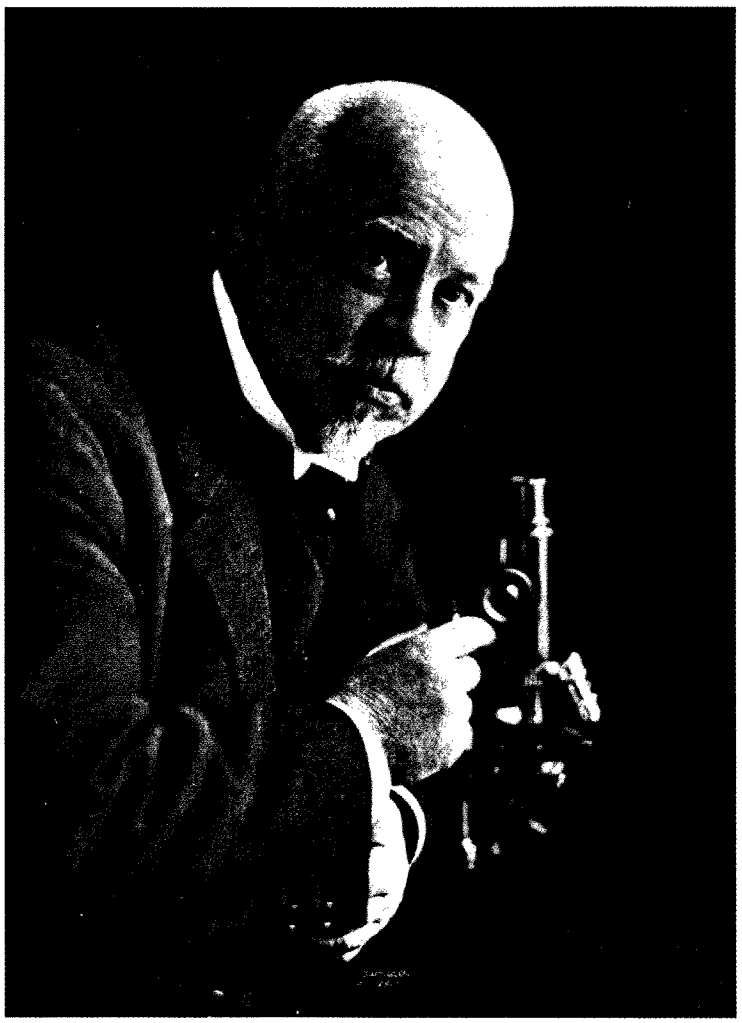
THE WELCH-ROSE REPORT: A PUBLIC HEALTH CLASSIC

DELTA OMEGA HONORARY PUBLIC HEALTH SOCIETY



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THE WELCH-ROSE REPORT

INTRODUCTION

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The Welch-Rose report was the seminal justification and blueprint for schools of public health in this country. It is a particular point of pride that this "public health classic" has been made available by the Alpha Chapter of Delta Omega on the occasion of the 75th Anniversary of the founding, in 1916, of the Johns Hopkins School of Hygiene and Public Health. Delta Omega, the public health honor society, was itself founded at Hopkins in 1924 by two students of that year's graduating class (thereby ensuring their place in the hagiography of public health).

Launched on a sea of professional and academic rivalry, the report established the need for professionally trained public health workers, a distinct but parallel entity to the curative-oriented medical profession. As the accompanying essay by Elizabeth Fee makes clear, however, the real "brass ring" was to be Rockefeller funding of the first formal, endowed school of public health in the nation. Welch, the primary author, carefully crafted the justification and description of his "institute"--the one he would found a year later as the Hopkins School of Hygiene and Public Health. His purpose was clear: "development of the spirit of investigation and the advancement of knowledge," so as to provide "advanced workers and investigators to be the teachers, authorities and experts...for service in different fields." This was accomplished by combining, in a single institution, graduate research as pioneered by the German institutes of hygiene with practical training modeled on the English schools for health officers.

The Welch-Rose report remains refreshingly current, an essential starting point for planning the future of public health and the training of its practitioners. It propounds the need for close collaboration with medical schools and hospitals; a continual refining of the interface of preventive and curative medicine; the importance of continuing studies for "those already engaged in health work"; translation of research results into policy and practice; the necessity for developing close working relationships with local, state and federal agencies and incorporating field experience into the educational experience (foreshadowing by 74 years the Institute of Medicine report, "The Future of Public Health"). All the disciplines listed by Welch and Rose remain relevant today. If "sanitary engineering" sounds outdated for our modern industrial society, substitute "toxic waste disposal."

Two issues remain unresolved. The more fascinating is the distinction between "maintenance of health" and "cure of disease." If the maintenance of health is within the provence of public health, then disease lies within the domain of curative medicine. But the nature of health and disease is continually

stressing the need to train all medical students and practitioners in preventive medicine.

The second issue, then as now, is our widespread failure to gain understanding (and support) for what we do. Recognizing the problem, Welch and Rose made much of the public health profession. But a profession traditionally is defined by its common body of knowledge. The Welch-Rose report admits that for public health, "unity is to be found rather in the end to be accomplished. " In other words, public health is not a single profession in the traditional sense, and is best defined by its shared goals rather than its disparate means. Articulating who we are and what we do remains one of our greatest challenges. The Welch-Rose report did not neglect even this intractable issue.

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The Welch-Rose Report: Blueprint for Public Health Education in America

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The Welch-Rose Report: Blueprint for Public Health Education in America

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The Welch-Rose Report of 1915 is both symbol and blueprint for the development of professional schools of public health in the United States. Perhaps the most remarkable single fact about public health education as it has developed in America is the creation of schools of public health that are allied with, but largely independent of, schools of medicine, and also largely independent of the structure of state public health services. In this, the United States created a structure of public health education quite different from that of Great Britain or Europe.[1]

In Great Britain, public health training was developed as a medical specialty by offering examinations and a diploma in public health to qualified medical practictioners; in most European countries, schools of public health were developed in conjunction with ministries of public health and state public health services. In the first instance, public health was captured by the medical profession; in the second, by state bureaucracies. Each system has its advantages and disadvantages. The system of public health education in America is unique by virtue of its independence–some would say isolation–from the larger system of the delivery of medical and health services to the population. This independence has given schools of public health great flexibility in responding to a changing national environment and also provokes and continual process of self-examination and self-questioning about the proper role, structure, and function of public health education. An understanding of the history of public health education and specifically of the Welch-Rose report of 1915 can help us understand the ideas and intentions of those who designed the first schools of public health and can therefore provide an informed basis for ongoing dicussions about the present and future shape of public health education in the United States and in other countries around the globe.

This essay first brings us back to late nineteenth and early twentieth century America, to the social conditions of an industrially developing country, with relatively weak federal and state governments, and relatively powerful private foundations and social reform groups. All were concerned about the state of public health and all, to one degree or another, saw public health as fundamental to social stability, national power, and the good society. Progress in this realm seemed to depend upon the development of a cadre of professionally trained men and women who could bring the benefits of scientific knowledge and discovery to the mass of the population and, by increasing the general level of health and happiness, help build a more stable, productive, and efficient social order.

This essay then examines in some detail the process of planning, designing and establishing the first schools of public health some 75 years ago, beginning with the School of Hygiene and Public Health at Johns Hopkins University. It discusses the major issues raised during the debates that took place in the early twentieth century around the best form and structure for a future system of public health education–questions to which the Welch-Rose report provided a highly influential set of answers. It then, and much more briefly, provides a sketch of some subsequent developments in the system of public health education, and suggests some of the questions and issues that are still unanswered.

Science and Public Health: The Need for a New Profession?

Most public health positions in the United States in the mid to late nineteenth century were part-time appointments at nominal salary. City and state health officers were often locally prominent physicians, although they could also be lawyers, landowners, businessmen, or engineers. Usually health officials were appointed to office by a governor, mayor, or city council; they might be known through bonds of friendship or the connections of political patronage. There was no specialized training to prepare a man to become the Commissioner of Health of a city–it seemed largely a matter of chance whether the individual selected turned out to have natural administrative ability or not; whether he was hard-working and dedicated to the job, or lazy and incompetent. Some of the better medical, engineering, and technical schools in the late nineteenth century offered courses in public health, preventive medicine, and sanitary engineering but there was no standardized system of training and little agreement about the forms of knowledge necessary for public health practice.[2]

No matter whether a health official was good, bad, or mediocre, he usually lasted only for a political season; newly elected politicians would turn the old team out and put their own men into key positions. No public health officer sensible to his own self-interest would become overly committed to such an unstable job; the post of public health officer could be an interesting and honorable position but it could not be regarded as a stable source of income, much less as a "career." Given the structure of public health practice, it is perhaps surprising that so many public health officers were dedicated and effective public servants. Hermann Biggs, for example, who was one of the best public health administrators in the country, continuously complained of the inadequate incomes of public health officers. While devoting much of his time to public health, he maintained a very successful private medical practice, explaining: I do public health because I love it and practice medicine because I have to make a living."[3]

Public health programs, when organized at all, were organized locally: as Robert Wiebe has argued, the United States in the nineteenth century was a society of "island communities" with considerable economic and political au-

tonomy.[4] The first public health organizations were those of the rapidly growing port cities of the eastern seaboard in the late eighteenth century. By 1860, public health activities were just beginning to move beyond the confines of local city politics, and in the 1870s and 1880s, most of the states created their own boards of health.[5] The impact of these state boards of health should not, however, be overemphasized; by 1900, only three states (Massachusetts, Rhode Island and Florida) spent more than two cents per capita for public health services.[6]

The development of public health departments, especially in the cities, was prompted by the industrial transformation of the late nineteenth century. The populations moving from the land to the rapidly growing cities competed for living space with the flow of immigrants from western, southern, and eastern Europe; families crowded into tenement housing, back alleys, and damp basement apartments, supplied with communal privies and polluted water sources. City streets were heaped with garbage, including dead and decaying animals, and the waste products of small manufactories; factories produced their own noise, smells, smoke, and industrial wastes to add to the dirt and confusion of the new industrial order.[7] Children died young of diarrheal and respiratory diseases, diphtheria, whooping cough, smallpox, and typhoid fever. Tuberculosis and other infectious diseases killed young adults and further impoverished families already struggling for survival. City health departments, especially in the eastern port cities, faced overwhelming social and health problems.[8]

An increasing number of voluntary reform groups were organized to address social and sanitary reforms. In 1872, the American Public Health Association was started by a small group of social reformers in New York City; other municipal associations were active in attempting to improve the conditions of the poor or in campaigning for specific social reforms.[9] Progressive reform organizations aided, pushed, and provoked city governments to act on some of the most obvious threats to cleanliness, order, and health in the urban environment.[10]

Gradually, the functions of city health departments, especially in the north and east, expanded. In addition to divisions of street cleaning, sanitary engineering, and vital statistics, they started bacteriological laboratories, divisions of tuberculosis and venereal disease control, and divisions of child and maternal health. The heads of these divisions held full-time posts, supported by a growing corps of public health nurses, sanitary inspectors, and statistical clerks. The main difficulty of most city health departments was to find personnel trained and competent to do the job, while resisting pressures to make political appointments of unqualified people. These official activities of the municipal health departments were supplemented by the energetic efforts of voluntary agencies dedicated to specific reforms.

The northern industrial cities thus displayed the social and health problems brought by rapid industrial growth, but they also generated the progressive

reform movements to address the most obvious problems. By contrast to the northeast, the southern states after the Civil War resembled an underdeveloped country within the United States. In the southern states, levels of literacy, agricultural production, and economic efficiency were all low as a legacy of slavery. The integration of the south into a growing industrial economy required far-reaching social and cultural changes. In this context, northern industrialists began investing in education as well as in cotton mills and railroads, and John D. Rockefeller, on the suggestion of Frederick Gates, created the General Education Board to support "the general organization of rural communities for economic, social and educational purposes."[11]

Charles Wardell Stiles convinced the Secretary of the General Education Board that the real cause of misery and lack of productivity in the south was hookworm, the "germ of laziness."[12] In 1909, Rockefeller agreed to provide $1 million to create the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease, with Wickliffe Rose, originally a philosophy professor in Tennessee, as Director. Rose worked to establish an effective and permanent public health organization in the southern states.[13] At the end of five years of intensive effort, his campaign had greatly expanded the role of public health agencies. In 1914, the organizational experience gained in the southern states would enable the Rockefeller Foundation to extend the hookworm control program to the Caribbean, Central America and Latin America. A major problem faced by the Rockefeller Foundation's efforts in the southern states had been to find adequately trained and competent public health workers; the leaders of the hookworm campaign found, by bitter experience, that they could not depend on the competence and efficiency of part-time public health officers, nor could they depend on the support or cooperation of most private medical practitioners. As a result of his experiences in the south, Wickliffe Rose decided that a new profession of public health must be created, with full-time public health workers who had been specifically trained for the job, and whose loyalties would be committed to public health rather than to clinical medicine.

Toward a Profession of Public Health

Public health had been defined in terms of its aims and goals—to reduce disease and maintain the health of the population—rather than by any specific body of knowledge. Many different disciplines contributed to public health work: physicians diagnosed contagious diseases; sanitary engineers built water and sewage systems; vital statisticians provided quantitative measures of births and deaths; lawyers wrote sanitary codes and regulations; public health nurses provided care and advice to the sick in their homes; sanitary inspectors visited factories and markets to enforce compliance with public health ordinances; and administrators tried to organize everyone within the limits of their budgets.

Physicians claimed to make a special contribution to public health, but so did other groups including chemists, nurses, engineers, lawyers, bacteriologists, and statisticians. The attempt to create a new profession of public health meant that these diverse and often competing interests would have to be brought together with a single vision, a common philosophy, and a unified educational program. If each group had different specific skills, they would have to learn to work together in practice. To create a more unified profession, their different professional identities would have to be integrated in the interests of a larger goal. Programs of education and training, credentialling, and licensing would have to be shaped to their different levels of prior training, scientific knowledge, and experience.

By the second decade of the twentieth century, non-medical public health officers were beginning to protest the increasing dominance of public health by medical men. By this time, the sanitary engineers were the only professional group strong enough to challenge the physicians' assumption that the future of public health should be theirs. Civil and sanitary engineers had created relatively clean city water supplies and adequate sewerage systems. With the benefit of hindsight, we can say that the sanitary engineers, through their work in improving water supplies and sewerage systems, surely deserve much of the credit for the decline of infectious disease mortality and morbidity in the late nineteenth century.[14] Professional competition between the sanitary engineers and the physicians became intense in the early years of the twentieth century as physicians reinforced their dominance in public health departments, and as sanitary engineers vociferously complained about the increasing "medical monopoly" of public health.[15]

Physicians, sanitary engineers, and public health leaders such as William Sedgwick, trained as a biologist, and Wickliffe Rose, originally a professor of philosophy, agreed on one unifying idea: the new profession of public health should be based on a scientific education. The discoveries of Louis Pasteur, Robert Koch, and other bacteriologists in the 1870s and 1880s had been rapidly integrated into public health practice in the United States; as Sedgwick aptly expressed the impact of bacteriological discoveries: "Before 1880 we knew nothing; after 1890 we knew it all; it was a glorious ten years."[16]

The new bacteriology became an ideological marker separating the "old" public health, mainly the province of untrained amateurs, from the "new" public health, which would belong to those trained in the techniques of science and laboratory research. The new emphasis on scientific knowledge would also provide a means of insulating public health practice from political pressures by making appointments more dependent on knowledge and training than on personal and political loyalties. At the same time, scientific training would differentiate public health professionals from the broader enthusiasms of voluntary reformers; in public health, the social reform impulse would be tempered

by scientific knowledge and expertise. Public health leaders were committed to the idea that health activities should be planned along scientific lines by a scientifically trained elite, and not left either to the good intentions of voluntary reform groups or to changing political pressures and special interests.

Some of the more progressive state governments, such as New York, were already by 1913 passing legislation to require minimal levels of scientific training for those appointed to public health positions. Such legislation was, however, in advance of the educational system: there were few real opportunities for education in public health and most public health workers were necessarily trained on the job. Where the federal and state governments were slow to act, the private foundations, and especially the Rockefeller Foundation, took the lead in organizing public health programs and professional public health education.

The Rockefeller Foundation: Plans, Choices, Strategies

One critical event in shaping the future structure of the public health profession was a conference held in New York on October 1914. This conference, held in the offices of the General Education Board of the Rockefeller Foundation, would have a dramatic impact: the decisions taken on that occasion would lay the basis for the future development of professional public health education. The public health leaders and Foundation representatives involved set themselves the task of defining the necessary knowledge base for public health practice and designing the educational system needed to train a new profession. William Henry Welch and Wickliffe Rose refined these ideas, each inserting his own favored emphasis, in their two versions of the famous Welch-Rose report of 1915, which was to become the central reference point for the design of schools of public health.

The creation of public health as a profession in the United States—however incomplete the process—was thus part of a deliberate plan and strategy. By examining the specific decisions taken, we can better understand the subsequent development of public health education and, with the benefit of hindsight, evaluate the results of this early planning. At the time, there were several possibilities for organizing professional public health education. One option was to regard public health as a unique amalgam of the biomedical, engineering, and social sciences, requiring specialized training in each of these fields. Some suggested that public health be treated as a combination of sanitary engineering and bacteriology, so that the contributions of engineers and physicians could both be honored. Others regarded public health as mainly a problem of social reform and social organization, in which social and political scientists should take a leading role. Yet others thought that public health should be a specialized branch of medicine, drawing on physicians' knowledge of disease processes, diagnosis, and therapy.

The question of the relationship of public health to other disciplines and professional groups was simultaneously the question of the content and methods of the field. Should public health identify closely with bacteriology and the successes of the germ theory of disease, or should it seek a broader definition, trying to understand the influence of social, economic, and environmental conditions on the health of individuals? Were the social sciences of fundamental importance to understanding the definition, patterns, and distribution of health and disease, or were they a side issue qualifying the serious business of biological research? If public health constituted the study of disease in society, how much attention should be devoted to disease and how much to society?

The most fundamental issues in the design of public health education were the tensions between public health and clinical medicine, and between the social and biological approaches to health. A series of other related issues also structured the debates about public health education. The first concerned the relative importance of advanced education for the few versus minimal training for the majority of public health practitioners. Those wanting training efforts to be directed at practicing public health officers urged the creation of short courses, correspondence courses, and extension courses rather than lengthy full-time degree programs, so that people already working in the field would have access to some specialized education.

The second issue, related to the first, was whether educational programs should concentrate on research and research methods—the means of developing new knowledge—or on the more practical skills needed in running a health department, planning an immunization campaign, or establishing a new clinic. Those advocating a research-oriented education argued that the demands of practice were constantly changing so that education in specific methods would soon be outdated; research training provided the basic scientific principles that could be applied to any problems arising in the future. Those advocating more practically oriented programs argued that the most urgent task was to implement existing public health knowledge rather than to devote resources to new research. They cited the British model of public health education, which they saw as being oriented toward administrative skills, and with licensure dependent on a combination of course work and practical training. Those advocating a research-oriented education referred to the German research institutes of hygiene as their model. In the debates about the form of public health education in America, the term "public health" usually referred to the English administrative model, while "hygiene" implied the German emphasis on research.

A third, related issue in public health education was the relative importance to be given to mass education for the general public. Most agreed in principle that public education in the broadest sense was important in improving the public's health, but they differed in the real priority they gave to popular education. Those most interested in promoting research tended to give a lower order

of importance to popular health education than did the advocates of practical training programs. These issues were not, however, synonymous, and some laboratory researchers were ardent advocates of popular education.

Wickliffe Rose and the Rockefeller Sanitary Commission

Wickliffe Rose, the architect and organizer of the Rockefeller Sanitary Commission's campaign against hookworm, was described by Abraham Flexner as "a thoroughly intellectual type" and as "a great general and strategist." Rose indeed thought of the world as a battle field in the conquest of disease.[17] The general, however, needed an army: officers and soldiers trained in the most effective and efficient methods of fighting disease, possessed with zeal for the battle, and properly equipped for the seriousness of the task. Rose knew that he did not want to rely upon part-time health officers, or on physicians whose main income came from private practice.

In the hookworm campaign, Rose had attempted to work through local health officials in each community. He had discovered that public health was strictly a part-time avocation for these men, and that their primary interest was in medical practice. He had early come to the conclusion that a new profession was needed, composed of men who would devote their whole careers to the control of disease. Rose insisted, as had Edwin Chadwick before him, that there must be two separate professions: medicine, for curing disease on an individual level, and public health, for preventing and controlling disease on a population level.

Abraham Flexner and the General Education Board

As the first step in the implementation of his plan, Rose turned to the General Education Board and to Abraham Flexner, whose "Flexner Report" of 1910 had been central to the reorganization of American medical education.[18] Flexner was not very interested in public health, but he knew a great deal about medical education, and the General Education Board held general responsibility for all Rockefeller education programs. At the time, Flexner was struggling to get medical school professors to give their full time to teaching and research and not be permitted to earn income from private practice—a principle that some accepted and others violently opposed. To Rose, the need for full-time health officers appeared in a similar light: real progress would depend on the separation of public health work from the competing loyalties of medical practice. In December 1913, Rose asked the General Education Board to consider ways of training men for public health service.[19]

Abraham Flexner immediately began to explore the existing facilities for training health officers. He soon discovered that Wickliffe Rose's concern about professional training was widely shared. Hermann Biggs, the energetic Commissioner of Health in New York State, was especially bitter about the lack of

properly trained men for health department work.[20] In 1913, Biggs had maneuvered a bill through the New York State legislature to allow the State Board of Health to set minimum qualifications for local health officers.[21] This bill had no immediate effect, for there were no applicants with any special training in public health, and no training program available in the state. Massachusetts, Pennsylvania, and Maryland had similar legislation, but again, it was ineffective without a supply of trained men to fill the available positions. The legal framework remained meaningless until provision could be made for educating the new professionals.

Existing training courses in public health were insufficient to meet the demand. Alexander Abbott, who had studied with Welch, Pettenkofer, and Koch, was graduating a small number of students from his public health program at the University of Pennsylvania.[22] Edwin Jordan at Chicago had a modest program for public health training, and E.P. Lyon had been trying to start at program in Minnesota. William W. Ford reported from Baltimore: "Even with the most favorable interpretation of our facilities...it must be admitted that the subject of Hygiene or Public Health is in its infancy at Johns Hopkins, and that we would not be justified in maintaining for a moment that we have the opportunities for properly training men for a career in Public Health."[23]

By far the most developed and successful model for public health training was the School for Health Officers run jointly by Harvard University and the Massachusetts Institute of Technology. By combining existing courses in Harvard and M.I.T. with a number of new offerings, the School for Health Officers had produced an impressive catalogue of courses in communicable diseases, sanitary engineering, preventive medicine, personal hygiene, demography, public health administration, sanitary biology, and sanitary chemistry. Two or three years of academic work were required for a certificate in public health.[24] The Harvard-M.I.T. School graduated a small number of highly trained health officers each year: five received certificates in 1914.[25] Some of those trained were medical men, but most were scientists and engineers. The School's Director, Milton J. Rosenau, had written the classic text, Preventive Medicine and Hygiene.[26]

As soon as Rosenau heard of the General Education Board's interest in the training of health officers, he wrote to Flexner proposing that "such a project might well be entrusted to Harvard University."[27] At the same time, Charles-Edward A. Winslow suggested a school in New York. Thinking of the immediate practical needs of the New York State Health Department, Winslow visualized a school that would concentrate on training public health nurses, sanitary inspectors, and health officers for small towns: the rank-and-file of the profession, not just the highly trained elite. He argued forcibly that the laws recently passed in New York State called for many hundreds of trained men and women to work in areas such as industrial hygiene, infant mortality, and school inspections.[28]

On May 28, 1914, Wickliffe Rose presented his own report on "Training for Public Health Service" to the General Education Board.[29] Rose argued that the public health officer of the future would not be a practicing physician but would follow an "independent career." Opportunities for professional employment already existed; a properly equipped school would find an immediate market for its graduates. Rose suggested that the General Education Board begin formulating a concrete plan to establish, on an experimental basis, one or two schools "at such places as Boston or New York."[30] Abraham Flexner agreed to organize a planning conference for the following October.

At this juncture, Columbia University submitted a proposal for a school of public health in New York. The Columbia plan, submitted by Edwin Seligman, Professor of Political Science, called for a combination of medical, engineering and social science courses, leading to a doctor of science degree. Abraham Flexner now had to add a representative from Columbia to his invitation list for the October conference. Nicholas Murray Butler, the President of Columbia University, suggested Seligman. Instead of inviting Seligman, or even one of the other distinguished Columbia faculty such as Hans Zinsser, professor of bacteriology, or Mary Adelaide Nutting, professor of nursing, Flexner asked Daniel Jackson, a junior faculty member from the engineering department, to represent Columbia. Protesting, Butler asked that Seligman be invited to the conference, but Flexner was adamant, and Jackson, who had neither an M.D. nor a Ph.D., received the invitation. In vain, Seligman warned that "the broader social side was in danger of not being adequately represented."[31]

The Columbia plan placed unusual emphasis on the importance of the social and political sciences and insisted that public health was a social and political problem, as well as a medical and engineering one. In the discussions that followed, three competing conceptions of public health emerged: the engineering or environmental approach, the socio-political, and the biomedical. In the end, the biomedical conception was to dominate with socio-political and environmental concerns relegated to a very subsidiary role, just as Seligman had feared.

Yale University was also planning a program in public health. Yale had been given an endowment to establish a chair of public health, and had asked Flexner for advice in selecting a candidate; Flexner suggested that the university postpone all plans until after the October conference.

As Flexner drew up his plans for the conference, Wickliffe Rose was clarifying his own idea of the necessary organization of public health training. By October 7, 1914, Rose already had the outlines of a plan to place schools of public health in strategic centers across the United States.[32] He sent Flexner a long list of men and organizations to be consulted, including, in addition to medical school representatives, the United States Public Health Service, the medical

departments of the army and navy, state, city and county health officers, food control officials, registrars of vital statistics, life insurance companies, industrial health managers, and sanitary engineers. Most of the men on Rose's list were never contacted; Flexner was not very interested in the opinions and concerns of practicing health officers, except those at the very highest level.

By contrast to Flexner, Hermann Biggs, like Winslow and Rose, wanted public health training to be closely tied to the practical needs of local communities. Biggs argued the need for short courses given in many different universities, supplemented by extension and correspondence courses, so that at least minimal training could be provided for the health officials of small towns and rural areas. In Biggs' view, the provision of graduate training for higher level health officials was less urgent.[33]

By the time of the conference in October 1914, Flexner thus had a variety of plans and proposals: Harvard and Columbia both wanted to establish schools, Biggs wanted a network of courses at different universities, Rose wanted a series of schools to be set up across the country, and both Abbott of Pennsylvania and Whipple of Harvard argued that no new schools would be needed if their existing facilities were expanded.

The General Education Board Conference of 1914

On October 16, the General Education Board conference brought together eleven public health representatives and nine Rockefeller trustees and officers. The public health men were Alexander C. Abbott, professor of bacteriology at the University of Pennsylvania; Hermann M. Biggs, Health Commissioner of New York State; Frederick Cleveland, Director of the New York City Bureau of Municipal Research; Daniel D. Jackson, assistant professor of engineering at Columbia; Edwin Jordan, professor of bacteriology at the University of Chicago; William H. Park, Director of the New York City Public Health Laboratory; Milton J. Rosenau, professor of preventive medicine at Harvard; Theobald Smith of the Rockefeller Institute for Medical Research; William H. Welch, professor of pathology and Dean of the Johns Hopkins School of Medicine; George C. Whipple, professor of sanitary engineering at Harvard; and Charles-Edward A. Winslow of the New York State Health Department.

Flexner began the meeting with a relatively safe question: what were the different types of public health officers for whom training was required? Biggs said there were three classes of health officers: executives, technical experts, and field workers. The "health officials of the first class," men with executive authority, included state and district health officers, and city commissioners of health. In the "second class" were the technical experts: the bacteriologists, statisticians, engineers, chemists, and epidemiologists who would conduct research and implement health department programs. Third were the "subordinates" or "actual field workers," the local health officers, factory and food in-

spectors, and public health nurses. This latter and most numerous group were the "foot soldiers" in Rose's war against disease.[34]

How, then, should these three classes be trained? Should the first class have broad, general training and the second class specialized training? William H. Welch argued the importance of basic scientific principles: "Train them in the fundamental principles. The rest, of course, requires specialized training, but it almost takes care of itself, and is easily supplied."[35]

But who should be trained? The single most difficult question was whether public health officials ought to be medical men. Was it reasonable to suppose that physicians would be willing to abandon their independence to become salaried employees? One consequence of the Flexner reforms in medical education had been a decline in the number of practicing physicians and a rapid increase in their incomes; it was hardly the most propitious moment to expect an influx of medical men into public health, when, as Frederick T. Gates pointed out, "the attractions of practice are becoming so extraordinary."[36] Indeed, the General Education Board's previous intervention into medical education had seriously undercut the possibility of creating a new cadre of salaried medical men in public health.

Welch refused to see the situation that had thus been created; he insisted that public health would be as attractive to medical men as the inducements of private practice.[37] Many physicians, he thought, would be eager for graduate training in public health and see it as a "splendid opportunity." Welch at that moment showed himself a poor prophet, for the majority of physicians in the United States were to demonstrate little enthusiasm for specialist public health education.[38]

Welch proposed that a qualified health officer should have a medical degree, hospital internship, and two additional years of special training in a public health school. Frederick Gates and Hermann Biggs argued against the requirement of a medical degree: Biggs preferred men "reasonably qualified to do the work" rather than to wait forever for an "unattainable" ideal.[39] Gates suggested that many medical men failed to establish successful practices; perhaps the failures in private practice might become students of public health? The idea of public health as a refuge for failed physicians hardly augured well for the new profession, but many at the conference felt that public health officers needed medical qualifications. Even Theobald Smith, who argued that physicians were "absolutely color-blind to the preventive point of view," thought that the health officer needed an M.D. so that he could "stand on a level with the medical man."[40] Abbott explained that the health officer would be dependent upon the cooperation of the medical profession in his community; a non-physician would find it doubly difficult to gain the respect and attention of local physicians.[41]

At this time, the increased activity of state and city health departments in the identification and control of infectious diseases often brought health officers into

conflict with private practitioners; many practicing physicians regarded public health with deep suspicion as a form of governmental encroachment on their freedom. When public health took on the battle against specific diseases, it threatened the territory of medicine; lacking strong state authority, public health officials had to cultivate the good will of the doctors. As John Duffy has argued, this had the effect of making public health officers "cautious to the point of timidity" in the period between 1906 and the 1930s, so reluctant were they to undertake any programs that might disturb the interests of their medical colleagues.[42]

The men at the 1914 conference, unable clearly to define the relationship between medicine and public health, were swayed by Welch's benign assurance that no real conflict existed. Welch, however, was much too optimistic; the issue, in different forms, would continue to plague the development of public health as a profession. In the United States, as in Britain, the interests of private medical practitioners and those of public health officers often conflicted; from the point of view of the physicians, public health officers interfered with the doctor-patient relationship, trespassed on their autonomy, and threatened to provide patients with free services, such as immunizations, for which private physicians might otherwise be paid.

This question of the larger relationship of public health and medicine was closely connected to the decision about the structural relationship between public health and medical education. Welch had initially spoken of public health departments within medical schools, Rosenau envisioned completely separate schools, and Biggs thought public health training should be independent of existing institutions. Biggs and Winslow, colleagues in New York State, argued that a school associated with a single university would have limited possibilities for field training, be hampered in influencing legislatures and appropriations, and be unable to standardize educational and professional qualifications.[43]

Wickliffe Rose now laid out an elaborate and carefully articulated plan. He argued the need for a national scientific school of public health, well endowed for research. This school should be affiliated with a university, but have its own independent identity, not simply be one department of a medical school. It must have its own building, grounds, endowment, and a faculty who would give their whole time to teaching and research. It should be located in a port city, "with its immigration element" but be within easy reach of opportunities for rural health work.[44] This school would select its students from across the country and place its graduates in strategic positions throughout the United States.

The central school was, however, only the beginning of the plan; it would be linked to smaller schools of public health to be established in every state. These simpler state schools would focus on teaching rather than on research, be linked to state health departments and medical schools, offer short courses for public

health officers in the field, and provide extension services for rural health education. Both central and state schools would teach public health education methods and seek to extend popular health information to the entire population.

Rose's plan brought together most of the elements of the morning's discussion; his description of the central school in a port city might have applied to Boston, New York, Philadelphia, or Baltimore. Biggs called the plan "admirable"; Theobald Smith found it "magnificent"; and Welch pronounced it "stirring and inspiring." Wallace Buttrick, President of the General Education Board, then suggested that Welch and Rose together work out a plan for the new school that could be mailed to all participants for criticism and suggestions. Welch agreed, and polititely suggested that Rosenau and Biggs join them. Flexner left the arrangements to Welch, and the meeting adjourned.

After the meeting, Boston and New York both laid claim to the new school. From Harvard, Whipple wrote that he had been gratified to see how closely the ideal school, outlined by Rose, corresponded to their efforts: "It makes us feel all the more certain that we are on the right track."[45] Edwin Seligman produced a more detailed plan for a "School of Sanitary Science and Public Health" at Columbia University.[46] In addition to the two-year course of study for graduates of medicine and engineering, this plan called for a certificate in public health for nurses, sanitary inspectors, and local health officers. Seligman attached to his proposal a letter from E.H. Lewinski-Corwin arguing for the conception of public health as a social science, on the grounds that most public health issues were not medical or technical problems, but questions of political economy:

> Congestion of population in cities, the condition of tenement houses, the elimination of slums, recreation centers, alcoholism, prostitution, the standard of living, social insurance, the saving of human wear and tear in industry, the elimination of the insane and feeble minded and many other similar problems affect the public health as much as the sewerage system, food inspection, and the quarantine of measles.[47]

On this argument, social science and political economy should be at the center of the public health curriculum, together with "the principles of administration and efficiency." But this social conception of public health was to receive little attention, as the emphasis on biomedical sciences came to dominate the social and environmental approaches to public health.

The Welch and Rose Reports: May 1915

While Harvard and Columbia were making their appeals to Abraham Flexner, Wickliffe Rose and William Henry Welch were supposed to be meeting in Baltimore, to outline the proposal for a new school of public health. Welch had first promised to write a draft proposal in October, in time for a second conference.[48] By March, Welch was still saying that he would soon have the report ready.[49] By April, Rose was becoming increasingly anxious: the next

General Education Board meeting was set for May 27, and Welch had still not written the report. By May 12, Rose had become still more anxious: where was the report? Perhaps despairing that Welch would ever produce the promised draft proposal, Rose wrote his own memorandum, entitled it "School of Public Health," and asked Welch to add his ideas to the draft. At the very last moment, Welch produced a document retitled, "Institute of Hygiene," which was then presented at the General Education Board meeting as the "Welch-Rose report." By delaying until the last possible moment, Welch had had avoided the promised consultation with Rosenau and Biggs and had made another conference impossible; even Rose did not have time to review the draft report before its official presentation.

There are thus two quite distinct versions of what has come to be known as the Welch-Rose report: the first, written by Rose, and the second, rewritten by Welch. The longer Rose version was his plan for a national system of public health training, with a central school of public health as the focal point of a network of state schools. The central school was to create "thoroughly trained and inspired leaders to mould public opinion and train the army of workers in the state's public health service."[50] It would develop a new "science of hygiene" and establish public health service as "a distinct profession." Rose clearly differentiated medicine from public health and asserted that "the science of protection is quite distinct from the science of cure."[51] Although the central school would be essential for creating this new science of hygiene, Rose's main focus was on the state schools and extension courses. Here, his model was the agricultural extension courses and farm demonstration programs used by the Rockefeller Foundation to modernize agricultural production in the southern states.[52] The Smith-Lever Act of 1914 had placed these programs under the management of state agricultural colleges, and Rose wanted to reproduce this pattern in public health: "This lesson which has been learned by the teachers of agriculture through a long period of costly experimentation we shall adopt bodily in our system of public health education."[53]

These programs asserted that real change in agricultural methods depended less on scientific research than on persuading the farming population to put new knowledge into practice: agricultural extension workers travelled from farm to farm urging individual farmers to try new crop techniques and organizing their children into clubs concerned with raising pigs, cattle, and poultry. In the same way, public health teachers would take instruction to "workers in the field" and would teach by practical demonstration. According to Rose, the central school would take the whole country as its "field of operations," sending out "an army of workers" to demonstrate the best methods of public health, and bringing back practical experience to be "assembled and capitalized" in research at the center of operations. In line with this conception, Rose emphasized three of the more practical departments in the curriculum: epidemiology, public health nursing, and public health administration.

The orientation of Welch's version of the "Welch-Rose report" was quite different. The change in title was significant: the substitution of "institute" for "school" implied a focus on research rather than teaching; the substitution of "hygiene" for "public health" meant an emphasis on science rather than on practice.[54] Welch wanted an "Institute of Hygiene": a center for scientific research and the production of knowledge, not the command headquarters for an army of practical workers as envisioned by Rose.

In his introductory pages, Welch contrasted public health and hygiene in England and Germany by explaining that in Germany, hygiene was taught as a scientific subject in the universities, while in England, emphasis was placed on practical public health administration.[55] Although Welch said the ideal American plan would give due weight to both the scientific and the practical aspects of public health, he made obvious his own conviction that scientific research should take priority over practice. In fact, Welch's version of the report essentially ignored Rose's proposed system of state schools, practical demonstrations, and extension courses. Enthusiastic paragraphs about the need for public health nurses and special inspectors disappeared; Welch combined Rose's three departments of epidemiology, public health nursing, and public health administration into a single "Division of General Hygiene and Preventive Medicine."[56] Welch insisted that the school's main purpose would be to cultivate and advance "the science of hygiene in its various branches" and not to meet the immediate needs of the public health service: "It would be a misfortune if this broader conception of the fundamental agency required for the advancement of hygienic knowledge and hygienic education should be obscured through efforts directed solely toward meeting in the readiest way existing emergencies in public health services."[57]

In describing the institutional relationships of the new "school" or "institute" the differences between the Welch and Rose reports might appear minor, but they would be highly significant in choosing its location. Rose argued that the school of public health must not be a department of a medical school: "the two have divergent aims and must stand apart."[58] Nevertheless, the school of public health had to be close to a medical school "in the interest of economy and efficiency" so that basic medical courses would not have to be duplicated. Welch dropped Rose's phrase about the divergent aims of medicine and public health, and substituted the milder expression that the institute of hygiene should have "an independent existence." He then added a short paragraph stating that the institute must have access to the facilities of "a good general teaching hospital" for study and training in preventive medicine.[59] This was a critical point as the location of the new school would be largely decided by evaluating the medical schools and teaching hospitals of Boston, New York, and Baltimore.

On May 27, 1915, the Welch version of the Welch-Rose report was presented and accepted by the General Education Board, and the report mailed to the

original conference members for their comments and criticisms. Most of the responses were highly favorable; the Harvard men supported it but seemed not to see its potential implications. Indeed, Whipple viewed the report as an endorsement of the Harvard-M.I.T. School: "The ideal of our School for Health Officers, which is much broader than its name implies, is very well set forth in the report of Dr. Welch and Dr. Rose."[60]

The New York men were more alarmed. Charles-Edward A. Winslow complained that the report was closer to the German than the English conception of public health, and should have emphasized practical field work; he also wanted the title changed to the "institute of public health and hygiene."[61] William H. Park wanted part-time men from city health departments, school health departments, and industrial plants to participate in teaching.[62] Frederick A. Cleveland urged that emphasis be shifted "to make administration the big idea and statistics the ancillary one."[63] Edwin Seligman wanted the new center to be called a "school" rather than an "institute" and complained pointedly about the emphasis given to the medical side of public health: "Nothing is said of the need of studying the substantial forces in our economic and social environment and the various plans for social and economic reform which frequently have a great influence on the health of the community. Again, such a matter as accident and sickness insurance, which usually occupies about half of any European book on social medicine, is not mentioned in the outline."[64]

Seligman agreed that connection with a medical school would be important, but argued for equal emphasis on the relation to a school of engineering and to other university departments: the majority of students would come, he thought, from departments of chemistry, biology, engineering, and from the social and political sciences, rather than from medical schools. Abraham Flexner responded that the medical school relation was essential: public health officers had to deal with the prevention and management of <u>disease</u>, and had therefore to gain their experience and understanding "in the laboratories and hospital of a medical school."[65]

By this reply, Flexner demonstrated either his distaste for, or ignorance of, the conception of public health held by the social and sanitary reformers; Flexner's was a "disease model" of public health practice. Flexner discounted Seligman's emphasis on social science as simply a self-interested position; he wrote to Rose that Seligman was "doubtless conscious of the fact that, on the medical school side, the position of Columbia is...vulnerable."[66] As Seligman was professor of political science, he had a "tendency to underrate the importance of the medical school." Rose answered mildly that Seligman was not underrating the importance of the medical school so much as wanting more emphasis on other departments, especially sociology. "We did recognize this relation and it could be expanded in much more detail."[67]

Rose did not share Flexner's adamant commitment to the medical model of public health, but it was Flexner who was to push forward the plans for public health education. In June 1915, Flexner wrote a memorandum to the Rockefeller Foundation proposing that a director and location be chosen for the "Institute of Hygiene." The director could then make detailed plans of organization.[68] By this time, the evidence suggests that Flexner had already decided that Baltimore should be the location and William Henry Welch the Director of the Institute. However, Jerome D. Greene, Secretary of the Rockefeller Foundation, thought the choice narrowed down to Boston and New York, "with the chances very much in favor of New York, in view of the large opportunities here for both municipal and rural practice."[69] Hurriedly, Flexner replied that it would be "unfortunate" to restrict narrowly the number of possible locations before having examined "all fairly possible situations" and "unfortunate to gravitate towards any one place prematurely." He added on a disingenuous note that "the factors are so many and so complicated that I have myself no idea as to what the ultimate decision should be."[70]

Choice of a Location: The Site Visits

In September, Wickliffe Rose proposed to Flexner and Greene that they visit Boston, New York, Philadelphia, Baltimore, Washington, D.C., Chicago and St. Louis, thus examining, as Flexner had suggested, "all fairly possible situations."[71] Boston was the first on the list; only four cities would in fact be visited—as the tour stopped at Baltimore. For the first three days, Flexner directed the interviews at Harvard: instead of dealing with issues specific to public health, these focused on the administrative relationships between the medical school and its affiliated hospitals. Flexner continually emphasized the fact that Harvard did not control the hospitals it used for teaching.[72]

The need for medical schools to control hospital appointments was one of Flexner's most cherished themes, an important, though little discussed, part of the "Flexnerian reforms" in medical education. But in the context of planning a school of public health, Flexner's obsession with the administrative control of hospitals seemed out of place. Flexner ignored Harvard's experienced public health teachers and researchers, considerable scientific talent, plentiful opportunities for field work, and progressive and cooperative city health department. He paid little attention to the School for Health Officers and, to add insult to injury, even failed to call on William T. Sedgwick, founder of the School, a leading light in public health circles, and the main proponent of a separate educational track for public health.

On his return from Boston, Flexner apologized to Sedgwick for his "unintentional and inadvertent" failure to invite him to the conferences on public health.[73] Sedgwick replied graciously but went on to criticize the Welch-Rose report.[74] He urged that the new center for public health training be called "An

American Institute of Public Health" and that it have a less German, more American and democratic orientation. It should be given "an almost absolute independence" to avoid being submerged by the medical school; it should articulate with federal, state, and municipal organizations to "keep in vital contact with the traditions, customs and spirit of American Democracy."[75] Sedgwick insisted that the new profession of public health be "coordinate, but not subordinate" to medicine and that the medical and engineering sides of public health be equally represented. Flexner's interests, however, were entirely medical and he continued to display a thinly veiled impatience with the environmental approach to public health. Flexner made his apologies to Sedgwick and continued to ignore his views.

Flexner, Rose, and Greene made only a brief visit to the University of Pennsylvania. Alexander Abbott seemed to have little idea of how to establish the proposed school of public health. When asked how the school would be organized, for example, he simply replied, "I have not thought it out definitely."[76] Pennsylvania had few resources in comparison to Harvard and Abbott had modest ambitions. He declared that he already had ample facilities, and would just like an increase in his staff: not the kind of inspiring vision that members of the General Education Board expected.

The third visit, to Columbia University, was more extensive. Columbia had an excellent program in public health nursing run by Mary Adelaide Nutting, and New York City had a progressive and cooperative city health department, led by Haven Emerson. On the other hand, the medical school provided no basis for optimism. The medical professors, meeting at the Century Club, appeared to have little comprehension of public health work or of its possible implications. Most strongly asserted that public health officers should be medical men, but beyond this, had few suggestions. It became clear that Columbia's strength lay in engineering, nursing, the social and political sciences, and in the opportunities for practical field work: all issues that in Flexner's mind were much less important than the quality of the medical school and hospitals.

The last site visit was to Baltimore and the Johns Hopkins University, which epitomized Flexner's ideal of medical education as he had amply demonstrated in the Flexner report of 1910.[77] Both the medical school and the hospital were heavily committed to the research ideal. As at Columbia, the medical school faculty had almost total power over the running of the medical institutions, but Flexner explained the difference: "they have a tremendous organization, a thoroughly homogeneous one, sympathetic to their authorities to start with. They have not got a lot of old fogies here."[78] At Hopkins, the medical school and the hospital were in theory independent corporations, but in reality, they had interlocking boards of trustees and tended to act as a single unit. Flexner was reassured that there would be no difficulty in using the hospital for research and training or in opening special hospital departments if needed.

Welch emphasized the advantages of Baltimore: property was cheap, the city was close to the southern states for practical public health work, and it was also close to the U.S. Public Health Service in Washington, DC. Cooperative relationships with federal and state health departments could easily be developed. Welch promised the school would be flexible in taking students with or without a medical degree. Theodore Janeway of the medical school was equally optimistic. Baltimore, he claimed, had many diseases not available in New York: amoebic dysentery, pellagra, and hookworm from the South, and tropical diseases from Cuba and the West Indies.[79] J. Whitridge Williams, the professor of obstetrics and gynecology, summed up the advantages of Baltimore: "If this school comes here the best thing we have to offer you is Dr. Welch. I feel sure that Dr. Welch with very little urging will take it on his shoulders to develop it...Another thing we have 100,000 darkies here with all their diseases, and their mortality twice as high as the whites, and three times as much tuberculosis, and four or five times as much syphilis."[80]

The visitors were evidently persuaded; within a week, they had submitted their report to the General Education Board with Baltimore as the heavy favorite.[81] Harvard, Columbia, and Pennsylvania were criticized because of the independence of their medical schools and hospitals, and because their medical professors tended to be locally prominent practitioners rather than academic researchers. The resources of the Johns Hopkins University in engineering, the sciences, and sociology were declared to be "modestly developed" though "modern in spirit." The City Department of Health was "far inferior to that of Boston, New York, or Philadelphia" although "the attitude of the authorities assures the University a free hand in utilizing its resources and possibilities, whatever they are."

The real advantage of Hopkins was its medical school, with a small faculty "animated by high ideals and very efficiently led." In summary, the report concluded: "The general resources of the University and of the community are inferior—in some respects much inferior—to those found in New York, Boston and Philadelphia; the Medical School fulfills the requisite conditions in the highest degree anywhere obtainable."[82]

The decision in favor of Baltimore produced considerable bitterness between Hopkins and Harvard. Abraham Flexner has been accused of rank favoritism for Hopkins, of hating Harvard, of being "Welch's matchmaker," and of dogmatic conviction that Hopkins was the only medical school worthy of respect.[83] Certainly, Charles W. Eliot, President of Harvard, was infuriated by the decision. He wrote to Flexner:

> The personality and career of Dr. Welch are the sole argument for putting the Institute in Baltimore—and he is almost sixty-six years old, and will have no similar successor. This is the first time that a proposed act of a Rockefeller Board has seemed to me to be without justification or reason-

able explanation.[84]

Flexner replied that the Welch-Rose report–as rewritten by Welch–had earlier been endorsed by the Harvard men, and had pointed to the department of medicine as the single most important factor in locating the Institute of Hygiene. "Viewed from this angle the personality and present activities of Dr. Welch, helpful as they might be at the outset, are not so essential as the character of the medical school organization, a thing which will surely endure."[85]

The question remains: why did Wickliffe Rose and Jerome Greene agree that the organization of the medical school should be the determining factor in locating a school of public health? Why did they give such importance to the management of hospitals, when these institutions were irrelevant to most public health activities? Why did Rose sign Welch's version of the report at the last moment and agree formally to present it to the Foundation, thus allowing his own vision of a comprehensive system of public health education to be eclipsed by Welch's narrower focus on a single institute of research?

From Jerome Greene's letters, it is clear that Wickliffe Rose had the deciding voice in giving the new school of public health to Welch and to Baltimore. Flexner had his mind set on Johns Hopkins; Greene favored Harvard; Rose was not only the most impartial of the three, but also the one who best knew from experience the practical side of public health. Rose had decided on Baltimore. It seems paradoxical, but he had emphasized the quality of the medical school precisely because he believed that the aims of public health contradicted the interests of the majority of the medical profession. Rose was entirely serious in his ambition to eliminate disease from the earth; he hoped, and believed, that in controlling infectious diseases, he would eventually put much of the medical profession out of business. As he saw the situation in the South: "A physician has to make a living but that depends on the prevalence of disease. Insofar as this function (prevention) is successful it diminishes the prevalence of disease and therefore diminishes his work and his income."[86]

In the southern states, Rose had found that the medical profession often constituted the main obstacle to public health programs. Even in New York, physicians had attacked the City Health Department for infringing upon their professional rights; the Rockefeller Foundation had wanted to fund public health activities but had retreated in the face of strong medical opposition.[87] Many physicians saw the Rockefeller activities in public health as an assault on their interests as small (medical) businessmen and as an effort to invade their markets. Rose understood this point of view and openly declared his ultimate aim to undercut the practice of medicine through the prevention of disease.

To Rose, therefore, the medical practitioners represented, in theory and often in practice, the potential opposition to the new profession of public health. For this reason, the influence of powerful local practitioners on the faculty of the medical schools at Harvard, Columbia, and Pennsylvania might threaten the

survival of a new school of public health. Johns Hopkins was different: there, the medical professors were full-time men, committed to research and teaching rather than to private practice.[88] These men would not be economically challenged by public health activities. They might be sympathetic to the new school or indifferent, but in any case, they were unlikely to destroy the fledgling institution by overt or covert opposition.

In April 1916, the Executive Committee of the General Education Board accepted the site visit report of Flexner, Rose and Greene. Welch was to be director of the Institute, with William Howell, professor of physiology in the medical school, responsible for its "executive management." Welch and Howell formally presented a detailed plan of organization to the Board of Trustees of the Rockefeller Foundation.[89] On June 12, 1916, the Executive Committee of the Rockefeller Foundation approved the plan, appropriating $267,000 for the initial operation of the new school at Johns Hopkins University. They gave the school a name representing a compromise between those who had wanted a "school of public health" on the English model and those who favored an "institute of hygiene" on the German model.[90] The new school thus gained its unwieldy title: "The School of Hygiene and Public Health"—implying that it would be both an institute for basic scientific research and, at the same time, a school for practical public health training.

William Henry Welch and the Hopkins School

When William Henry Welch won the competition to start the first of the central research and training institutes supported by Rockefeller Foundation dollars, he gained the ability to put his own ideas of public health education into practice.[91] At Hopkins, the alignment of the conceptual frameworks and methodologies of scientific medicine and public health were assured, as was the orientation toward research rather than practical training. Welch was now able to implement his own version of the Welch-Rose plan. He still, however, needed money for building and an endowment, and for this, he needed the support of the International Health Board of the Rockefeller Foundation. Throughout the initial years of organizing the school, Welch continually pushed his idea of a research institute of hygiene, while the Rockefeller Foundation urged him to pay more attention to public health administration, applied public health, short training courses, and popular health education.

The resulting structure of the school represented a negotiated agreement between Welch and the Rockefeller Foundation.[92] Welch agreed to offer short training courses for International Health Board officers and other carefully selected student groups; he allowed somewhat more curriculum time for public health administration and made limited excursions into the field of health education for the general population. When the Rockefeller Foundation provided extra funding in 1932, the school worked with the city health department to

establish the Eastern Health District, an area that served as a "population laboratory" for research and the practical training of students in field surveys and administrative methods. On the whole, however, the school continued to be strongly oriented toward laboratory research and the biomedical model of public health.

Welch had indeed obtained the institute of hygiene he had planned ever since, as a young man, he had visited the research institutes in Germany. His "school of hygiene and public health" would indeed be very successful as a research institute, with both faculty and students turning out research publications at a rapid rate.[93] As a school of public health, it trained a relatively small number of graduate students–relatively small, that is, in comparison to the national need for public health officers–and gave them very high level of professional education, with considerable emphasis on research. Many of these students would themselves become scientists and teachers, while others would become planners, administrators, and managers of health and public health services both in the United States and in many countries around the world.

The relatively small number of graduates would not have been problematic had the rest of the Rose plan for public health education been instituted: if, for example, state schools of public health had been quickly established to train large numbers of public health workers in the practical methods of public health. The state schools, however, were built more slowly, much later, and in fewer numbers than needed; the correspondence and extension courses needed to train large numbers of public health workers would come many decades later, or not at all. Rose might have used the Hopkins school as the starting point for designing a comprehensive national system of public health education for the United States, but he was soon to be distracted from the national scene by his appointment as Director General of the International Health Division of the Rockefeller Foundation, with responsibility for public health activities around the world.

New Schools of Public Health

Once the Hopkins school had defined the Welch model of public health, other schools tended to pattern themselves in the same image. Even the pioneering Harvard-M.I.T. School for Health Officers, which had preceded the Hopkins school, was reformulated into a structure similar to the one at Hopkins. In an important symbolic move, the school cut its ties with M.I.T. and sanitary engineering, and went over to the medical campus at Harvard University. The new Harvard School of Public Health, opened in 1922 with an endowment from the Rockefeller Foundation, was located beside the Harvard Medical School, and the Dean of the Medical School, David L. Edsall, was also made Dean of the School of Public Health.

The argument for an intimate relationship between the medical and public health schools was that the medical school would thus be imbued with the spirit

of public health. This turned out to be a naive hope: Harvard Medical School continued, as did Johns Hopkins, to demonstrate a distinct lack of interest in public health. The perspective of medicine was not, after all, determined by administrative arrangements, but was the synthesis of more fundamental political and economic forces, scientific advances, and technological change. The cutting edge of medicine followed technical possibilities in diagnosis, therapeutics, and surgery; high technology medicine was both exciting and lucrative. The growing economic power and resources of academic medicine contrasted with the relative and sustained poverty of public health. In such a context, bringing medical and public health education together was rather like merging a large corporation with a small one; public health tended to become submerged in the powerful interests of academic medicine and clinical research.[94]

Both the Hopkins and Harvard schools were identified with strong medical schools and with the "medical model" of public health; both were clearly oriented towards research, with a relatively small and elite postgraduate student body, and both were similarly organized into departments and disciplines.[95] Both schools trained a small number of U.S. students (relative to the large and growing demand for public health officers) and offered an elite route into high-level public health positions–the kind of educational mission consistent with the traditions of two private universities that prided themselves on their academic standards, highly qualified faculty, selective admissions policies, and institutional commitment to research.

Within the next few years, several major universities in the United States would establish or reorganize their public health programs. The specific formal organization of these programs differed: Yale University developed a department of public health within the School of Medicine; Columbia University established the De Lamar Institute of Public Health, and the University of Michigan created a division of hygiene and public health.[96] While these programs had individual differences, the basic model of the content and methods of public health education would be similar to that instituted at Hopkins and Harvard.

Public Health, the Depression, and the Social Security Act

A major stimulus to the development of public health education came in response to the Depression, the New Deal, and the Social Security Act of 1935. The Social Security Act expanded financing of the Public Health Service and provided federal grants to states to assist them in developing their public health services. Federal and state expenditures for public health actually doubled in the decade of the Depression.

Federal law required each state to establish minimum qualifications for health personnel employed through federal assistance, and recommended at least one year of postgraduate education in an approved school of public health. For the first time, the federal government provided funds, administered through

the states, for public health training. Overall, the states budgeted for more than 1,500 public health trainees, and the existing training programs were filled to capacity. As a result of the growing demand for education in public health, several state universities began new schools or divisions of public health and existing schools of public health expanded their enrollments.[97]

In 1936, the American Public Health Association reported that ten schools offered public health degrees or certificates requiring at least one year of residence; of these, the largest were Johns Hopkins, Harvard, Columbia, and Michigan.[98] By 1938, more than four thousand people, including about one thousand doctors, had received some public health training with funds provided by the federal government through the states. The economic difficulties of maintaining a private practice during the depression had pushed some physicians into public health; others were attracted by the new availability of fellowships or by increased social awareness of the plight of the poor and of their need for public health services. In 1939, the federal government allocated over 21 million dollars for public health programs: eight million dollars for maternal and child health, nine million for general public health work, and four million for venereal disease control.

Evaluation of Schools of Public Health

In 1938, the Rockefeller Foundation decided to evaluate the status and future of public health education.[99] The Scientific Directors of the International Health Division selected Thomas Parran, the Surgeon General of the Public Health Service, and Livingston Farrand, recently retired as president of Cornell University, to study the schools of public health in the United States and Canada.[100]

Parran and Farrand estimated that the nation's public health services required about 300 public health physicians each year and between 2,000 and 4,000 public health nurses. The demand for other kinds of public health personnel, such as sanitary engineers, statisticians, and epidemiologists, was also increasing dramatically. They noted that ten universities offered degrees in public health: California, Columbia, Harvard, Hopkins, Michigan, the Massachusetts Institute of Technology, Minnesota, Pennsylvania, Wayne State, and Yale. In 1939, the numbers of graduates per year ranged from 75 at Hopkins to 1 at Wayne State, with a total of 199 graduating public health specialists. Of these, 63 percent were physicians. An additional 20 universities and colleges offered programs in public health nursing and together graduated about 500 students each year. The 12 engineering colleges that offered degrees in public health engineering together graduated about 80 students per year.[101] Some of those schools, especially the nursing schools, offered only undergraduate degrees; a total of 24 schools and universities offered postgraduate courses in public health. In whatever manner the numbers of graduates were estimated, the existing schools were

clearly unable to meet the projected needs for trained personnel.

In addition to the demand for new graduates, most of the public health officers already employed by health departments needed further training to satisfy the new federal regulations. A Public Health Service survey of health departments had found that half of the physicians, one-third of the nurses, and two-thirds of the sanitary officers had no public health training whatsoever and were seriously undereducated by professional standards.

Again, legislation was in advance of the capacities of the educational system. The national need for public health graduates was far in excess of the numbers being trained by existing schools. Federal training funds were now allotted to California, Michigan, Minnesota, Vanderbilt, and North Carolina to develop short courses for rapidly training public health personnel. These short courses were recognized as a emergency measure until the schools were able to develop more adequate post-graduate educational programs. The University of Michigan, the University of Minnesota, Columbia University, Yale University, and Vanderbilt University were all expanding their graduate programs in an effort to meet the demand. The University of Michigan, for example, registered 176 full-time professional public health students in 1939; of these, 25 percent were medical, 25 percent engineering and sanitation, and 50 percent other disciplines including health education, statistics, and the laboratory sciences.[102] In addition, Michigan was training 186 public health nurses.

In their report to the Rockefeller Foundation, Parran and Farrand recommended increased support for Hopkins, Harvard, and Toronto, as the leading schools in the United States and Canada, to sustain research in public health disciplines, especially bacteriology, biostatistics, epidemiology, and public health administration. To help solve the national need for increased public health training, they recommended that regional training schools be supported in the far west, the mid west, and the south. They suggested that Berkeley, Michigan, and Vanderbilt seemed probable choices for the development of a second tier of public health education: they urged that new regional schools be oriented to practical training more than to research.[103] In essence, the Parran-Farrand report was recommending a limited version of the original Rose report on public health training: schools of public health in each major region of the country (rather than each state), with emphasis to be placed on training larger numbers of public health personnel.

International Expansion

Wickliffe Rose in the meantime had turned his attention to international public health. As Director-General of the International Health Board, he was in a position to expand his conception of public health education from a plan for the United States to a plan for world public health. He started by extending the hookworm control programs, begun in the southern states, to other countries,

beginning with British Guiana, Trinidad, Grenada, St. Vincent, St. Lucia, Antigua, Panama, Costa Rica, Guatemala, and Egypt. Rose next expanded the focus of the International Health Board to include malaria and yellow fever and developed major new programs in China, Latin America, and Central America.

In each country, the International Health Board offered Rockefeller Foundation Fellowships to experienced public health officers, both medical and non-medical, and to new medical graduates; the Rockefeller Fellows came to the United States for public health training and then returned home to participate in, and often to lead, their national health programs. Eventually, the International Health Board intended to establish schools of public health in these countries, staffed by faculty who had been trained in the United States. In other words, the original "Rose plan" for public health training was to be implemented on an international level.

The project of developing international schools of public health relied heavily on what the Rockefeller Foundation referred to as the "West Points of Public Health," a reference to the leading military academy in the United States. For the United States and, to a large extent, for all countries under U.S. influence, these were the Johns Hopkins School of Hygiene and Public Health and the Harvard School of Public Health. For the British colonies and the Commonwealth countries, this role would be filled by the London School of Hygiene and Tropical Medicine, which the Rockefeller Foundation funded from 1922; for Canada and the British West Indies, the University of Toronto School of Hygiene was funded in 1924. In China, the Peking Union Medical College, opened in 1919, provided an elite form of medical and public health training in a country otherwise somewhat isolated from U.S. influence. The first of the Latin American schools was established in Sao Paulo, Brazil, with assistance from the Rockefeller Foundation. Later, schools in India, Japan, and the Philippines provided centers for professional health training on the western model. Thus, a network of training centers was established in Europe, Latin America, and Asia, with faculty and students rotating between these centers on Rockefeller Fellowships, teaching exchanges, and research projects. As Raymond Fosdick described it:

> Rose and his successors as head of the International Health Board undertook the implementation of a bold and creative plan literally to girdle the globe with schools and institutes of public health, including public health nursing....The schools and institutes were located in Prague, Warsaw, London, Toronto, Copenhagen, Budapest, Oslo, Belgrade, Zagreb, Madrid, Cluj, Ankara, Sofia, Rome, Tokyo, Athens, Bucharest, Stockholm, Calcutta, Manila, Sao Paulo, and the University of Michigan....A migration of public health personnel back and forth across national boundary lines would be an enriching experience by which the new ideas and techniques of one area could become the common property of all.[104]

Medicine and Public Health: The Unhappy Marriage

The relationship between the emerging profession of public health and the well-established profession of medicine would continue to be problematic and controversial. The increased activities of health departments in the control of infectious diseases brought them into repeated conflicts with private practitioners; as soon as public health had left the confines of sanitary engineering and took on the battle against specific diseases, it had begun to challenge the boundaries of medical autonomy. As John Duffy has noted, the medical profession moved from a position of strong support for public health activities in the late nineteenth century to a cautious and suspicious ambivalence, and often, outright hostility in the early decades of the twentieth century.[105]

The Flexner reforms in medical education had been only a symptom of the larger transformation occurring in medical knowledge and practice in the early twentieth century.[106] As medical practice became dependent on developing scientific knowledge and technology, it was institutionalized in hospital settings.[107] Hospitals became dependent on physicians, and physicians in turn became dependent on access to hospital facilities. As doctors became ever more interested in the technical possibilities of scientific medicine and abandoned general practice for specialist training, they became less interested in community and preventive activities. As the standards of education and criteria for admission to the profession became more controlled and demanding, the numbers of practitioners fell and their incomes rose. Medical practice was intellectually and financially rewarding; relatively few physicians were attracted to public health with its relatively low incomes, political pressures, and comparative lack of autonomy.

Schools of public health had been established with the expectation that young physicians would take advanced training in public health after graduating from medical school. But young medical graduates showed themselves more drawn to the glamour, excitement, and rewards of curative medicine and surgery. The schools of public health at Johns Hopkins, Harvard, Yale, and Columbia all reported the same problems: most of their applicants were either experienced older men who had worked in public health positions without specialist qualifications, or young scientists interested in bacteriology, epidemiology, and other public health disciplines, but who lacked the medical degree now regarded as an essential qualification for public health leadership.[108] Important positions in public health were often offered to physicians without specialist training in preference to non-physicians with doctoral degrees in public health; the demand for physicians was such that they rarely needed public health training as a professional job requirement. As a result, the incentives for physicians to take specialized degrees in public health were further reduced, and schools of public health admitted the ever larger numbers of nurses, engineers, statisticians, and biologists who enthusiastically sought public health training.

This structural problem in the relationship between medicine and public health, already clear by 1920, was never entirely resolved. Public health in the United States would continue to be open to many professional groups and disciplines, while maintaining a special and privileged status for those with medical qualifications.

The relationship of public health to medicine was a continuing preoccupation of those organizing and implementing the expansion of public health education. The fond hope that schools of public health allied to medical schools would serve to permeate those medical institutions with the spirit of preventive medicine proved illusory. After twenty years of public health teaching, public health and medicine still seemed far apart and often moving in opposite directions. The situation in the United States in 1939 suggested a thriving and expanding public health movement, supported by new federal and state health programs, but developing in general isolation from the medical profession as a whole.

The officers of the Rockefeller Foundation, who were pouring money into education in medicine as well as in public health, continued to be optimistic that eventually the two would form a closer and more harmonious relationship. Indeed, they often asserted that, with the increasing success of medical science in curing disease, the emphasis within medicine would gradually shift from cure to prevention. The industrial and mechanical metaphors in which they conceptualized medicine transformed this dream into good business sense:

> A railway spends more money on train and track inspection than on wreck crews. The average automobile owner is on the watch for signs of motor trouble and does not wait until there is trouble. The factory manager looks solicitously after his machines and does not wait until there is a breakdown. The human body, which is vastly more complex than any machine, is in need of vigilant care and frequent examination. Yet for the most part it is neglected until pain and disability sound an unmistakable alarm. Then the doctor is called in and too often expected to do the impossible. He is thought of as a wreck crew rather than as a train and track inspector.[109]

In the United States, repeated attempts were made to bring preventive and curative medicine closer together by creating new educational programs in preventive medicine in medical schools, often with the aid of schools of public health. These attempts to change the nature of medical education were mainly remarkable for the recurrent enthusiasm of the efforts and the consistent failure of the results. Reviewing the organizational relationships and cooperative efforts between schools of public health and schools of medicine, Russell Nelson, President of the Johns Hopkins Hospital, later noted: "It is a sad story of unfulfilled expectations, numerous failures, frequent tensions, and some bad feelings."[110] Rejecting the idea that schools of medicine and public health should

be combined or that medical schools should "take over" public health, Nelson added that "Medical schools are already too large and complex to manage their present, and future, responsibilities, let alone take on others...In short, medical schools don't want to take over public health; the idea, it seems to me, appeals only to some administrators and armchair critics."[111]

Waller S. Leathers, Dean of the School of Medicine at Vanderbilt University, noted that in most U.S. medical schools, the teaching of preventive medicine was "of a desultory, uninteresting and poorly organized type."[112] Departments of preventive medicine were usually small and relatively weak, with low budgets and few faculty positions. In part, this was the consequence of a political problem: preventive medicine, to the extent that it was equated in many physicians' minds with "socialized medicine," seemed to represent a potential economic threat; medical schools were, in general, more willing to express vague support for the concept of preventive medicine than to provide active advocacy or strong financial commitment to the idea. The continuing efforts by some proponents of preventive medicine to dissociate it from social medicine and "socialized medicine" were probably hampered by the fact that many of the strongest advocates of preventive medicine and public health in the 1930s and 1940s were also committed to the concept of national health insurance as a means of solving the chronic problems of access to medical care in the United States.[113] Although the separation between medical and public health education seemed inevitable in the peculiar context of United States medicine, it was often perceived as a barrier to those trying to organize health services in developing countries. Luis Fernando Duque of Colombia bitterly attacked the rigid separation in the early development of schools of public health and medical education in Latin America:

> The health professionals shut themselves up in their schools of public health, and the physicians stayed within the walls of the medical schools and hospitals. The latter felt that public health specialists "were no longer doctors," while the health people believed themselves to be crusaders in a cause they had to win, imposing it if necessary on the community as well as on other physicians who did not understand them...[114]

Guillermo Arbona, the Secretary of Health of Puerto Rico, agreed that developing countries could not afford separate preventive and curative health services; for rationality and economy, they needed integrated health systems.[115] In the same vein, John B. Grant of the Rockefeller Foundation repeatedly argued that health services could be more efficiently and effectively provided if based on the concepts of regionalization, integration of preventive and curative services, and community health centers.[116] Grant insisted that medical education in developing nations should be oriented toward prevention, with training in administration, epidemiology, and the social sciences. He believed that a similar program should be used to transform medical education in the United States and

that it would make schools of public health unnecessary: "This trend, it seems to us, will occur as much in the richer and more highly developed countries as in the developing areas of the world. It will leave no justification for the existence of separate schools of public health, as such."[117]

The concepts of regionalization and the integration of curative and preventive services, however, were more often honored in rhetoric than in practice. The relationship between schools of medicine and schools of public health would continue to be marked by tensions and distance, with sporadic efforts to create cooperative programs of teaching and research. In summarizing the pragmatic case for the independence of schools of public health, Milton Roemer concluded that the academic environment of patient-oriented clinical medicine was simply not conducive to the growth of community-oriented public health disciplines.[118] The economic foundations of medicine and public health were fundamentally different: one dependent on government funded salaried positions, the other on the entrepreneurial basis of private practice. Efforts to merge public health and medical education in the United States were hardly likely to be successful as long as the economic foundations of preventive and curative services were so strikingly opposed.

In predicting a conflict between the private practice of medicine and the public organization of public health, Wickliffe Rose had perhaps been a better prophet than William Henry Welch. Welch's optimistic assertion that physicians would be eager for opportunities in public health had proved unfounded, except perhaps during the depression era, when many physicians struggling unsuccessfully to find patients capable of paying for private medical care found public health an attractive alternative. Federal and state funding and support for public health became more widely available with the programs of the New Deal. For a time, the economic imbalance between medicine and public health seemed to have shifted in favor of public health programs. The failure to enact national health insurance in the late 1930s, however, had also missed an opportunity to bring preventive and curative services together into a single national system.

Had Wickliffe Rose's plan for a national system of public health education been implemented, it could have helped build a strong constituency for public health both locally and nationally. It could have solved the problem of preparing sufficient numbers of qualified personnel for public health programs; it would probably have improved both the quality of those programs and the health of the population. The results of research in the Hopkins school, and the other schools founded on similar lines, could more readily have been implemented in practice. But it is also difficult to see how, in the United States context, Rose's vision have been successful without the political will to devote major federal and state resources to funding public health education and a broader sphere of public health practice. Welch's plan for public health research-based education was thus successfully implemented, but Rose's more ambitious educational plan has still to be realized.

[1]Elizabeth Fee and Roy M. Acheson, A History of Education in Public Health: Health That Mocks the Doctors' Rules (Oxford: Oxford University Press, 1991).

[2]Arthur J. Viseltear, "The Emergence of Pioneering Public Health Education Programmes in the United States," in Fee and Acheson, op. cit., pp. 114-154.

[3]Hermann M. Biggs, as quoted in Charles-Edward A. Winslow, The Life of Hermann M. Biggs: Physician and Statesman of the Public Health (Philadelphia: Lea and Febiger, 1929), p. 169.

[4]Robert H. Wiebe, The Search for Order, 1877-1920 (New York: Hill and Wang, 1967).

[5]The first state board of health, largely a paper organization, was created in Louisiana in 1855. The first working state health board was formed in Massachusetts in 1869, followed by California (1870), the District of Columbia (1871), Virginia and Minnesota (1872), Maryland (1874) and Alabama (1875). R.G. Paterson, Historical Directory of State Health Departments in the United States of America (Columbus: Ohio Public Health Association, 1939).

[6]S.W. Abbott, The Past and Present Conditions of Public Hygiene and State Medicine in the United States (Boston: Wright and Potter, 1900).

[7]Martin V. Melosi, Garbage in the Cities: Refuse, Reform, and the Environment, 1880-1980 (College Station, TX: Texas A&M University Press, 1981); Martin V. Melosi, ed., Pollution and Reform in American Cities, 1870-1930; (Austen, Tx: University of Texas Press, 1980); Joel A. Tarr, "Industrial Wastes and Public Health: Some Historical Notes, Part 1, 1876-1932," American Journal of Public Health 75 (1985): 1059-67.

[8]John Blake, Public Health in the Town of Boston, 1630-1822 (Cambridge, Mass.: Harvard University Press, 1959); Barbara Rosenkrantz, Public Health and the State: Changing Views in Massachusetts, 1842-1936 (Cambridge, Mass.: Harvard University Press, 1972); John Duffy, A History of Public Health in New York City, 1625-1626 (New York: Russell Sage Foundation, 1968); John Duffy, A History of Public Health in New York City, 1866-1966 (New York: Russell Sage Foundation, 1974); Stuart Galishoff, Safeguarding the Public Health: Newark, 1895-1918 (Westport, Conn.: Greenwood Press, 1975); Judith Walzer Leavitt, The Healthiest City: Milwaukee and the Politics of Health Reform (Princeton, N.J.: Princeton University Press, 1982); Charles-E.A. Winslow, The Life of Hermann M. Biggs: Physician and Statesman of the Public Health (Philadelphia: Lea and Febiger, 1929); E.O. Jordan, G.C. Whipple, C.-E.A. Winslow, A Pioneer of Public

Health: William Thompson Sedgwick (New Haven: Yale University Press, 1924); James H. Cassedy, Charles V. Chapin and the Public Health Movement (Cambridge, Mass.: Harvard University Press, 1962); Charles E. and Carroll S. Rosenberg, "Pietism and the Origins of the American Public Health Movement," Journal of the History of Medicine and Allied Sciences 23 (1968): 16-35; Richard H. Shryock, "The Early American Public Health Movement," American Journal of Public Health 27 (1937): 965-71; John Duffy, The Sanitarians: A History of American Public Health (Urbana, Ill.: University of Illinois Press, 1990).

[9]Stephen Smith, "The History of Public Health, 1871-1921," in Mazyck P. Ravenel, editor, A Half Century of Public Health (New York: American Public Health Association, 1921), pp. 1-12; Mazyck P. Ravenel, "The American Public Health Association: Past, Present, Future," in Ravenel, op. cit., pp. 13-55.

[10]The American Red Cross had been formed in 1882, the National Tuberculosis Association in 1904, the American Social Hygiene Association in 1905, the National Committee for Mental Hygiene in 1909, and the American Society for the Control of Cancer in 1919. See Wilson G. Smillie, Public Health: Its Promise for the Future (New York: Macmillan, 1955), pp. 450-58; Barbara Rosenkrantz, "Cart Before Horse: Theory, Practice and Professional Image in American Public Health," Journal of the History of Medicine and Allied Sciences 29 (1974): 57.

[11]Raymond B. Fosdick, Adventure in Giving: The Story of the General Education Board (New York and Evanston: Harper and Row, 1962), pp. 57-58.

[12]For a detailed account of the Rockefeller Sanitary Commission, see John Ettling, The Germ of Laziness: Rockefeller Philanthropy and Public Health in the New South (Cambridge, Mass.: Harvard University Press, 1981).

[13]Wickliffe Rose, First Annual Report of the Administrative Secretary of the Rockefeller Sanitary Commission, (1910), p. 4, as cited in Raymond B. Fosdick, The Story of the Rockefeller Foundation (New York: Harper and Brothers, 1952), p. 33.

[14]It is difficult to be confident about mortality rates in the United States before 1900, when the death registration areas began regular reporting. The evidence seems, however, to suggest that mortality rates between 1850 and 1880 remained relatively constant, with wide annual variations depending on the presence of epidemics. In the 1880s the mortality rates began to decline, and continued this decline, with minor fluctuations, throughout the period from 1890 to 1915. The major component of the decline was in infant mortality, especially mortality rates from the infectious diseases and infant diarrhea. This pattern is consistent

with the thesis that the extension of municipal water systems and the filtration of water supplies played a major role in the decline in mortality. The pasteurization of milk was probably also an important contributing factor. On the estimation of mortality rates for the period, see Edward Meeker, "The Improving Health of the United States, 1850-1915," Explorations in Economic History 9 (1972): 353-73; Michael R. Haines, "The Use of Model Life Tables to Estimate Mortality for the United States in the Late Nineteenth Century," Demography 16 (1979): 289-312; Frederick L. Hoffman, "The General Death Rate of Large American Cities, 1871-1904," Publications of the American Statistical Association 10 (1906-1907): 1-75. For a general discussion of the social impact of infectious diseases, see John Duffy, "Social Impact of Disease in the Late Nineteenth Century," Bulletin of the New York Academy of Medicine 47 (1971): 797-811.

[15]Morris Knowles, "Public Health Service not a Medical Monopoly," American Journal of Public Health 3 (1913): 111-22.

[16]As cited in E.O. Jordan, G.C. Whipple, C.-E.A. Winslow, A Pioneer of Public Health: William Thompson Sedgwick, p. 57.

[17]Abraham Flexner, An Autobiography (New York: Simon and Schuster, 1960), p. 134; Raymond Fosdick, Chronicle of a Generation: An Autobiography (New York: Harper and Brothers, 1958), p. 255.

[18]Abraham Flexner, Medical Education in the United States and Canada (New York: Carnegie Foundation for the Advancement of Teaching, Bulletin No. 4, 1910); for Flexner's interest in preventive medicine, see Gert H. Brieger, "The Flexner Report: Revised or Revisited?" Medical Heritage (Jan/Feb 1985): 25-34.

[19]Executive Committee of the International Health Commission, Minutes, December 19, 1913. Rockefeller Foundation Archives, Record Group 1.1, Series 200 (hereafter RFA, RG 1.1, Ser 200).

[20]Hermann Biggs was perhaps the first great public health administrator in the United States. Biggs was extremely successful as a private medical practitioner and had formed relationships with the politically powerful in New York City; Biggs used his influence–and the wealth he had gained from private practice–to further the cause of public health in New York.

[21]On Biggs' efforts in reorganizing the New York State Department of Health, see Charles-Edward A. Winslow, The Life of Hermann M. Biggs: Physician and Statesman of the Public Health (Philadelphia: Lea and Febiger, 1929), pp. 251-88.

[22]University of Pennsylvania: Courses in Public Health, 1909-1910 (Philadelphia: University of Pennsylvania, 1909). This catalogue gives a complete listing of courses leading to the diploma in public health; A.C. Abbott to A. Flexner, 1/20/14. RFA, RG 1.1, Ser 200.

[23]William W. Ford to A. Flexner, 1/16/14. RFA, RG 1.1, Ser 200.

[24]Milton J. Rosenau, "Courses and Degrees in Public Health Work" Journal of the American Medical Association 64 (1915): 794-96. See also, "Catalogue and Announcement," Circular of the School for Health Officers 1 (1913): 1-41.

[25]Jean Alonzo Curran, Founders of the Harvard School of Public Health, with Biographical Notes, 1909-1946 (New York: The Josiah Macy Jr. Foundation, 1970), p. 7.

[26]Milton J. Rosenau, Preventive Medicine and Hygiene (New York and London: D. Appleton and Company, 1913).

[27]Milton J. Rosenau, "Memorandum" and letter to Abraham Flexner, 1/9/14. RFA, RG 1.1, Ser 200.

[28]When Winslow later became professor of public health at Yale University, he would be mainly concerned with educating medical students and physicians; he would continue, however, to be actively involved in training public health nurses.

[29]Wickliffe Rose, "First Report to the General Education Board: Training for Public Health Service," 5/28/14. RFA, RG 1.1, Ser 200.

[30]Ibid, p. 3.

[31]E. Seligman to A. Flexner, 10/10/14. RFA, RG 1.1, Ser 200.

[32]W. Rose to A. Flexner, 10/7/14. RFA, RG 1.1, Ser 200.

[33]H. Biggs to A. Flexner, 10/15/14. RFA, RG 1.1, Ser 200.

[34]Transcript of General Education Board meeting, 10/16/14, p. 21. RFA, RG 1.1, Ser 200.

[35]William H. Welch, ibid., p. 30.

[36]Frederick T. Gates, ibid., p. 47.

[37]William H. Welch, ibid., p. 47.

[38]Greer Williams, "Schools of Public Health—Their Doing and Undoing," Milbank Memorial Fund Quarterly 54 (1976): 489-27.

[39]Hermann Biggs, transcript of General Education Board meeting, 10/16/14, p. 48. RFA, RG 1.1, Ser 200.
[40]Theobald Smith, ibid., p. 85.

[41]A.C. Abbott to A. Flexner, 10/10/14. RFA, RG 1.1, Ser 200.

[42]John Duffy, "The American Medical Profession and Public Health: From Support to Ambivalence," Bulletin of the History of Medicine 53 (1979): 1-22.

[43]Transcript of General Education Board meeting, 10/16/14, pp. 67-68. RFA, RG 1.1, Ser 200.

[44]Wickliffe Rose, ibid., p. 71-80.

[45]G. Whipple to A. Flexner, 10/22/14. RFA, RG 1.1, Ser 200.

[46]E. Seligman to A. Flexner, 12/23/14. RFA, RG 1.1, Ser 200.
[47]E.H. Lewinski-Corwin to E. Seligman, 9/15/14. Rockefeller Foundation Archives, Record Group 1.1, Series 200. E.H. Lewinski-Corwin to E. Seligman, 9/15/14. RFA, RG 1.1, Ser 200.

[48]W. Rose to A. Flexner, 10/27/14. RFA, RG 1.1, Ser 200.

[49]W. Rose to A. Flexner, 3/17/15. RFA, RG 1.1, Ser 200.

[50]Wickliffe Rose, "School of Public Health," p. 10. RFA, RG 1.1, Ser 200.

[51]Ibid., p. 11.

[52]For a description of these programs, see Raymond B. Fosdick, Adventure in Giving: The Story of the General Education Board (New York and Evanston: Harper and Row, 1962); and Abraham Flexner, The General Education Board, 1902-1914 (New York: General Education Board, 1915), pp. 18-70.

[53]Wickliffe Rose, "School of Public Health," May 1915, p. 8. RFA, RG 1.1, Ser 200.

[54]The word "hygiene" had traditionally been broadly defined as the promotion of health; Welch, however, gave the term a new and specific meaning, by using it to refer to the German research tradition in health, epitomized by the German "institutes of hygiene."

[55]Welch based this summary on a report prepared for him by William W. Ford of Johns Hopkins Medical School, "The Present Status and the Future of Hygiene or Public Health in America," March 1915, William Henry Welch papers, The Alan Mason Chesney Archives, The Johns Hopkins University, Box 118.

[56]William H. Welch " Institute of Hygiene," 5/27/15, p. 11. RFA, RG 1.1, Ser 200.

[57]Ibid., p. 8.

[58]Wickliffe Rose, "School of Public Health," May 1915, p. 12. RFA, RG 1.1, Ser 200.

[59]William H. Welch, "Institute of Hygiene," 5/27/15, p. 8. RFA, RG 1.1, Ser 200.

[60]G. Whipple to A. Flexner, 6/12/15. RFA, RG 1.1, Ser 200.

[61]C.-E.A. Winslow to A. Flexner, 6/14/15. RFA, RG 1.1, Ser 200.

[62]W. Park to A. Flexner, 7/3/15. RFA, RG 1.1, Ser 200.

[63]F.A. Cleveland to A. Flexner, 6/11/15. RFA, RG 1.1, Ser 200.

[64]E. Seligman to A. Flexner, 8/10/15, p. 4. RFA, RG 1.1, Ser 200.

[65]A. Flexner to A. Seligman, 9/13/15. RFA, RG 1.1, Ser 200.

[66]A. Flexner to W. Rose, 9/13/15. RFA, RG 1.1, Ser 200.

[67]W. Rose to A. Flexner, 9/16/15. RFA, RG 1.1, Ser 200.

[68]A. Flexner, "Memorandum on the Subject of Public Health," 6/13/15. RFA, RG 1.1, Ser 200.

[69]J.D. Greene to A. Flexner, 6/29/15. RFA, RG 1.1, Ser 200.

[70]A. Flexner to J.D. Greene, 7/1/15. RFA, RG 1.1, Ser 200.

[71]W. Rose to A. Flexner, 9/16/15. RFA, RG 1.1, Ser 200.

[72]For the historical context of the struggle for control of hospital appointments, see Charles E. Rosenberg, "Inward Vision and Outward Glance: The Shaping of the American Hospital, 1880-1914," Bulletin of the History of Medicine 53 (1979): 346-91.

[73]A. Flexner to W.T. Sedgwick, 11/6/15. RFA, RG 1.1, Ser 200.

[74]W.T. Sedgwick to A. Flexner, 11/8/15. RFA, RG 1.1, Ser 200.

[75]W.T. Sedgwick to A. Flexner, 11/26/15, p. 4. RFA, RG 1.1, Ser 200.

[76]"Conference held at the University of Pennsylvania, November 8, 1915," p. 19. RFA, RG 1.1, Ser 200.

[77]Abraham Flexner, Medical Education in the United States and Canada (New York: Carnegie Foundation for the Advancement of Teaching, Bulletin No. 4, 1910).

[78]"Meeting at Johns Hopkins Hospital to Consider the Establishment of a School of Hygiene in Connection with the Johns Hopkins University," January 18, 1916, p. 23. RFA, RG 1.1, Ser 200.

[79]Ibid., p. 84.

[80]Ibid., p. 184.

[81]"Institute of Public Health: Final Report of the General Education Board," 1/26/16. RFA, RG 1.1, Ser 200.

[82]Ibid., pp. 9-10.

[83]Greer Williams, "Schools of Public Health—Their Doing and Undoing" Milbank Memorial Fund Quarterly 54 (1976): 489-27.

[84]C.W. Eliot to A. Flexner, 2/1/16. See also C.W. Eliot to A. Flexner, 2/18/16. RFA, RG 1.1, Ser 200.

[85]A. Flexner to C.W. Eliot, 2/11/16. RFA, RG 1.1, Ser 200. There can be little doubt that Flexner was biased towards old college, Johns Hopkins, and towards his old family friend, William Henry Welch. In his autobiography, Flexner recalled the site visits and decision in the following terms: "Someone in each of these centers had more or less vague ideas, but one man alone possessed the requisite knowledge and vision. I reported to Rose that it was immaterial where the school was located; it mattered only who directed it. The only possible director, in my opinion, was Dr. Welch; the school might be placed wherever he wished." Abraham Flexner, I Remember: An Autobiography (New York: Simon and Schuster, 1960), p. 197.

[86]"Conference at Columbia University, November 13 and 15, 1915," p. 77. RFA, RG 1.1, Ser 200.

[87]Ibid., p. 45.

[88]Johns Hopkins was the first medical school to move toward the full time system for both clinical and preclinical departments. By 1916, the full time system had been instituted for three of the major clinical departments: medicine, surgery and pediatrics. See Thomas Turner, Heritage of Excellence: The Johns Hopkins Medical Institutions, 1914-1947, especially pp. 3-22 (Baltimore: Johns Hopkins University Press, 1974); Alan M. Chesney, Johns Hopkins Hospital and The Johns Hopkins University School of Medicine, volume 3 (Baltimore: The Johns Hopkins University Press, 1963).

[89]W.H. Welch and W. Howell, "Suggestions Regarding Organization of an Institute or School of Hygiene," William Henry Welch Papers, The Alan Mason Chesney Archives, The Johns Hopkins University, Box 118, p. 1.

[90]England at this time did not have schools of public health as such, but it did have a national system of public health training, one that was pragmatic, flexible, and oriented to the demands of practice, in contrast to the German emphasis on research.

[91]Welch's original model of a research institute in hygiene had been Pettenkofer's Institute of Hygiene in Munich which had deeply impressed him when, as a young man, he had visited several of the leading German medical research laboratories. In 1901, Welch had become one of the seven founding trustees of the Rockefeller Institute, the first American institute to be devoted to biomedical research on the German model. Its director was Simon Flexner, originally one of Welch's students, and Welch probably had the Rockefeller Institute in mind as an example of the kind of research institute he intended to establish at Johns Hopkins.

[92]For a detailed history of the early years of the Hopkins school, see Elizabeth Fee, Disease and Discovery: A History of the Johns Hopkins School of Hygiene and Public Health, 1916-1939 (Baltimore: Johns Hopkins University Press, 1987).

[93]Much of the early research of the faculty was published in the American Journal of Hygiene, a scientific journal started at the School of Hygiene and Public Health in 1921, and later renamed the American Journal of Epidemiology. See Elizabeth Fee, "Adapting to Specialization: The Founding, Growth, and Transformation of the American Journal of Hygiene," American Journal of Epidemiology, 134 (1991): 000-000. Research papers published in other scientific journals were for many years published in bound volumes, the Collected Papers, which were distributed to many libraraies, universities, and research institutions.

[94]The history of the Harvard school has been fully described in Jean Alonzo Curran's Founders of the Harvard School of Public Health, with Biographical Notes, 1909-1946 (New York: Josiah Macy, Jr. Foundation, 1970).

[95]There were differences in emphasis: Hopkins was especially noted for epidemiology and nutrition research, while Harvard was stronger in industrial and child hygiene.

[96]See Arthur J. Viseltear, "The Emergence of Pioneering Public Health Education Programmes in the United States," in Elizabeth Fee and Roy M. Acheson, eds., A History of Education in Public Health: Health That Mocks the Doctors' Rules (Oxford: Oxford University Press, 1991), pp. 114-154; John Sundwall, "The Division of Hygiene and Public Health," in W.A. Donnelly, ed., The University of Michigan. An Encyclopedic Survey in Nine Parts, Part 8. (Ann Arbor: University of Michigan, 1956), pp. 1149-1159; Arthur J. Viseltear, "The Yale Plan of Medical Education: The Early Years," Yale Journal of Biology and Medicine 59 (1986): 627-48; Arthur J. Viseltear, "C.-E.A. Winslow and the Early Years of Public Health at Yale, 1915-1925," Yale Journal of Biology and Medicine 55 (1982): 137-51; Roy M. Acheson and Anthony M.-M. Payne, "Preventive Medicine at the Yale School of Medicine, 1950-1965," Milbank Memorial Fund Quarterly 65 (1967): 287-301.

[97]For an excellent account of the development of the School of Public Health in North Carolina, for example, see Robert R. Korstad, Dreaming of a Time: The School of Public Health, The University of North Carolina at Chapel Hill, 1939-1989 (Chapel Hill, NC: School of Public Health, The University of North Carolina at Chapel Hill, 1990).

[98]W.S. Leathers et al., Committee on Professional Education of the American Public Health Association, "Public Health Degrees and Certificates Granted in 1936," American Journal of Public Health 27 (1937): 1267-72.

[99]Raymond Fosdick, The Story of the Rockefeller Foundation (New York: Harper Brothers, 1952) pp. 42-43.

[100]Livingston Farrand had previously worked for the International Health Board as Director of the tuberculosis program in France during World War I; he had been chairman of the Central Committee of the American Red Cross, Treasurer of the American Public Health Association and also President of the University of Colorado. He was president of Cornell University from 1921 to 1937.

[101]Thomas Parran and Livingston Farrand, "Report to the Rockefeller Foundation on the Education of Public Health Personnel," 10/28/39, Rockefeller Foundation Archives, Record Group 1.1, Series 200, pp. 15-18.

[102] Ibid., p. 69.

[103]Ibid., p. 89.

[104]Raymond Fosdick, The Story of the Rockefeller Foundation (New York: Harper Brothers, 1952) pp. 42-43.

[105]John Duffy, "The American Medical Profession and Public Health: From Support to Ambivalence," Bulletin of the History of Medicine, 53 (1979): 1-22.

[106]E. Richard Brown, Rockefeller Medicine Men (Berkeley: University of California Press, 1979; Paul Starr, The Social Transformation of American Medicine (New York: Basic Books, 1982).

[107]Charles Rosenberg, The Care of Strangers: The Rise of America's Hospital System (New York: Basic Books, 1987).

[108]Arthur Viseltear, "The Yale Plan of Medical Education: The Early Years," Yale Journal of Biology and Medicine 59 (1986): 627-48; Arthur J. Viseltear, "C.-E.A. Winslow and the Early Years of Public Health at Yale, 1915-1925," Yale Journal of Biology and Medicine 55 (1982): 137-51; Elizabeth Fee, Disease and Discovery: A History of the Johns Hopkins School of Hygiene and Public Health, 1916-1939 Baltimore: Johns Hopkins University Press, 1987.

[109]George E. Vincent, The Rockefeller Foundation: A Review for 1920 (New York: The Rockefeller Foundation, 1921), p. 4.

[110]Russell A. Nelson, "Organizational Relationships of Schools of Public Health with Schools of Medicine," in Schools of Public Health: Present and Future, edited by John Z. Bowers and Elizabeth Purcell (New York: Josiah Macy Jr. Foundation, 1974), pp. 11-14.

[111]Ibid., p. 12.

[112]W.S. Leathers, "Undergraduate Instruction in Hygiene and Preventive Medicine to Medical Students," 7/8/31, p. 4, RFA, RG 1. 1, Series 100.

[113]See, for example, Elizabeth Fee, "Henry E. Sigerist: From the Social Production of Disease to Medical Management and Scientific Socialism," Milbank Quarterly 67 supplement 1 (1989): 127-150.

[114]Luis Fernando Duque, "The Future of Schools of Public Health in Latin America," in Schools of Public Health in Latin America (New York: Josiah Macy Jr. Foundation, 1974), p. 3.

[115]Guillermo Arbona, "Future Role of Schools of Public Health," in The Past, Present and Future Schools of Public Health (Chapel Hill, N.C.: University of North Carolina, 1963), pp. 81-89.

[116]Conrad Seipp editor, Health Care for the Community: Selected Papers of Dr. John B. Grant (Baltimore: The Johns Hopkins Press, 1963).

[117]John B. Grant, "Mutatis Mutandis," in Health Care for the Community, p. 182.

[118]Milton I. Roemer, "More Schools of Public Health: A Worldwide Need," International Journal of Health Services 14 (1984): 493-94.

INSTITUTE OF HYGIENE

Being a Report by
Dr. William H. Welch
and Wickliffe Rose

to the

General Education Board
Rockefeller Foundation

Submitted in 1915

INSTITUTE OF HYGIENE[1]

At a conference[2] on training for public health service held at the offices of the General Education Board in New York on October 16, 1914, discussion seemed to develop substantial agreement on the following points: (1) That a fundamental need in the public health service in this country at the present time is of men adequately trained for the work; (2) that a distinct contribution toward meeting this need could be made by establishing at some convenient place a school of public health of high standard; (3) that such an institution, while maintaining its separate identity, should in the interest both of economy and of efficiency be closely affiliated with a university and its medical school; (4) that the nucleus of this school of public health should be an institute of hygiene.

Mr. Rose and Dr. Welch were asked to formulate a plan for such an institute of hygiene and in compliance with this request offer the following report, which is designed to set forth the scope and general character of the organization of the institute and the service which it should render in training in hygiene, preventive medicine and public health and in the advancement of these subjects. If desired, the report can be supplemented by a detailed statement of organization, plan of building, budget and courses of instruction.

I. Public Health and Hygiene in England and in Germany

The origins of the modern public health movement and of the cultivation of hygiene as an independent science may be found especially in the passage of the Public Health Act in England in 1848 and in the establishment of the first hygienic institute by von Pettenkofer in Munich in 1865. The greatest stimulus to further development came from the discoveries relating to the causation and the mode of spread of the infectious diseases and the conse-

[1] William H. Welch and Mr. Wickliffe Rose.

The following report, prepared by Dr. William H. Welch and Mr. Wickliffe Rose, was presented to the Trustees at their meeting, January 12, 1916. The Rockefeller Foundation Annual Report, (The Rockefeller Foundation, 61 Broadway, New York), 1916, p. 415-427.

[2] Dr. A. C. Abbott, Dr. Hermann M. Biggs, Dr. Simon Flexner, Mr. Jerome D. Greene, Dr. Victor G. Heiser, Dr. Edwin O. Jordan, Mr. Starr J. Murphy, Dr. Wm. H. Park, Mr. Wickliffe Rose, Dr. M. J. Rosenau, Dr. Theobald Smith, Dr. George C. Whipple, Dr. C. E. A. Winslow, Dr. Wm. H. Welch, Prof. D. D. Jackson, Dr. F. Cleveland, Dr. Wallace Buttrick, Dr. E. C. Sage and Dr. Abraham Flexner.

quent vastly increased power to control these diseases. It is instructive for the present purpose to note the different conceptions and directions of development in this field in the two countries. In Germany every university has its department or institute of hygiene, conducted by a professor and corps of assistants, where the subject is presented broadly in all its varied aspects, students are taught by lectures, laboratory courses and field work, and the science is advanced by research. In England, on the other hand, the important hygienic laboratories are few and mostly governmental or independent. For training the emphasis is laid upon public health administration, in which respect Great Britain leads the world. Those desiring to qualify as medical officers of health must possess the diploma in public health, obtained by passing an examination after at least nine months of specal preparation, most frequently under a qualified medical officer of health and in a hospital for infectious diseases. It seems obvious that lessons are to be learned from both the German and the English systems, and that the ideal plan will give due weight to both the scientific and the practical aspects of hygiene and public health.

II. The Situation and Needs in America

In this country we are woefully lacking both in laboratories of hygiene and in opportunities for training in public health work. Three or four medical schools have hygienic laboratories, but none is complete, and adequately equipped and supported. Still other schools attempt something in the way of instruction in this subject, but it is all inadequate and unsatisfactory.

The need for supplying these deficiencies is at present the most urgent one in medical education and in public health work, and is recognized on all sides. The cry comes loudest from public health officials, social workers and others interested in public health administration, national, state, municipal and rural, who realize the lack of trained leaders and trained workers in all grades of the service. Here with the rapidly growing appreciation of efficient public health organization new and promising careers of useful service are opening for those who are qualified by ability, character and training. Scarcely less important is it for medical students and physicians who engage in practice to be well grounded in the principles of hygiene and of preventive medicine. Furthermore, the advancement of knowledge in this field, the cultivation of hygiene as a science, is one of the great needs of this country and should be a fundamental aim of an institute of hygiene.

III. Various Classes to be Trained

The first and in many respects the most important class of persons who will seek to be trained in a school of public health are those who expect to devote their lives to health work in some of its branches. These will aim to

become for the most part public health officials or to be engaged in some capacity in public health service, but some may become teachers or be connected with institutions or find other opportunities for a career in the ever widening field of sanitation. It is of the first importance to consider and to supply the needs for the education of the prospective public health officials.

Without attempting an exhaustive analysis, the following classification will suffice to indicate the various types of officers or experts required in public health administration:

1. Higher administrative officials, as commissioners of health and health officers in cities and districts, and division or bureau chiefs in the larger state and city departments of health.

2. Health officers in towns, villages and rural communities.

3. Higher technical officials or experts, as statisticians, sanitary engineers, chemists, bacteriologists, diagnosticians, epidemiologists, etc.

4. Inspectors of various kinds, as school, sanitary, food, factory, etc. inspectors.

5. Public health nurses.

With this class may be included those preparing to enter the Public Health Service of the federal government.

An institute or school of hygiene should furnish suitable training for all of these, and while courses adapted for special needs will be supplied, it does not seem desirable to conceive of such an institute as constituted primarily to provide training for higher or lower grades of service so much as to furnish opportunities for a good general education in all branches of hygiene.

While it is hardly possible to over estimate the importance of providing opportunities for the training of those who are to become public health officials, the need here is at present so acute that there is some danger of overlooking the conception of hygiene as a science and art which is much broader than its application to public health administration. Hygiene includes much more than state medicine. It is not necessary to consider here the distinction sometimes made, especially in this country, between hygiene and sanitation. In this report the term "hygiene" is used to include both, that is, the whole body of knowledge and its application relating to the preservation and improvement of health of individuals and of the community and to the prevention of disease.

With this broad conception it is obvious that the educational and scientific opportunities of an institute of hygiene should not be limited to the use of those who intend to become specialists in public health work and should cover a wider field than that of state medicine or sanitation.

It is of the utmost importance that education in the principles of hygiene should be available for students and graduates in medicine who are to engage

in the practice of their profession. With the present crowded medical curriculum obligatory courses in hygiene for undergraduate students of medicine must necessarily be restricted, but with the tendency toward greater freedom of election of medical studies there is the need and opportunity to provide more extensive optional courses in hygiene. There is a wide field for the establishment of graduate courses in hygiene for physicians. Even in Great Britain, where the character of training is designed almost wholly for public health officials, many who intend to become medical practitioners secure the diploma in public health. The mission of the practising physician is in many respects changing, and there can be no doubt that a year or more of graduate work in hygiene would be eagerly sought by many physicians and and would greatly increase their capacity of useful service to their patients and to the community, if the proper opportunity for such work were provided.

Sanitary engineering has become a specialized profession, and the institute of hygiene should combine with the engineering school in supplying the requisite training.

The public health nurse, both as a part of the public health service and independently of such connection, is destined to play a rôle of increasing importance in the improvement of conditions of health living and working and in the control of infectious and industrial diseases in this country. The institute of hygiene should cooperate with schools and organizations for training nurses in meeting the need for a supply of trained public health nurses.

When one considers the many points of contact between the modern social welfare movement and the public health movement, and to what an extent social and economic factors enter into questions of public health it is clear that an institute of hygiene must take full cognizance of such factors and that students of social science should profit by certain opportunities in the institute, as well as students of hygiene by training in social science and social work.

An important class to be provided for in an institute of hygiene will be those engaged in special advanced work in some branch of the subject and in original investigations of hygienic problems. A main function of the institute should be the development of the spirit of investigation and the advancement of knowledge, upon which intelligent public health administration and individual hygiene are absolutely dependent. It will be especially from this class of advanced workers and investigators and from the group of assistants in the institute that the teachers and the authorities and experts in hygiene will be recruited for service in different fields of activity and the standards of the profession of hygiene and of public health will be elevated.

IV. Field to be Covered

The field covered by the terms "hygiene," "sanitary science," "public health," "preventive medicine" is so broad and varied that it is hardly possible within a brief compass to indicate all of the subjects here included. Strictly speaking the territory embraces a group of sciences or the application of various underlying sciences. Unity is to be found rather in the end to be accomplished—the preservation and the improvement of health—than in the means essential to this end. It is the focussing upon this definite purpose which gives coherence to the organized body of knowledge embraced under the designations "hygiene" and "sanitation," and makes important its study and cultivation as a professional pursuit.

Although the practitioner should have knowledge of hygiene and of the means of preventing disease and has abundant opportunity in the practice of his calling to apply this knowledge, and the public health worker, if he is to prevent disease, must have a knowledge of the origin, mode of spread and diagnosis of disease, still it is becoming increasingly clear that public health work constitutes a distinct profession, and the wider recognition of this fact will be an important result of the creation of institutes or schools of hygiene.

The wide scope of the professional training required for the well equipped public health worker is sufficiently indicated by the mere enumeration of the more important subjects to which more or less attention must be given in an institute of hygiene, at least so far as their scientific groundwork in relation to sanitation is required. Such subjects are vital statistics; epidemiology or the causation, spread and prevention of transmissible diseases, including tuberculosis and the venereal diseases; diagnosis of infectious diseases; industrial hygiene; sanitary parasitology, including bacteriology and immunology; sanitary chemistry; sanitary engineering; hospital construction and administration; housing, ventilation, heating, lighting; disinfection; the hygiene of air, soil, water and climate; water supplies and sewage disposal; infant mortality and child hygiene; hygiene of schools; mental hygiene; heredity and eugenics; social hygiene; personal hygiene; diet and nutrition; rural, farm and dairy hygiene; milk supply; food and drug adulterations; nuisances; public health administration and organization, sanitary laws and codes; quarantine and immigration; tropical hygiene; relation of animal diseases to human diseases; public education in healthy living; social service work; sanitary surveys.

V. Agency Required to Perform this Function

The central, essential and main agency required to meet the needs which have been indicated is an institute of hygiene, housed in its own building, provided with the requisite laboratories and facilities and with its own staff

of teachers giving their entire time to the work of teaching and investigating. Given such a central institute it is easy to add to the curriculum, when found necessary, certain courses which are now given, or could readily be supplied by various existing departments of the medical school, the engineering school or other faculties of the university. The mere assembling of such courses does not constitute a school of hygiene. The great need of the country today in the promotion of public health is the establishment of well equipped and adequately supported institutes or laboratories of hygiene, where the science of hygiene in its various branches is fruitfully cultivated and advanced and opportunities are afforded for thorough training in both the science and the art. It would be a misfortune if this broader conception of the fundamental agency required for the advancement of hygienic knowledge and hygienic education should be obscured through efforts directed solely towards meeting in the readiest way existing emergencies in public health service.

1. *Relation to a Medical School.*—The profession of the sanitarian or public health worker not being identical with that of the practitioner of medicine, the institute of hygiene, as the essential part of a school of hygiene, should have an independent existence and should not be regarded merely as a department of a medical school. But the medical school offers much which the institute of hygiene will require either as preliminary training or in course and which it will not care to duplicate. In the interest of economy and efficiency, therefore, the school of hygiene should be closely related to a medical school of high standard in such way that the facilities of each should be open to the students of both.

It is likewise important for study and training in preventive medicine that the institute should have access to the facilities of a good general teaching hospital, as well as to various special hospitals. The need of opportunities for observation and study of patients in an infectious disease hospital is of course obvious.

2. *Connection with a University.*—To perform to best of advantage its function, the institute should be a part of a university. The medical school has found such connection to be a practical necessity. The institute of hygiene would draw even more heavily upon certain schools or departments of the university, as those of engineering and of sociology. In additon to having at its disposal the facilities of the university, the institute would find the stimulating and sustaining scientific spirit and ideals of the university an indispensable asset.

3. *Separate Identity.*—While intimately related to the university and its medical school, the institute of hygiene should be established on its own

foundation, and should preserve and emphasize its own identity as a separate institution devoted exclusively to the science and the service of health; it should have its own building, and its own corps of instructors with adequate provision for teaching and research.

While it is not difficult to bring together on paper a group of courses selected from the several schools and departments of the university and by the addition of a few new courses make a presentable prospectus of a school of public health, this is not the conception of such a school or institute as we believe will best fulfill the functions of developing the science and art of hygiene and of training for this new profession. If the institute is to make itself felt as a constructive force it must have in it a group of scientific investigators and teachers whose absorbing interest is in developing the science of hygiene and applying it to the conservation of health.

While the concentration of work here advocated involves some duplication of equipment, this is not as large as might be supposed and in view of the great advantages, does not constitute a serious objection. The institute must have its own chemical laboratory; it would be inconvenient and unsatisfactory in the extreme to attempt to use chemical laboratories devoted mainly to other purposes for the many important studies in sanitary chemistry. The principle microbiological laboratory of a medical school could without detriment be transferred to the institute of hygiene, although provision must exist for bacteriological work in the pathological laboratory, as well as in the hospital. Most of the other physical equipment of the institute would involve little duplication.

4. *Organization and Departments.*—At least in the beginning there should be a director of the institute, who will also be the head of one of the main divisions. Eventually the heads of these divisions may constitute a group or faculty with coordinate powers in directing the policy and affairs of the institute.

It is possible to indicate only in outline and in a general way the principal departments or divisions of an institute of hygiene, as details of organization and division of work should be left to the staff of teachers whose interests and qualifications will very with the individuals.

a. *Chemical Division.*—The applications of chemistry to sanitary science and art are extremely important and varied, and already highly developed.

b. *Biological Division.*—Here there would be a number of subdivisions, as bacteriology, protozoology, medical zoology.

c. *Engineering or Physical Division.*—A part of this can best be provided for in the engineering school, but the institute should provide opportunities for the study of certain hygienic problems requiring the application of physical science.

d. *Statistical Division.*—While the various questions connected with the collection and study of vital statistics constitute the most important subject in this field, there are other important applications of statistical science to hygiene.

e. *Division of General Hygiene and Preventive Medicine.*—Under this broad head may be included epidemiology, industrial hygiene, the principles of public health administration and other subjects not embraced under the previous captions.

The foregoing classification is not designed to be either final or exhaustive and is manifestly reduced to its simplest terms.

If qualified men can be found there should be three or four teachers of the rank of full professors, but in their absence it would be better to select even for some of the important divisions younger men of great promise with the grade of assistant professors or of associates. In addition to these probably at least eight or ten assistants at moderate salaries would be required.

As already stated, the institute once established on its own foundation will draw upon the medical school, the engineering school and other departments of the university for courses of instruction which it will not care to provide on its own grounds, and it will itself cooperate in furnishing instruction to students in other departments.

5. *Field Work.*—Hygienic excursions to inspect water filtration plants, sewage disposal systems, methods of heating and ventilation and for kindred purposes constitute a valuable part of practical sanitary training. The most important training in the field, however, will be provided by establishing working relations with state and municipal departments of health and with the United States Public Health Service. This arrangement will provide for giving to the students practical experience in every department of public health work. The students may in this way become acquainted under favorable conditions with the methods of handling the health problems of the large city as well as those of the rural community. There will be opportunity for participating in the work of sanitary surveys. Cooperation with the Federal Public Health Service will give good opportunity for experience in quarantine work and in sanitary and epidemiological work on a large scale. Such relations will be mutually helpful. The states and cities will reap the benefit of intelligent and scientifically trained workers who will enter the service as real workers in all fields of its activities. The institute and its students in turn will have the benefit of this practical experience.

6. *Museum.*—An important feature of the institute will be a good hygienic museum, which will contain models, charts, preparations, and other material which can be gradually brought together. This will serve not only for demonstrative teaching, but also for the education of the public. The

influence and usefulness of the institute will be extended by popular lectures, conferences and extension courses.

7. *Special Courses.*—The institute should provide for the needs of those already engaged in health work, who desire to pursue short courses or to do advanced work in special branches.

8. *Requirements for Admission; Certificates and Degrees.*—The details regarding the conditions for admission to the institute may be left to future consideration, but it should be stated that while the majority of candidates for diplomas and degrees will doubtless be graduates in medicine, these distinctions should not be limited to physicians. The institute should be ready to receive and to reward with its diplomas and degrees all who come with a satisfactory preliminary education and pursue the required training, which need not be rigidly uniform for all matriculates. Even those who may not meet the requirements for matriculation and become candidates for the degree may find opportunity to pursue special courses of study. It has been abundantly demonstrated that the profession of public health work can be successfully followed by sanitarians whose principal training has been sanitary engineering, sanitary chemistry and sanitary biology.

9. *Influence of the Institute.*—The benefits to be expected from the establishment of such an institute as that proposed are not to be measured solely by the number of students trained within its walls. The institute can supply only a relatively small number of those who desire to enter upon public health service. The far-reaching influence of the institute should be felt in the advancement of the science and the improvement of the practice of public health, in establishing higher standards and better methods of professional education in this field, in stimulating the foundation of similar institutes in other parts of the country, in supplying teachers and in cooperating with schools of a simpler character designed for briefer technical training which should be established in each state in connection jointly with boards of health and medical schools.