

Physicians Open a Can of Worms

American Nationality and Hookworm in the United States, 1893-1909

Alan I Marcus

In the late-nineteenth and early-twentieth centuries, Americans from many walks of life acted and thought as if national identity was crucial in evaluating the thoughts and deeds of their fellow countrymen. At bottom, they believed that America and the American people were distinctive, or should be regarded as such. True they disagreed among themselves; contemporaries always do. They debated, in this instance, the causes of the nation's distinctiveness. Some insisted that America's distinctiveness had its roots in the nation's Teutonic or Anglo-Saxon racial stock. Others argued that American distinctiveness derived from the Americans' ability to differentiate among themselves in terms of distinct classes and castes, and as a result form a hierarchical socio-economic and political system. No matter what specific explanation of distinctiveness members of society employed, they commonly believed that any group outside the national norm was alien, foreign, degenerate, deviant—non-American, in other words.¹ To those Americans, continued existence of these groups in the United States constituted a problem of American nationality and suggested one of two general remedies. The first was to exclude the undesirables from the country, as in immigration restriction, or to segregate them from society, as with Jim Crow legislation, or to scorn them as unworthy of society's blessings, as with the dependent, the delinquent or other "submerged" classes. Probably the more common tactic before the decade of

the 1910s was the second “cure”: to reform the unfortunate wretches and to make them into groups that could be integrated into American society. Many of the “reform” movements of the early-twentieth century—so-called progressive reform, to many historians—fell into this category, including the settlement house movement, the Country Life movement, attacks on “boss-ruled” political machines and Americanization movements in public education, among many other examples.²

It should be no surprise that such larger social concepts as nationality influenced or decisively shaped medical knowledge and practice no less than any other facet of American life. Medicine, it would appear, tells us just as much about doctors—and hence the larger social and cultural order—as it does about patients’ afflictions, real and imagined. The disease of hookworm provided an especially vivid example of this maxim.³

Hookworm is an unpleasant disease. Its victims suffer from pronounced anemia, often accompanied by diarrhea and slight fever. They are usually lethargic, have sallow skin and experience diminished mental and physical development. The disease is especially common among children. But adults, too, are susceptible. For children the disease can be strikingly tragic; it can lead to grotesque anatomical deformities. Although the disease is generally not fatal, hookworm typically remains within its hosts for as long as ten years and frequently renders them unable to perform the most rudimentary physical tasks.⁴

Occasionally American doctors did report hookworm’s symptoms in the mid-nineteenth century, but it was not until 1893 that the first case of hookworm was noted in the American medical literature.⁵ Over the next decade or so, American physicians became increasingly aware of the disease, discussing and debating its geographic distribution, mode of transmission, method of dissemination and implications. By 1905 they had wrought a consensus. They agreed that hookworm spread via human feces and that it invaded its hosts by burrowing through their skin. Moreover—a crucial point of my thesis—the malady was endemic in the American South; thus doctors raised the question as to the unAmericanness of the South and its various peoples.

The consensus among doctors on hookworm led to certain consequences, most notably an extraordinary public-private partnership: the Rockefeller Sanitary Commission for the Eradication of Hookworm. Organized in 1909, the Commission assisted in the establishment in the South of state and county health boards and treated many of the South’s likely two million victims of hookworm. The Commission also devoted much effort to prevention. It launched a campaign intended to educate rural Southerners to use sanitary privies, to wear shoes and to behave in a proper healthful manner. This would, Commission members argued, free the South from the catastrophe of hookworm. Thus the American medical discussion of hookworm, as well as the Commission, should be understood

as normal events within the context of larger debates and actions concerning American nationality.⁶

From the beginning American doctors defined hookworm as a foreign disease. The New Orleans, Buffalo and St. Louis physicians who each detected the parasite in one of their patients during the 1890s treated their cases as isolated incidents and explained them in a similar way. Each noted that his hookworm victim was reared in southern Europe; each argued that the disease was not indigenous to the United States. These practitioners also reasoned that the disease's occasional appearance in America was a consequence of southern European immigration, especially of the lower classes, and was confined to those people as well as a few others—family members, friends and co-workers—infected by virtue of close association.⁷ Hookworm then was not an American disorder in the 1890s, but instead an infirmity of some lower-class Europeans in America.

F. G. Mohlau, a Buffalo physician, underscored this point. He insisted in 1896 that the ailment would continue periodically to crop up in America but primarily among recent arrivals. Mohlau explained that immigrants carried the disease to the United States, and he relied on his Buffalo experience to reach this conclusion. Aware that Italian laborers “employed in brickyards, miners and potmakers” had been “the principal sufferers of hookworm in Europe,” he thought it “natural” that when these men “took to the notion of traveling . . . they imported the disease to America.” This had been the case in the past and would be so in the future, he contended, because “if laborers are afflicted with the disease while in Europe, how can it disappear while coming over the ocean.”⁸

The notion that virtually each case of hookworm in the United States had been and would continue to be of European derivation received a severe jolt in 1900. Bailey K. Ashford, an assistant army surgeon stationed in Puerto Rico, uncovered hookworm in a significant portion of the island's rural population. His discovery of endemic hookworm in Puerto Rico broadened the known geographic distribution of the disease and placed it for the first time among a group native to the Western Hemisphere.⁹ Other physicians soon confirmed Ashford's observations and also reported the disease as naturally occurring in the West Indies and the Philippines.¹⁰ These revelations made it difficult to maintain that the sporadic cases of hookworm in the United States all originated in Europe. American medical men took the disclosures into account and ended their interpretation of the disease as exclusively an Old World one.

American physicians, however, did not alter fundamentally their opinion that every instance of hookworm in America was either restricted to or caused by someone of foreign extraction. To doctors, hookworm in America remained a disorder of foreigners and the new evidence led them to conclude only that incidences of the disease in the United States were bound to increase.¹¹ Their prediction proved accurate when in 1900-1901

physicians diagnosed apparently isolated cases of the disease in Virginia, Texas, Maryland, Pennsylvania, Missouri and the District of Columbia.¹²

Medical men attributed this rise of hookworm in the United States to the nation's new relationship with the allegedly backward people inhabiting tropical countries. Acquisition of new territories in the war with Spain coupled with intensification of trading with Latin America bid fare to convert hookworm in America into a common malady. For example, Thomas A. Claytor, professor of clinical medicine at the Columbian University (now Georgetown University), claimed that hookworm came to America with European immigrants and when Americans returned "from our newly acquired possessions." Charles Wardell Stiles concurred. This was an important endorsement, for Stiles was America's ranking helminthologist and Ashford's teacher at the Army Medical School and Medical Museum. He too pointed to European emigrés, but focused on soldiers stationed in hookworm-infested countries and workers on what would become the Panama Canal. Since these two latter groups traveled between places where hookworm "is known to exist" and the United States Stiles thought it impossible for the nation "to remain free of infection"; he "confidently expect[ed] an increase" in reports of hookworm. Two Philadelphia hospital physicians, Herman B. Allyn and M. Behrend, expressed similar sentiments, but emphasized the West Indies as a source of the disease. They noted that commerce with these islands "is becoming more and more intimate," and thus warned mainland doctors to anticipate new cases of the disease. To prevent any cases from going undiagnosed, R. Lee Hall of Baltimore called on his colleagues to examine patients' stools for hookworm "in all intestinal disorders, when associated with marked anemia."¹³

Concern over the "foreign" disease was carried to its natural conclusion by two San Francisco physicians. Herbert Gunn and Phillip King Brown asserted that the parasite was "being imported daily, chiefly from Hawaii." As a consequence, they urged the federal government to establish "methods of quarantining the immigrants until they could be freed from infection." J. Norman Henry of the Pennsylvania and Philadelphia Hospitals said it boldly: "When we consider that the disease produced by the parasites is one that induces physical degeneration and lack of development," we must exclude "from our country infected foreigners."¹⁴

Emphasis on hookworm as an entirely extra-national disorder weakened in 1902. The work of Stiles, then employed in the United States Department of Agriculture's Bureau of Animal Industry, was crucial to that change. He understood that the soil and climate of the South were congenial to hookworm. He also knew that the region harbored an animal-specific type of hookworm and, adding up these facts, suspected that it too might shelter a human variant. As a result, he requested and received hookworm specimens found in humans in Puerto Rico, Virginia and Texas.

Upon microscopic examination, he determined that these human parasites all were anatomically similar, but differed structurally from those in Europe. More precisely, the North American worms lacked the hooks or teeth of the European variety. They possessed instead a set of plates on the anterior of the mouths. Stiles named the new species of human hookworm *Uncinaria Americana*—the uniquely American hookworm—and suggested that “although it is rarely recognized,” hookworm probably “is endemic in the southern states.”¹⁵

Stiles’s supposition required verification and he made plans to survey the South to determine the extent of hookworm there. Even as he prepared for his journey, however, some Southern urban physicians began the trek themselves; they ventured into the rural South and examined inhabitants for the disease. H. F. Harris, a member of the Atlanta College of Physicians, was among the first. He went to Georgia and Florida and found in each place a portion of the population infested with the worm, which led him to proclaim hookworm “the most common of the serious diseases of the southern part of the United States.”¹⁶ During the next few years, Harris’s results were duplicated by Claude A. Smith, pathologist at Atlanta’s Grady Hospital, E. D. Bondurant, Professor of Neurology and Pathology in the University of Alabama’s Medical Department, J. L. Nicholson and Watson S. Rankin, pathologists at Wake Forest College, Louis M. Warfield, formerly of Johns Hopkins Hospital and then of Savannah, Georgia, C. C. Bass, Chief of the Clinic of the Medical Department of Tulane University and Stiles, who in late 1902 produced the most complete and detailed study of hookworm in the South.¹⁷ Although Stiles presented his study to the Pan-American Sanitary Conference—it drew by far the most attention—and led to the designation of hookworm as “lazyworm,”¹⁸ all reports were essentially similar. Each researcher detected numerous cases of the disease and provided evidence that many rural Southerners suffered the malady.

These studies frequently concluded with pleas to Southern rural medical men for action. Harris, for example, submitted a preliminary report to *American Medicine* and then followed it with a more complete version delivered before the Medical Association of Georgia. In both forums, he urged Southern practitioners “earnestly [to] take up this matter” because “in no other serious disorder does the victim suffer so long [and] in no other condition is he for such a period a menace to those about him.” J. B. Guthrie, a New Orleans general practitioner, concurred. In a talk to the Orleans Parish Medical Society in 1903, Guthrie appealed directly “to the practitioner who lives in the regions where the so-called ‘dirt eaters’ and ‘poor white trash’ abound. Rural doctors must, he argued, “come to realize the number of [hookworm] cases that exist in this and the surrounding states,” for “the recognition of this disease, its prophaxis, and

treatment” will result “in the physical and mental betterment of individuals and communities.”¹⁹

Despite the compelling nature of the evidence, not all physicians immediately accepted the existence of hookworm in the American South. The position of William Osler, Professor of Medicine at Johns Hopkins Hospital and perhaps the foremost American physician in the late-nineteenth and early-twentieth centuries, prior to Stile’s survey, provides a good example. He initially dissented, on professional grounds, from even considering that hookworm might be found in the South. Responding to statements such as those made by William Pepper in his 1894 medical textbook in which he initiated that “it is possible” that hookworm “exists in some of the Southern States,” Osler dismissed such opinions out of hand primarily because they implied that Southern rural doctors long had mistaken malaria for hookworm. Judging speculations of this stripe almost slanderous and countering with a rigorous defense of the training received by rural Southern physicians, Osler argued that their long experience in the field would not permit such a blatant misdiagnosis.²⁰

In light of the hookworm work of 1900-1902, remarks such as Osler’s did not go unchallenged. Claude Smith echoes the conviction of many Southern urban doctors by placing blame for failure to detect hookworm on the inadequacy of their rural counterparts. “Almost every country practitioner in the South sees every year any number of cases of anemia,” Smith noted, which they usually classify “as malarial cachexia” and treat with “quinin [sic], iron, arsenic, etc.” In most cases, patients show “only slight temporary improvement.” Lack of success in treating anemia patients stems from misdiagnosis; country physicians administer to patients for malaria when the disease actually is hookworm, and the error in diagnosis has been compounded by the almost total ignorance about hookworm among rural physicians. Indeed, Smith sniped, the real reason hookworm in the South “was not recognized sooner was because it is a disease of the country and not of the city.”²¹

Osler abandoned his defense of rural medical men as soon as the situation became clear. Indeed, by 1903, Osler was warning students during medical rounds about the prevalence of hookworm in the American South.²² But other physicians, even as they acknowledged the disease’s presence in the South, returned to the question of its origins in America. This endeavor produced several new explanations, each of which confirmed the illness’ ultimate un-American origins; though apparently of such longstanding as not to have been brought to the United States by either late-nineteenth-century European immigrants or inhabitants of recently conquered territory, hookworm remained in essence a disease inflicted upon Americans by others. Allen J. Smith offered in 1901 a most unusual account for the disease’s appearance in the rural South. Smith, a Galveston, Texas physician, a former student of Stiles, and among the first

to identify hookworm in the United States, blamed dogs for the malady. Confusing the worms of man with those specific to canines, he incorrectly hypothesized that man's best friends gave their human companions the disease.²³

Other physicians presented more conventional explanations, frequently finding the malefactors among the nation's supposedly inferior races. Harris proposed in 1902, for example, that American Indians initially spread the disease across the continent. He claimed, in fact, "that the Aborigines of this country were infested with this parasite" and carried it to "all parts of the United States where the conditions are suitable for development."²⁴ A year later, David Reisman pinpointed a different culprit. Editor of *American Medicine*, he cited a report that West African chimpanzees harbored *Uncinaria Americana*, and argued that Blacks may have brought the disease to America, suggesting that "the early slave trade" was probably the cause for the malady's appearance in the United States.²⁵

While American hookworm's origins remained in question, physicians after 1904 produced only a handful of new geographic studies of the disease. Few seemed necessary, for the contention that hookworm enjoyed widespread distribution in the South went unchallenged. Achievement of consensus, however, did not result in a decline in the number of hookworm articles in medical journals. Medical men continued to publish their findings, though not to demonstrate the disease's prevalence in the South. Instead, they sought to keep the problem in front of rural doctors, to remind them of the immediacy of the menace and to impress upon them the importance of proper and speedy diagnosis.²⁶ Not all physicians subscribed to medical publications, of course, and hookworm crusaders took care not to neglect their less well read country brethren. These rural doctors too received the hookworm message, but through clinics held in conjunction with county medical societies. W. P. Ivey, a Lenoir, North Carolina physician, argued before the North Carolina Medical Society that clinics were the well-trained urban doctors' "very best way to stir up interest in the subject among country physicians." And as if to demonstrate the power of talking before a group of rural practitioners, he closed his address in a dramatic fashion:

Here, gentlemen, my conclusions:
Uncinariasis is among us.
It is among us abundantly.
It is a grievous burden to its host.
It is a menace to the neighbors.
It kills folks.
It makes mental underlings.
It makes physical dwarfs.
It curtails producing power.

It steals dollars from our wealth.
What are you going to do about it?²⁷

That hookworm was endemic in the South was by 1904 an article of faith among even the most isolated Southern practitioners. Recognition of the situation in the American South marked a major event in both medical and cultural history. It would lead not only to the efforts of the Rockefeller Sanitary Commission, but also it provided a medical focus around which to discuss a national cultural issue, that of American nationality. Indeed, one of the first and most extensive uses of the disclosure of hookworm was as an explanation for Southern deviance. In particular, physicians employed it to account for the region's unique people: the crackers, poor whites or clay eaters.

Investigators in the late-nineteenth century had identified poor whites as un-American. They labeled them "descendants of the lowest grade of humanity on the British Island" with only enough Anglo-Saxon spirit to make a poor chattel, and described their males as possessing "inimitable drawling speech," a "sallow complexion, lanky frame, lazy habits and immorality." Their females seemed no better. Portrayed as "ugly, feeble, [and] dumb," these women commanded "no romantic charm" and appeared even "too dull witted for factory work." Contemporaries recognized that the degeneracy of these people sapped Southern strength and vitality and thus wreaked havoc on both the South and the nation. But uncovering the cause of the group's deviance proved a more irksome task. The Anglo-Saxon heritage of these people made it difficult to ascribe their repulsive and un-American actions to defective or inferior racial stock. Several observers nonetheless adopted an hereditarian approach, explaining both how crackers became degenerates and why they drew little notice prior to the late-nineteenth century. These commentators suggested that Southern poor whites had come to America as indentured servants in the first half of the seventeenth century. Disinclined to labor, the servants were quickly replaced by Black slaves, and freed of bondage, took to the hills of Appalachia. There they remained isolated and inbred until after the Civil War when for reasons unknown poor whites left the mountains, moved to the Southern lowlands and were discovered by their shocked countrymen to be in ghastly condition.²⁸

In light of massive hookworm infestation in the South, however, another explanation became plausible. Proponents of the new view explained the troublesome problem of Southern deviance by transferring the question of deviance squarely into the medical arena. To these doctors, disease was the cause of the apparently aberrant behavior of rural Southerners. And diagnosis of the problem in medical terms held out hope for a medical cure. "This important discovery," noted George H. Simmons, editor of the *Journal of the American Medical Association*, will produce an

improvement in "the physical and mental status" and in "the economic and physical conditions" of "the poorer classes" of the South.²⁹

Transformation of Southern deviance into a medical problem stood as only one response to hookworm. It gained converts among physicians and others as the century's first decade progressed. But another reaction ran parallel to it during these early years. Some medical men argued that the existence of hookworm merely reaffirmed the South's deviance; it seemed not the cause of the actions or, more properly, the inactions of Southerners, but rather the inevitable, natural consequence. Put more straightforwardly, behavioral depravity of Southerners translated into medical depravity, and it resulted in their affliction. Unsanitary habits of poor whites portended and brought disease. Their aversion to water, their scorn for footwear and their contempt for toilets or privies made rural Southerners liable to a host of diseases, of which hookworm was only among the most devastating. A New York physician expressed this position baldly. When asked in 1905 if he expected hookworm to make inroads in the state, he answered that New York's population was safe unless it "goes barefoot and forgets to take baths for three years or so."³⁰

Medical men did not confine themselves to hookworm while documenting the connection between uncivilized habits and sickness in the South. They cited a number of maladies, including ground itch, a prevalent and bothersome Southern complaint. Although apparently unrelated to and considerably less threatening than hookworm, the shocking incidence of ground itch in the South seemed, as did hookworm itself, to symbolize the region's perversity.

Neither the symptomology of ground itch nor its cause seemed mysterious. Usually restricted to a person's toes, the disease was characterized by an intense itch of several weeks' duration. Vesicles formed on the irritated part, often rupturing to expose a painfully tender raw area. Contemporaries in the late-nineteenth and very early-twentieth centuries attributed the disease to going without shoes on damp ground, particularly in the evening or early morning; it appeared as if the poisoned dew irritated the skin and provoked a rash not unlike that now associated with poison ivy. That diagnosis of the disease's cause seemed not to require medical intervention and made its resolution quite clear. Southerners could avoid contracting ground itch simply by adopting the civilized custom of wearing shoes.³¹

Ground itch, then, seemed an annoying but relatively insignificant disease with a straightforward etiology. Hookworm, on the other hand, held dire consequences and its mode of transmission seemed not quite as apparent. To be sure, all interested in hookworm understood that ova were discharged in and spread by human feces. But the manner in which individuals became infested was a subject of some debate. Around 1900, most American investigators assumed that the eggs or larvae entered the

alimentary canal only through the mouth; they maintained that water, soil or vegetables contaminated by feces bearing hookworm ova or larvae produced the disease only when taken orally.³²

This idea focused attention on the lack of cleanliness of rural Southerners generally and on the clay eaters specifically. Devouring clay seemed a particularly noxious habit, a “foreign” habit in terms of American nationality, and its poor white perpetrators appeared justifiably rewarded with hookworm.³³ Even more astonishingly, some of their numbers were so degraded as to publicize their practice, establish dirt-eating clubs and send apparently dangerous material through the United States mail.³⁴ The terrible trait of clay eating was not confined to adults, moreover, but also indulged in by Southern children. One unnamed Black commentator summed up the situation succinctly. “De little chidren begin ‘fore dey kin walk,” he reported, “and dey eat it till dey die; dey chaw it lake ‘backer. It makes all dar stumacs big like as you seed ‘em and spiles dar ‘gestion. It’s mighty onhelfy.” Simmons took a moderate position on this issue, one that reflected his constituency’s ambivalence. While he linked dirt eating and hookworm, he claimed that each was both cause and effect. The entire process constituted “a vicious cycle.” The disease itself seemed “in part responsible for the depraved appetite and the depraved appetite keep[s] up the infection.”³⁵

While the oral explanation for hookworm dominated American medical thought, Europeans suggested another possibility. As early as 1898, Arthur Looss, a German investigator working in Egypt, proposed that hookworm entered the human body through the skin. To prove his point, Looss infected himself several times with the parasite, taking care to insure that neither the larva nor the ova found their way into his mouth. In 1900, he experimented with a recently amputated limb. He covered the appendage with hookworm larvae and subsequent microscopic examinations demonstrated that the larvae bore into the skin near hair follicles.³⁶ Charles A. Bentley, a British researcher active in the Far East, confirmed and extended Looss’s observations two years later. Working with live human subjects, he not only determined that hookworm larvae passed through the skin, but also indicated that the process produced a persistent irritation and inflammation in otherwise healthy tissue.³⁷

United States medical men knew of the European experiments and conclusions. They often cited these studies early in the new century but considered them primarily speculative, the evidence inconclusive and continued to boost the oral transmission theory. Part of the leeriness stemmed from the still unresolved question of how flesh-burrowing larvae reached the *jejunum*, the middle part of the small intestine where they attached themselves. More significant, however, was recognition that the European research was predicated upon a particular species of hookworm,

one structurally different from the uniquely American variety and one that might infect its host in a different manner.³⁸

Although skepticism about the European announcements prevailed, these reports opened new avenues of inquiry as several American doctors looked into the possibility that *Uncinaria Americana* behaved in a way similar to its European relative. Claude Smith undertook the most rigorous and extensive investigations and, between 1903-1906, laid out many of the specifics of the American hookworm. In the course of these endeavors, Smith not only discussed the life cycle of *Uncinaria Americana*, but also demonstrated its mode of human infestation. Smith's work resulted in recognition that ground itch and hookworm in the American South actually were but a single disease, the former merely a symptom produced by boring larvae. As one Southern urban physician advised his rural colleagues in light of Smith's initial studies, "take the attitude of the Saxons that a man is guilty until he is proved innocent and apply it to ground itch." Lay all cases of ground itch "to hookworm infection until we prove any individual case to the contrary."³⁹

Smith's work owed much to the European hookworm investigators, a debt he early acknowledged, and he initially undertook a set of observations based on the proposition that hookworm and ground itch were a solitary disease. This study did not employ statistics, but relied on impressions of and conversations with rural Southerners. In this first effort he attempted to correlate the disease with a number of demographic factors. Smith determined that both ground itch and hookworm were far more prevalent among children and noted that children wore shoes less frequently than adults. He then checked families and found that hookworm struck most often these members who chose to forego footwear. Finally, he surveyed Southerners and concluded that hookworm always seemed to follow an earlier ground itch bout, a diagnoses he confirmed whenever possible through microscopic analysis of fecal matter.

Smith next examined hookworm larvae in vitro. He found them highly motile; often they tried to climb his glass containers' walls. He also determined that the larvae did not float in water, but sank to a vessel's bottom, an observation that suggested few cases of the disease were transmitted by drinking fecally contaminated water.

Although Smith had compiled a great deal of impressionistic evidence, he had not shown conclusively that ground itch and hookworm were identical. He pursued that problem in the next phase of his experiments and sought to use hookworm larvae to give human volunteers the disease. Wrapping their arms for about thirty minutes with a suspension of larvae to give human volunteers the disease. Wrapping their arms for about thirty minutes with a suspension of larvae, feces and dirt, he recorded the initial symptoms and later monitored the course of the affliction. His subjects immediately suffered from ground itch and soon developed char-

acteristic lesions. After about three or four weeks, these disappeared, but the volunteers grew languid and lost weight. At this time, no hookworm ova appeared in their feces. The situation changed a month later, however, for at that date he detected eggs in their stools, which he identified as hookworm ova and hatched *in vitro*.

Smith conducted one last series of experiments. Proceeding from the assumption that the parasite does not multiply inside the host, he tried to prove that severity of the disease depended on the number of instances in which the patient underwent infestation. To this end, he hoped to demonstrate that the quantity of eggs produced by a hookworm victim was directly proportional to the amount of times he endured ground itch. Smith continued to work with humans, but he now varied their exposure to the larvae, subjecting them to as many as four ground itch episodes. In each case, he found that the ones who suffered ground itch the most frequently yielded the most hookworm eggs in their feces.⁴⁰

Smith had established ground itch as the most important manner by which humans contracted hookworm. His investigations also turned attention from dirt eating as a major cause of the disease and focused it instead on the heretofore minor Southern malady of ground itch. For hookworm, they absolved one peculiarity of rural Southern life and replaced it with another; these studies substituted going barefoot for dirt eating. The research did little, however, to resolve the cultural/medical conflict formalized by discovery of hookworm in the South. Antagonists could agree that Southerners were stricken by the disease, but also could continue to debate whether it stood as a cause of their actions or an effect.

Yet that debate among medical men had ended. Although Smith's studies did not bear directly on the cause or the effect, that issue vanished from the medical journals at about the time he concluded his investigations. Its disappearance from post-1905 medical publications signaled neither the victory of either point of view nor the triumph of scientific inquiry or expertise. Instead, cessation of open discussion seems to have rested on a tacit acknowledgement that attempts to decide the question were extraneous to the central concern of remedying Southern deviance. Hookworm in the American South had become, in essence, a new kind of public problem, one in which organization for public action took precedence. And that demanded only that practitioners recognize and agree that medical illness characterized the region's poor whites.

Designation of the South as an area afflicted with a helminthological disease served both medical and cultural determinists. Depending upon a proponent's perspective, the malady could function either as a means to cure or an excuse for curing the rural South. In both cases, however, it promised that the situation among Southerners could be corrected and that the South might become American. Those believing that depravity of poor whites resulted in hookworm sought to cure the disease and to prevent its

recurrence by removing the deviance; they favored what was in effect a cultural attack on the South's depravity, which included reformation of the unsanitary and uncivilized habits of Southerners and their institutions. Those approaching the problem from the view that the disease caused the deviance offered a similar plan. They sought both to heal sufferers and to wipe out the disease, a process necessitating institution of new behaviors on the part of afflicted Southerners to prohibit their reinfestation.

Post-1905 suggestions for public action reflected the medical theorists' new practical bent. Physicians ignored the cause or effect issue, concentrated on treating hookworm victims and particularly preventing reinfection, and stressed the importance of integrating the South within the American socio-economic and political system. William Weston, a Columbia, South Carolina doctor, demonstrated in 1908 the new concerns. Arguing before the South Carolina Medical Association that "certain portions of the South are notoriously unprogressive," Weston attributed the region's economic ills to the prevalence of hookworm which hampered attempts to create a reliable labor force. Indeed, Weston estimated that his state lost at least \$30,000,000 yearly simply because poor whites were sick and unable to work.

Two methods of forming a stable work force to develop the South presented themselves, but he found only one feasible. Weston disagreed with those who wanted to bring Europeans to staff Southern mills, reasoning that the answer ought to lie with the South's indigenous "foreign" population, the poor whites. After all, he concluded, our native foreigners "speak our language [and] are familiar with our laws and customs."

Weston quickly acknowledged that "crackers" could constitute an adequate labor force and therefore assume "the responsibility of citizenship" only when freed of hookworm. He called on his medical colleagues to do their duty as "physician-citizens" and lead the fight. His proposal for converting poor whites into "efficient developers of the South's and of the State's resources" entailed establishment of a state-financed and sponsored commission of physicians. Union of the state and medical men to counter hookworm was neither novel to Weston nor to South Carolina. As early as 1904, Ashford and several other army medical officers acted under federal auspices to form the Puerto Rico Anemia Commission. Two years later, Bass brought the commission idea to the mainland, urged Mississippi physicians to be the first Southern contingent to erect such a body, and set about to gain legislative support. Since the plan for South Carolina was predicated on propositions similar to those voiced earlier and since it sought the same goal—to rid an area of hookworm—it can be presumed to have been designed to function in a similar manner. If South Carolina had created a commission—the government funds necessary for the venture were not forthcoming—its members certainly would have scoured the state,

treated disease victims and preached the sanitary privy and the wearing of shoes to both poor whites and their medical practitioners.⁴¹

While Weston only sketched his program, Stiles offered a similarly oriented, far more specific plan. He too considered the question of Southern aberrance and identified several mechanisms for improving the region's supposedly racially-inferior groups. But he asked pointedly "what is the country doing for the elevation of poorer whites of the rural districts of the South." Stiles noted that although "we have numerous schools and colleges for the education of the negro" and "the Indian is the ward of the government," little activity had been "directed especially to the elevation of any considerable number of the 'crackers.'" He proposed to correct the omission through the creation of a regionwide hookworm eradication campaign. He pleaded for "introduction of Public Health Week into all" Southern public schools programs to teach mothers the "great sanitary principles," and to reinforce these lessons he urged newspaper advertisements as well as reminders posted "in every street car in the South." Stiles hoped to "bring about a sanitary reform on the farms, by persuasion if possible," but recognized that voluntary compliance might fail. He therefore advocated national legislation that would "send to a chain gang any person who deliberately pollutes" either public or private land.⁴²

Other doctors avoided state or national power, however, because they deemed legislative edicts ineffective. They feared that attempts to coerce Southerners to change their habits surely would raise the hackles of these proud people and increase resistance to the very measures necessary to free the region of the scourge. For example, the Medical Record's Thomas L. Stedman confirmed in 1909 that any effort to compel "the children of the southern small farmers and the pickaninnies" to use sanitary privies and to wear shoes "would be a task from which even the most daring sanitary reformer would shrink." To make rural Southerners behave like other Americans and to become free of the pestilence, Stedman called for community pressure and concerted action. But unlike many of his contemporaries, Stedman saw hookworm in Black and White terms. Blacks, he felt, brought the parasite from Africa and polluted "the soil from the Potomac and the Ohio to the Gulf," but were acclimated to and therefore did not suffer severely from the malady. Stedman insisted that Blacks were deviant because of race, not disease or culture. They served "as breeders of the worm and sowers of its seeds, to the lasting injury of their white neighbors." To overcome this menace, he appealed to "the charitably disposed and the patriotic people of the South"—the better classes—to establish "leagues for combating the hookworm" modeled "after the plan of the [Northern cities'] antituberculosis leagues." These organizations would work to educate Southerners about the errors of their ways as well as the continuing medical threat posed by Blacks and eventually produce the desired results. Action of this type was imperative because "the

regeneration . . . of the South depended absolutely upon the extermination” of the disease “that is literally sucking its life blood.”⁴³

H. Edwin Lewis, editor of *American Medicine*, also spoke out. He too stressed the importance of an educational campaign by an elite, but insisted doctors should furnish both the impetus and knowledge. He dealt with hookworm in explicitly national terms, arguing that the disease was “a matter of national concern” because it stood as “a removable cause of part of our own racial deterioration.” Although acknowledging that Southerners “are now suffering from their notorious neglect of cleanliness,” Lewis knew that a physician-directed education campaign would eliminate “the lack of intelligence” which prevents crackers from “learning how to be as clean as [members of] civilized communities should be.” But while calling for doctors to mobilize their professional societies to end “the defective development which has apparently removed [poor whites] from national control,” he also fed Southern egos. He reminded readers that the South formerly had been an integral part of the nation, but now “the presidents and leaders who once came from south of Mason’s and Dixon’s line, . . . nearly all come from the north.” Eradicating hookworm would rectify the regional imbalance.⁴⁴

Such proposals marked the climax of the public medical discussion about hookworm prior to the formation of the Rockefeller Sanitary Commission. Though considerably different in approach, all considered hookworm a national problem and one focusing exclusively on the medical sickness of the South. This post-1905 definition of Southern deviance as a simple medical issue without regard to cause or effect stood as a milestone in the history of hookworm in the United States. It produced an accord among medical practitioners and made Southern aberrance appear amenable to a concrete, yet swift program of public action.

Despite the episode’s drama and significance, however, it did not indicate a transformation of the idea of hookworm from that first formulated in the late 1890s. To be sure, in the sixteen years after 1893, investigations of doctors changed the particulars of and the locus of concern about hookworm. But in a real sense, the substance remained the same; the disease and its victims retained their quintessentially alien character as hookworm persisted as a problem of American nationality. Prior to the twentieth century, medical men had attributed the appearance of hookworm in the United States to Southern European immigrants. In the early 1900s they linked it to the inhabitants of the tropics. They then implicated Indians and Blacks as possible agents in the malady’s spread through America. Finally, urban doctors pinpointed defective Southern country life as either the true cause or effect of hookworm. This mode of living whether the origin or the consequence of the disease seemed as foreign to and out of concert with the American nation as any of the other determinations. It evoked tremendous expressions of concern, culminating

in efforts to correct the defectiveness and to make the rural South American. Throughout the period, physicians had continued to interpret hookworm within the context of American nationality.

Notes

1. See, for instance, William E. Chandler, "Methods of Restricting Immigration," *Forum* 13 (1892), 128-142; E. L. Godkin, "The Harm of Immigration," *Nation* 56 (1893), 42-43; Charles Mulford Robinson, "Improvement in City Life," *Atlantic Monthly* 83 (1899), 524-537; Albert Allemann, "Immigration and the Future American Race," *Popular Science Monthly* 75 (1909), 586-596; Frank T. Carlton, "Urban and Rural Life," *Popular Science Monthly* 69 (1906), 255-260; Robert DeC. Ward, "The Agricultural Distribution of Immigrants," *Popular Science Monthly* 66 (1904), 167-175; George K. Holmes, "The Peons of the South," *Annals of the American Academy of Political and Social Sciences* 4 (1893), 256-274; John Roach Straton, "Will Education Solve the Race Problem?" *North American Review* 170 (1900), 786-794; Charles H. Smith, "Have American Negroes Too Much Liberty?" *Forum* 16 (1893), 174-183; W. P. Trent, "Dominant Forces in Southern Life," *Atlantic Monthly* 79 (1897), 49-61; and Murat Halstead, "Revival of Sectionalism," *North American Review* 140 (1885), 237-250.

2. The literature on these topics is extensive. See, for example, Allen F. Davis, *Spearheads for Reform: The Social Settlements and The Progressive Movement, 1890-1914*, (New York, 1967); Barbara Miller Solomon, *Ancestors and Immigrants, A Changing New England Tradition* (orig. 1956; Chicago, 1972); John Higham, *Strangers in the Land, Patterns of American Nativism, 1860-1925* (New Brunswick, New Jersey, 1955); and William L. Bowers, *The Country Life Movement in America*, (Port Washington, New York, 1974). The history of compulsory public school attendance still needs to be written. For an early-twentieth-century document that considers the issue, see Forest Chester Ensign, *Compulsory School Attendance and Child Labor* (Iowa City, Iowa, 1921).

3. Of use on the larger cultural order are Sidney Fine, *Laissez Fair and the General-Welfare State* (Ann Arbor, Michigan, 1956); Roy Lubove, *The Progressives and the Slums* (Pittsburgh, 1962); Alan I. Marcus, "Disease Prevention in America: From a Local to a National Outlook, 1880-1910," *Bulletin of the History of Medicine* 53 (1979), 184-203; John Braeman, "Beveridge and the First National Child Labor Bill," *Indiana Magazine of History* 60 (1964), 1-36; and Stephen Wood, *Constitutional Politics in the Progressive Era* (Chicago, 1969).

4. William Osler, *The Principles and Practice of Medicine*, 8th ed. (New York, 1912), 302-303.

5. Though a case of the disease was not reported in the United States until 1893, many American physicians much earlier had seen cases of hookworm in their country—but had not diagnosed them—and had known of the disease's designation as a distinct malady. Indeed, from at least the eighteenth century, American medical men had provided vivid descriptions of their patients' suffering that in retrospect could only be attributed to hookworm. Similarly, European doctors had identified the hookworm-producing parasite as early as 1843, established the disease as a particular disorder caused by that specific agent by the 1850s, and included that knowledge in parasitology courses in their medical schools by 1870. Presumably, then, the perennial stream of Americans crossing the ocean to seek medical or post-graduate training at European colleges must have been exposed to these new and important gleanings.

6. For the Commission, see, for example, James H. Cassedy, "The 'Germ of Laziness' In the South, 1900-1915: Charles Wardell Stiles and the Progressive Paradox," *Bulletin of the History of Medicine* 45 (1971), 159-169; Mary Boccaccio, "Ground Itch and Dew Poison: The Rockefeller Sanitary Commission, 1910-1914," *Journal of the History of Medicine and Allied Sciences* 27 (1972), 30-53; and John Eitling, *The Germ of Laziness: Rockefeller Philanthropy and Public Health in The New South* (Cambridge, Massachusetts, 1981).

7. See W. L. Blickhahn, "A Case of Ankylostomiasis," *Medical News* 63 (1893), 662-663; F. G. Mohlau, "Anchylostomum Duodenale, With Report of Cases," *Buffalo Medical Journal* 36 (1896-97), 573-579; and C. H. Tebault, Jr., "Anchylostomiasis," *New Orleans Journal of Medicine and Surgery* 52 (1899-1900), 145-148.

8. Mohlau, 574.

9. Lieutenant Bailey K. Ashford, "Ankylostomiasis in Puerto Rico," *New York Medical Journal* 71 (1900), 552-556.

10. See, for example, "Report of the Board of Investigation of Tropical Diseases in the Philippines," *Report of the Surgeon-General of the United States Army for 1901*, 203-219 and John Guiteras, "Ankylostomiasis in Florida and Cuba: The New Species, *Uncinaria Americana*," *American Medicine* 4 (1902), 100-101.

11. George H. Simmons, "Ankylostomiasis," *Journal of the American Medical Association* (hereafter cited as *JAMA*) 37 (1901), 1466-1467.

12. William B. Grey, "Anchlostomium Duodenale in Virginia," *Virginia Medical Semi-Monthly* 6 (1901), 269-270; M. Charlotte Schaefer, "Anchylostoma Duodenale in Texas," *Medical News* 79 (1901), 655-658; R. Lee Hall, "Ankylostomiasis—Report of A Case," *JAMA* 37 (1901), 1464-1465; Thomas A. Claytor, "A Preliminary Report Upon A Case of Uncinariosis (Anklostomiasis)," *Philadelphia Medical Journal* 7 (1901), 1251; J. H. Dyer, "Anchylostomiasis," *Interstate Medical Journal* (1901), 94-96; Herman B. Allyn and M. Behrend, "Ankylostomiasis In the United States. Report of A Case," *American Medicine* 2 (1901), 63-66; Joseph B. Greene, "A Case of Ankylostomiasis (Uncinariosis) Occurring To A Sailor," *New York Medical Journal* 75 (1902), 460.

13. Thomas A. Claytor, "Uncinariosis (Ankylostomiasis). A Further Report of a Case, With Notes Upon the Autopsy," *American Journal of Medical Sciences* 123 (1902), 28; Charles Wardell Stiles, "The Significance of Hookworm Disease (Uncinariosis or Ankylostomiasis) In Man, *Annual Report of the Bureau of Animal Industry for 1901*, 183-184; Allyn and Behrend, 66; Hall, 1465. Though a Ph.D. in Zoology, Stiles is considered as a physician for this paper.

14. Herbert Gunn, "Uncinariosis In California, Based on Observation of Sixty-Two Cases," *California State Journal of Medicine* 3 (1905), 212-213.

15. Charles Wardell Stiles, "A New Species of Hookworm (*Uncinaria Americana*) Parasitizing Man," *American Medicine* 3 (1902) 777-778.

16. H. F. Harris, "Ankylostomiasis, The Most Common of the Serious Diseases of the Southern Part of the United States," *American Medicine* 4 (1902), 776.

17. Claude A. Smith, "Uncinariasis in the South," *JAMA* 40 (1903), 709-713; E. D. Bondurant, "The Hook Worm Disease in Alabama," *New York Medical Journal and Philadelphia Medical Journal* 78 (1903), 8-11; J. L. Nicholson and Watson S. Rankin, "Uncinariasis As Seen in North Carolina; Its Frequency, Etiology, Pathological Significance, Symptoms and Treatment," *Medical News* 85 (1904), 7-12; Louis M. Warfield, "Grave Anemia Due to Hook-Worm Infection," *Medical Record* 66 (1904), 9-12; C. C. Bass, "Uncinariasis in Mississippi," *JAMA* 47 (1906), 185-189; Charles Wardell Stiles, "Report upon the Prevalence and Geographic Distribution of Hookworm Disease (Uncinariasis or Ankylostomiasis) In the United States," *Hygienic Laboratory Bulletin No. 10* (Washington, D.C., 1903).

18. For a discussion of the lazyworm controversy, see Mark Sullivan, "An Emancipation," *Our Times: Pre-War America* (New York, 1930), 290-299.

19. H. F. Harris, "Ankylostomiasis," 776 and "Uncinariasis (Ankylostomiasis); Its Frequency and Importance in the Southern States," *Transactions of the Medical Association of Georgia* 1903, 351-367; J. B. Guthrie, "Report of Uncinariasis," *Mobile Medical and Surgical Journal* 3 (1903), 549-556. See also Thomas W. Dorsett, "Hookworm Disease (Uncinariasis)," *Therapeutic Gazette* 28 (1904), 793-794; Allen J. Smith, "Uncinariasis in Texas," *American Journal of Medical Sciences* 126 (1903), 769-798; and W. P. Dunbar, "*Uncinaria Americana*," *Texas Medical News* 14 (1904), 3-5.

In the late-nineteenth and early-twentieth centuries, physicians defined for themselves a new social role. The new niche they chose—and ultimately were awarded—within the American socio-economic and political system was as guardians of the public health. In this way they sought to function as protectors or promoters of American nationality. For an elaboration of this argument in a local context, see Alan I. Marcus, "Professional Revolution and Reform in the Progressive Era: Cincinnati Physicians and the City Elections of 1897 and 1900," *Journal of Urban History* 5 (1979), 183-207.

20. For the statement on hookworm, see William Pepper, *A Text-Book of the Theory and Practice of Medicine* (Philadelphia, 1893-1894), 2, 833. For the material on Osler and others, see the following retrospective works, Sullivan, 306; Charles Wardell Stiles, "Early History, In Part Esoteric, of the Hookworm (Uncinariasis) Campaign In Our Southern United States," *Journal of Parasitology* 25 (1939), 288-289; and Frances Maule Björkman, "The Cure For Two Million Sick," *World's Work* 18 (1909), 11608.

21. "Discussion on Uncinariasis," undertaken during the 54th annual session of the American Medical Association, *JAMA* 40 (1903), 311.

22. *Ibid.*, 310.

23. *Ibid.*, 313. Smith publicly retracted his hypothesis here. In 1906, Stiles and

Joseph Goldberger showed that dogs could be hosts for *Uncinaria Americana*. The worm did not seem to reproduce in canines, however. See Charles Wardell Stiles and Joseph Goldberger, "A Young Stage of the American Hookworm—*Necator Americanus* (Stiles, 1902)—8 to 12 Days After Skin Infection In Rabbits and Dogs," *American Medicines* 11 (1906), 63-65.

24. Harris, "Ankylostomiasis," 776.

25. David Reisman, "The American Hookworm in Chimpanzees," *American Medicine* 6 (1903), 611. Reisman, however, would not have the last word. In 1906, Stiles would complicate an already complex situation and raise the specter that the disease might soon extend beyond the South. Retreating from his position that *Uncinaria Americana* was a uniquely American worm, Stiles would report the existence of the American variety among natives of China and Guam. This revelation proved particularly troublesome to Californians because the state not only possessed a climate and soil suitable for the worm's growth, but it also accepted many Chinese within its borders, some of whom were almost certainly infected. See Charles Wardell Stiles, "The American Hookworm (*Necator Americanus*) In Guam and China," *Johns Hopkins Hospital Bulletin* 17 (1906), 313.

26. See, for instance, Ralph N. Greene, "Hookworm Disease," *Memphis Medical Monthly* 24 (1904), 521-524; Horace B. Blan, "The Anemia of Hookworm Disease," *Nashville Journal of Medicine and Surgery* 97 (1905), 106-108; Samuel S. Adams, "A Case of Uncinariasis In a Child," *Archives of Pediatrics* 23 (1906), 240-248; George Homan, "Remarks on Hookworm Disease (Uncinariasis), With Report of a Case," *Journal of the Missouri State Medical Association* 2 (1906), 764-770; B. B. Bagby, "Uncinariasis," *Virginia Medical Semi-Monthly* 11 (1907), 469-471; A. G. Fort, "American Hookworm—Uncinariasis," *Atlanta Journal—Record of Medicine* 10 (1908), 154-157.

27. W. P. Ivey, "Uncinariasis In the Mountains of North Carolina," *New Albany Medical Herald* (1904), 204-207. For similar attempts to spread the word through local medical societies, see, for example, W. P. Dunbar, "Uncinariasis—Report of a Case In Hunt County," *Texas State Journal of Medicine* (1906), 71; Greer Baughman, "Report of a Case of Uncinariasis," *Virginia Medical Monthly* 11 (1907), 569-570; and Albert G. McGill, "Uncinariasis," *Journal of the Arkansas Medical Society* 4 (1908), 440-444.

28. *New York Times*, May 10, 1896, 10, and May 31, 1898, 7. While poor whites long had resided in the rural South, they engendered a new type of concern in the late nineteenth century. This new concern required observers to explain why they had not noticed the crackers earlier, and often they responded by claiming the existence of poor white trash was in fact a new occurrence in the rural South. For contemporary reflections about poor whites in the early- and mid-nineteenth century, see both Paul H. Buck, "The Poor Whites of the Ante-Bellum South," *American Historical Review* 31 (1926), 41-54 and A. N. J. Den Hollander, "The Tradition of 'Poor Whites,'" in W. T. Couch, ed., *Culture in The South* (Chapel Hill, North Carolina, 1935), 403-431.

29. George H. Simmons, "Uncinariasis (Ankylostomiasis) In the Southern States," *JAMA* 40 (1903), 37. Also see James McKeen Cattrell, "A Newly Recognized Factor In American Anemias—"The Germ of Laziness," *Popular Science Monthly* 62 (1902-1903), 381-383.

30. *New York Times*, June 25, 1905, 7. Also see material in note 18.

31. The disease description comes from Claude Smith, "Uncinariasis In the South," 710.

32. Charles Wardell Stiles, "Uncinariasis (Ankylostomiasis) in Man and Animals In the United States," *Texas Medical News* 10 (1901), 529-530. Also see, for instance, Dyer, 95; Bondurant, 11; and Joseph A. Capps, "Uncinariasis or Ankylostomiasis," *JAMA* 40 (1903), 31.

33. See, for instance, Isaac Ivan Lemann, "Importance of Uncinariasis To the Southern Practitioner," *Mississippi Medical Record* 7 (1903), 214; Capps, 31; Smith, Uncinariasis In Texas," 795-796.

34. "American News and Notes," *American Medicine* 3 (1902), 94. For another view, see "Medical Items," *Medical Record* 49 (1896), 467-468.

35. *New York Times*, June 6, 1899, 7; Simmons, "Uncinariasis (Ankylostomiasis) In the Southern States," 36; James Roberts Gilmore, *Among The Pines* (New York, 1862), 82.

36. For a good summary of Looss' work in English, see F. M. Sandwith, "Note On the Entrance of Ankylostoma Embryos Into the Human Body By Means of the Skin," *British Medical Journal* (1901), part 2, 690-691 and "Proof That Ankylostoma Larvae Can Enter the Skin," *Journal of Tropical Medicine* 5 (1902), 380-381.

37. Charles A. Bentley, "On the Causal Relationship Between 'Ground Itch' or 'Panighao,' and The Presence of the Larvae of the Ankylostoma Duodenale In the Soil," *British Medical Journal* (1902), part 1, 190-193.

38. See, for instance, Lemann, 217; George H. Simmons, "The Mode of Infection In Ankylostomiasis," *JAMA* 37 (1901), 117-118; Thomas A. Claytor, "The Treatment of Uncinariasis," *JAMA* 40 (1903), 308; Smith, "Uncinariasis In Texas," 797.

39. The quote is from Warfield, 12. In addition to Smith, Warfield and Nicholson and Rankin investigated the relationship between ground itch and hookworm in America. See Nicholson and Rankin, 978-987. Citations to Smith's work follow below note 40.

40. Claude A. Smith, "Uncinariasis In the South," 709-712, "Some Remarks Upon Hook-Worm Disease," *Mobile Medical and Surgical Journal* 5 (1904), 47-59, "Uncinariasis In the South, With Special Reference to Mode of Infection," *JAMA* 43 (1904), 592-596, "Further Remarks on the Mode of Infection In Uncinariasis," *JAMA* 45 (1905), 1142-1145, "[Proceedings of the American Society of Tropical Medicine]," *JAMA* 45 (1905), 1899, and "The Causative Factor In the Production of the Dermatitis of Ground Itch (Uncinariasis)," *JAMA* 47 (1906), 1693-1695.

41. For Weston's proposal, see William Weston, "Uncinariasis," *Journal of the South Carolina Medical Association* 4 (1908), 124-127. For the Puerto Rico Anemia Commission, see George H. Simmons, "Tropical Anemia (Ankylostomiasis) In Puerto Rico," *JAMA* 43 (1904), 334; Jane Howell Harris, "Uncinariasis," *Journal of the Medical Society of New Jersey* 2 (1905), 302-306; and L. L. Seaman, "Uncinaria Duodenalis (Hookworm Disease), Its Presence in Puerto Rico and Treatment Suggested," *Southern California Practitioner* 20 (1905), 161-166. For Bass and the commission idea, see Bass, 187-189.

42. Charles Wardell Stiles, "Soil Pollution and Hookworm Disease in the South: Their Result and Their Prevention," *Mobile Medical and Journal* 12 (1908), 193-203.

43. Thomas L. Stedman, "An Enemy to the South," *Medical Record* 76 (1909), 608-609.

44. H. Edwin Lewis, "The Prevalence of Uncinariasis in America," *American Medicine* 15 (1909), 497-498.