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## *Address*

### THE PROBLEMS OF SANITATION.\*

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Twenty-five years ago Mr. Frederic Harrison, writing of the nineteenth century, gave us this picture of London, the largest city of the modern world, and, indeed, of all time.

To bury Middlesex and Surrey under miles of flimsy houses, crowd into them millions and millions of over-worked, underfed, half-taught, and often squalid men and women, to turn the silver Thames into the biggest sewer recorded in history; to leave us all to drink the sewerage water, to breathe the carbonized air, to be closed up in a labyrinth of dull, sooty, unwholesome streets; to leave hundreds and thousands confined there, with gin, and bad air, and hard work, and low wages, breeding contagious diseases, and sinking into despair of soul and feebler conditions of body; and then to sing pæans and shout, because the ground shakes and the air is shrill with the roar of infinite engines and machines, because the blank streets are lit up with garish gas-lamps, and more garish electric lamps, and the postoffice carries billions of letters, and the railways every day carry 100,000 persons in and out of the huge factory we call the greatest metropolis of the civilized world—this is surely not the last word in civilization.

We need not pause now to inquire whether this characterization of the London of the nineteenth century was correct, or, admitting that it was, whether it is now true of London or any other city, whether the human race at the beginning of the twentieth century is still dazzled and bewildered by its sudden material acquisitions, whether we are even now rushing violently down a steep place into the sea, I would simply ask you to remark the large part that faults and defects of sanitation play in Mr. Harrison's eloquent indictment. Some of the hardest things said about the nineteenth century by its critics refer to the neglect of public hygiene. Again and again the luxury of a few and the comfort of more are contrasted with the unhygienic conditions under which many others are forced to live and work. Unhygienic conditions in themselves are nothing new. In medieval London, and indeed throughout Europe, the dwelling places and mode of living of the majority of the citizens were far more unwholesome, far more conducive to the spread of infectious disease than in the London of 1882 or 1907. Mr. Harrison himself in another connection thus pictures the life of the Middle Ages:

The old Greek and Roman religion of external cleanness was turned into a sin. The outward and visible sign of sanctity now was to be unclean. No one was clean, but the devout Christian was unutterably foul. The tone of the Middle Ages in the matter of dirt was a form of mental disease. Cooped up

in castles and walled cities, with narrow courts and sunless alleys, they would pass day and night in the same clothes, within the same airless, gloomy, windowless, and pestiferous chambers; they would go to bed without night clothes and sleep under uncleansed sheepskins and frieze rugs; they would wear the same leather, fur and woolen garments for a lifetime, and even for successive generations; they ate their meals without forks, and covered up the orts with rushes; they flung their refuse out of the window into the street or piled it up in the backyard; the streets were narrow, unpaved, crooked lanes through which, under the very palace turrets, men and beasts tramped knee-deep in noisome mire. This was at intervals varied with fetid rivulets and open cesspools; every church was crammed with rotting corpses and surrounded with graveyards, sodden with cadaveric liquids, and strewn with disinterred bones. Round these charnel houses and pestiferous churches were piled old decaying wooden houses, their sole air being these deadly exhalations, and their sole water supply being these polluted streams or wells dug in this reeking soil. Even in the palaces and castles of the rich the same bestial habits prevailed. Prisoners rotted in noisome dungeons under the banqueting hall; corpses were buried under the floor of the private chapel; scores of soldiers and attendants slept in gangs for months together in the same hall or guardroom, where they ate and drank, played and fought.

At all events the city slum is not a modern institution. The main difference between the medieval and the modern attitude towards unhygienic conditions lies in our having now become awake to the sources of disease and death and to the knowledge that much disease is preventable. The public conscience to-day winces and rebels at the sight of evils once regarded with indifference or helplessness. So long as mankind supposed that in the language of Cruden's "Concordance," "diseases and death are the consequences and effects of sin," so long did a bewildered resignation accompany the mysterious visitations of Providence. For many this was radically and permanently changed when the germ-theory gave to the human race for the first time in its history a rational theory of disease susceptible of experimental verification. When that fact was established that much disease could be prevented, an enduring foundation was laid for works of sanitation.

The campaign against disease can be carried on in various ways. Individual cases of disease can be nursed with all the care that experience has shown to conduce to recovery, suitable drugs may be administered, surgical interference resorted to, individual peculiarities studied and taken advantage of; in fact, all the resources of modern medicine focused on the state of disturbance or abnormality in the individual patient. Such treatment has saved in the past, and will save in the future, many lives dear to friends and family and of incalculable value to country and race.

As a mass-method of attacking disease, however, it is distinctly palliative and not remedial. There is no man in his right mind who would not rather avoid disease altogether than be healed of a malady even by the

\*Lecture delivered before the Harvey Society, New York, Oct. 26, 1907.

most skilful physician. For many and evident reasons prevention must in the long run take precedence over cure.

Preventive measures fall conveniently into two classes—those dealing with the physical well-being and resistance of the individual, such as diet, muscular exercise, sleep, fatigue, the use of stimulants and narcotics, and the general efficiency of the bodily functions, and, secondly, those having special reference to environmental conditions or affecting many persons or communities. The methods that the individual may adopt to ward off disease and enhance resistance lie within the scope of personal hygiene, those that involve larger or smaller groups of individuals, constitute the province of public hygiene or sanitation.

#### THE ROLE OF PERSONAL HYGIENE.

The methods for the furtherance of personal hygiene must be largely educative in character, and it must be recognized that the progress possible in this direction is distinctly limited by inherited constitutional factors. The prevention of disease and premature death is in many cases impossible even if the strictest and most efficacious regimen be maintained and if the hostile action of outside agencies be successfully avoided. In other words, some organisms carry within themselves the seeds of decay which germinate early and come to fruition in spite of all individual endeavors. A congenitally feeble or defective mechanism may be strengthened, but can not be remade. In most instances, however, measures of personal hygiene avail powerfully in promoting normal life and happiness and in some degree in preventing premature death. I need only mention the high resistance to many infectious diseases possessed by the well-nourished, properly exercised, undrugged individual. Improvement in personal hygiene must depend to a great extent on education, must necessarily be slow, and its success in preventing disease be conditioned in large part by the inherited constitution.

#### PUBLIC HYGIENE.

Any distinction between personal hygiene and public hygiene can not in the nature of things be an absolute one. The stream can not rise higher than its source, the welfare of the group is determined by that of the individuals composing it. More and more, too, the concerns of personal hygiene are tending to become problems of public hygiene. Bodily cleanliness is essentially a personal matter; it would be an absurdity in the present state of public opinion to legislate for compulsory bathing, and yet the establishment of free public baths is everywhere recognized as an important measure of public sanitation. The same thing applies to exercise and the establishment of municipal playgrounds and gymnasias. The principle is perfectly sound. Primarily the function of public hygiene is both to avert from the community as a whole the consequences of misdoing, neglect or ignorance on the part of any one, or any number, of its members, and to provide for groups of individuals, conditions as favorable for health and happiness as the most intelligent and far-seeing could demand for themselves. Such conditions may not always be those that the least intelligent or most greedy members of the community desire, but from the point of view of public hygiene they are none the less inevitable.

Up to the present, measures of sanitation have affected chiefly the infectious diseases. This is shown, for example, by the list of the ten leading causes of death in Massachusetts in 1856 and in 1904 (Table 1).

TABLE 1.—THE TEN LEADING REPORTED CAUSES OF DEATH IN MASSACHUSETTS IN ORDER OF FREQUENCY.

1856.	1904.
Consumption.	Heart Disease.
Scarlet Fever.	Consumption.
Brain Disease.	Pneumonia.
Old Age.	Diseases of Brain and Cord.
Pneumonia.	Diseases of Kidneys.
Typhoid Fever.	Cancer.
Dysentery.	Cholera Infantum.
Heart Disease.	Accidents.
Cholera Infantum.	Bronchitis.
Diphtheria and Croup.	Diarrhea and Cholera Morbus.

In 1904 typhoid fever had dropped to thirteenth, dysentery to seventeenth and scarlet fever to twenty-first place.

It is here seen that the diseases that have been displaced are largely the infectious diseases. It is not possible in all cases to determine the factors that have been operative in the decline, and in some cases causes beyond our control have perhaps been at work, but undoubtedly measures of quarantine, isolation, school hy-

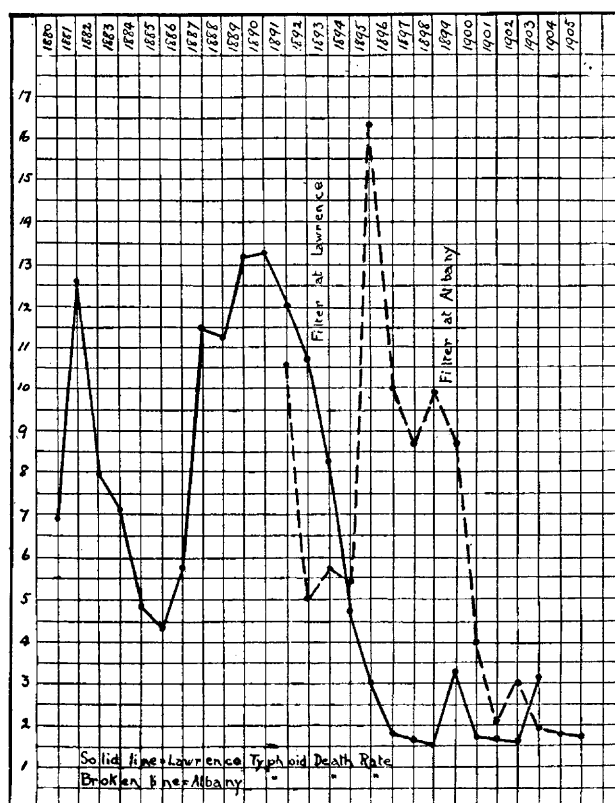


Chart 1.—Typhoid death rates in Albany, N. Y., and Lawrence, Mass., before and after installation of filters.

giene and other protective devices adopted by the community have played a part in the shrinking of once prevalent infections. In some instances the effect of methods of sanitation is not to be mistaken. One of the most remarkable, as indeed one of the best understood examples of the efficacy of sanitary features, is afforded in the influence of improved public water supply on typhoid fever.

The improvement that has followed the substitution of a pure water supply for a polluted one in cities like Lawrence and Albany is unmistakable.

It is not my purpose, however, to rehearse the triumphs of sanitation. There is much to be accomplished before we can legitimately give ourselves the gratification of dwelling on past achievements. It seems to me desirable to keep before our minds the present outlook

for applying scientific knowledge to the prevention of disease rather than the historical development of, or even the recent advances in, sanitation. In many directions it is evident that we need further information before we can plan an intelligent campaign. As regards typhoid fever, for example, it is true that even after a pure public water supply has been secured the typhoid death rate remains excessively high in most American cities as compared with European cities somewhat similarly conditioned.

The relative proportions of this residual typhoid derived from direct contact, from milk, oysters and other articles of food, from the agency of flies, from shallow wells<sup>1</sup> and other sources are not known. Owing to the great prevalence of typhoid fever in this country, cases contracted outside pure-water districts are probably imported into them more frequently here than abroad. Typhoid bacillus carriers, like the cook discovered by Soper,<sup>2</sup> who was responsible for 32 cases of typhoid fever in seven families, are also, for the same reason, probably more numerous here than in Germany, but we have no precise information on these points.

#### INFANT MORTALITY.

Again, how much do we really know about the best methods of preventing summer mortality among infants

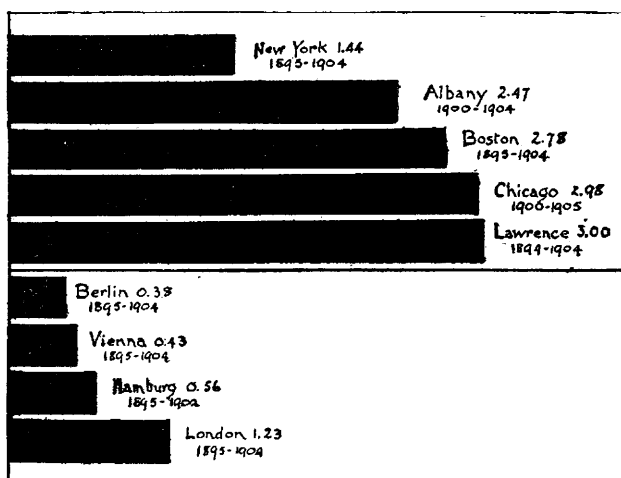


Chart 2.—Typhoid death rates in American and European cities, Albany, Lawrence and Hamburg, after installation of filters; Chicago, after opening of the sanitary drainage canal. The remarkable case of the City of Washington, D. C., is purposely left out. There the installation of a modern sand filtration plant (November, 1905), was followed in the next year (1906) by a higher typhoid death rate (4.93) than had been recorded for either of the three preceding years (1903, 4.50; 1904, 4.38; 1905, 4.39).

in large cities? We have accumulated a considerable body of data about infant feeding, the advantages of fresh air and pure milk, but do we yet know to what extent our initial preventive measures have affected infant mortality or is there general agreement as to what the next step should be? Is there any likelihood that either "certified milk" or "pasteurized milk" will prove the final solution? Do we know in what proportion of cases domestic infection is the cause of infant diarrhea, and whether such domestic infection in the tenement-house districts can be prevented in any other way than by the slow and wasteful process of individual education? Is there adequate provision for a statistical basis for determining the effect of such preventive meas-

ures as may be instituted? It is well known to statisticians that, unless the number of births is ascertained, deductions as to infant mortality can not be well founded. In this country the record of births is in most places so defective that I may be pardoned perhaps for illustrating the errors into which we may fall in estimating infant mortality without knowledge of this factor.

TABLE 2.—INFANT MORTALITY.

Pop'n of about 150,000.	Deaths under 1 year.	Infant deaths per 10,000 population.	Total deaths.	Per cent. of total deaths.	Inf. d'ths b'ths; true inf. death rate.
Town A....	650	43.3	2181	29.8	4555 14.2
Town B....	498	33.2	3780	13.2	2879 17.2

In some cases, therefore, we are compelled to ask ourselves whether an apparent decline in infant mortality is due simply to a decline in birth rate or to a genuine amelioration in sanitary conditions. Since seasonal fluctuations and variations render short-time statistics of little value, it is evident that the answer to the question can hardly be an immediate one.

In England, it is stated, the infant mortality has not materially decreased during the last 25 years, although the general death rate has fallen considerably.<sup>3</sup> Newman, in his recent book on Infant Mortality, regards it as demonstrated that the infant mortality rate is not declining, and bases far-reaching conclusions on this assumption. Germany, however, shows a steadily lowering mortality rate since 1885, the quinquennial averages for the large towns showing successive diminution.<sup>4</sup> In the United States the available data are very meager owing to the incomplete record of births. According to the records, however, the infant mortality in Boston and New York has steadily fallen by quinquennial periods since 1886.

TABLE 3.—DEATHS OF CHILDREN UNDER 1 YEAR PER 1,000 LIVING BIRTHS. AVERAGE OF 5 YEAR PERIODS.

England and Wales. 1885-1904.	Large towns in Germany. (Over 15,000 pop.) 1885-1904.	Boston. 1886-1905.	New York. 1886-1905.
142	244	181	288
148	231	170	218
158	220	151	185
142	208	141	158

#### PUBLIC HYGIENE A SOCIAL QUESTION.

At the present time the scope of public hygiene is widening. It is becoming more plainly seen that the public health is intimately and unavoidably connected with a thousand phases of the social order. To strike at the roots of disease it is often necessary to get under the surface of modern life and acquaint ourselves with deep-seated human instincts. The mere formulation of the problem is, however, something, and will serve to arouse the interest of different groups of individuals whose cooperation is essential to success. That in this country we are entering on this initial phase, which must be largely educational and exploratory, is shown by the number of strong national societies that have been formed to study and advise concerning special problems, such as tuberculosis, school hygiene, the alcohol problem, the venereal diseases, and the stunting and disastrous effects of excessive child labor.

It is surely no small matter that we have come to the point where considerable groups of influential men and women are willing to undertake the task of making plain to the general public the momentous character of

1. In 1899 from 3,500 to 4,000 such wells were in use in the city of St. Louis.

2. THE JOURNAL A. M. A., June 16, 1907, 2019.

3. Report of the Committee on Physical Deterioration.

4. Rahts, med. stat. Mitt. a. d. k. Ges., 1906, x, p. 79.

these questions. A concerted and persistent campaign of education backed by scientific investigation is likely to have greater weight in molding public opinion than the isolated appeals of reformers and philanthropists, however timely and well directed. The great measure of success already achieved by the crusade against tuberculosis at least serves to encourage this belief.

It is evident, I think, that with the increasing complexity of the social structure, the field of public hygiene will continue for some time to broaden. Many matters affecting the physical well-being of society which are now overlooked, ignored or regarded as a necessary part of keeping the pace, will come to be seen in their true light. I do not refer now to the improvement of the human race by selection and controlled mating, although the physical possibility of strengthening the human mechanism must be recognized and may one day be a subject for state interference, but to measures more susceptible of immediate application. We are still treating, for example, in an amateurish, desultory fashion such important questions as the influence of city dust and smoke on the respiratory tract, the effect on the nervous system of the pounding it receives from city noises and the consequences of racial mingling and amalgamation. The waste of life and the maiming of bodies by violence, which has reached so gruesome a pass, especially in this country, is distinctly a preventable evil calling for preventive measures.

TABLE 4.—AVERAGE ANNUAL DEATH RATE PER 100,000 POPULATION.

City.	Period.	Homicide.	Suicide.	Accident.	Total.
London .....	1903-4	1.1	11.2	54.2	66.5
Berlin .....	1900-5	0.96	29.1	59.4	89.5
New York.....	1900-5	4.2	22.3	108.	134.5
Chicago .....	1900-5	6.7	22.9	76.2	105.8
Boston .....	1900-4	3.5	13.7	84.9	102.1

#### INDUSTRIAL HYGIENE.

The time is now ripe for a fuller consideration of the interest that the whole community has in dangerous trades and hazardous occupations. The extent to which industrial injuries can be prevented by slight changes in materials and machinery is hardly realized by the general public. Strong arguments can be brought to bear in favor of industrial insurance against death and disability from accident, in favor of charging up to an industry the depreciation in men as is the custom with the depreciation in buildings and in machinery. The extra cost of a hazardous industry ought, as a business procedure, to be laid on that industry, and manufacturers will unquestionably find the public willing to assent to this view.

There are still stronger arguments, economic as well as humanitarian, for preventing or minimizing injury and disease in dangerous trades and occupations. It needs no dissertation to prove that it is less expensive as well as more humane for the community to take measures to safeguard machinery rather than to allow accidents to happen and pay the cost, whether legitimately in the form of industrial insurance, or, as now, in the support of hospitals and poorhouses and in diminished industrial efficiency. The factory inspector of the state of Illinois in a plea for better protection before the state legislature last winter brought out the facts that:

It costs 35 cents to take out the raised set screw, bore a hole into the line shaft and set in the sunken set screw. And yet we had in Illinois almost 100 deaths last year in factories from the raised set screw. We know that it costs \$15 to guard a woodshaper. The average life of the machine is ten years, and woodworkers will tell you their average loss is a hand for each machine every year.

In the same connection it was shown that Illinois, the third greatest industrial state in the Union, has no law protecting workers in factories, in workshops or in the building trades. At this session a bill was passed for the protection of structural iron workers on bridges and buildings,<sup>5</sup> but similar bills for the protection of other occupations were defeated. There is in Illinois no law providing for ventilation in shops or safeguarding machinery, hatchways and elevator shafts. Here is a pretty definite opening for preventive and protective measures which are reasonably certain to save life, prevent disabling injuries and diseases and promote the efficiency and well-being of the body politic.

#### THE "POISON WORKERS."

The same thing is true of the trades and manufacturers involving more or less direct contact with poisonous substances, like mercury, lead, arsenic and phosphorus. Such dangerous industries are controlled in most European countries by elaborate regulations designed to protect the workmen against the peculiar dangers to which they are exposed. Twenty-four such industries for which special rules are in force are enumerated in England and fifteen in Germany. In the United States legal protection is almost lacking, although a great improvement in conditions has been accomplished through the voluntary action of some philanthropic and far-seeing manufacturers. In certain industries, notably those involving work with lead and phosphorus, the preventive and protective influence of simple hygienic measures is so marked that the duty of society to itself would seem to require that such measures be made obligatory. Investigation of the whole question of occupational diseases under American conditions is much needed.

#### EDUCATION IN PUBLIC HYGIENE.

If we grant that the collective health and physical soundness of a nation or people are at least as worthy of public concern as the conservation of other national resources, then the road is clear before us. In the present apathetic state of public opinion, as attested not only by the imperfect legal crystallization of our knowledge, but by the inadequate material and moral support given by most American communities to public health officials, one of the first steps must be educational. The clamor of modern life does not make it an easy task to shape intelligent public opinion. Many voices are crying aloud in the market place insistently and with great fervor. And yet there are indications that the preliminary work of education in public hygiene is taking effect.

The influence attained and the work already accomplished by the national societies before referred to, and especially the wide interest evoked by the Committee of One Hundred of the American Association for the Advancement of Science, to consider methods of establishing a national department or bureau of health, are signs not to be mistaken. The rapid growth of the Public Health Defense League, organized to combat all forms of quackery, charlatanism and fraud, is another instance of increasing public interest. Especially timely is the action of the American Medical Association in recommending the establishment of a Board of Public Instruction empowered to disseminate through the medium of the public press and in other channels authoritative information regarding the causes and pre-

5. Last year in the City of Chicago, out of a total membership of 1,358 in the Bridge and Structural Iron Workers' Union, 156 either lost their lives or were totally or partially disabled.

vention of disease. In the significant language of the report of the committee on the establishment of such a board,<sup>6</sup> the reading public would then come to understand "that the chief aim of the medical profession is to prevent rather than cure disease." The awakening of interest must be accompanied by and is, indeed, in large part conditioned by the investigation of public health problems. As already pointed out, our knowledge of the causation and prevention of disease is in many directions far too imperfect to enable us to formulate a rational program. We can not go to the public, except with a well-considered plan of action based on irrefragable scientific data. The outlook for advance in sanitation depends, then, on several factors: More intensive investigation of the causes of disease, especially viewing disease as a folk phenomenon, affecting large bodies of people; the effective marshalling of existing knowledge and the exposition of its bearing on the collective physical welfare; the crystallization in legal form of well-established principles and information in order to prevent as far as possible injury to some through the avarice, ignorance or neglect of others; and, finally, the realization by the general public of the fact that the public health service is second to none in its economic value to the community. What would be thought of the individual experimenter who conducted experiments unsystematically and without reference to their significance, who employed untrained and poorly paid assistants, who neglected to keep a record of his experiments and observations, who paid little or no attention to the similar experiments of others and omitted to interpret his results? This is the sort of experimenting modern society carries on in matters of life and death.

#### THE PLACE OF THE MEDICAL PROFESSION.

Where is the place of the medical profession? What part ought it to take in forwarding the aims of sanitation? Selfishly, the interest of individual physicians is hardly promoted by a diminution in the amount of disease.<sup>7</sup> To the eternal honor of the body of medical practitioners be it said that this view has never been entertained; that, on the contrary, physicians have been foremost in the work of preventing disease, of drying it up at the fountain head.

Some of you may remember in the antivivisection literature the grotesque libel on Pasteur, one of the gentlest and most humane men that ever lived, to the effect that he used to capture stray dogs, carry them to his laboratory, inoculate them with rabic virus and turn them loose again in the streets of Paris in order to swell his revenues by providing a supply of patients. What sound-minded, educated person does not recognize in the stupidly extravagant falsity of such a statement an utter perversion of the attitude of the whole medical profession toward the causation and prevention of disease? So far from diabolically trying to increase opportunities for medical practice, the constant effort of physicians as a whole has long been directed toward detecting threatened or incipient disease and checking or cutting it off at its source, thus undermining their own livelihood.

But is this all? While the first concern of practical medicine must long continue to be for the individual, are not the conditions of modern life forcing new re-

sponsibilities on the medical profession? There are signs that the community is ready to welcome a fuller participation in the work of sanitation. I remember some years ago expressing my interest in the problems of water purification to a distinguished medical friend. I was met by the remark, "O, why not leave all that to the engineers?" One difficulty in the existing situation is that too much has been left to the engineers, that the working out of many problems of sanitation has fallen into the hands of men without a comprehensive understanding of the problems of disease and disease prevention. I would not be thought to underestimate in any way the splendid achievements of engineers and especially American engineers in the field of sanitation when I express my belief that the promotion of the public health is primarily a medical, not an engineering, undertaking.

#### TEACHING HYGIENE IN MEDICAL COLLEGES.

And this brings up the question whether a somewhat radical adjustment in the work of the medical schools will not soon be warranted, if not indeed demanded. The fact that disease may be combated not only by the cure of affected individuals, but by individual prophylaxis and by general sanitary measures, calls for a more formal and effective recognition than it has yet received. The three medical specialties of the future are curative medicine, the supervision of personal hygiene and the direction of public hygiene; and progressive medical schools must soon begin to make provision for symmetrical development along these lines. Differentiation within the medical profession is, to be sure, already taking place, but is still in an early embryonic stage. Men trained in the methods of curative medicine drift into public health work without adequate equipment for the special tasks before them, and, while the results accomplished, thanks to the adaptability of the American character, are often surprisingly satisfactory, it can hardly be doubted that a still higher level of attainment would be reached if facilities for acquiring a suitable training were more easily come at and if more men prepared themselves with malice aforethought for the public health service.

One great obstacle to the adoption of public hygiene as a career is undoubtedly the low value heretofore set by society on proficiency and knowledge in matters pertaining to the public health. There is at present little to tempt an ambitious young man to fit himself as an expert in any phase of community medicine, since the hope of the social and financial recognition that reward the eminently successful practitioner and the assurance of a modest competence for a moderate success are alike lacking. This discouraging outlook for a livelihood and a career is the rock that has wrecked the few sporadic courses that have been launched by American universities and professional schools with the purpose of providing trained men for the public health service.

No birds were flying in the air,  
There were no birds to fly.

The remedy for this unfortunate condition is plainly to make the public health service a career worthy of the best efforts and the highest aspirations. The problems of sanitation are essentially as attractive as those of curative medicine, and effective public recognition seems the one thing withheld. In the long run the standing of men that specialize in public hygiene must be determined by the community at large, but the medical profession can do much by its own position to bring about

6. THE JOURNAL A. M. A., June 15, 1907, 2047.

7. A recent president of the British Medical Association, Dr. Henry Davy, has stated that fifty years ago his immediate predecessor in practice frequently received as much as \$1,500 a year for attending typhoid fever cases, but that during the past few years his own income from typhoid patients has hardly averaged \$25.—Brit. Med. Jour., Aug. 3, 1907.

a proper evaluation of the work done in this field. As one important step better opportunities should be provided in medical schools for the training of men in public hygiene. In connection with the engineering schools of large universities or in cooperation with technical schools, courses of study leading to a special degree ought now to be planned by all progressive medical schools. Investigation of the broader aspects of disease and disease-prevention should be encouraged, not merely as affecting individuals, but as affecting the masses of mankind. Specialists in public hygiene should be supported by a united and organized medical profession and the value of such special service as they can render made unmistakably and authoritatively evident. Public opinion is now sensitive on matters affecting the public health and will lend a ready ear to professional advice. Now is the time to turn our faces to the investigation of disease on the large scale, to make clear that the prevention of disease is more worthy of consideration than the cure and, foreseeing the inevitable decline of curative medicine, to foster and develop the newer art of sanitation as an integral part of the work of the medical profession.

### *Original Articles*

#### PREGNANCY AS AN ETIOLOGIC FACTOR IN DENTAL DISEASE.\*

JAMES E. POWER, D.M.D.

PROVIDENCE, R. I.

In dealing with this most important phase of the pathology of pregnancy, I wish to state that I understand but little of the causes producing the destructive processes which involve the organs of mastication during this period. On the other hand, I believe that possibly it may be of interest to record my experiences and observation of certain conditions existing during the period of gestation, with the hope that they may serve as stimuli to other minds.

It is a well recognized fact that the child-bearing process is a natural and physiologic episode in the life of the female. It is equally well recognized that in the life of the pregnant woman every day brings forth numerous conditions which have the power of converting physiologic into pathologic conditions, embracing every form of disease from interference with the function of a special organ to the cessation of all function. In the former instance, we have disease; in the latter, death either of the embryo or of the mother.

Nature does much to fortify herself against all of these dangers; the heart, for example, is said<sup>1</sup> to become hypertrophied to such a degree that its weight is increased about one-fifth, the ventricle or propelling portion being the part affected. This expansion of the heart is very probably for the purpose of meeting the extra work required of it during the advancing months of pregnancy. Provisions are made, likewise, for the spleen, the liver, the kidneys, and in fact for all the organs, in order that they may perform the duties required of them while further changes occur in the respiratory, circulatory, nervous, and digestive systems. In view of the fact that these changes take place within a very short period of time, we can understand how

easily the resistant capacity of the system may be decreased. During the metamorphoses just described, the pregnant woman must digest more food in order to supply the growing organs, the embryo and herself, with nourishment; hence a greater supply of blood and an increased activity of the excretory and secretory organs result from these physiologic changes.

All of these changes have their relative effect on the conditions of the oral cavity and its appendages. To note these, therefore, is one of the obligations which both the dentist and the physician are bound to respect. These changes influence the nervous system, and, therefore, render the individual peevish, fretful, and careless. A form of neurasthenia perhaps causes the individual to become depressed. I have repeatedly observed that even women of refinement grow careless, neglectful of their personal appearance, and in some cases, almost entirely disregardful of the laws of hygiene during this period when so many changes are taking place, tending naturally to lessen their resistant capacity, and to increase the tendency to disease.

Perhaps no part of the body is neglected more than the oral cavity, and in many instances, no part of the body manifests more strikingly the result of this neglect.

Since the physician is responsible directly, and the dentist, indirectly, for the salvation of the teeth during the time the pregnant woman is in their charge, their first duty is to impress on the mind of the patient how dependent is the entire system on the cleanliness of the oral cavity. It is reasonable to suppose that all persons of average minds, now realize that the conditions necessary for the growth of micro-organisms are heat, moisture and the presence of oxygen. A moment's reflection causes us to realize that the blood, the saliva, and the air we breathe, furnish these requisites, and therefore, predispose to a rapid development of micro-organic life, having the power not only of causing disease in other organs, but also of producing death. Scientific investigators have proved this beyond any reasonable doubt, and so it devolves on us as professional men not only to advise and instruct the pregnant woman, but more particularly to insist on a proper recognition of this most important law of nature, namely, that she should have a specially careful regard for the hygiene of her mouth. In seems to me that there is no domain in medicine wherein the physician and dentist can cooperate to such mutual advantage as in the treatment of the oral conditions arising during pregnancy.

The physician is usually acquainted with the fact that a most important physiologic phenomenon has taken place in the life of the woman at a time when a little advice to the patient is often invaluable. Generally, or at least in many cases, the physician is consulted before the patient has formed any of the habits which are characteristic of the later stages of pregnancy. He should prepare her, therefore, for the unpleasant conditions which are to follow, should teach her the dangers associated with unclean mouths. He should also inform her that the natural degenerative process resulting from her condition, together with her lessened resistant capacity, may cause complete destruction of the teeth, which will have not only a dangerous effect on herself but on the condition and health of her offspring.

In this instance, if in no other, the special knowledge and skill of the dentist should be solicited, and the patient placed in his charge. The dentist should make a thorough examination, and should restore all the diseased teeth to a normal condition, so far as this is pos-

\* Read in the Section on Stomatology of the American Medical Association, at the Fifty-eighth Annual Session, held at Atlantic City, June, 1907.

1. American Text-Book of Obstetrics, p. 154.