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Addresses

STATE MEDICINE: ITS FOUNDATION, SUPER- STRUCTURE AND SCOPE.

INCLUDING A SCHEME FOR A PUBLIC HEALTH SYSTEM
ADAPTED TO COUNTIES, STATES AND THE NATION.*

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I should be unpatriotic and uncivil did I not deeply realize and warmly announce that this is historic ground. Here, more than a century ago, principles were proclaimed and deeds done that flashed on the world like a lightning stroke and illumined the way to liberty and law with a brilliancy that startled kings and potentates on their ancestral but treacherous thrones. Those principles found fertile soil in the courageous bosoms of colonists, who, embodying them in their creeds, vindicated them with their valor and their blood.

Near by are Plymouth Rock, Dorchester Heights, Boston Common, Bunker Hill, Cambridge, Concord and Lexington—all names that have helped to kindle the fires of patriotism in the bosoms of succeeding generations of American school boys and to keep them burning until at the close of loyal lives their bodies were laid away in the soil they so early learned to love so well.

When one recalls the momentous events of that unique and significant landing on this shore, the trials and tragedies through which those heroic pioneers passed, and the proud victories they won in forest, field and forum, it is not strange that this soil has been prolific in soldiers, statesmen, orators, jurists, historians, poets and scholars. While proclaiming that all these vocations have been adorned by illustrious sons of this Commonwealth, the words are uncoined with which to pay just tribute to the mothers who fed these men in infancy from their fertile and faithful bosoms, who guided their youthful footsteps along the paths of truth and virtue, and who fired their manly hearts with noble impulses and lofty aims.

Bostonians! Men and Women of Massachusetts! I salute you as the proud descendants of a noble ancestry, an ancestry from which you have received a royal heritage of moral heroism and of mental and material achievement. May these priceless treasures go down to your children's children in unbroken succession and with unfailing vigor.

However rich this field of thought, the duty of the hour compels me to abandon it, which I do by inviting your attention to a discussion of the following theme: "State Medicine, Its Foundation, Superstructure and

Scope, Including a Scheme for a Public Health System adapted to Counties, States and the Nation."

Accepting the term, state medicine, to mean the exercise of power by a civil government for the protection of its people against disease, as well as for the promotion of their physical welfare and development, the first inquiry that meets us at the threshold of the discussion is: On what foundation does this power rest?

As the welfare of a government is but the aggregate of that of its individual citizens, this power can, in the last analysis, be reduced to the supreme law of self-defense, an inalienable and essential right that belongs to governments as to individuals.

Since a thinker so acute and profound as Herbert Spencer has argued that sanitary supervision is not a legitimate function of government, this position seems worthy of some analysis. Without undertaking to reproduce at any length Mr. Spencer's argument, it is easy to see that, among other ways, he was betrayed into error by assuming the existence of analogies where none exist.

Quoting from his "Social Statics" we find the following:

There is a manifest analogy between committing to government guardianship the physical health of the people and committing to it their moral health. If the welfare of men's souls can be fitly dealt with by acts of parliament, why then the welfare of their bodies can be fitly dealt with likewise. . . . The arguments employed by the dissenter to show that the moral sanity of the people is not a matter for state superintendence are applicable, with a slight change of terms, to their physical sanity also.

In this argument Mr. Spencer is guilty of the amazing error of assuming that the soul and the body are analogues. Take away that premise, which no one will hesitate for a moment to do, and the fallacy of the argument quoted is at once exposed. It is evident that within reasonable limits the body can be controlled by governmental authority, but such authority is powerless to control the soul. Infection in the body may be detected and measures instituted to prevent its propagation, but the soul eludes inspection and may, in defiance of government, both harbor and propagate infection of the foulest kind. Through the fear of penalties men may be restrained from the physical act of murder, but not from the malicious desire to kill. The question is not merely one of right on the part of a government to exercise a power, but of ability to make that power effective. Although powerless to legislate wickedness out of men's minds and hearts, may not a government legislate diseases out of their bodies, in so far as its power extends? No analogy exists, therefore, betwixt legislating for the physical and for the moral sanity of a people; the one is practicable, the other impracticable; the one logical, the other illogical.

Rejecting Mr. Spencer's reasoning and endorsing a noble sentiment proclaimed by Lord Beaconsfield in

*Oration on State Medicine before the Fifty-seventh Annual Session of the American Medical Association, Boston, June, 1906. The manuscript of this address was not forwarded to THE JOURNAL until recently, hence the lateness of its appearance.

these words, "The health of the public ought to be one of the chief considerations of a statesman," the postulate is submitted that every government should provide itself with a complete, coherent and efficient public health system, by and through which it may exercise its inherent right of sanitary supervision over the bodies of its citizens.

In formulating such a system one fundamental and material principle must be incorporated, namely, a public health system must correspond in construction with the government to which it belongs. Under the application of this principle it is evident that the public health system of a monarchy and that of a democracy would differ in many and essential particulars, and that between these two systems, standing at the extremes, many modifications would be required in order to provide a system adapted to each existing form of government. A public health system, like any other arm of government, must derive its power from where power exists; in a monarchy from the king, in a democracy from the people, and in other and mixed forms of government from the existing source of power.

These general propositions announced, the field of discussion will be restricted to outlining a public health system believed to be adapted to our form of government. The fact that our government is a complex one surrounds the work of construction with some, but not insuperable, difficulties. The ground over which we are now assembled is a constituent part of the city of Boston, likewise of the county of Suffolk, likewise of the state of Massachusetts, and finally of the United States; that is, a series of concentric governments exist, each having jurisdiction within certain spheres over this locality. Similar conditions exist in all other localities of the United States.

In constructing a public health system for this country the relative rights and duties of the public health officials that would represent these concurrent governments must be definitely defined and accurately adjusted. To do this it is imperative that we ascertain in which one of these governments does sovereignty as to public health powers reside. All will concede that the Constitution of the United States as interpreted by the Supreme Court is the source from which this information must be derived. All will further agree that the general government is a government of delegated powers and does not possess any powers other than those delegated to it by the states, as embodied in the Constitution. It is safe to assert that not a line in that document can be pointed out delegating to the general government public health powers, and inasmuch as the spontaneous generation of power in the general government is quite as much of an impossibility as in physics, it is clear that the general government can not and does not possess a power never delegated to it. But let us appeal to the Supreme Court of the United States, the highest tribunal of the land, for an authoritative adjudication of this question.

In *Gibbons vs. Ogden*, 9th Wheaton, p. 203, Chief Justice Marshall said:

Inspection laws, quarantine laws, health laws of every description, as well as laws for regulating the internal commerce of a state and those which affect turnpikes, roads, etc., form a portion of that immense mass of legislation which embraces everything within the territory of a state not surrendered to the general government. No direct general power over these subjects is granted to Congress, and consequently they remain subject to state legislation.

In *Fertilizing Company vs. Hyde Park*, 97 U. S., p. 667, Mr. Justice Swayne said:

That power (the police power) belonged to the states when the federal constitution was adopted. They did not surrender it, and they all have it now. It extends to the entire property and business within their local jurisdiction.

In *Patterson vs. Kentucky*, 97 U. S., p. 505, Mr. Justice Harlan said:

Hence the states, may by police regulation, protect their people against the introduction within their respective limits of infected merchandise. A bale of goods on which duties have or have not been paid, laden with infection, may be seized under health laws, and if it can not be purged of its poison, may be committed to the flames. So may the states by like regulation exclude from their midst not only convicts, paupers, idiots, lunatics and persons likely to become a public charge, but animals having contagious diseases.

Judge McLean, in the *Passenger cases*, 7 How., p. 400, said:

In giving the commercial power to Congress the states did not part with that power of self-government which must be inherent in every organized community. They may guard against the introduction of anything which may corrupt the morals or endanger the health or lives of their citizens.

In the *Passenger cases*, 7 How., p. 414, Mr. Justice Swayne said:

The states of the Union may, in the exercise of their police powers, pass quarantine and health laws, interdicting vessels coming from foreign ports, or ports within the United States, from landing passengers and goods, prescribe the places and time for vessels to quarantine, and impose penalties on persons for violating the same; and . . . such laws, though affecting commerce in its transit, are not regulations of commerce.

Could stronger or clearer words be used? Can any amount of verbal legerdemain rob these decisions of their plain and obvious meaning? Do they not place sovereignty as to public health powers in the states? If so, can Congress constitutionally place it elsewhere? The question is not what the Constitution might have done, but what it did do.

Owing to outbreaks of yellow fever, which took place in the South last summer, this question of sovereignty as to public health powers has assumed a very acute stage, has been much discussed, and is now deeply and directly involved in legislation pending in Congress. While time does not permit of any extended discussion of the point at issue, one argument the speaker has heard advanced by intelligent advocates of federal supremacy, and evidently deemed by them invulnerable, will be briefly noticed. The argument is stated thus:

If a hostile ship armed with heavy guns and manned by marines were approaching our shores, would it not be the right and the duty of the federal government to meet and repel such ship? Likewise, were a ship containing infection on board approaching our shores would it not equally be the right and duty of the federal government to repel such ship, or to render it harmless?

To some the two examples cited might seem parallel and the conclusion intended to be forced therefrom irresistible, but a moment's analysis will dispel such delusion. In the Constitution the war-making power is expressly delegated to the federal government, hence it becomes, not only the right, but the duty of that government to meet and repel the hostile ship. Not so with reference to the infected ship, no power over ships by reason of infection existing on board having been delegated by the states to the federal government. Had such delegation of power been made, then it would clearly be the duty of the federal government to meet

and repel, or render harmless, the infected ship. In so far as constitutional power in the general government is concerned the two examples cited are in no wise analogous; therefore, the conclusion which advocates of federal control would draw from the sophism quoted is wholly unwarranted and untenable.

Having cleared away some preliminary questions, we will now enter on the hypothetical construction of the proposed public health system, designed as it is to apply to municipalities, counties, states and the nation, and to constitute one articulated and coherent whole.

In building up any system the adoption of a unit of construction not only facilitates the work, but tends to render the result logical and symmetrical. In this instance a county medical society, organized in accordance with a scheme to be presently unfolded, will be adopted as the first unit of construction, and naturally such an organization will be placed at the foundation of the superstructure.

I. COUNTY MEDICAL SOCIETY—COUNTY BOARD OF HEALTH.

EXECUTIVE FORCE.

- (a) Committee of public health.
- (b) County health officer and assistants.
- (c) Health officer for each municipality in the county.

It will be observed that in the above scheme a county medical society is made equal to, or synonymous with, a county board of health. Objection to this arrangement might be made on the ground that the members of a county medical society would be too numerous and too scattered to serve practically and efficiently as a board of health.

If by serving as a board of health it be understood that the members are to meet, discuss and decide on the policy to be pursued in the face of every menace to the public health, and then to participate, more or less, in supervising the execution of the policy decided on, the objection would be valid, and, therefore, fatal to the scheme proposed. But in constructing a public health system for a county a deliberative body must first be provided, one composed of members capable of discussing in a scientific as well as practical way the sanitary interests of the people, so as to evolve the best principles and plans for the promotion of those interests.

Unquestionably the physicians of a county would constitute such a body, their daily vocation being to study and their highest function to prevent disease. With a board of health so constituted not only would every member feel a personal interest in studying the sanitary needs of the people, but the people would become the beneficiaries of the combined sanitary knowledge of the physicians of the county.

Inquiry might arise as to whether the physicians of the counties would voluntarily organize for public health purposes. To this inquiry an affirmative answer may confidently be given. Indeed, the physicians of many, perhaps most, of the counties in the states are already organized for scientific and social purposes, and if to these objects that of the protection of the health of the people be added, an additional and powerful incentive to organization will have been infused into the minds and hearts of the members of the medical profession that will not only bring them together, but hold them together by that magnetism which visible and valuable fruit gathered as the result of organization will arouse.

To endow a county medical society with the authority of a board of health would necessarily require an act of

the state legislature, but if the members of the profession in the several states will organize by counties, with the distinct purpose of acquiring this right, it will be conferred.

Naturally a board constituted as suggested would need executive officials. These are enumerated in the scheme as: A committee of public health, which should be composed of five members; a county health officer, with assistants; and a health officer for each municipality in the county.

While the committee of public health is reckoned under "executive force," the function of such committee is intended to be advisory rather than executive, the idea being to provide a small body of judicious and experienced members thoroughly competent to represent and speak for the parent board during the intervals of its sessions; and, further, a body capable of assembling quickly, so as to give the executive officials any advice or help they might need under critical or unusual conditions.

For many and conclusive reasons the election of all officials included under the term "executive force" should be conceded by law to the board of health, the chief of these reasons being stated as follows:

1. Such concession would place the selection of these officials in the most competent hands.
2. The fidelity of officials thus selected would be materially promoted by a consciousness on their part of the fact that their electors would be the most competent, and often the most critical, judges of their efficiency, and, therefore, of their fitness to succeed themselves.
3. Such concession would effectually divorce the system from politics and protect it from domination by commercial influence, advantages of immeasurable value that can be secured in no other way.

Considering the system thus far formulated as a whole, it will be seen that it provides for a deliberative board of health, composed of the very best material a county could furnish, and then for an executive force chosen by the board itself, thus correlating head and hand in such way as to secure unity of purpose and harmony of action, a combination of forces calculated to achieve all for the health of the people of a county that modern sanitary science can do.

We now advance to the next division of the system undergoing construction, or that applying to a state. Following the plan pursued with reference to a county, the salient features of *this* division will be set forth in schematic form:

II. STATE MEDICAL ASSOCIATION—STATE BOARD OF HEALTH.

EXECUTIVE FORCE.

- (a) State committee of public health.
- (b) State health officer.
- (c) State bacteriologist and pathologist.
- (d) State chemist.
- (e) State registrar of vital and mortuary statistics.

It will be seen that the scheme of organization proposed for a state is in harmony with that formulated for a county.

For reasons corresponding with, but more imperative than, those assigned when discussing county organization, the medical association of a state should constitute the state board of health.

To confer plenary public health power on a few medical men in a state and exclude all others from any participation whatever in either deliberating on, or shaping

the policies to be pursued, will not only deprive the people of the counsels of the great body of the profession on sanitary questions, but will be in danger of leading to discord in the profession itself, a condition tending to weaken administration and seriously to impede sanitary progress. Indeed, complete success in the enforcement of any public health system whatever is impossible without the full, intelligent and hearty cooperation of the medical profession. Inspired authority tells us that "in multitude of counsels there is safety," a truth that should judiciously be applied in the construction of a public health system for state governments such as ours. To obtain this "multitude of counsels" on sanitary questions a forum must be established on which medical men who have ideas can be heard, where reports from executive officials can be rendered and discussed and, when necessary, explained, and where any disputes as to principles or policies can definitely be settled by vote.

By vesting a state medical association with the authority of a state board of health all of the difficulties pointed out will be avoided and all of the advantages claimed secured. When after due deliberation sanitary campaigns have been planned and policies fixed, execution should be wrought out under one man, a principle in perfect accord with the theory and practice of our civic governments.

Inasmuch as a state government is sovereign over its county governments, it logically follows that a state board of health should be sovereign over county boards, a principle that must be applied in practice in order to unite the latter into one homogeneous and effective whole.

The executive force a state board of health would need appears in the scheme. Here again the function of the committee of public health would be much more advisory than executive. The ten members of which such a committee should be composed ought to be men of judicial mould, thoroughly alive to the possibilities of state medicine, and capable when called on to aid in meeting emergencies of not only representing the parent board but of reflecting high credit on it.

The titles given the purely executive officials are sufficiently distinctive to indicate the nature of their duties, hence these need not be elaborated on. The method of protecting this division of the system against the baneful effects of political and commercial domination would be the same as that suggested for county boards, that is, to vest the election of all executive officials in the state board.

Having completed the superstructure undergoing erection, in so far as it applies to counties and states, the crowning position, corresponding with that of a dome, remains to be assigned to the national government.

The Supreme Court having denied to that government the possession of any public health power whatever, the inference would seem legitimate that it could not constitutionally participate in a public health system at all. This by no means follows. On the contrary, the federal government being the product of the organic union of the states in certain respects and for certain purposes, can not be otherwise than directly and deeply interested in the sanitary welfare of its constituent members. Naturally, therefore, it should stand ready to promote that welfare by whatever constitutional measures it can employ. But, obviously, before the general government can do anything in that direction it must create an official arm through which it can operate. In accordance

with a principle announced in the early part of this discussion such arm should correspond in organization with a democratic form of government, that is, should include a deliberative body and an executive force.

Again adopting the schematic form, the following is submitted as an appropriate organization through and by means of which the national government could participate in public health work:

III. DELEGATES FROM STATE BOARDS—A NATIONAL BOARD OF HEALTH.

EXECUTIVE FORCE.

1. A commissioner of health.
2. Six assistant commissioners, assigned as follows:
 - (a) Organization and legislation.
 - (b) Epidemics and endemics.
 - (c) Maritime quarantine.
 - (d) Vital and mortuary statistics.
 - (e) Laboratories—biologic, chemical and pathologic.
 - (f) Demography.

It will be observed that the scheme contemplates the creation by Congress of a national board of health, such board to be composed of delegates from the state boards. One delegate from each state board would, according to the biblical requirement already quoted, supply a sufficient "multitude of counsels" to guarantee safety, but at the same time would not form a body so large as to be unwieldy.

The delegates usually selected to represent the state boards would be men who had undergone more or less training in public health work in their respective states; therefore, they would be in a favorable position for grasping and dealing with the broad sanitary problems they would understand could be completely solved in no other way than by cooperation between the states. Indeed, this spirit of cooperation, inspired by a clear conception of the benefits to accrue therefrom, would so dominate the deliberations of the national board as to lead to practical and highly fruitful results, and in many directions.

Objection might be offered to the creation of a national board of health on the ground that the general government, being itself destitute of all public health power, could not endow a board with any public health power whatever. Accepting the theoretic and constitutional correctness of the objection, it yet remains that a national board of health could aid immensely in advancing the cause of sanitary progress.

The semi-annual meetings of such a board would constitute a great school for study and a great center for disseminating education.

The subjects discussed, the demonstrations made, and the data furnished at these meetings would yield a rich and ever-growing mass of scientific and practical information that could and would be applied to the prevention and extinction of diseases. Indeed, the recommendations of the board would soon acquire a moral force and power more imperious than statutes, state or national. As many of these recommendations would apply to municipalities, counties and states, they would be cordially accepted by the representatives of the states and carried home to be enforced by municipal ordinances or state laws. In this way and in many other ways the board, although clothed with advisory authority only, might set on foot and work out great sanitary reforms.

The good work need not stop here. The Constitution provides that compacts between the states may be

made, such compacts corresponding with treaties between separate and independent nations. One of the functions of a national board of health would be, or should be, to study the public health relations existing between the states, and to formulate a code of rules for so regulating these relations as to diminish friction, reduce hardships, promote mutual protection, and, at the same time, not increase exposure to internal or external dangers. With such a code formulated, the states, or any number of them, would be competent, under the constitutional provision referred to, to form a compact and legally bind themselves to abide by the rules agreed on. In this way a national board of health could be the instrument of bringing about the enactment of public health and quarantine laws that would operate across state lines, a kind of legislative work that, in the absence of all public health power on the part of the federal government, can be accomplished in no other way.

Did time permit, other fields of usefulness for a national board of health could be pointed out, in which such board could materially advance the sanitary interests of the people of the entire country, and without at all encroaching on the reserved rights of the states.

The executive force proposed for a national board of health is to consist, as shown in the scheme, of a commissioner of health and six assistant commissioners, all of whom, for reasons corresponding with those assigned when discussing the organization of county and state boards, should be made elective by the board itself.

Time does not admit of comment on the duties of this executive force in detail. The commissioner would naturally be the chairman and chief executive officer of the board. The assistant commissioners would be assigned to specific fields of duty, indicated by the designations given them, respectively.

If provided with an arm—such as that urged—for doing public health work the national government would be in a position to render prompt and efficient aid, including both skill and money, to the states in times of pestilence and peril. Take a concrete example: Suppose the existence and extensive prevalence of a formidable disease—cholera for instance—in this city. The city health officer would be here to direct the battle against the disease; the state health officer, I take it, would come to his aid; and the two together would consult as to the measures to be employed for the extinguishment of the outbreak. Suppose, further, that in accordance with the scheme contended for an assistant national commissioner, to whom had been assigned the duty of looking after epidemics, should appear on the scene and offer his help and the financial aid of the general government; would either be declined, should either be declined? The unanimous and constitutional answer would be, no!

Although the hypothetical assistant commissioner would possess no legal authority in this city, yet as sanitary science knows no bounds, but is as wide as the world, any measures he might propose would, if deemed more efficient than those being employed, be gratefully accepted and promptly enforced, thus furnishing an illustration of how, according to the system proposed, city, state and national health officials could work side by side in overcoming a common enemy.

Another example: Two of the biggest and most vital public health questions now agitating the country and claiming the attention of Congress are interstate and maritime quarantine. The removal of friction and

hardships as to the former, and the establishment of uniformity and efficiency as to the latter, are the solutions demanded, and properly so, by the profession and the people. All quarantines being either scientific or unscientific, that is, based on justifiable grounds or on panic and fear, some competent and cooperative authority should exist for prescribing the conditions under which a quarantine, either domestic or foreign, should be proclaimed. The members of such a national board of health as that suggested would, by virtue of their connection with the boards of their respective states, occupy positions peculiarly favorable for enabling them to systematize the entire subject of quarantine and to formulate a code of principles and rules that would place it on a scientific and humane basis. Grant that the national board would be without authority to enforce, after having formulated, such a quarantine code, yet if the members of that board should, by virtue of occupying a dual position, be able to secure the enforcement of the measures agreed on by their respective states, the end sought would be none the less certainly, because indirectly, achieved.

The same principle would apply to public health policies of every kind, that is, the state boards would usually accept and enforce the recommendations of a national board, in the councils of which their respective health officials were permitted to participate.

In truth, a national board would focalize the best thought on sanitary questions the entire country could evolve, and would in turn radiate that thought out again, crystallized into well-digested and practical measures for the protection of the health and lives of the people.

Viewing the proposed system in its entirety, it will be seen that, like a living organism, all of its parts would be interdependent and correlated, through which would circulate from center to circumference, and back again from circumference to center, the warm and nutritious blood of altruism, vitalizing, energizing and unifying all of the divisions of the system into one homogeneous and effective whole. With such a system in operation, municipalities, counties, states and the nation could unite their sanitary forces into one aggressive army and, marching under the banner of "preventive medicine," could make war on, and conquer, and destroy, disease in many of its strongest citadels.

The scheme presented is not a visionary one. In so far as it applies to counties and to states, it was conceived and substantially formulated nearly forty years ago by my lamented predecessor in office, Jerome Cochran, the most original thinker and the profoundest philosopher on professional and public health organization that this country or any other has ever produced.

More than thirty years ago the profession of my state accepted the system by adopting constitutions for county and state organization written by Cochran's own hand, which constitutions, with some modifications, stand today as enduring monuments to the foresight and wisdom of their author. Somewhat later the people of Alabama, through their legislature, accepted the principles of the system by embodying them in a code of public health laws.

Since the inauguration of the system just created, the great scourge of the tropics, yellow fever, has never been permitted to enter the country through Alabama's seaport, and four times within the past ten years when adjacent and neighboring states were sorely smitten by this scourge—their people dying or flying, their indus-

tries silenced, and the wheels of their commerce obstructed at many points—Alabama has been safely and serenely protected, her protection being the proudest trophy that could be laid on the tomb of Jerome Cochran.

The scope of "state medicine" is practically boundless. With a complete and cooperative public health system—one extending in logical continuity from counties to nation—the principles of sanitary science could be enforced and taught in every educational institution of the land, from the humblest rural school to the most renowned university, thus securing the sturdiest physical and broadest mental growth and development of which the youth of the country are susceptible; the foul atmospheres of overcrowded workshops could be kept fresh and pure, thereby supplying the toilers with an abundance of that life-giving element without which the best work can not be done; the strength of arms digging out mineral and metallic wealth deep down in the bowels of the earth could be upheld and reinforced; the hygienic rights of helpless victims paying the penalties of crimes in the prisons of the country could be guarded and defended; crowded counting houses, where busy brains are often forgetful of the needs of the body, could be rendered safe and salubrious; our soldiers and sailors could be protected from the ravages of diseases frequently more fatal than the carnage of battle; yea, the light and the teachings of modern sanitary science could illuminate and fortify every home of the land and, like a good angel, could turn away from happy families the untimely visits of the "pale messenger."

These and much more can state medicine do to place the standard of physical manhood and womanhood on a higher, purer and better plane.

SANITATION IN THE CANAL ZONE.*

W. C. GORGAS, M.D.

Colonel and Assistant Surgeon-General U. S. Army; Chief Sanitary Officer, Canal Zone.
ANCON, CANAL ZONE.

Being a working doctor and one not accustomed to addressing audiences, I must ask your indulgence in making the attempt. Indeed, I would never have thought of making this address, except that your dean, Dr. Polk, assured me that some account of our sanitary work at Panama would be acceptable. And I can see that an outline of the sanitary work at Panama might be of use to men just being graduated into our profession, as an illustration of a new avenue of useful work in the way of tropical sanitation that has developed in the last eight or ten years.

Great advances have been made in this line of work in that period, due to important discoveries made just prior to that time, and the English and Americans have done a great deal of useful work in sanitation in their tropical colonial possessions. The discovery that the bite of a certain species of mosquito is the only means of transmitting yellow fever has enabled our sanitary workers in the tropics greatly to improve the health conditions of the whites who are necessarily employed there.

When we took possession of Cuba in 1898, the great sanitary problem was the control of yellow fever. The discovery made in 1901 by the Army Medical Board, composed of Drs. Reed, Carroll, Lazear and Agramonte,

after we had been in Cuba about two years, enabled the sanitary authorities to rid that island of yellow fever. The island remained free for three years. I must not neglect to say that Dr. Coles Finlary had deduced the theory that the *Stegomyia* conveyed yellow fever, and he had in many papers steadily maintained that theory since 1881.

The government was then turned over to the Cubans, political discussions arose, governmental administration became more or less lax, and yellow fever reappeared. Last year the United States again assumed control; the same sanitary methods were reapplied and yellow fever has again disappeared. It is now generally recognized that yellow fever can be controlled by sanitary measures based on the knowledge that the *Stegomyia* mosquito alone conveys this disease. This has been demonstrated a number of times in various parts of the western hemisphere.

The control of yellow fever in Cuba was important, not alone for the protection of our own people down there, but more for the protection of the United States against this disease. Cuba is so situated commercially with regard to our gulf coast that, as long as she was infected with yellow fever, she was a constant menace to our gulf states, and to the United States generally, and she actually did give us yellow fever many times. This ability to control yellow fever by simple and inexpensive measures attracted a great deal of attention. After the announcement by the army board of the discovery they had made, our sanitary work in Havana had to be entirely reorganized, in order to adapt it to the conditions made evident by this discovery. It was, of course, of vital importance to us, and after much thought and discussion we evolved plans looking to the carrying out of three classes of work.

First, the rendering of all non-immunes immune by giving them a light attack of yellow fever. In a population such as Havana has, you know the native is not liable to yellow fever, and is spoken of as being immune. The stranger is the only one liable to this disease, and is known as a non-immune.

Second, the destruction of all *Stegomyia* mosquitoes that had, by biting yellow fever patients, become infected with yellow fever.

Third, the destruction of all *Stegomyia* mosquitoes.

We were agreed that the first method—that of rendering non-immunes immune—was the one that would most probably lead to success. After a fair trial, however, we convinced ourselves that yellow fever given intentionally by the bite of a mosquito could not with certainty be controlled, and that if this method was used on a sufficiently large scale to render the non-immune population immune it would cause a considerable number of deaths. We were not warranted, therefore, in pushing this branch of the work.

When we left Cuba after the disappearance of yellow fever, we were inclined to think that results had been obtained principally by the destruction of the infected *Stegomyia*, but further experience at Panama has convinced me that the important element is the destruction of the *Stegomyia* generally. I merely mention this as showing how practical work and experience entirely change well-grounded theories.

We took possession of the canal at Panama in the spring of 1904. The experience of our predecessors, who had built the railroad and attempted to build the canal, was ample to convince us that unless we could protect our force against yellow fever and malaria we

* Address to the graduating class, 1907, in the Cornell University Medical College.