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HEALTH DEPARTMENT,
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NEW YORK CITY.

*Preventive Medicine in the City of
New York.*

*The Address in Public Medicine delivered at the 65th Annual
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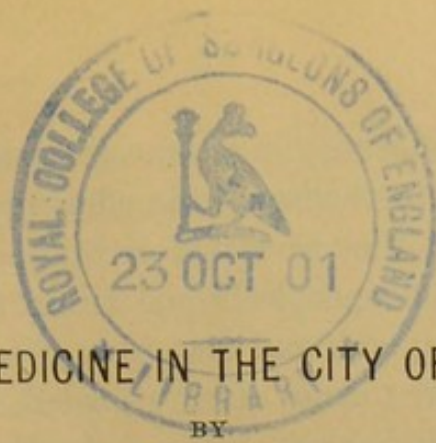
BY

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OCTOBER, 1897.





PREVENTIVE MEDICINE IN THE CITY OF NEW YORK,¹

BY

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I desire to express my high appreciation of the honor conferred upon me by the invitation of the Council of the British Medical Association to deliver the address on Public Medicine at its annual meeting, and for this I wish to render my grateful acknowledgment.

I interpret the invitation, however, as a tribute to the work of the Health Department of New York City, with which I have had the honor to be connected for many years, and as an expression of the desire of the Council to give recognition to the practical advances made in sanitary science in the greatest city of the new world. I have, therefore, regarded your invitation as a command to select for the subject of this address the consideration of some of the measures which have more particularly distinguished the work of the New York City Health Department, and to describe some of the procedures followed in the sanitary surveillance of infectious diseases which have been introduced by it.

I feel a great diffidence in presenting an address dealing with these subjects before the British Medical Association, representing, as it does, the medical profession, and, to a great extent, the health officers of a country which has so long and so justly been regarded as the birth-place and home of sanitary science. It has been the custom of sanitarians of all nations to look to England for guidance and direction in matters connected with the public health, and the low mortality statistics, especially from zymotic

¹ Read before the British Medical Association, Montreal, Sept. 3, 1897. *British Medical Journal*, London, Sept. 11, 1897.

diseases, in England, testify in no uncertain language to the value of English sanitary methods and the efficiency of their execution. When we remember that never before in the world's history have there been 30,000,000 people living within 50,000 square miles, as is the case in England, and that more than 20,000,000 of this population reside in towns, often crowded, we appreciate more fully the remarkable healthfulness of the England of to-day and the extraordinary success of English sanitation, as of English methods in all the practical affairs of life.

The fact should be strongly emphasized that the advances in preventive medicine in Great Britain, as shown by the mortality tables for nearly half a century, have preceded those in every other country, and I doubt not that the influence of the British Medical Association has been no small factor in contributing to the high standard of the public health. In view of these considerations, it is natural that a foreigner should hesitate to address this Association on questions connected with public medicine.

I must further ask your indulgence in having devoted the greater part of this address to the study and description of procedures and methods, rather than, as is generally the custom, to the consideration of some one of the broader questions in public medicine. This course has been adopted because, in my judgment, such a discussion will be of greater value and interest than the consideration of any general topic, which latter could furnish little specific information as to the conditions and methods of sanitary work in the United States.

It seems necessary, in order that you may have an intelligent conception of the conditions under which sanitary work in the United States is carried on, that I should first point out, in a general way, how they differ from those in Great Britain. It should be noted particularly that in the United States there is no National Board of Health, and there are no national regulations of general application. In each of the several States of the Union the sanitary administration is solely under the control of the State authorities. The State Boards of Health are energetic and progressive in many of the States, but in some there is no sanitary work of importance done.

It necessarily follows that throughout the United States there is great lack of uniformity in regulations and methods and in

the efficiency of their execution. It is hardly possible to make any definite statement as to the condition of preventive medicine generally, for what is true of one State is not true of another. Speaking broadly, in the rural districts and in the towns and smaller cities, especially in the South and West, the sanitary methods are of the crudest type. On the other hand, in many of the large cities, there is found a broad, enlightened and progressive policy and an efficient administration equal to that presented in any of the great cities of the world.

Instead, therefore, of attempting the consideration of the broader subject of public medicine in the United States, I shall confine myself to a discussion of the conditions and methods of sanitary work in New York, as these serve as a type of the best of those found in the greater American cities.

The Health Department of New York City is organized under a special act of the Legislature of New York State, and is an entirely independent sanitary organization, not being subject even to the jurisdiction of the State Board of Health. The Board of Health of the Health Department is composed of four members, viz.: The President, who is the chief executive officer; the Commissioner of Health, who must be a physician (these two being appointed by the Mayor of New York City), and two *ex officio* members—the Health Officer of the Port of New York (who is a State officer nominated by the Governor) and the President of the Board of Police Commissioners of New York City (the latter being added to bring the Police Department and the Health Department in closer relations to one another). The Commissioner of Health of the Health Board of New York City is *ex officio* a member of the State Board of Health, as is also the Health Officer of the Port of New York; so that two of the members of the Municipal Board are also members of the State Board of Health, but the State Board has no jurisdiction in New York City, and the action of the Municipal Board is absolutely independent.

The Board of Health of New York City has jurisdiction over the whole of New York City, as it now exists, with its about 2,000,000 of population, and with the beginning of 1898 a similar Board, increased to five members, will have complete jurisdiction over Greater New York, with a population of about

3,250,000. All of the administrative and executive work of the Department is concentrated at the main offices, and is carried on under the immediate direction of the chiefs of the various divisions into which the Department is divided. The act of the Legislature of New York State creating the Department gives to the Board most ample powers, executive, judicial and legislative in character. The funds for the support of the Department are supplied from the general funds of New York City.

Before proceeding to a discussion of the management of infectious diseases in New York, I desire to call especial attention to the fact that all matters connected with the scientific investigation, diagnosis, care or sanitary supervision, in every way, of the infectious diseases are regarded by the Board of Health as properly coming within its province. In the development of the methods now in use the proposition expressed has furnished the governing principle. I need hardly point out the great difference between this conception of the functions of a sanitary board and that usually held.

The duties of sanitary authorities relating to the infectious diseases are generally regarded as limited to the inspection of reported cases of only a few of the infectious diseases, their removal to hospitals when required and the subsequent proper disinfection of the premises.

In times of emergency, as in the presence of serious epidemics, more comprehensive and stringent measures are considered justifiable; but it has not been generally regarded as necessary or desirable that municipal sanitary authorities should furnish opportunities for or assistance in the diagnosis of infectious diseases, should conduct experimental investigations into their causes, should assist in the treatment in any way of cases outside the hospitals, or otherwise concern themselves with these matters. It has seemed to us in New York City, however, that everything connected with the infectious diseases in every form came properly within the scope of the Department's work.

The first important departure in New York City from the older methods was made in 1892 by the establishment of a bacteriological laboratory. This was, I believe, the first bacteriological laboratory ever established under municipal control. It was designed originally to afford facilities for the bacteriological

diagnosis of Asiatic cholera, and for the investigation of questions relating to disinfection and disinfectants. A few months after the opening of the laboratory the scope of its work was broadened and facilities for the bacteriological diagnosis of diphtheria were offered to the physicians of New York City free of charge. The necessity for making repeated examinations during the course of this disease soon became evident, and such changes were made by the Health authorities in the methods of dealing with diphtheria as were suggested by the earlier experimental observations.

These investigations of the New York City Health Department relating to diphtheria laid the foundation of municipal bacteriological laboratories and made them necessary to the proper conduct of sanitary work.

The work on diphtheria was soon followed by the perfecting of arrangements for the free bacteriological examination of sputum for the diagnosis of cases of suspected tuberculosis occurring among residents of New York City.

In October, 1894, investigations in connection with the production of diphtheria antitoxin were begun, and in December of that year the municipal authorities made a special annual appropriation (antitoxin fund) of \$30,500 for the prosecution of this work. The Health Department commenced the use of the antitoxin produced in its own laboratories on January 1, 1895. The plan, as now developed, includes:

1st—The furnishing of free supplies of diphtheria antitoxin to all public institutions in New York City.

2d—The furnishing of free supplies of diphtheria antitoxin to private physicians for use among persons too poor to pay for the remedy; the only condition being that reports of the cases treated be forwarded to the Health Department on their completion.

3d—The free administration of diphtheria antitoxin on the request of the attending physician to any resident of New York City by a specially detailed staff of medical inspectors.

The sale of the surplus product of diphtheria antitoxin was authorized by a special act of the New York State Legislature in 1895, and the fund thus accumulated, according to the provisions of this act, is devoted solely to "the production and use of

diphtheria antitoxin or other antitoxins." The remedy is on sale in over one hundred pharmacies in the city. It is consigned to these, the price being fixed by the Health Department in all cases, and ten per cent. on the sales is allowed to the pharmacies as commission.

The special antitoxin fund made possible the establishment of a hospital and research bacteriological laboratory, devoted to the production of diphtheria antitoxin and other bacteriological products and to general experimental investigations in relation to the infectious diseases. The work of this laboratory now includes the production of tetanus and streptococcus serums, mallein and tuberculin (used by the Department in the diagnosis respectively of glanders and tuberculosis in animals) and numerous experimental investigations regarding the infectious diseases, especially diphtheria, typhoid fever, tuberculosis and small-pox.

In October, 1896, arrangements were completed for placing at the command of the physicians of New York City* Widal's test for the diagnosis of typhoid fever, largely after the method of Wyatt Johnston, of Montreal, and recently arrangements have also been made for the administration of Pasteur's treatment for the prevention of rabies.

A special laboratory and stable are devoted to the production of bovine vaccine virus, and this is freely distributed and vaccination is performed free of charge by the medical officers of the Department. Special investigations undertaken in this laboratory have resulted in the production of a glycerinated vaccine pulp of great activity and durability. This has entirely displaced the virus prepared by drying on quills or ivory points generally employed.

A better idea, perhaps, of the extent of the work performed in the laboratories of the Health Department of New York City may be obtained from the following statistical statement of some of the routine work:

During the year 1896, 25,049 cultures were examined for diphtheria bacilli; 1,856 specimens of sputum from cases of sus-

* A new method devised by Dr. Hiss, of the Health Department Laboratories, for the bacteriological diagnosis of typhoid fever through the examination of the intestinal discharges has just been introduced. This, it is believed, will prove of great service in many ways and will be free from many of the objections pertaining to the Widal test.

pected tuberculosis were examined for tubercle bacilli; 16,796 vials of diphtheria antitoxin were issued; 918 cases of diphtheria were treated in their homes by the medical *attaches* of the laboratories, and 1,214 persons were immunized.

The scientific staff of the bacteriological and vaccine laboratories now includes twenty-five physicians, one chemist and two veterinarians, in addition to clerical and laboratory assistants and attendants.

The work connected with disinfection was formerly in charge of the Director of the Bacteriological Laboratories, and the methods employed are still determined in the laboratories, but the details of execution are now intrusted to the Chief Inspector of Contagious Diseases.

Every case of contagious disease reported to the Department is regularly inspected by the Medical Inspector assigned to the district in which it occurs. When consent can be obtained, such cases are removed to the Department hospitals. In tenement-house districts an effort is always made to induce patients suffering with such diseases to enter the hospitals, and, if the conditions are such as to require it, removal to the hospitals is enforced. A comparatively small proportion of the total cases, however, are actually treated in the hospitals. After completion of the illness or transfer of the patient, thorough disinfection is performed in the house or apartment, and all infected materials are removed to the disinfection station for destruction or for disinfection by steam. After treatment they are returned to the owner, no charge being made for the services. Disinfection is compulsory in every case.

The inspection work of the Health Department is carried on by a number of different corps of inspectors attached to the various divisions of the Department. These inspectors are in part medical men and in part they are non-medical men who have had special training in the work to which they are detailed. The medical corps include the district medical inspectors, the district and special vaccinators, the inspectors for the administration of diphtheria antitoxin, the diagnosticians, the summer corps of inspectors, the medical inspectors of schools, the veterinary inspectors and several special inspectors of disinfection of lodging-houses and public institutions. These various corps,

with the exception of the summer corps and the school inspectors, are permanent and are on duty throughout the year. The school inspectors are on duty only through the school year, and the work of the summer corps is limited to July and August. There are also a number of corps of sanitary and food inspectors (not necessarily medical men) and the disinfection corps. The former include the inspectors of plumbing and ventilation, the sanitary police, the inspectors of offensive trades, the inspectors of meat, fish, milk and food, and the inspectors of mercantile establishments.

The functions of most of these different corps are, for our purpose, sufficiently indicated by the name. It may be here added, however, that, under the law creating the corps of inspectors of mercantile establishments, definite provisions are made as to employment of women and children in such establishments, and as to the time, nature and condition of such employment.

It should, perhaps, also be stated that the function of the diagnosticians, two of whom are always on duty day and night, is to give expert assistance in the *clinical* diagnosis of contagious diseases. It is a part of their duty to see every case of contagious disease before its admission to the Department hospitals.

The veterinary inspectors have supervision of the application of the tuberculin test for the diagnosis of tuberculosis in cattle, and of the diagnosis of other infectious diseases of cattle and horses.

I desire now to present somewhat in detail the methods of procedure in relation to two diseases, viz., diphtheria and tuberculosis, as in these diseases the methods have been developed to an unusual extent in New York.

Knowledge of the existence of cases of diphtheria reaches the Department, either by a direct report of the case by the attending physician or through the forwarding of a culture to the laboratory for bacteriological examination, when the case is of doubtful character. If on examination of the culture the Loeffler bacilli are found, the case is reported to the Division of Contagious Diseases from the laboratories, at the same time that a report is forwarded to the attending physician. In both instances the cases are immediately referred to the Medical Inspector connected with the Division of Contagious Diseases who is assigned

to the district in which the case occurred. If the person lives in a tenement-house, lodging-house, boarding-house or hotel, and a culture has not been previously made by the attending physician, the Inspector makes, in each instance, a culture to confirm the diagnosis. The subsequent action of the Department depends upon the result of this culture. If diphtheria bacilli are found, the case is treated as one of diphtheria; if they are absent, the subsequent treatment depends on the special conditions existing. In every instance in which the case is proven to be diphtheria, at the end of ten days a secondary culture is made by the attending physician or the District Medical Inspector, to determine whether the diphtheria bacilli are still present in the throat, and subsequent cultures are made at short intervals until the examinations show that the organisms are no longer present. The case is then referred for disinfection, a detailed statement being left at the house by the Medical Inspector in charge, to guide the disinfectors as to the course which shall be followed.

Every case of diphtheria which comes to the knowledge of the Department is recorded in a card index, according to the number of the house and the street in which it occurs. In this index envelopes are used in place of cards, and in each envelope, representing always one case, are placed all of the data relating to the first and subsequent cultures and results. As each case is recorded it is at the same time plotted on a sectional map of New York City, drawn to scale, showing every house-lot in the city. This plotting is done by conventional signs, so that it is possible at a glance to determine the grouping and distribution of cases in different parts of the city, the number of cases occurring in any given house in the city during the last four years since this method has been in use, and the month when reported. It is also possible in a moment, by reference to the yearly card index, to find all the information in relation to each case which the Department possesses.

A special corps of inspectors is assigned to the administration of diphtheria antitoxin, and, on request, one of these inspectors will visit a person suffering from diphtheria in any part of the city, day or night, and administer diphtheria antitoxin, under the supervision of the attending physician. When the patients are too poor to employ an attending physician, the inspectors will

supervise their removal to the hospitals. These inspectors are also prepared, at the request of the attending physician, to perform intubation in laryngeal diphtheria. It is the usual course, where antitoxin is administered by an inspector, to immunize all members of the family who have been exposed to the disease. Diphtheria antitoxin has been largely employed for the immunization of the inmates of public institutions, especially children, when diphtheria has appeared. This is the ordinary routine, and in every instance during the last two and a half years it has been possible to quickly stamp out diphtheria in institutions by this process.

As already stated, diphtheria antitoxin is furnished on request free of charge to all public institutions, and may be obtained by physicians at any of the one hundred depots where it is on sale, free of charge, for administration to persons who are too poor to pay for the remedy.

In connection with the study of diphtheria, experimental investigations are constantly being carried on to determine the virulence of the diphtheria bacilli found in healthy throats in simple catarrhal angina and follicular tonsilitis, and regarding the various matters which relate to the bacteriology of this disease.

The attitude assumed by the Health Department of New York City towards pulmonary tuberculosis and the measures adopted for its prevention constitute, in my opinion, a most important feature of its work. No more striking example of the influence of inherited and transmitted beliefs and prejudices can be found than is afforded by the exhibition of hesitation and reluctance on the part of the proper authorities to assume the sanitary supervision of the tubercular diseases. It is now universally admitted that tuberculosis is infectious and communicable, and the most fatal disease to which the human race is subject. Yet, as a rule, no effective measures, or no measures at all, have been adopted by sanitary authorities with relation to it. We believe, nevertheless, that it may be more easily controlled than any other of the principal infectious diseases with which we have to deal, and that it is of as great importance—judged by the deaths it causes—as all the others together. The full courage of scientific conviction seems to have been generally lacking among public officers in dealing with this disease.

The Health Board of New York City first began an educational campaign, in relation to the causation and pervention of pulmonary tuberculosis, in 1889. In that year a communication on this subject, presented by the writer and the associated consulting pathologists of the Department, was widely published, and leaflets based on it, giving the essential facts as to the nature of this disease, were freely distributed. No further action was taken at that time, as investigation showed that the medical profession and the public were not then prepared for more extended measures.

In December, 1893, the attention of the Department was again called to the subject by the writer, and it was determined to at once institute more comprehensive measures for the prevention of this disease. The measures then adopted required the notification of all cases of pulmonary tuberculosis occurring in public institutions and requested reports of cases occurring in the practice of private physicians. They also included arrangements for the bacteriological examination of sputum, to assist in the early diagnosis of the disease; the inspection of all reported cases in tenement-houses, lodging-houses, hotels and boarding-houses and the instruction of the patients and their families as to the nature of the disease and the means to be taken for its prevention; the inspection of the premises in all instances where deaths were reported as due to tuberculosis, and the issuing of orders, when it was deemed necessary, upon the owners of apartments which had been occupied by consumptives and vacated by death or removal, requiring that such apartments be thoroughly renovated, by cleaning and by painting, papering or kalsomining, before they were again occupied by other persons; and finally the education of the public, by wider and more comprehensive methods, as to the nature of this disease. Placards were also attached to the doors to prevent the re-occupation of apartments which had been vacated by death or removal before the orders requiring renovation had been complied with.

Under the resolutions by virtue of which these measures were enforced, 4,166 cases of tuberculosis were reported in 1894; 5,818 in 1895, and 8,334 in 1896. So far as was possible, all of these cases, except those in private houses, were visited or the premises where they had lived were inspected, and, in addition,

the premises occupied by persons dying from tuberculosis (numbering each year nearly 6,000) were inspected and such action taken as was considered possible and desirable. Altogether the premises and cases thus coming under observation during these three years numbered more than 35,000.

These facts convey some idea of the enormous sanitary importance of the subject. It is conservatively estimated that there are at least 20,000 cases of well developed and recognized pulmonary tuberculosis now in New York City, and an additional large number of obscure and incipient forms of the disease. A very large proportion of the former cases constitute more or less dangerous centres of infection, the degree of danger depending in each instance upon the intelligence and care which is exercised in the destruction of the expectoration. All the suffering and death consequent upon the prevalence of this disease are, in view of modern scientific knowledge, largely preventable by the careful observation of simple, well understood and easily applied measures of cleanliness, disinfection and isolation.

In the beginning of 1897 the Health Board further adopted some recommendations made jointly by Dr. T. Mitchell Prudden, Consulting Bacteriologist to the Health Department, and the writer, which advised that pulmonary tuberculosis be declared to be an "infectious and communicable disease, dangerous to the public health," and which required "the notification of all cases occurring in the city," in the same way as is required in regard to typhoid fever, diphtheria and other similar diseases. Tuberculosis, however, in accordance with the special section of the Sanitary Code, enacted to provide for these measures, is distinctly separated from eruptive diseases—is not classed with them as a contagious disease, but is referred to as "an infectious and communicable disease." It has always appeared to the Health Board exceedingly desirable that a broad distinction should exist in the public mind between this disease and those diseases which are more properly classed as contagious.

In the treatment of apartments which have been occupied by tubercular patients and vacated by death or removal, renovation has been and is ordered, rather than disinfection attempted, because the Health Board has always felt that disinfection for tuberculosis in the poorest tenement-houses was too difficult to be

satisfactorily performed, and has considered renovation as certainly efficient. In the thousands of orders requiring the renovation of premises, which have been issued under the resolution referred to upon the owners of real property during the last four years, little or no difficulty has been experienced in enforcing compliance, and rarely has there been serious objection.

Public institutions, hospitals, asylums, homes, etc., are now not only required to report the name, last address, sex, age and occupation of every case of tuberculosis coming under observation within one week of such time, but they are further required to notify the Department of the discharge or transfer of such patients. The purpose of this procedure is to keep under more or less constant supervision those cases of pulmonary tuberculosis which occur among the poorest classes of the population; in other words, those which are most likely to be dangerous sources of infection to others. Unfortunately, at the present time there are no hospitals directly under the control of the Health Department for the care or isolation of cases of pulmonary tuberculosis; but it is hoped that such hospitals may soon be provided.

The best medical opinion forbids that persons suffering from pulmonary tuberculosis be treated in association with other classes of cases in the general medical wards of general hospitals. This opinion is based on the daily observations of the dangers incident thereto, and it has very properly resulted in the exclusion, to a large extent, of persons suffering from this disease from many of the general hospitals to which they were formerly admitted.

A large experience has also shown that in institutions devoted solely to the care of consumptives the general welfare of the patients is more easily fostered, the risks of fresh infection more certainly diminished and the chances for recovery more surely enhanced than in general hospitals in which all classes of cases are received.

From the beginning of this work the officials of the Health Department of New York City have encountered, in the lack of proper facilities for the care of consumptives, a great obstacle to practical success, and I am convinced that the grave responsibilities which rest upon sanitary authorities generally in this matter cannot be properly discharged without the establishment,

under their direct control, of additional special hospitals for the care and treatment of this disease. No week passes in which the officers detailed to this work in New York do not encounter many instances in which the members of many households, numerous inmates of crowded tenement-houses, employees in dusty and unventilated workshops, and many others, are dangerously exposed to infection from victims of this disease, who cannot gain admittance to the overcrowded public institutions, or who reject all proffered assistance and instruction, and, from ignorance, indifference or inability through weakness due to the disease, scatter infectious material broadcast, thus diminishing their own chances for recovery and imperilling the health and safety of others. In such cases sanitary suggestions are futile, and removal to a hospital constitutes the only effective action. I am convinced that no factor is so potent to-day in perpetuating the ominous death list from pulmonary tuberculosis as the lack of proper facilities for the adequate care of the poor stricken with this malady.

The measures designed for the prevention of tuberculosis properly include not only those which relate to the transmission of the disease from human beings to each other, but also those which relate to the transmission of the disease from affected animals, especially the bovine species, to human beings, through the meat and milk used as food. The Health Department of New York City, while feeling strongly that the most important source of infection is through the sputum of consumptives, has yet elaborated with great care methods for protecting the public, so far as lies within its power, from infection through the meat and milk of tubercular animals. In order that a more effective control of the milk supply should be possible, an ordinance was passed in 1895 forbidding the sale of milk within the city without a permit from the Health Department, and requiring that all wagons used for transportation or delivery of milk should likewise have wagon permits. Before these permits are issued, the holder of the permit must furnish information as to the source from which the milk is obtained, the number of animals, the character of the food supply and the sanitary conditions surrounding the dairy. Special regulations have been established with regard to the sale of milk, and permits may be revoked at any time by the Health

Board, where evidence exists that these regulations have not been strictly complied with. All milch cows in New York City (about 3,000 in number) are now being subjected to the tuberculin test, under the supervision of the Health Department, and animals found to be diseased are killed. It is proposed, as soon as this work is completed in New York City, to require similar tests to be applied to all cows whose milk is sent to New York City. There also exists a careful inspection of animals slaughtered for food and of all meat sent into the city, and carcasses found to be tubercular are destroyed.

Most beneficial effects have already resulted from the various measures instituted for the prevention of this terrible disease. Not only has there been a very material decline in the number of deaths occurring from it, but there has been also a most gratifying increase of intelligent knowledge as to its nature among the poorest class of the population. The inspectors detailed for this work report that, on their first inspection, in nearly one-half of the cases occurring in many parts of the tenement-house districts of the city, it is found that more or less efficient precautions are being taken for its prevention. Such precautions are the use of rags to receive the sputum (which are later burned), instead of handkerchiefs; the use of cups containing water or a disinfecting solution; the separation of the clothing of the patient from that belonging to others, and similar measures.

This increase of intelligence and the precautions resulting from it afford the greatest promise for the future of a persistent and still more rapid decline in the frightful morbidity and mortality caused by the tubercular diseases.

Investigations made by the Department showing that the dust in the street cars and various public places is often infectious, led to the enactment of an amendment to the Sanitary Code prohibiting spitting on the floors of street cars, ferry boats and other public conveyances, and requiring that all companies should post in their cars, boats, etc., printed notices forbidding this. This regulation is very difficult of enforcement; but, while the results have been by no means entirely satisfactory, there has yet been a definite improvement in the existing conditions.

The method employed for recording and plotting cases of diphtheria is also used for cases of tuberculosis. I have had pre-

pared transcripts from the maps on which are plotted the cases of diphtheria and tuberculosis, to show the distribution of these cases in certain wards of the city. These wards have been selected in each instance because of the large number of cases of the respective diseases occurring in them.

Maps 1 and 2 show respectively the 4th and 6th wards, with the distribution of reported cases and deaths from tuberculosis in these wards during three years. The cases and deaths in 1894 are plotted with a circle, cases and deaths in 1895 with a triangle, and the cases and deaths in 1896 with a dagger. The dwelling-houses in the maps have been colored so as to put them in contrast with buildings not occupied as dwelling-houses. Thus the dwellings in which one or more cases of tuberculosis occurred during this period are colored pink, and those free from tuberculosis during these years are colored blue. The divisions which are uncolored are not dwelling-houses, but occupied as business buildings, warehouses, etc.

These maps argue more forcibly for the infectious and communicable character of this disease than could any words. It should be said, however, that in some instances, where a large number of cases have occurred in one house during these years, the house had been occupied as a Chinese lodging-house. This is especially true of several of the houses on Pell and Mott streets.

Maps 3 and 4 show the distribution of cases of diphtheria for the same period in the 10th and 13th wards. These maps, as has been said, are simply transcripts, reduced in size, from the maps on which are plotted, day by day, the reported cases and deaths from these diseases throughout the city.

ANALYSIS OF DISTRIBUTION OF REPORTED CASES AND DEATHS
FROM TUBERCULOSIS IN WARDS IV. AND VI.

Years 1894, 1895, 1896, and to March, 1897.

T A B L E I.

WARD IV.

According to the census of 1896, there were 663 inhabited houses in Ward IV., with a population of 18,323, or an average number of 27.6 persons per house.

No. of houses in which cases occurred.....	248
“ cases in 1894.....	173
“ cases in 1895.....	161
“ cases in 1896-97.....	207
<hr/>	
Total number of cases in 3 years.....	541
Average number of cases per infected house.....	2.81
<hr/> <hr/>	
Percentage of houses infected.....	37.3
Average number of cases per house in ward.....	0.81
<hr/> <hr/>	
Cases per 1,000 population in 1894.....	9.4
“ “ “ 1895.....	8.7
“ “ “ 1896-97.....	11.2
<hr/>	
Total cases per 1,000 population in 3 years..	29.3
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TABLE II.

WARD IV.

Houses Showing 3 or More Cases Each of Tuberculosis.

No. of houses in which 3 or more cases occurred.....	70
“ cases in 1894.....	88
“ cases in 1895.....	95
“ cases in 1896-97.....	119
<hr/>	
Total cases in these houses in 3 years.....	302
Average number of cases per house.....	4.3
<hr/> <hr/>	

Comparing these figures with those obtained for the whole ward :

Total number of infected houses in Ward IV.....	248
Number of houses in which 3 or more cases occurred....	70
Percentage on total infected houses.....	28.2
<hr/> <hr/>	
Total number of cases in ward.....	541
Cases occurring in 28.2 per cent. of the houses infected..	302
Percentage of total cases.....	55.8
<hr/> <hr/>	
Total number of inhabited houses.....	663
Number of houses in which 55.8 per cent. of cases occurred	70
Percentage in total houses.....	10.5
<hr/> <hr/>	

It is thus seen that of the infected houses 28.2 per cent. contained 55.8 per cent. of the cases, and these occurred in only 10.5 per cent. of all the houses in Ward IV.

TABLE III.

WARD VI.

According to census of 1896 there were 630 inhabited houses in Ward VI., with a population of 22,897.

No. of houses in which cases occurred.....	239
“ cases in 1894.....	157
“ cases in 1895.....	127
“ cases in 1896-97.....	191
<hr/>	
Total number of cases in 3 years.....	465
Average number of cases per house.....	1.94
Total number of dwellings in ward.....	630
Number of houses infected with tuberculosis.....	239
Percentage of infected houses.....	37.9
<hr/>	
Average number of cases per house in ward.....	0.72
Cases per 1,000 population in 1894.....	6.8
“ “ “ 1895.....	5.5
“ “ “ 1896-97.....	8.2
<hr/>	
Total cases per 1,000 population in 3 years.	20.5

TABLE IV.

WARD VI.

Houses Showing 3 or More Cases Each of Tuberculosis.

No. of houses in which 3 or more cases occurred.....	45
“ cases in 1894.....	72
“ cases in 1895.....	56
“ cases in 1896-97.....	78

Total cases in these houses in 3 years.....	206
Average number of cases per house.....	4.5

Comparing these with the figures obtained for the whole ward :

Total number of infected houses.....	239
Number of houses in which 3 or more cases occurred....	45
Percentage of total infected houses.....	18.9

Total number of cases in ward.....	465
Cases occurring in 18.9 per cent. of the houses infected.	206
Percentage of cases in same.....	44.3

Total number of inhabited houses.....	630
Number of houses in which 44.3 per cent. of cases occurred	45
Percentage in total houses.....	7.1

Thus, 44.3 per cent. of the cases occurred in 18.9 per cent. of the infected houses, and these constituted only 7.1 per cent. of all the houses in Ward VI.

I desire now to refer briefly to the system of medical school inspection, instituted by the Health Department during the last year, which has given thus far most satisfactory results, and which promises greater good in the future.

Early in 1897, under the authority of a special resolution of the Board of Estimate, 150 Medical School Inspectors were appointed by the Health Board, after Civil Service examination. The duties of these inspectors consist in the examination daily, at the opening of the primary and grammar departments of each of the public schools and of the parochial and industrial schools, of all the children who are set apart by the respective class-room teachers as not appearing to be entirely well. These children are examined in each school by the Inspector detailed to the school, and are either excluded from the school-room or returned to the class, depending on the result of the examination. Every pupil found to be suffering from any form of general contagious disease, or any contagious disease of the eye or parasitic disease of the skin, is sent home, with a written statement to the parents of the cause for this action, and in cases of the eruptive diseases and of diphtheria, reports are immediately forwarded to the Chief Inspector of Contagious Diseases, and by him referred to the various District Medical Inspectors for inspection and supervision.

During three months (65 school days), in which this system has been in operation, there have been examined 63,812 children, who had been set aside by the teachers as not appearing entirely well, of which number 4,183 were excluded for the following reasons :

Measles	88
Diphtheria	167
Scarlet fever	32
Croup	11
Whooping-cough	26
Mumps	117
Contagious eye diseases.....	702
Parasitic diseases of head.....	2,627
Parasitic diseases of body.....	108
Chickenpox	130
Skin diseases	175
	4,183
	4,183

The children excluded because they were thought to be suffering from Measles, Scarlet Fever, Diphtheria and Chicken-pox, were afterwards seen by the Medical Inspectors, and in the majority of cases the original diagnosis was confirmed.

The educational work of the Health Department, is, I believe, of great importance. It has been the custom of the Department for some years past to issue, from time to time, circulars of information on various topics, and especially with relation to the infectious diseases, their diagnosis, treatment or management. Some of these circulars are popular in character, very large editions being published, 50,000 or more at a time, and are designed for general distribution, particularly among the tenement-house population.

Examples of this class are the following: "Information for Consumptives and their Families," "Infant Feeding," "Methods of Transmission of Contagious Diseases," and numerous others on similar topics. Circulars of information are also issued, which are designed for distribution among the medical profession. These relate to the work of the Health Department in connection with infectious diseases, or to the bacteriological products of the laboratories. Many such circulars have been issued on various topics connected with diphtheria, such as "Bacteriological Examinations for the Diagnosis of Diphtheria," "Relation of Membraneous Croup to Diphtheria," "Diphtheria Antitoxin," "Persistence of Diphtheria Bacilli in the Throat during Convalescence from Diphtheria," "Occurrence of Diphtheria Bacilli in Healthy Throats and in Catarrhal Angina," etc. Other circulars of information have been issued on "The Importance of Bacteriological Examinations in the Early Diagnosis of Pulmonary Tuberculosis," "The Nature and Causation of Pulmonary Tuberculosis," "The Measures adopted by the Board of Health for the Prevention and Restriction of Pulmonary Tuberculosis," and on the use of "Mallein," "Tuberculin," "Tetanus Antitoxin," "Glycerinated Bovine Vaccine Virus," etc.

As these various circulars are published by the Health Department, copies of them are sent to the medical journals published in New York City and to the daily press. Thus they gain at once a wide circulation. In addition, some one or more of these circulars is included in each report of the results of the

bacteriological examinations in diphtheria and tuberculosis, as they are sent from the laboratories. As more than one hundred reports daily are sent out, a large circulation is again attained among physicians in this manner. In some instances, circulars considered to be of unusual importance have been delivered by messenger to the house of every physician in New York City.

Aside from the circulars described, numerous scientific bulletins have been issued, from time to time, from the bacteriological laboratories, detailing the results of original investigations in connection with infectious diseases, and these bulletins are widely distributed among the profession of New York City.

I do not believe that the importance of this educational work can be over-estimated. Its value is incalculable in widely disseminating popular and scientific information with regard to the results of the latest studies in infectious diseases, and there have been constantly exhibited in New York the most gratifying indications of the influence of the information thus distributed, on both the general public and the medical profession.

More than this, the circulars keep constantly before the medical profession and the laity the work, the duties and the functions of the Health Department, as related to the people and the profession.

It has been frequently urged, especially in the earlier work of the New York City Health Department, that the methods proposed were theoretically commendable enough, but that they were impracticable. This criticism has been often made, particularly in Europe. The best reply to it is, that the results have shown that they are not impracticable. What has been described is not something that it is proposed to do, but it is a statement of what has been done and is being done, and this work, as briefly outlined in some of its phases, is to be considered as merely introductory.

It is the purpose of the Health Board to establish a supervision of all infectious diseases along the lines which have been thus far developed in relation to tuberculosis and diphtheria, as rapidly as the scientific knowledge at command makes such a course possible.

The final test of the efficiency of any scheme of sanitary control and of the healthfulness of any community or locality, is

found in the morbidity and mortality statistics, considered in relation to the causes of sickness and death. It is not simply the number of deaths or cases of sickness in proportion to the population, but also the nature of the diseases which cause morbidity and mortality.

In comparing the statistics for different localities, however, the special factors relating to each locality must be taken into consideration; for a death-rate which would indicate unusually favorable conditions in a large city might show far from favorable conditions in a rural population. The density of population has generally a very definite relation to the mortality.

Dr. Farr attempted to deduce a formula by which the mortality of any locality could be translated into that of another having a different degree of aggregation of the population. He showed that when the population has reached a certain density, there is a constant uniform increase in the death-rate with any further increase in its density. For example, in 50 districts in Great Britain, with a population of 2,500,000, and with 650 persons to a square mile, the death-rate was 20.5 per thousand. In those districts which contained 2,100 persons to a square mile, and a population of 2,000,000, the death-rate had increased to 24.4; with a population of 2,800 to a square mile the death-rate had further increased to 25.5, and with a population of 6,144 persons to a square mile the death-rate was 30.2.

The local variation in mortality with the density of population has not been constant in New York City, for in some of the Wards, where the density of the population is greatest, the mortality has been below the average, and in other Wards, with a relatively scarce population, the mortality has been extremely high. Other factors have exerted an even greater influence on local variations of mortality than density. The highest death-rates have been found in the lower and oldest parts of the city, where the buildings are old and the sanitary conditions in many respects unfavorable.

The nationality of the population has a definite influence, as has been shown in an analysis of the death-rates in different parts of New York City, made by Dr. Roger S. Tracy, Registrar of Vital Statistics. Those districts with the densest population, where the rates are comparatively low, are largely inhabited by

Russian and Polish Jews, who are a hardy race and proverbially long-lived. On the other hand, the Wards having the highest death-rates, or nearly the highest, are occupied largely by Italians, among whom, in the United States at least, the death-rate is exceedingly high.

The sanitary problems presented in a city like New York are unusually difficult, on account of the diversity and cosmopolitan character of the population. The presence of large numbers of foreign born inhabitants of many different nationalities, grouped often in restricted localities, and retaining their native customs and modes of life, and the great density of the population, constitute factors which largely complicate the situation.

The physical conformation of Manhattan Island is, in some respects, exceedingly unfavorable. The island is long and very narrow, and, as a result, certain parts of the city are overcrowded, as is in fact the island as a whole. Fully three-fourths of the population live in tenement-houses, which are five, six or more stories in height, and contain from two to four or more families on each floor. Each house is placed on a lot of not more than 25 by 100 feet, and frequently 20 families, numbering more than 100 persons, live on an area of this size.

The average density of the population in New York City below the Harlem river, *i. e.*, on Manhattan Island, is greater than that of any of the other great cities of the world. The only localities approaching in density of population certain Wards in New York are a small area in Paris, where the population is 430 to the acre; one district in Prague, where the population is 485 to the acre; and the Whitechapel district in London, which has a population of about 300 to the acre in Spitalfields, Mile End and Newtown, and 365 in Bethnal Green. In New York City, Sanitary District A, of Ward XI., has a population of more than 800 to the acre; Ward X., over 640 to the acre; Ward XIII., 540; Ward XVII., 430; Ward VII., 360, and Ward XIV., 295.

These facts must be kept in mind in considering the mortality statistics of New York, as compared with those of the large cities of Great Britain and the Continent. With these

before us, the diminution in the death-rates and the present death-rate are most significant.

A comparison of the mean total death-rate for decennial periods in New York City since 1834 shows that there was an increase during the first three periods ending in 1863, and that since that date there has been a continuous and very heavy decline in the rate, especially marked in the most recent years. The mortality in New York arose to such a high point that the inhabitants became alarmed, and in 1866 the Health Department as now constituted was organized. In the decennial period ending in 1843 the mean death-rate was 28.03; for the period ending 1853 it had risen to 33.81; during the next period ending in 1863 it was 33.94. Since that time it has declined to 31.11 for the decennial period ending in 1873; to 26.87 for the period ending in 1883; to 25.78 for the period ending in 1893, while in the year 1894 it was 22.76; in 1895, 23.10; in 1896, 21.54, and for the first half of 1897, 19.60. The population meanwhile has increased from 312,090 in 1840, to an estimated population of 1,990,000 on July 1st, 1897.

The mortality rate is normally higher for the first half of the year than the second half, and it is therefore probable that the rate for 1897 will be a fraction over 19, or a diminution of 25 per cent. on the death-rate for the decennial period ending in 1893.

The percentage of mortality occurring in children under five is always high, and has been long regarded as an excellent index of existing sanitary conditions. The injurious effects of unsanitary conditions and surroundings always fall heaviest upon the youngest element of the population.

TABLE V.

NEW YORK CITY.

*Annual Death-rate for all Causes, and for Certain Diseases,
1886-1896, Inclusive, and January-July, 1897 :*

YEAR.	All Causes.	Diphtheria and Croup.	Phthisis.	All Tubercular Diseases.	Measles.	Smallpox.	Scarlet Fever.	Typhoid Fever.	Diarrhoeal Diseases of Children Under Five Years.	Diphtheria and Croup, all Tubercular Diseases, Measles, Smallpox, Scarlet Fever, Typhoid Fever, and Diarrhoeal Diseases of Children Under Five Years.
1886.....	25.99	1.87	3.79	4.42	0.46	0.022	0.26	0.23	2.08	9.34
1887.....	26.32	2.06	3.56	4.06	0.52	0.067	0.40	0.22	2.20	9.53
1888.....	26.39	1.68	3.46	3.99	0.39	0.050	0.89	0.24	2.00	9.24
1889.....	25.32	1.46	3.31	3.86	0.30	0.0006	0.79	0.25	2.00	8.66
1890.....	24.87	1.11	3.41	3.97	0.45	0.001	0.25	0.22	1.86	7.86
1891.....	26.31	1.19	3.11	3.56	0.40	0.001	0.74	0.23	1.92	8.04
1892.....	25.95	1.23	2.95	3.55	0.51	0.050	0.57	0.23	1.85	7.99
1893.....	25.30	1.45	2.91	3.51	0.22	0.060	0.31	0.22	1.65	7.42
1894.....	22.76	1.59	2.57	3.16	0.32	0.085	0.30	0.18	1.50	7.14
1895.....	23.11	1.05	2.77	3.34	0.42	0.005	0.25	0.17	1.51	6.75
1896.....	21.52	0.91	2.58	3.06	0.37	0.0005	0.21	0.15	1.32	6.02
Jan.-July, } 1897..... }	19.60	....	2.44	2.97	0.20	0.021	0.30	....	....	....

TABLE VI.
NEW YORK CITY.

Death-rates for all Causes, and for Certain Diseases, by Decennial Periods, 1844 to 1893; by Years, 1894, 1895 and 1896, and January-July, 1897:

	ALL CAUSES.	OVER FIVE YEARS OF AGE.	* UNDER FIVE YEARS OF AGE.	‡ MIASMATIC, DIARRHOEAL AND TUBERCULAR DISEASES.
§1844 to 1853.....	33.81	....	....	....
1854 to 1863.....	33.94	....	....	....
†1866 to 1873.....	31.11	17.2	123.3	13.2
1874 to 1883.....	26.87	16.4	104.7	11.8
1884 to 1893.....	25.78	16.8	95.1	9.3
1894.....	22.76	14.7	85.3	7.5
1895.....	23.11	15.1	85.3	7.2
1896.....	21.52	14.5	76.4	6.4
Jan. to July, 1897.....	19.60	13.9	64.8	‡5.4

Table VI. shows the death-rate from all causes and the rate over and under five years of age for the decennial periods since 1866, and for 1894-'95-'96, and the first half of 1897.

* The population under five years of age is computed for each decennial period or year as 11.37 per cent. of the total population, based on the census of April, 1895. In 1880, the percentage of population under five years to total population was 11.63, based on the United States census of that year.

† Eight years only. The Health Department was organized in 1866.

‡ This rate is comparatively too low, as the deaths from diarrhoeal diseases are at a maximum during the third quarter of the year.

§ The general death-rate prior to 1851 is below the actual rate, as the registration of deaths, where burials occurred within the city limits, was not required by law.

|| Miasmatic diseases include: Smallpox, Measles, Scarlet Fever, Typhoid Fever, Typhus Fever, simple and ill-defined and irritative fevers, Diphtheria, Croup and Whooping-cough.

The rates given in the above tables are the crude death rates.

As will be seen, the average death-rate in children under five for 1894, '95 and '96, was 40 or more per 1,000 less than the average rate during the eight-year period ending in 1873, and in 1896 was 47, or 38 per cent. less than for this period. In 1897 there will undoubtedly be a still greater diminution, although the death-rate for children under five for the first six months of the year cannot be taken as the average for the year, as the deaths from diarrhœal diseases are always much lower during the first half of the year.

This table also shows the combined death-rate from miasmatic, diarrhœal and tubercular diseases for these same periods and years, and, as will be noted, there has been a diminution of more than 50 per cent. in the deaths from these diseases.

The search for the causes of diminished mortality from all causes shows that the largest reduction has been in the zymotic death-rate, including diarrhœal diseases of children under five, and there has been also a steady and important decline in the tubercular death-rate since 1886. (Table V.)

Investigation further shows that a special reduction in the mortality from diphtheria and croup, amounting to nearly 40 per cent., has occurred since the introduction of diphtheria anti-toxin with the beginning of 1895. This reduction has taken place in spite of an increase in the number of reported cases of this disease. Up to the beginning of 1895 there had been a steady increase for some years in the mortality from diphtheria and croup, and for the year 1894 the death-rate was higher than that from any other single disease, excepting tuberculosis and pneumonia—pneumonia really including a number of different affections. The combined death-rate from measles, scarlet fever, diphtheria, croup, small-pox and typhoid fever has been reduced almost exactly one-half within ten years, the rate for 1896 for these diseases being 1.64 per 1,000 population, as contrasted with 3.26 for 1887; for 1897 it will apparently be still lower.

The government of the United States is democratic, but the sanitary measures adopted are sometimes autocratic, and the functions performed by sanitary authorities paternal in character. We are prepared, when necessary, to introduce and enforce, and the people are ready to accept, measures which might seem radical and arbitrary, if they were not plainly designed for the

public good, and evidently beneficent in their effects. Even among the most ignorant of our foreign-born population, few or no indications of opposition or resentment are exhibited to the exercise of arbitrary power in sanitary matters. The public press will approve, the people are prepared to support, and the courts sustain, any intelligent procedures which are evidently directed to the preservation of the public health. The belief is never aroused in any class of the population, however ignorant, that the institution or enforcement of any sanitary measure is primarily designed for the restriction of individual freedom. There is nowhere to be found any jealousy or distrust of law or government as such. It is, therefore, possible to adopt measures more arbitrary in many respects than could be adopted in most other countries, simply because our government is democratic.

This gives the key-note to the attitude of the sanitary authorities of New York. The most autocratic powers, capable of the broadest construction, are given to them under the law. Everything which is detrimental to health or dangerous to life, under the freest interpretation, is regarded as coming within the province of the Health Department. So broad is the construction of the law that everything which improperly or unnecessarily interferes with the comfort or enjoyment of life, as well as those things which are, strictly speaking, detrimental to health or dangerous to life, may become the subject of action on the part of the Board of Health. It attempts not only to increase the healthfulness of the city, but also to render it a more enjoyable and comfortable place of residence. In its relation to the medical profession it aims to give every assistance which the latest scientific investigations can place within its power, in the treatment and management of communicable and infectious diseases, while not interfering in any way with the privileges or prerogatives of the medical attendant, unless such interference becomes necessary for the protection of other persons from possible infection. It prescribes specific regulations as to the management of infectious diseases, the violation of which may be followed by the forcible removal of the patient to its hospitals. The public press, quite without reference to its political affiliations, offers a unanimous and most cordial support to the policy of the Board.

The conduct of sanitary matters in New York is restrained by no traditions or precedents. It is determined, from month to month, by what is believed to be for the best good of the inhabitants, in view of the most recent knowledge and the latest developments in scientific medicine.

The limits of this address do not permit, nor is it desirable, that I should touch upon many of the other phases of the work of the Health Department indirectly related to the prevention of disease and the preservation of the public health.

It has been my purpose, as was stated in the introduction, simply to detail some of the features which have more particularly distinguished the work of the New York City Health Department and to describe some of the phases of the sanitary supervision of certain infectious diseases which have been introduced by it.

I believe it may be truly said that there is no great city in the world to-day which, in the broad sense, is cleaner and healthier than New York. By clean is meant the purity of the atmosphere, the cleanliness of the streets, the abundance and purity of the water supply, and the efficiency of the sewerage system. I wish that so much could be said as to the character of the habitations of the poor, the public baths and public convenience stations, the breadth and number of its parks and public commons, and the type of its charitable and penal institutions. In many of these respects New York is deficient; but great and rapid advances have been made and are being made in these matters.

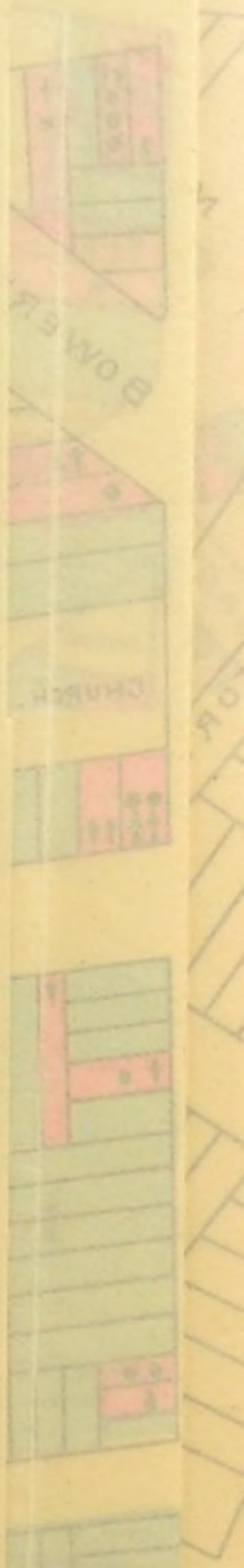
When it is said that no city is healthier than New York, this statement is made with a consideration of all the sanitary factors in the situation, such as the size and density of the population, the varied nationality of the inhabitants, the character of climate, etc.

Nowhere can there be found a fuller recognition than in the United States of England's high standard of excellence in public medicine, or a more sincere appreciation of her vast contributions to the progress of sanitary science. But she must look well to her laurels if her cities are to be kept cleaner than the great cities of the United States and her urban population made

healthier and happier than the same class on this side of the Atlantic.

In the United States we are prepared to adopt, without hesitation the best that England produces, or that the world affords, in public medicine, as well as in science, art and commerce, and notwithstanding the persistent and determined efforts of our sensational press, the sentiments of the medical profession, and of the people at large, toward Greater Britain are those of sincere respect for her institutions, profound admiration for her great achievements and warm affection for her people.

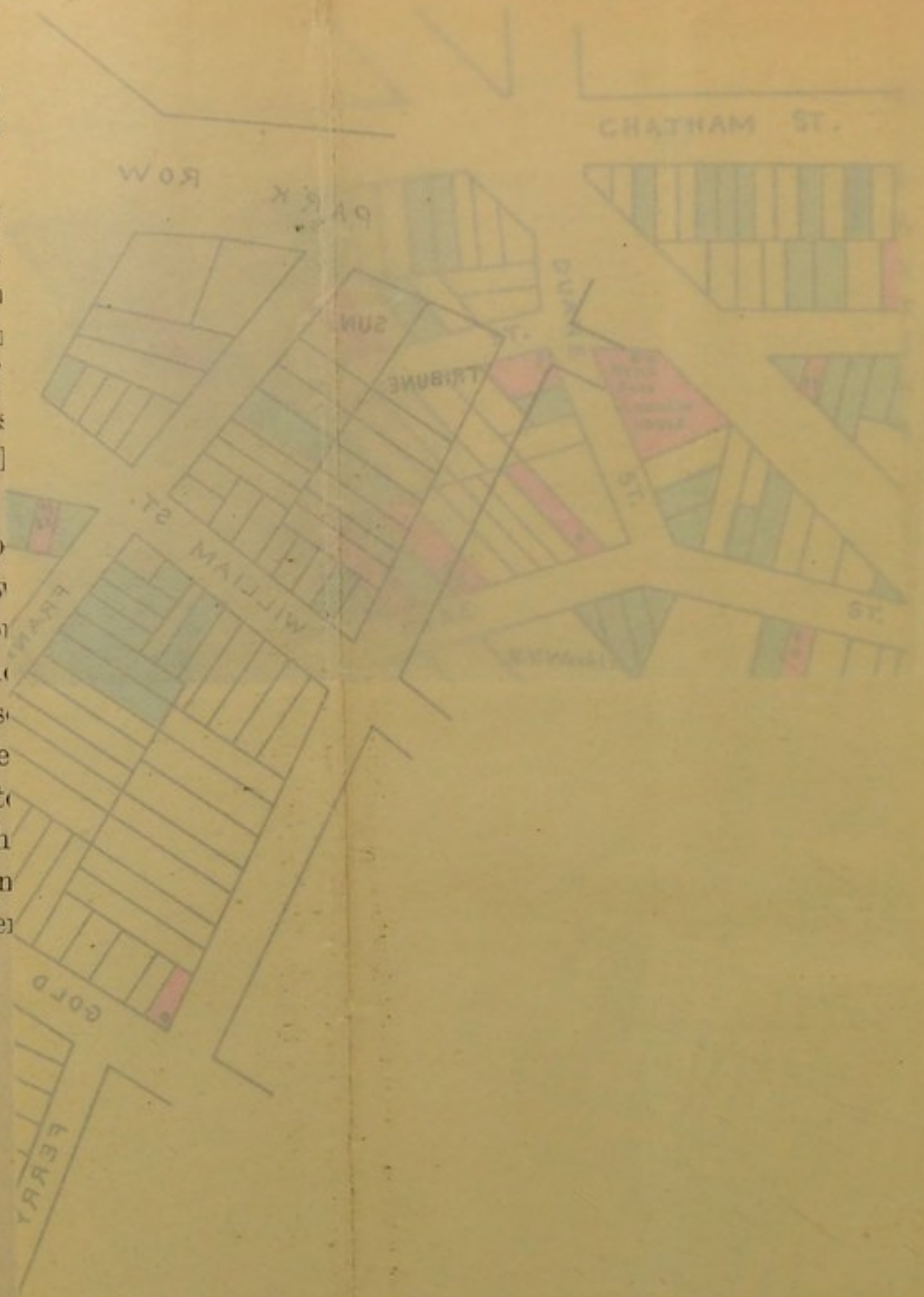
If I have appeared in this address to have dwelt too long upon and described too fully some of the sanitary methods followed in New York I would urge in extenuation my desire that you should know our institutions and methods, as well as we know yours, and that through the medium of this great medical association, the largest and most influential in the world, the two great English-speaking nations might, in this respect, be brought into somewhat closer and more intelligent relations with each other. Thus the science of preventive medicine will be advanced and the people of both nations will live healthier and, therefore, longer and happier lives.



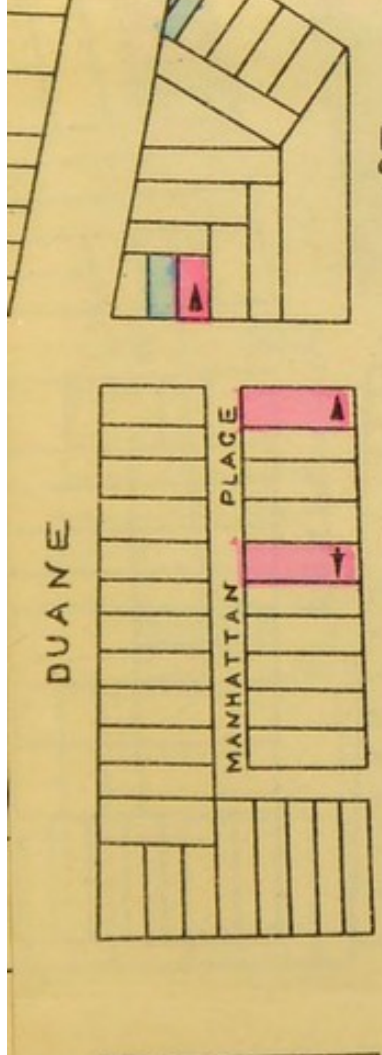
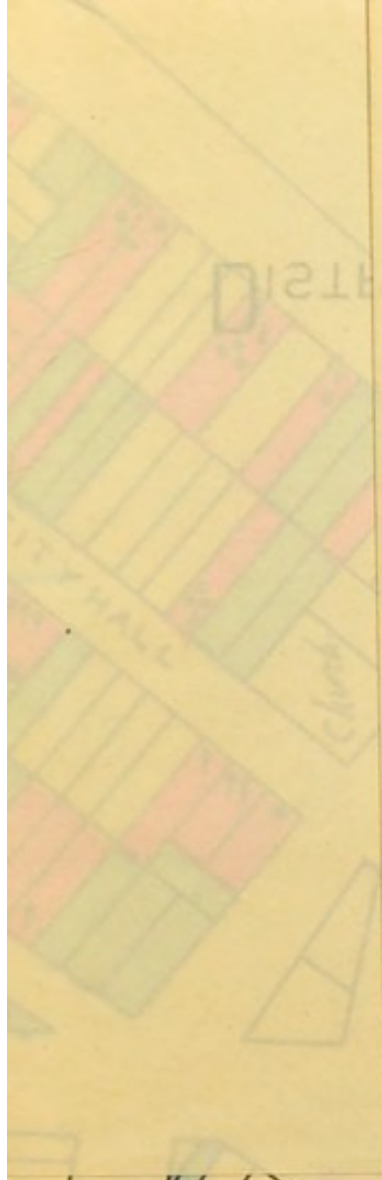
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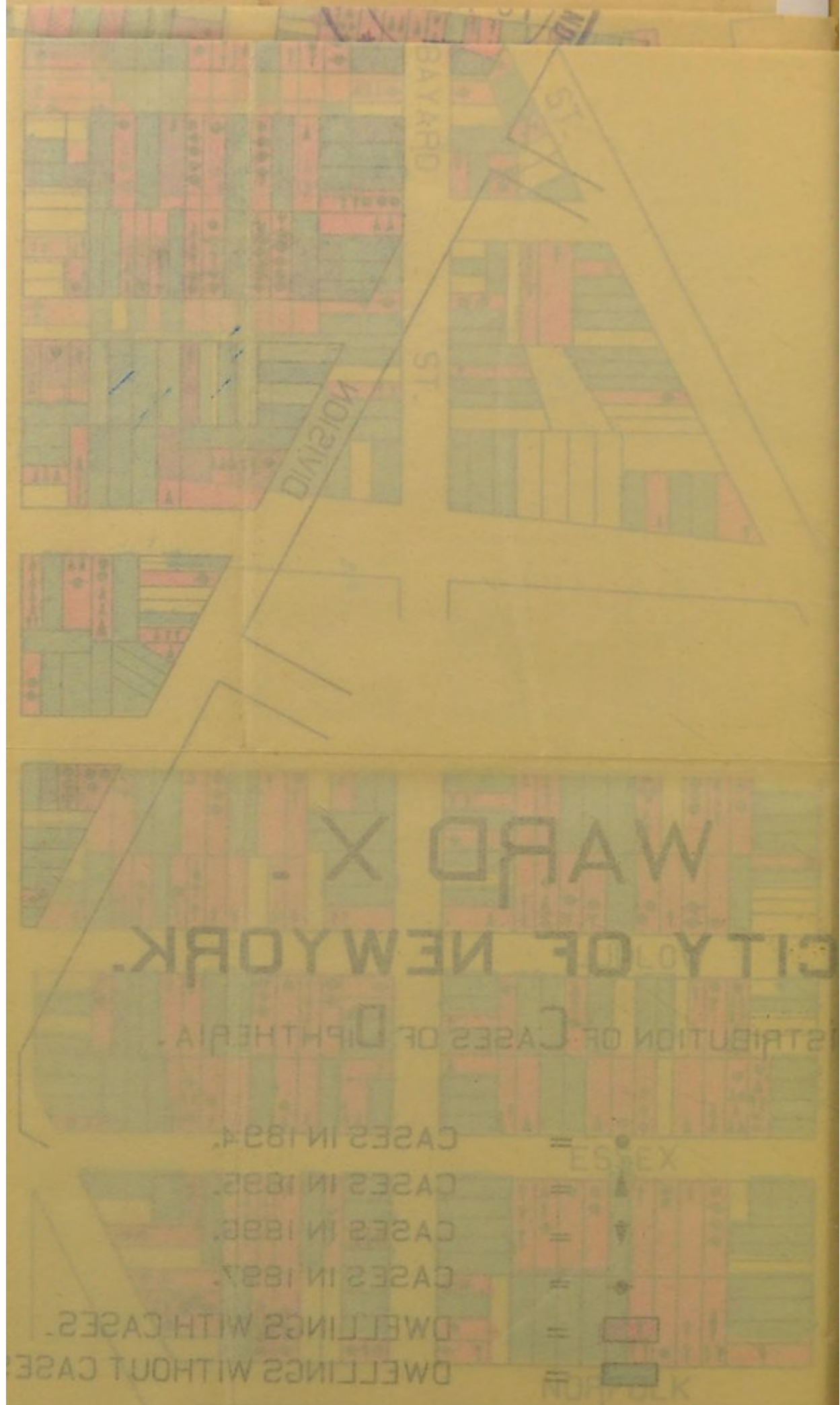
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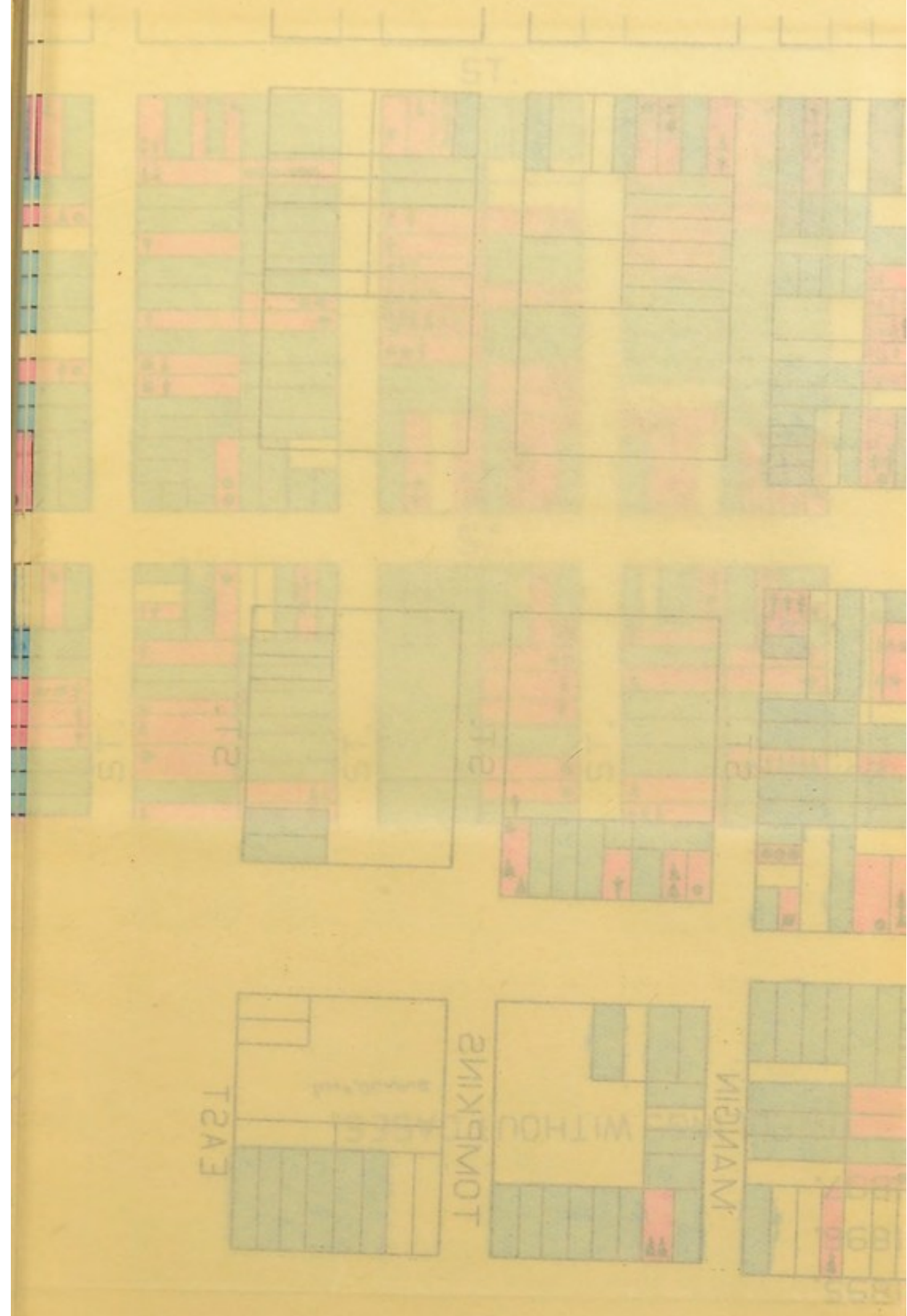
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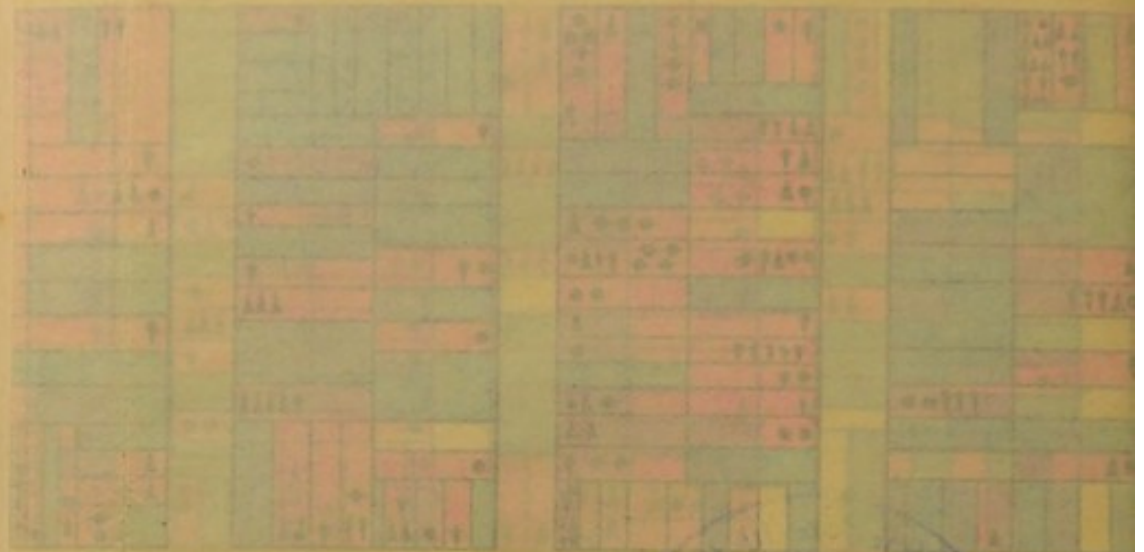
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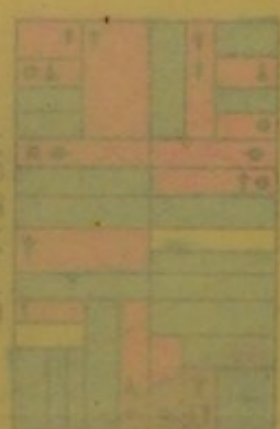
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