions, but it is clearly seen in the areas of science and medicine. Despite significant evidence that HIV (human immunodeficiency virus) is not casually transmitted, medical and public health experts have been unable to provide the categorical reassurances that the public would like. But without such guarantees, public fear has remained high. In part, this reflects a misunderstanding of the nature of science and its inherent uncertainty. While physicians and public health officials have experience tolerating such uncertainty, the public requires better education in order to effectively evaluate risks.^{5,6}

Third, as a culture, we Americans are relatively unsophisticated in our assessments of relative risk. How are we to evaluate the risks of AIDS? How shall social policy be constructed around what are small or unknown risks? The ostracism of HIV-infected children from their schools in certain locales, the refusal of some physicians to treat AIDS patients, job and housing discrimination against those infected (and those suspected of being infected) all reveal the pervasive fears surrounding the epidemic. Clearly, then, one public health goal must be to address these fears. Addressing such fears means understanding their etiology. They originate in the particular social meaning of AIDS—its "social construction." We will not be able to effectively mitigate these concerns until we understand their deeper meaning. The response to AIDS will be fundamentally shaped by these fears; therefore, we need to develop techniques to assist individuals to distinguish irrational fears of AIDS from realistic and legitimate concerns. In this respect, many have focused on the need for more education.

Lesson #2—Education will not control the AIDS epidemic

Early in the twentieth century, physicians, public health officials, and social reformers concerned about the problem of syphilis and gonorrhea called for a major educational campaign.⁷ They cogently argued that the tide of infection could not be stemmed until the public had adequate knowledge about these diseases, their mode of transmission, and the means of prevention. They called for an end to "the conspiracy of silence"—the Victorian code of sexual ethics—that considered all discussion of sexuality and disease in respectable society inappropriate. Physicians had contributed to this state of affairs by hiding diagnoses from their patients and families, and upholding what came to be known as the "medical secret." One physician described the nature of the conventions surrounding sexually transmitted diseases:

Medical men are walking with eyes wide open along the edge of despair so treacherous and so pitiless that the wonder can only be that they have failed to warn the world away. Not a signboard! Not a caution spoken above a whisper! All mystery and seclusion . . . As a result of this studied propriety, a world more full of venereal infection than any other pestilence.⁸

Prince Morrow, the leader of the social hygiene movement, the antivereal disease campaign, concluded, "Social sentiment holds that it is a greater violation of the properties of

life publicly to mention venereal disease than privately to contract it."⁹

During this period, the press remained reticent on the subject of sexually transmitted infections, refusing to print accounts of their effects. Reporters employed euphemisms such as "rare blood disorder," when forced to include a reference to a venereal infection. Nevertheless, magazines and newspapers did accept advertisements for venereal nostrums and quacks. In 1912, the US Post Office confiscated copies of birth control advocate Margaret Sanger's *What Every Girl Should Know*, because it considered the references to syphilis and gonorrhea "obscene" under the provisions of the Comstock law.⁴

Enlightened physicians vigorously called for an end to this hypocrisy. "We are dealing with the solution of a problem," explained Dr. Egbert Grandin, "where ignorance is *not* bliss but is misfortune, and where, therefore, it is folly not to be wise."¹⁰ Social reformers viewed education and publicity as a panacea; forthright education would end the problem of sexually transmitted infection. If parents failed to perform their social responsibilities and inform their children, then the schools should include sex education. By 1919, the US Public Health Service endorsed sex education in the schools, noting, "As in many instances the school must take up the burden neglected by others."¹¹ By 1922, almost half of all secondary schools offered some instruction in sex hygiene.

Educational programs devised by the social hygienists emphasized fear of infection. Prince Morrow, for example, called fear "the protective genius of the human body." Another physician explained, "The sexual instinct is imperative and will only listen to fear." Margaret Cleaves, a leading social hygienist, argued, "There should be taught such disgust and dread of these conditions that naught would induce the seeking of a polluted source for the sake of gratifying a controllable desire."¹²

In this sense, educational efforts may have actually contributed to the pervasive fears of infection, to the stigma associated with the diseases, and to the discrimination against its victims. Indeed, educational materials produced throughout the first decades of the twentieth century emphasized the inherent dangers of all sexual activity, especially disease and unwanted pregnancy. In this respect, such educational programs, rather than being termed sex education were actually anti-sex education. Pamphlets and films repeatedly emphasized the "loathesome" and disfiguring aspects of sexually transmitted disease; the most drastic pathological consequences (insanity, paralysis, blindness, and death); as well as the disastrous impact on personal relations.

This orientation toward sex education reached its apogee during World War I, when American soldiers were told, "A German bullet is cleaner than a whore." Despite their threatening quality, these educational programs did not have the desired effect of reducing the rates of infection. And indeed, sexual mores in the twentieth century have responded to a number of social and cultural forces more powerful than the fear of disease.

There are, nonetheless, some precedents for successful educational campaigns. During World War II, the military initiated a massive educational campaign against sexually transmitted disease. But unlike prior efforts, it reminded soldiers that disease could be prevented through the use of condoms, which were widely distributed. The military program recognized that sexual behaviors could be modified, but

that calls for outright abstinence were likely to fail. Given the need for an efficient and healthy army, officials maintained a pragmatic posture that separated morals from the essential task of prevention. As one medical officer explained, "It is difficult to make the sex act unpopular."¹³

Today, calls for better education are frequently offered as the best hope for controlling the AIDS epidemic. But this will only be true if some resolution is reached concerning the specific content and nature of such educational efforts. The limited effectiveness of education which merely encourages fear is well-documented. Moreover, AIDS education requires a forthright confrontation of aspects of human sexuality that are typically avoided. To be effective, AIDS education must be explicit, focused, and appropriately targeted to a range of at-risk social groups. As the history of sexually transmitted diseases makes clear, we need to study the nature of behavior and disease. If education is to have a positive impact, we need to be far more sophisticated, creative, and bold in devising and implementing programs.

Education is not a panacea for the AIDS epidemic, just as education did not solve the problem of other sexually transmitted diseases earlier in the twentieth century. It is one critical aspect of a fully articulated program. As this historical vignette makes clear, we need to be far more explicit about what we mean when we say "education". Certainly education about AIDS is an important element of any public health approach to the crisis, but we need to substantively evaluate a range of educational programs and their impact on behavior for populations with a variety of needs.

Because the impact of education is unclear and the dangers of the epidemic are perceived as great (see lesson #1), there has been considerable interest in compulsory public health measures as a primary means of controlling AIDS.

Lesson #3—Compulsory public health measures will not control the epidemic

Given the considerable fear that the epidemic has generated and its obvious dangers, demands have been voiced for the implementation of compulsory public health interventions. The history of efforts to control syphilis during the twentieth century indicates the limits of compulsory measures which range from required premarital testing to quarantine of infected individuals.

Next to programs for compulsory vaccination, compulsory programs for premarital syphilis serologies are probably the most widely known of all compulsory public health measures in the twentieth century United States. The development of effective laboratory diagnostic measures stands as a signal contribution in the history of the control of sexually transmitted diseases. With the development of the Wassermann test in 1906, there was a generally reliable way of detecting the presence of syphilis. The achievement of such a test offered a new series of public health potentials. No longer would diagnosis depend on strictly clinical criteria. Diagnosis among the asymptomatic was now possible, as was the ability to test the effectiveness of treatments. The availability of the test led to the development of programs for compulsory testing.

Significantly, calls for compulsory screening for syphilis predated the Wassermann exam. Beginning in the last years of the nineteenth century, several states began to mandate premarital medical examinations to assure that sexually transmitted infections were not communicated in marriage. But without a definitive test, such examinations were of

limited use. With a laboratory test, however, calls were voiced for requiring premarital blood tests. In 1935, Connecticut became the first state to mandate premarital serologies of all prospective brides and grooms. The rationale for premarital screening was clear. If every individual about to be married were tested, and, if found to be infected, treated, the transmission of infection to marital partners and offspring would be halted. The legislation was vigorously supported by the public health establishment, organized women's groups, magazines, and the news media. Many clinicians, however, argued against the legislation, suggesting that diagnosis should not rely exclusively on laboratory findings which were, in some instances, incorrect. N.A. Nelson of the Massachusetts Department of Public Health explained, "Today, it is becoming the fashion to support, by law, the too common notion that the laboratory is infallible."¹⁴ Despite such objections, by the end of the World War II, virtually all the states had enacted provisions mandating premarital serologies.

Legislation is currently pending in 35 state legislatures that would require premarital HIV serologies. The rationale for such programs is often the historical precedent of syphilis screening. The logic seems intuitively correct: We screen for syphilis. AIDS is a far more serious disease, we should therefore screen for AIDS. In this respect it is worth reviewing the effectiveness of premarital syphilis screening as well as those factors that distinguish syphilis from AIDS.

Mandatory premarital serologies never proved to be a particularly effective mechanism for finding new cases of syphilis. First, physicians and public health officials recognized that there was a significant rate of false positive tests which occurred because of technical inadequacies of the tests themselves or as a result of biological phenomena (such as other infections). As the concepts of sensitivity (the test's performance among those with the disease) and specificity (the test's performance among those free of infections) came to be more fully understood in the 1930s, the oversensitivity of tests like the Wassermann was revealed. As many as 25 per cent of individuals determined to be infected with syphilis by the Wassermann test were actually free of infection; nevertheless, these individuals often underwent toxic treatment with arsenical drugs, assuming the tests were correct. Beyond this, individuals with false positive tests often suffered the social repercussions of being infected: deep stigma and disrupted relationships. As many physicians pointed out, a positive serology did not always mean that an individual could transmit the disease. Because the tests tended to be mandated for a population at relatively low risk of infection, their accuracy was further compromised. Some individuals reportedly avoided the test altogether.¹⁵

Many of the difficulties associated with the high numbers of false positives were alleviated as new, more specific tests were developed in the 1940s and 1950s, but the central problem remained. Premarital syphilis serologies failed to identify a significant percentage of the infected population. In 1978, for example, premarital screening accounted for only 1.27 per cent of all national tests found to be positive for syphilis. The costs of these programs were estimated at \$80 million annually.¹⁶ Another study in California projected the costs per case found through premarital screening to be \$240,000.¹⁷ Moreover, premarital screening for syphilis continued to find a significant number of false positives. As these studies indicated, the benefits of screening programs are dependent on the prevalence of the disease in the population being screened. In this respect, it seems unlikely that pre-

marital screening effectively served the function of preventing infections within marriage that its advocates assumed it would. These data led a number of states to repeal mandatory premarital serologies in the early 1980s.

Compulsory premarital syphilis serologies thus offer a dubious precedent for required HIV screening. The point, of course, is *not* that the test is inaccurate. ELISA (enzyme-linked immunosorbent assay) testing coupled with the Western Blot *can be* quite reliable, but only when applied to populations which are likely to have been infected. Screening of low-prevalence populations, like premarital couples, is unlikely to have any significant impact on the course of the epidemic. Not only will such programs find relatively few new cases, they will also reveal large numbers of false positives. A recent study concluded that a national mandatory premarital screening program would find approximately 1,200 new cases of HIV infection, one-tenth of 1 per cent of those currently infected. But it would also incorrectly identify as many as 380 individuals—actually free of infection—as infected, even with supplementary Western blot tests. Such a program would also falsely reassure as many as 120 individuals with false negative results.¹⁸ Moreover, the inability to treat and render non-infectious those individuals who are found to be infected severely limits the potential benefits of such mandatory measures. With syphilis serologies, the rationale of the program was to treat infected individuals.

This, of course, is *not* to argue that testing has no role in an effective AIDS public health campaign. During the late 1930s, a massive voluntary testing campaign heightened consciousness of syphilis in Chicago, bringing thousands of new cases into treatment. AIDS testing, conducted voluntarily and confidentially, targeted to individuals who have specific risk factors for infection, may have significant public health benefits. Compulsory screening, however, could merely discourage infected individuals from being tested. This makes clear the need to enact legislation guaranteeing the confidentiality of those who volunteer to be tested and prohibiting discrimination against HIV-infected individuals.

As a mandatory measure, premarital screening is a relatively modest proposal. During the course of the twentieth century, more radical and intrusive compulsory measures to control STDs, such as quarantine, have also been attempted. These, too, have failed. During World War I, as hysteria about the impact of STDs rose, Congress passed legislation to support the quarantine of prostitutes suspected of spreading disease. The Act held that anyone suspected of harboring a venereal infection could be detained and incarcerated until determined to be non-infectious. During the course of the War, more than 20,000 women were held in camps because they were suspected on being “spreaders” of venereal disease.

The program had no apparent impact on rates of infection, which actually climbed substantially during the War. In sexually transmitted infections, the reservoir of infection is relatively high, modes of transmission are specific, and infected individuals may be healthy. In the case of AIDS, where there is no medical intervention to render individuals non-infectious, quarantine is totally impractical because it would require life-long incarceration of the infected.

Compulsory measures often generate critics because such policies may infringe on basic civil liberties. From an ethical and legal viewpoint, the first question that must be asked about any potential policy intervention is: Is it likely to work? Only if there is clear evidence to suggest the program

would be effective does it make sense to evaluate the civil liberties implications. Then it is possible to evaluate the constitutional question: Is the public health benefit to be derived worthy of the possible costs in civil liberties? Is the proposed compulsory program the least restrictive of the range of potential measures available to achieve the public good?¹⁹

In this respect, it is worth noting that compulsory measures may actually be counterproductive. First, they require substantial resources that could be more effectively allocated. Second, they have often had the effect of driving the very individuals that the program hopes to reach farther away from public health institutions. Ineffective draconian measures would serve only to augment the AIDS crisis. Nevertheless, despite the fact that such programs offer no benefits, they may have substantial political and cultural appeal (see lesson #1).

Because compulsory measures are controversial and unlikely to control the epidemic, there is considerable hope that we will soon have a “magic bullet”—a biomedical “fix” to free us of the hazards of AIDS.

Lesson #4—The development of effective treatments and vaccines will not immediately or easily end the AIDS epidemic.

As the history of efforts to control other sexually transmitted diseases makes clear, effective treatment has not always led to control. In 1909, German Nobel laureate Paul Ehrlich discovered Salvarsan (arsphenamine), an arsenic compound which killed the spirochete, the organism which causes syphilis. Salvarsan was the first effective chemotherapeutic agent for a specific disease. Ehrlich called Salvarsan a “magic bullet,” a drug which would seek out and destroy its mark.²⁰ He claimed that modern medicine would seek the discovery of a series of such drugs to eliminate the microorganisms which cause disease. Although Salvarsan was an effective treatment, it was toxic and difficult to administer. Patients required a painful regimen of injections, sometimes for as long as two years.

Unlike the arsphenamines, penicillin was truly a wonder drug. In early 1943, Dr. John S. Mahoney of the US Public Health Service found that penicillin was effective in treating rabbits infected with syphilis. After repeating his experiments with human subjects, his findings were announced and the massive production of penicillin began.²¹

With a single shot, the scourge of syphilis could be avoided. Incidence fell from a high of 72 cases per 100,000 in 1943 to about 4 per 100,000 in 1956.²² In 1949, Mahoney wrote, “as a result of antibiotic therapy, gonorrhea has almost passed from the scene as an important clinical and public entity.”²³ An article in the *American Journal of Syphilis* in 1951 asked, “Are Venereal Diseases Disappearing?” Although the article concluded that it was too soon to know, by 1955 the *Journal* itself had disappeared. *The Journal of Social Hygiene*, for half a century the leading publication on social dimensions of the problem, also ceased publication. As rates reached all time lows, it appeared that venereal diseases would join the ranks of other infectious diseases that had come under the control of modern medicine.

Although there is no question that the nature and meaning of syphilis and gonorrhea underwent a fundamental change with the introduction of antibiotic therapy, the decline of venereal diseases proved short-lived. Rates of infection began to climb in the early 1960s. By the late 1950s much of the machinery, especially procedures for public education,

case-finding, tracing and diagnosis had been severely reduced.¹

In 1987, the Centers for Disease Control (CDC) reported an increase in cases of primary and secondary syphilis. The estimated annual rate per 100,000 population rose from 10.9 to 13.3 cases, the largest increases in 10 years. These figures are particularly striking in that they come in the midst of the AIDS epidemic which many have assumed has led to a substantial decline in sexual encounters. Moreover, after an eight-year decline, rates of congenital syphilis have also reportedly risen since 1983. The CDC concluded that individuals with a history of sexually transmitted infection are at increased risk for infection with the AIDS virus.²⁴

Despite the effectiveness of penicillin as a cure for syphilis, the disease has persisted. The issue, therefore, is not merely the development of effective treatments but the *process* by which they are deployed; the means by which they move from laboratory to full allocation to those affected. Effective treatments without adequate education, counseling, and funding may not reach those who most need them. Even "magic bullets" need to be effectively delivered. Obviously effective treatments should be a priority in a multifaceted approach to AIDS and will ultimately be an important component in its control; but even a magic bullet will not quickly or completely solve the problem.

No doubt, new and more effective treatments for AIDS will be developed in the years ahead, but their deployment will raise a series of complex issues ranging from human subject research to actual allocation. And while effective treatments may help to control further infection, as they do for syphilis and gonorrhea, treatments which prolong the life of AIDS patients may have little or no impact on the rates of transmission of the virus, which occurs principally among individuals who have no symptoms of disease.

This suggests certain fundamental flaws in the biomedical model of disease. Diseases are complex bio-ecological problems that may be mitigated only by addressing a range of scientific, social, and political considerations. No single intervention—even an effective vaccine—will adequately address the complexities of the AIDS epidemic.

Conclusions

As these historical lessons make clear, in the context of fear surrounding the epidemic (lesson #1), the principal proposals for eradicating AIDS (lessons #2–4) are unlikely to be effective, at least in the immediate future. These lessons should not imply, however, that nothing will work; they make evident that no single avenue is likely to lead to success. Moreover, they suggest that in considering any intervention we will require sophisticated research to understand its potential impact on the epidemic. While education, testing, and biomedical research all offer some hope, in each instance

we will need to fully consider their particular effectiveness as measures to control disease.

Simple answers based upon historical precedents are unlikely to alleviate the AIDS crisis. History does, however, point to a range of variables which influence disease, and those factors which require attention if it is to be effectively addressed. Any successful approach to the epidemic will require a full recognition of the important social, cultural, and biological aspects of AIDS. A public health priority will be to lead in the process of discerning those programs likely to have a beneficial impact from those with considerable political and cultural appeal, but unlikely to positively affect the course of the epidemic. Only in this way we will be able to devise effective and humane public policies.

REFERENCES

1. Cutler JC, Arnold RC: Venereal disease control by health departments in the past: Lessons for the present. *Am J Public Health* 1988; 78:372–376.
2. Bulkey LD: *Syphilis of the Innocent*. New York: Bailey and Fairchild, 1894.
3. Anon: What one woman has had to bear. *Forum* 1912; 68:451–454.
4. Brandt AM: *No Magic Bullet: A Social History of Venereal Disease in the United States since 1880*. New York: Oxford University Press, 1985, Rev. Ed. 1987.
5. Eisenberg LE: The genesis of fear: AIDS and public's response to science. *Law, Med Health Care* 1986; 14:243–249.
6. Becker MH, Joseph JG: AIDS and behavioral change to reduce risk: A review. *Am J Public Health* 1988; 78:394–410.
7. Yankauer A: AIDS and Public Health. (editorial) *Am J Public Health* 1988; 78:364–366.
8. Willson RN: The relation of the medical profession to the social evil. *JAMA* 1906;47:32.
9. Morrow PA: Publicity as a factor in venereal prophylaxis. *JAMA* 1906; 47:1246.
10. Grandin E: Should the Great Body of the General Public Be Enlightened? *Charities and Commons*, February 24, 1906.
11. US Public Health Service: *The Problem of Sex Education in the Schools*. Washington, DC, 1919; p 9.
12. Cleaves M: *Transactions of the American Society for Social and Moral Prophylaxis* 1910; 3:31.
13. Pappas JP: The venereal problem in the US Army. *Milit Surg* August 1943; 93:182.
14. Nelson NA: Marriage and the laboratory. *Am J Syphilis* 1939; 23:289.
15. Kolmer JA: The problem of falsely doubtful and positive reactions in the serology of syphilis. *Am J Public Health* 1944; 34:510–526.
16. Felman Y: Repeal of mandated premarital tests for syphilis: A survey of state health officers. *Am J Public Health* 1981; 71:155–159.
17. Haskell RJ: A cost benefit analysis of California's mandatory premarital screening program for syphilis. *West J Med* 1984; 141:538–541.
18. Cleary PD, Barry MJ, Mayer KH, Brandt AM, Gostin L, Fineberg HV: Compulsory premarital screening for the human immunodeficiency virus. *JAMA* 1987; 258:1757–1762.
19. Gostin L, Curran W: The Limits of Compulsion in Controlling AIDS. *Hastings Center Report* 1986; 16(suppl):24–29.
20. Marquardt M: *Paul Ehrlich*. New York: Henry Schuman, 1951.
21. Dowling H: *Fighting Infection*. Cambridge: Harvard University Press, 1977.
22. Brown WJ, Donohue JF, Axnick NW, Blount JH, Jones OG, Ewen NJ: *Syphilis and Other Venereal Diseases*. Cambridge: Harvard University Press (APHA), 1970.
23. Mahoney JF: The effect of antibiotics on the concepts and practices of public health. In: Galdston I (ed): *The Impact of Antibiotics on Medicine and Society*. New York: 1958; 98–120.
24. USPHS, Centers for Disease Control: *MMWR* 1987; 36:393