

III. PLAN FOR A SANITARY SURVEY OF THE STATE.

We now proceed to give an outline of a plan for the Sanitary Survey of the State which we propose for adoption. In drawing it up we have carefully inquired into the circumstances of many cities and towns in the State, and the sanitary condition of the inhabitants; and have, with no inconsiderable labor, matured a series of measures, which seem to us best adapted, under all the circumstances, as the plan which would be most likely to be practical and useful. In the progress of the inquiry, we have examined many printed works on the subject, and have availed ourselves of the information elicited in correspondence with gentlemen in Europe and in this country, whose knowledge, experience and judgment in these matters are entitled to the highest regard.

In a valuable communication, presented in the appendix, received from the councillors of the Massachusetts Medical Society, a preference is given to the plan of appointing a single individual to make the survey, after the manner of the agricultural, zoölogical, and other scientific surveys, which have heretofore been made by the State. Objections are, however, urged with considerable force against this plan. It is said that to intrust so great and important a work to one mind, however well qualified, would be less likely to receive public confidence and approbation, and hence would be less useful, than if it were the joint production of several minds, or received their joint approval; that if made with the facts at present accessible, although it would afford much valuable information, it might lead to erroneous conclusions; and that it would be merely transient, and not of permanent usefulness.

The English sanitary surveys have generally been the results of the joint labors of several individuals; and nearly all of them, of authority and usefulness, have been based principally upon the facts furnished by the efficient system of registration of births, marriages, and deaths, in operation there. Those which have departed from these facts, or have made a partial selection from them, are more or less mixed up with error.

Health is a variable matter, capable of improvement or deterioration. It may be good in one year, and not in another, and not alike in two places at the same time. No plan can therefore be extensively useful, or permanently valuable, which shall be confined to a single year or a single survey. It should extend over a series of years, and through a series of successive observations and examinations. In this way only can the laws of health and life of any place be accurately ascertained, and a sanitary survey produce all the good that might be attained by it. People are prone to neglect their own and the public health, and this fact is a reason why the subject should be frequently brought to their notice.

Our plan consists of a series of measures, which may be rendered permanent if desired; presented in the form of separate recommendations. They are divided into two classes, and are to be regulated and controlled by the agencies which are proposed to be established; one by the legislative authority of the State, and the municipal authorities of towns and cities, and the other by social organization and personal action. Though intimately connected, these measures are in some respects independent of each other. They are not of equal importance, and it is not expected they will all be immediately made use of; a part only may be adopted at one time, and another part at another time, as circumstances may require. They are here presented together, as necessary to give fullness and unity of design to the whole plan. It is not supposed, however, that they are all the useful sanitary measures which a complete and perfect plan would require. The progress of this inquiry, and the circumstances which it develops in different years,—the discoveries which will be made by the united intellectual efforts that will be brought to bear upon this subject,—will suggest others. Some of these measures are of great magnitude, and would each furnish matter for a volume, if fully explained and illustrated. All we propose to do in this connection is, to name and define each, and to give a brief explanation and illustration of its character and design. These measures, it must be recollected, however, are only a series of plans by which a sanitary survey might be carried forward.

The accompanying information is inserted merely to illustrate these plans.

I. STATE AND MUNICIPAL MEASURES RECOMMENDED.

Under this class of recommendations are to be included such measures as require, for their sanction, regulation and control, the legislative authority of the State, or the municipal authority of cities and towns. They may be called the legal measures,—the *Sanitary Police* of the State, (p. 16.)

I. WE RECOMMEND *that the laws of the State relating to Public Health be thoroughly revised, and that a new and improved act be passed in their stead.*

We suppose that it will be generally conceded that no plan for a sanitary survey of the State, however good or desirable, can be carried into operation, unless established by law. The legislative authority is necessary, to give it efficiency and usefulness. The efforts, both of associations and individuals, have failed in these matters. We have shown that the present health laws of the State are exceedingly imperfect, even for the general object for which they were designed ;—that it is difficult, and perhaps impracticable, to ascertain what precise powers they confer, and what duties they require ;—and that they are not adapted, in any way, to the purposes of a sanitary survey. This must be apparent to any one who may examine them.

There are two remedies for these defects : one to amend the existing laws ; and the other, to combine such amendments as it would be desirable to make with such provisions of the existing laws as it would be desirable to retain, and to present the whole together, in this amended form, as a complete health act, repealing such acts as are inconsistent with its provisions. We prefer the latter remedy. It will be better understood, and more easily carried into practice, by the people. Such legislation has been common, in this State and elsewhere, in relation to this and other matters.

Entertaining these views, we suggest that a general health law should be passed, which should be comprehensive in its design and simple in its provisions,—be adapted to the present circum-

stances of the State, and be so framed that it might be clearly understood and carried into practical operation; and which, while it would answer all the purposes of a general health act, as heretofore understood, would, at the same time, accomplish all the purposes of a sanitary survey.

We have accordingly drawn up, and present in the appendix, a draft of such an act as, in our judgment, it would be expedient to pass, to secure the advantages designed to be attained. It creates a permanent agency, for the regulation and control of all matters relating to the sanitary condition of the State and its inhabitants. It retains such provisions of the existing laws as are deemed worthy of being retained, and incorporates such others as are deemed necessary to form a complete legal sanitary system. It confers no summary powers not now possessed by Boards of Health, but it limits more closely, and defines more clearly, the duties of those by whom these powers are to be exercised. The objects of all the sections of the Revised Statutes now in force are provided for. The first four sections are contained in a more extended form, and provided for by other agencies, in the first 15 sections of the new act; 18 sections,—5, 6, 7, 15, 17, 18, 35 to 42 inclusive, 45, 47, and 48,—in section 16th; 8 sections,—24 to 34 inclusive,—in the 17th; 2 sections,—43 and 44,—in the 18th; 4 sections,—24, 49, 13, and 12,—are inserted with but little modification; 5 sections of the act of 1849, which take the place of 10 and 11 of the Revised Statutes, are inserted, so modified as to apply to towns as well as cities. With these provisions, various other new and important ones are incorporated; and the whole is so arranged as to form a simple but systematic, efficient, and practical plan, adapted to the present condition and wants of the State. The whole act, long as it seems to be, is not so long as the act relating to public health in the Revised Statutes. That contains 49 sections, and this 39 only.¹

¹ The "Act relating to Public Health in the City of New York," passed by the Legislature, April 10, 1850, covers 48 octavo pages, and contains 89 sections and 31 sub-sections; the acts relating to the Board of Health in Philadelphia cover 111 pages; that relating to the public health in England fills a duodecimo volume of 330 pages; that of Liverpool, contains 231 sections, and several sub-sections; that of Edinburgh, 260 sections, or 101 closely printed octavo pages.

II. WE RECOMMEND *that a GENERAL BOARD OF HEALTH be established, which shall be charged with the general execution of the laws of the State, relating to the enumeration, the vital statistics, and the public health of the inhabitants.*

The act establishing the Board of Education was one of the most important acts relating to common schools, ever passed in Massachusetts. That central agency, under the guidance of its late talented secretary, has given to the cause of public education an importance, and to the common schools a standard of elevation and usefulness, not before attained. The cause of Public Health needs a similar central agency, to give to the whole sanitary movement a uniform, wise, efficient, economical and useful direction. If different local authorities, or individuals,—not always possessed of the best means of information,—are left to originate plans for their own guidance, and anything is done, they will be more likely to make unintentional mistakes, and create unnecessary expense, than if wise and able minds were devoted to the subject, and suggested what ought to be done, and the best and most economical mode of doing it. Such an agency would have an exact knowledge of the condition of every city and town in the State, and by these means of information would be able to suggest the measures best adapted to the different circumstances. They would prevent a wasteful expenditure of money in imperfect or inefficient measures. The advantages which would result to the whole State, and to every part of it,—to each and all of the inhabitants,—from the establishment of such a central General Board of Health, composed of the best scientific counsel and the best practical experience which the State can afford, having constant access to the most enlightened intellects, and to a knowledge of the labors of the best practical men in the world, and assisted by at least one mind wholly devoted to the object in view,—are too great to be fully seen at once, and can scarcely be over-stated or over-estimated.

The duties of the Board are pointed out in the fourth section of the act. They are to have the general direction of each census; to superintend the execution of the sanitary laws of the State; to examine and decide upon sanitary questions, sub-

mitted to them by public authorities ; to advise the State as to the sanitary arrangements of public buildings and public institutions ; to give instructions to local Boards of Health, as to their powers and duties ; to suggest local sanitary rules and regulations ; to recommend such measures as they may deem expedient, for the prevention of diseases and the promotion of the public health ; and to report their proceedings annually to the State.

III. WE RECOMMEND *that the Board, as far as practicable, be composed of two physicians, one counsellor at law, one chemist or natural philosopher, one civil engineer, and two persons of other professions or occupations ; all properly qualified for the office by their talents, their education, their experience, and their wisdom.*

The constitution and powers of the Board are prescribed in the first seven sections of the act proposed for its establishment and organization. It is intended that it shall be composed of seven persons, besides the governor and secretary of the Board of Education for the time being. And that the disadvantages of too frequent changes may be avoided, that successive Boards may know the proceedings of their predecessors, and that the outgoings and incomings of new members may not destroy its system and vitality, it is provided that the members shall be appointed for seven years, and go out of office alternately.

The members should not be selected exclusively from one profession, for two reasons:—1. Numerous questions, requiring a knowledge possessed by different professions, will be presented for discussion and decision ; and it is desirable that the Board should be able to bring competent knowledge to the investigation of every subject. And 2. To show to all that the promotion of public health is a matter which does not belong exclusively to the medical profession, but concerns every profession and every person. The idea which too generally prevails, that every thing relating to health belongs exclusively to one profession, operates against sanitary improvement. The services of medical men are indispensable ; but the services of other professions, and of every person in their respective spheres,

must be put in requisition, before reform can be complete. The Board should therefore contain—

1. Two physicians, at least, of scientific attainments, and of extensive practical experience in their profession, thoroughly understanding sanitary science, and deeply feeling the importance of wise sanitary measures.

2. One counsellor at law, who, besides the general knowledge of law and medical jurisprudence which he could bring to the purposes of the Board, might especially be able to investigate any legal question that might arise.

3. One chemist, or natural philosopher. Many questions relating to the influence of the elements on the production or prevention of disease, may require the special investigation of an experienced chemical philosopher, and this important branch of science should be ably represented at the Board.

4. One civil engineer, possessing competent knowledge to determine the best methods of planning and constructing public works, and the best architectural sanitary arrangements of public buildings, workshops, and private dwelling-houses, would be an exceedingly valuable member.

5. Two other persons, of acknowledged intelligence, good judgment, and of practical experience in the common business affairs of life, and capable of investigating and fully understanding the principles of sanitary science, might compose the remainder.

All should make themselves thorough masters of the objects of their appointment ; have sagacity and foresight to perceive the bearing and effect of every measure proposed ; be eminently practical men, wise in deliberation, and judicious in decision. The objects of the Board will be of the greatest importance and interest ; and it should, and undoubtedly will, command, not for its pecuniary emoluments, but for its high respectability, honor, and usefulness, the greatest talent in the Commonwealth, and the services of those who, in an eminent degree, possess the public confidence.¹

¹ Dr. Duchatelet, an eminent member of the Council of Health of Paris, in describing the qualifications of officers of Public Health, says :—" It is generally thought in the world that the medical knowledge acquired in the schools is all that is necessary to become a useful member of the Council of Health. The greater part of medical men themselves share this

IV. WE RECOMMEND that the Board be authorized to appoint some suitable and competent person to be the Secretary of the Board, who should be required to devote his whole time and energies to the discharge of the duties of his office, and be paid a proper salary for his services.

The duties of the Secretary are defined in the eighth section of the proposed act. Besides keeping the records and accounts of the Board, he is to superintend the taking, and prepare the abstracts of each State census; to perform the duties relating to the registration of births, marriages, and deaths, now performed by the Secretary of State; to make special sanitary surveys of places, when directed; to report annually an abstract of the information obtained; to perform such other duties as may be legally imposed upon him; and to diffuse "throughout the Commonwealth information relating to the sanitary condition

opinion; and, on the strength of some precepts which they have collected from books on health and professions, they think themselves sufficiently instructed to decide on the instant the gravest questions, which can only be resolved by special studies. A man may have exhausted medical literature; he may be an excellent practitioner at the sick-bed, a learned physician, a clever and eloquent professor; but all these acquirements, taken in themselves, are nearly useless in a Council like that of Paris. To be really useful in the Council, it is necessary to have an extended knowledge of natural philosophy; to know with exactness the action which trades may have on the health of those who exercise them, and the much more important action of manufactories of every species on men congregated in towns, on animals, and on plants. This knowledge, so important, of the action of manufactories and trades, is not to be acquired by ordinary study, or in the science of the cabinet. It is not to be obtained without positive notions on the arts, and on the greater part of the processes peculiar to each trade. It requires habit, and the frequenting of the places of work. In this particular, more even than with medicine, books are not a substitute for practice. From what has been said, the necessity will be evident to introduce into the Council those physicians who have made health, and particularly the public health, a special study; and to join with them chemists, and, above all, manufacturing chemists, and other professions."—*Chadwick's Sanitary Report*, p. 423.

The *Edinburgh Review* for Jan., 1850, (p. 221,) in an article on Sanitary Reform, holds the following language in relation to the Board of Health in England:—"We believe that some not unnatural jealousy has been felt by the medical profession, as to the constitution of the Board; but we cannot regret the circumstance that its chief operative leader is not a physician. It is very necessary that such a department should have the best scientific counsel and assistance that the country can afford, and the debt which it owes to the recent services of Dr. Southwood Smith, Dr. Sutherland, and other physicians, cannot well be overrated; but, on the other hand, it seems indispensable that an administrative body, coming in contact with constitutional rights and responsibilities, should have another kind of leadership. To balance the heroism and disinterestedness, for which we most willingly give them credit, the medical body have some defects, especially in their jealousies and prejudices. It is difficult to get them to countenance any thing inconsistent with what they have long seen and practised; and they would certainly not be so ready as laymen to give way to the collective wisdom of their own brethren. We firmly believe, in short, that the first physicians in the country will more frankly communicate to such a board as the present, their individual convictions, than to any convocation of their professional brethren; and that the board will more candidly weigh and more cheerfully adopt their views. The value of unprofessional superintendence,—the same class of persons who are to execute arrangements never being entirely the same as those who devise them,—has been evinced in the management of the Admiralty. It has been appositely remarked, that Nelson never would have obtained high command from a board of old admirals. Nor is it uninteresting to remember that, though they have liberally responded to it, the idea of sanitary reform, on the scale which we are now considering, did not originate within the medical profession. And, in truth, the constant direction of the faculties to the cure of actual disease, does not seem likely to leave much observation to devote to the study of its external causes."

of the State and its inhabitants, to the end that the laws of health and life may be better understood, the cause of disease ascertained and removed, the length of human life extended, the vital force and productive power increased, and the greatest amount of physical improvement and of happiness attained and enjoyed."

He should be amply qualified, in all respects, for the office ; know what to do, and how to do it, and what information to obtain, and how to obtain it. He should be thoroughly educated in the science of public health, and the causes and prevention of disease ; and be capable of arranging, analyzing, abstracting, combining, and publishing the facts that may be collected, with proper deductions and conclusions from them, in such form as will be most useful to science, and contribute most to the improvement of practical life. To discharge the duties of such an office in such a manner as they might and ought to be discharged, would, in our judgment, be enough to satisfy the desires of any man who wished to be honored and useful.

V. WE RECOMMEND *that a LOCAL BOARD OF HEALTH be appointed in every city and town, who shall be charged with the particular execution of the laws of the State, and the municipal ordinances and regulations, relating to public health, within their respective jurisdictions.*

The constitution, and the powers and duties of these Boards, are defined and prescribed in the proposed act. They are each to be composed of not less than three nor more than seven persons, besides the mayor and city registrar of cities, (or the city clerk, where there is no city registrar,) and the chairman of the selectmen, and the town clerk, of towns ; and are to be appointed for the same number of years as there are members constituting the Board ; and to go out of office alternately, like the General Board of Health, and for the reasons already given. Any one, however, being duly qualified, may be reappointed. These Boards should be filled by men of similar character to the General Board, and without reference to any peculiar political or religious opinions they may entertain. One or more physicians, educated in sanitary science, should be members of each

Board. Persons of sound judgment and good education, of other professions or occupations, and qualified and fitted for these peculiar duties, might supply the remainder. All should have the public respect and confidence. It is intended that they shall be appointed by the mayor and aldermen of cities, and the selectmen of towns, because this mode would be more likely to secure a better Board, than a nomination and election in general town meeting.

The duties of these Boards are pointed out in the act, and particularly in the sixteenth section; and also in the several recommendations in this report. They will be required, generally, to carry into execution, within their own town, the sanitary laws of the State, and the orders of the General Board of Health; and, as far as possible, to prevent disease, and raise the standard of public health to the highest point.

We have referred (pp. 48-54) to the sanitary laws and customs of this State; and we deem it proper again to refer to the subject, that we may compare them with the measures proposed in this recommendation. The Revised Statutes (p. 208) provide that—

“Every town, respecting which no provision is made, by any special law, for choosing a Board of Health, may, at their annual meeting, or at any other meeting legally warned for the purpose, choose a Board of Health, to consist of not less than three, nor more than nine persons; or they may choose one person to be a health officer; and, in case they shall not choose any Board of Health, or health officer, the selectmen shall be the Board of Health.”

Each of the charters incorporating the nine cities in this State, contain a provision similar to the following:—

“All the power and authority now by law vested in the Board of Health for the town of —, or in the selectmen of said town, shall be transferred to and vested in the city council, to be carried into execution by the appointment of Health Commissioners, or in such other manner as the city council shall deem expedient.”

And the act of May 2, 1849, provides that—

“1. All the powers vested in, and the duties prescribed to,

Boards of Health of towns, by the general laws, shall be vested in, and prescribed to, city councils of cities, in case no special provision to the contrary is made in such laws themselves, or in the special laws applicable to any particular city.

“2. The powers and duties above named may be exercised and carried into effect by city councils, in any manner which they may prescribe, or through the agency of any persons to whom they may delegate the same, notwithstanding a personal exercise of the same, collectively or individually, is prescribed in the instance of towns, as above referred to. And city councils are hereby authorized to constitute either branch, or any committee of their number, whether joint or separate, the Board of Health for all, or for particular purposes, within their own cities.”

In addition to these general provisions of law, some special Boards of Health, as we have already shown, have been incorporated. Under their operation, it is left optional with each city and town to make or not to make ordinances and regulations on the subject of public health. The practice of different cities and towns, in exercising their powers, has been various.

In Boston, the mayor and aldermen are constituted Health Commissioners, and they appoint, annually, a Committee on Internal Health, on External Health, on Streets, on Drains and Sewers, on Water, and on Burial Grounds; each consisting of three members, who examine into all complaints and matters affecting the public health in their respective departments. The city council choose, annually, the following officers:—

1. A *Superintendent of Streets*, to have the general care of sweeping and cleansing the streets, lanes, alleys, public walks, squares, &c., of the city.

2. A *Superintendent of Common Drains and Sewers*, to superintend the location and construction of these important aids to comfort and health.

3. A *Water Board*, to superintend the distribution of the inestimable blessing to health, which is now furnished in all desirable quantities by the Boston Water Works.

4. A *City Physician*, “to examine into all nuisances, sources

of filth, and causes of sickness, which may be on board of any vessel at any wharf within the harbor of Boston, or in any article which may have been landed from any vessel on any wharf or other place, and, under direction of the mayor and aldermen, to cause the same to be removed and destroyed ;"— "to vaccinate all persons who may apply to his office for the purpose, and to give certificates of vaccination, without charge ;"— "to attend upon all cases of disease in the jail," and "within the city, whenever he shall be called upon by the Health Commissioners, or overseers of the poor."

5. A *Port Physician*, to be the physician of the city establishments at Deer Island, and to superintend the quarantine of all vessels and passengers which arrive in the harbor of Boston.

6. Five *Consulting Physicians*, "in case of an alarm of any contagious, infectious, or other dangerous disease, occurring in the city or neighborhood, to give the mayor, or either branch of the city council, all such professional advice and information as they may request, with a view to the prevention of the said disease, and at all convenient times to aid and assist with their counsel and advice in all matters that relate to the preservation of the health of the inhabitants."

7. A *City Registrar*, to record births, marriages, and deaths, and to superintend the interment of the dead.

8. A *City Marshal*, to act as health officer ; "from time to time to pass through the streets, alleys, and courts of the city, to observe nuisances, to receive complaints from the inhabitants," &c.

Each of these departments is independent of the others. The superintendent of streets collects the street dirt and house dirt, deposits it in an outer limit of the city, and sells it as wanted. He also collects the house offal, and delivers it at a given place within the city, to contractors, who remove it without the city, and who paid \$8,000 for it in 1849. The night soil is removed under the direction of the city marshal ; the householders paying \$3.00 per load for its removal in summer, and \$1.50 in winter.

The annual net expenses of all the health departments have been as follows, for the years ending May 1:—

For	In 1847.	In 1848.	In 1849.	In 1850.
Sewerage and Drainage,	\$16,705 68	\$18,532 14	\$25,872 56	\$37,268 11
Internal Health,	53,014 44	67,273 04	68,792 16	88,441 71
External Health,	805 84	1,339 33	1,121 95	3,531 51
Total,	\$70,525 96	\$87,144 51	\$95,786 67	\$129,241 33

The extra expense of \$28,245 87 for the Cholera Hospital, and other precautionary measures on account of the cholera, in 1849, are included in the amount under 1850.

In Salem, Roxbury, Charlestown, and most of the cities, the superintendence of all matters relating to the public health is placed under the city marshals, as health officers, subject to the control of the mayors and aldermen. No Boards of Health or health committees are appointed, and no separate accounts are kept of the expenses incurred.

The towns of Marblehead and Plymouth have Boards of Health under their special acts, though often inactive. Springfield, Danvers, and some other towns, have had health committees for several years. Danvers has published some valuable reports of their committees. But, as far as our knowledge extends, few towns have chosen Boards of Health, or health committees, nor have the selectmen often acted in that capacity. With the exception of a few cities and towns, nothing whatever has been done on the subject. Much good has resulted in Boston and some other places, from their health regulations, but not so much as might and ought to have been effected. The whole plan, where any plan exists, for the sanitary police of the State, is essentially defective. The sanitary laws are inefficient and inoperative. They *allow* something, but *require* little or nothing to be done, and consequently little or nothing is done. Health, if attended to at all, is considered merely a secondary, incidental matter, and not, as it should be, a leading, essential matter. In some towns, when Boards of Health or health committees have been chosen, it has been done in open town meeting, by nominations at large, like fence-viewers, or other unimportant town officers. Such a practice is not likely to

secure competent men. And in places where more consideration is given, persons holding office for one year only are often appointed, who, though worthy in other respects, cannot, from their education and position, be supposed to be qualified to act intelligently on these great matters.

Even in Boston, where so much has been done, and well done, far more might be accomplished, at the same expense, by the plan which we propose, than by the existing regulations. This it would be easy to show, if space were allowed for discussion and illustration.

A permanent Board of Health, having the general superintendence of all sanitary matters, constituted as it might and should be, would supersede the consulting physicians, relieve the over-burdened aldermen of some of their onerous labors, and manage every department with more uniformity, wisdom, economy, and efficiency. The city registrar and mayor would be ex officio members of the Board. Through the former they would have access to the records of every death which takes place, and thus be made acquainted, at all times, with the prevailing diseases, and the public health; and through the latter a constant intercourse might be kept up between the Board and the city government. The annual reports, which such a Board would be required to make, might be made of far more interest and usefulness than any now distributed. They would be annual sanitary surveys of the city, affording suggestions of the highest importance to the welfare and improvement of the citizens.

And what might be done on a large scale in Boston, might be done on a smaller one in all the towns in the State.

VI. WE RECOMMEND *that each local Board of Health appoint a Secretary; and also, if occasion require, a Surveyor and Health Officer.*

The 12th section of the proposed act provides for the appointment, and the 13th, 14th and 15th sections prescribe the duties, of the officers of Boards of Health. Every Board should have a secretary, to keep its records, books and papers, and perform such duties as usually pertain to such an office. A surveyor or engineer would also be useful, especially in cities

and populous villages, to examine into all questions which may require the investigation of such an officer, as prescribed by the act, or for the office of engineer of the General Board, page 113. In many of the small country towns this officer might be dispensed with, though in all he would be useful. Each Board should have an Officer of Health, who should, where practicable, be an intelligent physician, well educated, and especially acquainted with sanitary science, having no peculiar theory to build up or support, as regards different modes of practice for the cure of disease, but conscientiously desirous of doing all within his power to *prevent* disease, and to raise the standard of health within his jurisdiction, by carrying into execution all proper local regulations, and those of the general Board of Health. Some towns may not be able to select such an one, and in such cases, persons of other professions or occupations may be substituted. All officers of local Boards of Health should possess, in as great degree as possible, the qualifications already stated as proper to be possessed by the members and officers of the general Board of Health. (Page 113.) From an examination of the sections of the proposed act to which we have referred, and of the various recommendations and suggestions of this report, officers of local Boards of Health will be able to learn their duties, without a recapitulation in this place.

The 3d and 4th sections of the health laws in the Revised Statutes, authorize Boards of Health to "appoint a physician to the board," and to "establish the salary or other compensation of such physician, and shall regulate all fees and charges of every person, appointed by them in the execution of the health laws and of their own regulations." This is a power greater than is proposed to be conferred by the new act.

VII. WE RECOMMEND *that local Boards of Health endeavor to ascertain, with as much exactness as possible, the circumstances of the cities and towns, and of the inhabitants under their jurisdictions; and that they issue such local sanitary orders and make such regulations as are best adapted to these circumstances.*

The sixteenth section of the proposed act, authorises local Boards of Health to issue orders and make rules and regulations for nineteen purposes. This authority, however, is to be exer-

cised only in certain contingencies, of which they are to be judges. If, in their opinion, the public health suffers ; or if it would be promoted by making such regulations, in regard to either particular, they are bound to make them ; if otherwise they may omit doing it. No regulations inconsistent with the constitution and laws of the State, however, can in any case be made. Any regulation may be modified or annulled, as circumstances may require. Discretion and wisdom, in this as in other matters, will be required in carrying this provision into effect. The powers conferred are not greater than those now possessed under the Revised Statutes, nor in some respects are they so great and summary. The proposed act limits, defines, and restrains existing powers, though it allows them to be extended to some other matters not now specially provided for, which seem to us properly to come under the cognizance of local Boards of Health.

In the appendix, we have given several regulations for local Boards of Health, extracted from many existing codes in our possession ; and from them may be formed and arranged, by modification, alteration, abridgement, and extension, a system adapted to different localities.

VIII. WE RECOMMEND *that local Boards of Health endeavor to carry into effect all their orders and regulations in a conciliatory manner ; and that they resort to compulsory process only when the public good requires it.*

In carrying any public measure into effect the favorable opinion and coöperation of the people is desirable. It can thus be accomplished more easily and more thoroughly. Boards of Health should diffuse information concerning their regulations, and the measures they propose for execution ; and public opinion should be educated and properly influenced in their favor. It would be unwise, in most cases, to enforce any regulation or measure against the general and deliberate wishes of the inhabitants, after such a regulation has been fully and fairly laid before them and comprehended. It sometimes happens, however, that opinions are given from interested motives, or from local or party prejudices, which are not the deliberate, unbiassed sentiments of the people generally. Such opinions

should not be received as guides of public action. Caution and careful examination should be used before executing any measure not generally sanctioned.

Under the operation of sections 19 to 24, of the 21st chapter of the Revised Statutes, the sheriff can, if he chooses, with or without the consent of those interested, appropriate any person's house and any one's provisions and personal services, for the use of the sick. This summary power has existed in this Commonwealth for nearly two hundred years; but, notwithstanding its antiquity, it is deemed proper to modify it in some degree, as in the 21st section of the proposed act. Cases may occur, however, where, in a house or a locality, a nuisance or a disease may exist, which is directly injurious to the health of the neighborhood, and which the owner or occupant, even after persuasion and remonstrance, refuses to remove or abate. In such cases it becomes the *duty* of the Board of Health to interfere. Public safety requires it—human life demands it. And for such cases the authority of this section is very properly given.

IX. WE RECOMMEND that an appropriation be made annually by the State, for the purchase of books for the use of the general Board of Health; and by each city and town for the purchase of books for the use of each local Board of Health.

We have said that a knowledge of what ought to be done, and of the best way of doing it, is an important requisite in the discharge of any duty; and in none is it more important than in matters relating to health. The principles on which the science of public health is founded, the different modes by which those principles have been applied, and the practical experience of those by whom they have been carried forward, are from time to time published, and are accessible to the public. And as a means of enlightened action and judicious economy, an appropriation should be made by the State, and by each city and town, of such a sum as circumstances may render expedient, for the purchase of the most useful and important of these publications for the use of the several Boards of Health. They would aid in the adoption, application and administration of different measures, in different localities; and thus enable us

to avoid the useless and expensive mistakes made by others, and to which we may be liable. The expediency of this measure is too obvious to need discussion. The Board of Health of Philadelphia is the only one in this country, to our knowledge, which has commenced the formation of a Sanitary library. Their excellent example is worthy of imitation by others. Section eleven of the act provides for this matter. In the appendix we have given a list of several works that have come under our own immediate examination, and which we have found to be valuable for such an object.

X. WE RECOMMEND *that each local Board of Health be required to make a written report annually to the town, concerning its sanitary condition during the next preceding year; and to transmit a written or printed copy of the same to the General Board of Health.*

The cause of education is not of greater importance than the cause of public health; and what has been done for the former may very properly be done for the latter. It is now twenty years since one of this Commission, being then a member of the school committee of the town of Concord, prepared and published a new code of school regulations for that town. Among other matters it was provided that bound blank books for school registers for each school district, prepared under such form as he prescribed, should be furnished by the general school committee to the several teachers at the commencement, and returned at the end of the successive school terms; and that the committee should make written reports to the town at the annual meeting, concerning the schools, under their superintendence, during the next preceding year. The first written report was prepared, presented, and published by him in 1831. This regulation *was original with him*; and as far as his knowledge extends, *this was the first annual school report of that description ever presented in a public town meeting in Massachusetts.* Subsequently this regulation was introduced into Cambridge, Northborough and other places; and it operated so well that, at his suggestion, while a member of the legislature, the law of April 13th, 1838, relating to this subject, was matured and passed. And it may with perfect truth be said that no one

measure, aside from the establishment of the Board of Education, has done so much good.

What has done so much for education may do as much for public health. The annual school reports have made education a subject of abiding interest among the people, prevented ignorance and saved the intellectual character of the State. The sanitary reports would bring matters of no less importance before the people of every town; make public and personal health a subject of no less abiding interest; and thus tend to prevent disease and physical suffering, and save life. They would be annual lessons on sanitary science, localized and reduced to practice in the known experience or observation of the citizens.

The materials for the composition of these reports will of course vary in different places and in different years. Concerning large towns and epidemic seasons, more may, with propriety, be said than concerning small towns and healthy seasons. But to the Boards of Health of every town, in every year, a sufficient number of topics will be suggested for a report, which might be so drawn as to be made interesting and valuable. The births, marriages and deaths; the different diseases and causes of the deaths, and the external circumstances under which they occurred; the amount and kind of sickness suffered among different occupations, and in the public schools; a description of localities where diseases have been most prevalent; facts which develop the causes of disease; means suggested for their prevention; and the various subjects mentioned in this report, and especially in the circular in the appendix, relating to a sanitary survey, or developed in the practical discharge of duties, will furnish to Boards of Health ample materials and facts for discussion. We have inserted in the appendix reports which might have been made in two towns for the last year, to illustrate our ideas of what such reports might contain.

A copy of the reports from every town in the State is to be transmitted to the General Board of Health to furnish materials for their annual reports. In this way a sanitary survey of the State would be made and published every year, imparting information of the utmost importance.

XI. WE RECOMMEND *that the sanitary and other reports and statements of the affairs of cities and towns which may be printed should be in octavo form, on paper and page of uniform size, (similar to the public documents of the State,) and designed to be bound together, as THE ANNUAL REPORTS OF THE TOWN; and that five copies be preserved by the Board of Health, one copy be furnished to the General Board of Health, one to the State Library, and that others be given to Boards of Health elsewhere in exchange for their publications.*

The system of exchanges of public documents and works, was introduced into this State, by a member of this commission, by a resolution which passed the Legislature, April 23, 1838. This was some years before Mr. Vattemare was known in this country as its promoter. Though much less has been accomplished in carrying out the provisions of that resolve, than might have been done, yet considerable benefit has already resulted from the measure. A uniform collection of all the printed documents of a city or town, bound and preserved; and in addition a collection of similar works of other towns and public bodies, would constitute an exceedingly valuable fund of the recorded experience of the age; and could not fail of being of great use to all interested. We have accordingly provided for it in section eleven.

The city of Baltimore requires reports from all the departments of the government and city institutions, to be made annually in January; and these reports are published together, in a volume, forming an exceedingly valuable depository of official papers, showing the history and progress of the city. A similar practice, embracing a part only of the city institutions, prevails in Salem, Lowell, Cambridge, and in some other places, in our own State. It should be generally adopted by all municipal corporations, any of whose documents are printed.

XII. WE RECOMMEND *that the successive enumerations of the inhabitants of the State be so made, abstracted, and published, that the most useful and desirable information concerning the population may be ascertained.*

Several important purposes are attained in an accurate enumeration or census of the inhabitants. The constitution of the

United States and of this State both require such enumerations to be made, as the basis on which the number of representatives to the national and state legislatures shall be determined. This is a *political* purpose. The character of man, as a social being, is modified by the circumstances of his existence, and varies as these circumstances vary in their development in different places and at different periods; and it is desirable for a social and *scientific* purpose that such characteristics may be ascertained as will exhibit these varieties or differences. *An exact knowledge, too, of the living inhabitants in a given locality, is the first, and an essential element, for estimating their sanitary condition.* This is the third most important purpose.

It should be the main design of every census, taken for a scientific or sanitary purpose, to ascertain some positive facts, concerning the then existing persons enumerated, which may be compared with other similar facts, as a common standard, or together, to show the characteristics of different populations. Two censuses, one containing a class of facts as to ages or other circumstances, and another, a different class, cannot be so compared together, and hence are nearly useless. The value of the six different enumerations of the inhabitants of the United States, would have been much greater than they are, if all of them, both of the free and slave population, had been made and abstracted upon a well digested and the same uniform plan. As they are, they contain but a few classes of facts which admit of comparison with each other. It is well to consider, before taking a census, what facts or characteristics are most desirable and important; and, when determined upon, the same facts should be obtained in every subsequent census.

To fulfil all the political requirements of the constitution of the United States, and of this State, an enumeration of the whole number of the inhabitants, merely, without any particulars except a statement of the free and slave population separately, and "excluding Indians not taxed," is all that is required. But the scientific and sanitary inquirers are not satisfied with such an enumeration. They desire to know something more than the mere numbers of the people. They know that the social character and elevation, and the sanitary welfare

of the population, depend upon various other characteristics, not possessed by all populations alike, or in the same degree; and that these cannot be ascertained by the number alone.

What then are the characteristics of a population, which it is desirable and important should be known, and which admit of positive ascertainment? In our judgment, the following classes of facts are desirable in every census :¹—

1. *Color and Freedom.* Three classes of persons exist in this country,—the whites, the colored, and the Indians; and of the colored there are two sub-classes—the free and the slave. The political rights, possessed by each of these classes, differ in different states; and it has been supposed that they are not all affected alike by the same sanitary influences. The numbers possessing each of these characteristics should therefore be ascertained both for political and sanitary purposes.

2. *Sex* is another characteristic universally acknowledged as important, and the numbers of each should be carefully obtained.

3. The *Ages* of the population are characteristics, interesting and important in many respects, and indispensably necessary in all sanitary inquiries. Without them a census is comparatively useless. They should be ascertained by the enumerator with as much exactness as possible; and afterwards so abstracted that uniform comparisons may be made between the populations of the same ages living in different places, at different periods, and under different circumstances; and with the dead.

4. The *Domestic Condition*, or the number of unmarried, married, and widowed, is an interesting characteristic, which

¹ The purposes of this report will not admit of so full an explanation and illustration of these several classes of facts, nor of the plan of obtaining them and of making the abstracts for publication, as may be necessary to make them clearly understood. Those who desire further information on the subject, are referred to a Report on the State Census of Massachusetts, (House document No. 127, for 1849); to the Instructions issued for taking the seventh census of the United States; to the Report on the Census and Statistics of Boston for 1845; to an article in the Journal of the Statistical Society of London, on the Best Mode of taking the Census of the United Kingdom for 1841, Vol. III, p. 72, for April, 1840; to the three volumes of Abstracts of that Census, published under the titles of the Enumeration Abstract, Occupation Abstract, and Age Abstract; to the admirable but voluminous Report of the Commissioners for taking the Census of Ireland for 1841; to the series of Reports of the Registrar General of births, deaths and marriages in England, and especially to the Appendices to the Ninth Annual Report, and to the "Recensement Général"—the General Census of Belgium for 1846,—a work admirably executed, under the Central Statistical Commission, of which M. Quetelet is President. These works contain the results of the more recent experience, and should be carefully studied by all who may have the superintendence of the census.

has been ascertained in the censuses made by nearly all the governments of Europe, and should be known for its important social and sanitary influence.

5. The *Occupations* of the people have an influence upon their character and health. The facts should be obtained, at least, in relation to all males over fifteen years of age, and engaged in the principal professions and occupations.

6. The *Place of Birth* should be known, so far as to specify separately those born in the town or city where they reside, (to show the sanitary influence of locality) those born in the different States of the United States, and those born without the United States.

7. *Education* has an influence upon the sanitary condition of the people; and some facts regarding it should be known concerning all persons over 20 years of age. An answer to the question, "Can you read and write?"—will afford a simple and definite fact, and may be obtained concerning every person.

8. *House Accommodation* is quite important. The number of persons to a family, and the number of families and persons to a house, and the extent of their accommodations, should be known. Life and health are often affected by over-crowded dwellings.

9. *Means of Subsistence* and *Comfort* also have an influence upon the sanitary condition of a people. A simple but definite, certain and important fact, as to this characteristic, might be determined by the number of "owners of real estate," (not "the value of real estate owned," which is indefinite and uncertain as applied to individual inquiry.) A comparison of the proportion of this number or class of persons with the whole population of different places and at different periods, would exhibit interesting results.

10. *Health*. Useful information concerning four special diseases,—blindness, deafness, insanity and idiocy,—has been ascertained in the last two censuses. The number of persons thus afflicted, as well as the number of paupers and criminals, should be known.

Two plans have been devised for obtaining the facts in a census.

1. By *abstract inquiry*; and by the use of a blank tabular form of a schedule, containing headings, under which are to be entered the different classes of facts, and in such form, as they are intended to appear in the final printed abstract. They are elicited by the inquiry,—How many are in this class, and in this, and so on, naming each class. It is obvious that even by this plan, *if accuracy is intended*, the characteristics of every person and of every elementary fact, so far as relates to all the particulars required by the schedule, must first be obtained separately; and afterwards, though, at the same time, they must be analyzed, abstracted and combined, and entered under the respective heads to which they belong. By this complication of the matter errors are likely to occur, and cannot easily be avoided. This plan may answer for guesses, or estimates, but affords no check against over-estimates or imperfections, nor is it any test of accuracy; and besides, such a plan admits of no other combination or abstract of the facts than the one pointed out in the schedule.

2. By *individual or elementary inquiry*; and by the use of a blank schedule, in which the name of every person enumerated is to be entered; and opposite the name, under separate headings, such facts, descriptive or characteristic of each, as are designed to be ascertained. These may be more or less extended at pleasure. By this plan, the single object of obtaining the elementary facts of the census, in the most simple, correct and positive manner, without complicating the labor at the time with any combination or abstract, is all that is attempted by the enumerator. The abstracts for publication are made in a different form by another agency. It is obvious that by this plan errors will be much less likely to occur, and may be more easily corrected at the time if they should happen, than by the plan of abstract inquiry. Taking the name of every person will be a guarantee that no more will be returned than actually exist. And the *same* facts may be *accurately* obtained, more easily, rapidly, and economically. And besides, the facts thus obtained may be abstracted and combined in very many different ways, to show a much greater variety of interesting and important results.

The first is the plan hitherto adopted in the censuses of the United States. The second, however, is now regarded by all correct statisticians, who have carefully examined the two plans, as very much the best, and as the only one which will ensure accuracy. It was first introduced into this country in the census of Boston, in 1845; and, since then, that example has been commended and followed by other cities. A modification of the plan, designed for general application, was prepared, at the special request of the Census Board at Washington, and has been adopted, though not without some deviations, for the seventh census of the United States, to be taken this year.¹

The schedule recommended, relating to the free inhabitants, contained the following headings:—

1	2	3	4			5		6	7	8	9	10	11		12	13	14	15
Dwelling-houses, numbered in the order of visitation.	Families, numbered in the order of visitation.	Name of every person whose usual place of abode, on the first day of July, 1860, was in this family.	Description.			Domestic condition.		Profession, occupation, or trade, of each male person over fifteen years of age.	Owners of real estate.	Place of birth.		At school during last year.	Persons over twenty years of age who cannot read and write.	Whether deaf and dumb, blind, insane, idiotic, a pauper, or a convict.				
			Age.	Sex.	Color.	Married.	Widowed.			Born in the town, where each resides.	In what other states, territories or countries born.							
					White, black, or mulatto.													

These schedules are designed to contain complete *Registers of the Population*. Three sets, or copies, are to be made; one of which is to be deposited in the office of the court of the county, and one in the office of the secretary of the state, to which they relate; and the other is to be forwarded to the Secretary of the Interior, at Washington. Under his superintendence, or that of some person whom he shall appoint, these

¹ The design of the schedule should be to obtain some positive, existing, known characteristics of the population, at the time of the enumeration. Whether "married within the year" is a historical inquiry, and the "value of real estate owned" a collateral one, which destroys the unity of the design.

schedules are to be arranged. They are not to be published, nor are they to be considered as models for publication; but they are to serve the simple purpose of containing a comprehensive mass of useful elementary facts concerning the people. These facts are to be classified, abstracted, and published, in such form, to such extent, and with such deductions, as shall be deemed useful and proper. An excellent plan for the abstracts, as to the ages, for general or sanitary purposes, is furnished in the example, (p. 34,) taken from the English census. The ages of the population of every county in the United States, and of every town in this State, should be abstracted in this way. Every census should be made under the superintendence of intelligent, competent persons, familiar with statistical science, and especially with that part of it which relates to human life,—its reproduction, its continuance, and its extinction. The value of the results will greatly depend upon the degree of intelligence applied to their production. The plan we recommend is not an exception to this general rule. Like others, it must have intelligence to carry it into successful execution; but, if so executed, it will secure a far more complete and perfect census than any hitherto taken. A competent central commission, at Washington, with power to appoint subordinate commissions in each state, has heretofore been recommended for the national census. For our State enumerations, we have proposed that they shall be made under the direction of the General Board of Health. The plan above recommended might be fully carried out by them, and as complete and as accurate a State census as can be desired, might thus be obtained. The same agency that abstracts and publishes information concerning the dead, should make and publish information concerning the living. The abstracts should be made on a uniform plan, so as to be easily compared together.

Every local Board of Health should have, for their own use, a manuscript Register of the Population of their own city or town, as proposed, with an index for reference to each family. It would be of great service in the various sanitary matters which might come before them.

Enumerations of parts of the population, for a special purpose, are often made. The number of children between certain ages is required to be known every year, as a basis for the division of the income of school funds, in different states. In a letter contained in the appendix to the fourth Registration Report, the writer said :—“ The *educational age*, as fixed by the laws of Massachusetts, is 4 to 16. It seems to me, however, that this specific classification is injudicious, and that 5 to 15 would be better. The latter points or ages are universally adopted by nations, as important in the divisions of the population, and in the statistics of the dead ; and there are many reasons why the educational age should be within these points. It would be less labor to make the enumeration ; and, from examinations which have been made, it appears that the ages of children attending school more nearly correspond to them. Comparisons could be more readily made with the ordinary divisions of the population. I agree in opinion with a recent eminent writer, in thinking, in its application to schools, that ‘ hereafter 15 will be the age at which, in any census, it will be considered that, in the mass of the community, occupation begins, and education ends.’ ” In 1849, this hint was matured into a law ; and 5 to 15 is *now* the legal Educational Age in Massachusetts.

XIII. WE RECOMMEND *that the Constitution of the State be so altered, that the State Census shall be taken in 1855, and at the end of every subsequent period of ten years.*

The constitution of this State, as amended in 1839, [Chap. I, Sect. 2, Art. 1, and Sect. 3, Art. 2,] provides that “ a census of the inhabitants of each city and town, on the first day of May, shall be taken and returned into the office of the Secretary of the Commonwealth, on or before the last day of June, of the year one thousand eight hundred and forty, and of every tenth year thereafter, which census shall determine the apportionment of senators and representatives for the term of ten years.”¹

The constitution of the United States originally provided [Art. I, Sect. II,] that “ the actual enumeration [of the inhab-

¹ Rules and Orders of the House of Representatives, pp. 68, 100, 105.

itants] shall be made within three years after the first meeting of the Congress, and within every subsequent period of ten years, in such manner as they shall by law direct," for the purpose of determining the number of representatives which each state shall be entitled to send to Congress. And by the act of March 1, 1790, the first enumeration of the inhabitants of the United States was made that year. New acts have been passed, ordering new censuses every ten years, since that time. The seventh national census is to be taken this year, (1850.)

By the operation of these two constitutions, two enumerations of the inhabitants of this State were taken in 1840, are to be taken this year, and will continue to be taken at the end of each succeeding period of ten years, so long as neither of these constitutions remain unaltered. Two enumerations of the inhabitants of a place, made in the same year by different authorities, are not only inexpedient, but may be of positive inconvenience. If they should be essentially different, as was the case in some places at the last census, a doubt might be thrown over the authenticity of both, and neither taken as correct. Besides, two, if equally correct, would afford no information that one might not give. If one were taken in the intervening period, both would be of great value. Besides affording the means of showing the growth of different places, they would enable us to make much more accurate sanitary comparisons and deductions. The whole matter, too, being under the control of the State, such a plan might be adopted and successfully carried out, as would secure the best and most useful results, as suggested in the last recommendation. This period might also be used for the ascertainment of other statistics, beside such as relate to the population.

The words "in the year one thousand eight hundred and forty" occur three times in Sect. 2, Art. 1, and twice in Sect. 3, Art. 2; and the proposed amendment would require merely that the words *fifty-five* be substituted for the word *forty* in these five instances. It is worthy of consideration, however, whether the time for taking the census should not be the 1st day of July,—the middle of the year,—instead of the 1st day of May.

We are opposed to frequent alterations of the constitution of the State ; but what we now recommend affects no principle. Its expediency and utility are so obvious, that it must commend itself to general approbation. The constitution of New York provides for a state census at the same period here proposed.

To avoid the expense and inconvenience of two enumerations, an arrangement has been proposed that the United States should unite with the State, and take one census only. But this has not been effected, because the United States could not with propriety delegate an authority to one state, to return a basis of representation, which it did not to another.

XIV. WE RECOMMEND *that the laws relating to the public registration of births, marriages, and deaths, be perfected and carried into effect in every city and town of the State.*

We have already said that an accurate knowledge of the living inhabitants of a place forms the first element for estimating its sanitary condition. An exact knowledge of the births, marriages, and deaths, forms the second essential element. Without both of these elements, we cannot determine, with any considerable degree of accuracy, whether the public health at one place is better than at another, or whether at the same place it is better at one time than at another. By them we can determine both of these propositions.¹

A new act relating to registration was passed on the 3d of May, 1849, and instructions have been prepared for carrying it into effect, and issued by the Secretary of State. The law is

¹ The following extract from the Quarterly Return of the Registrar-General in England, for April, 1850, shows some of the purposes to which this information may be applied:—“While the returns of the exports, imports, and revenue, furnish good indications of the production, consumption, and commerce of great classes in the country, the marriages, births, and deaths supply a surer test of the condition of the whole population. It is gratifying to find that the general results of both classes of returns are favorable. The marriages, which in 1847 were so much depressed, and increased almost imperceptibly in 1848, rose to 141,599 in the year 1849; and in the autumn quarter were 43,632; which is a higher number than has ever before been celebrated, excepting in the autumn quarter of 1845. The deaths have also declined; they were 98,607. The country, which, after the failure of the potato crop in 1846, was covered with funerals,—in the train of a multitude of diseases, and of two great epidemics, the fatal influenza of 1847-8, and the more deadly cholera of 1849,—is now in health again. The deaths in the first quarter of 1850 were less by 21,065 and 21,414 than the deaths in the corresponding quarters of 1847 and 1848. Fewer children have been left fatherless, fewer parents have been bereaved of their children. Sickness and suffering,—though perhaps not precisely in the same ratio as the mortality,—have diminished. The skilful and active industry of the kingdom has been less interrupted by the illness of workmen and the incapacity of masters; the parishes have had fewer poor to relieve; the friendly societies fewer sick members to support; insurance societies less to pay on policies; everything dependent on the duration of human life has been relieved of pressure; the minds of the people have not been irritated by hunger, fever, and discontent.”

becoming more and more popular; and, if superintended by an efficient State agency, and faithfully carried into operation by the local authorities of all the towns, it may secure the many important benefits designed by its passage. The headings of the registry books now in use are as follows:—

<i>Births in</i>						<i>Registrar.</i>						
No.	Date of birth.	Name, (if any.)	Sex and condition.	Place of birth.	Names of parents.	[BACK OF THE BOOK.]	Residence of parents.	Occupation of father.	Place of birth of father.	Place of birth of mother.	Informant.	When registered.
1	2	3	4	5	6		7	8	9	10	11	12

<i>Marriages solemnized in</i>							<i>, County of</i>		<i>Registrar.</i>		
No.	Date of marriage.	Names and surnames of groom and bride.	Residence of each at the time of marriage.	Age of each.	Occupation of groom.	Place of birth of each.	[BACK OF THE BOOK.]	Names of parents.	What marriage—whether 1st, 2d, 3d, &c.	Name and official station of the person by whom married.	Date of register.
1	2	3	4	5	6	7		8	9	10	11

<i>Deaths in</i>							<i>Registrar.</i>							
No.	Date of death.	Name and surname of the deceased.	Age Years. } Months. } Days. }		Place of death.	Sex and condition.	Occupation.	[BACK OF THE BOOK.]	Place of birth.	Names of parents.	Disease, or cause of death.	Place of interment.	Informant, or undertaker.	When registered.
1	2	3	4	5	6	7		8	9	10	11	12	13	

The returns to the Secretary of State contain all the information in the books of records, excepting columns 11 and 12.

relating to births ; 10 and 11, relating to marriages ; and 12 and 13, relating to deaths. These returns are printed on paper of uniform size,—18 inches square,—and are designed to be bound into annual volumes. These volumes are thus easily accessible, and afford the means of investigating the operation of any diseases which prevail in the State, as well as the personal history of individuals.

A few important improvements should be made in the administration and execution of the law ; and the local Boards of Health are authorized to make any regulations they may deem expedient for this purpose. Efforts should constantly be made to obtain the records of the events *at or near the time at which they take place*. When delayed to the end of the year, or even for a much shorter period,—owing to the frequent changes in the residences of our people, and to other causes,—mistakes and omissions are inevitable.¹

The facts as to *births* might be obtained, by the clerks and registrars by their own personal agency, or by making proper arrangements with physicians, or by district officers of the town, or by requiring the parent or person interested to make the return within a fixed period, under penalty.

As to *deaths*, by the appointment of competent undertakers, and by requiring them to obtain and record, in each case, all the information desired, *before the burial*. The certificates of the causes of death should always be obtained, when practicable, from the attending physician ; and we have no doubt that few instances would occur in which they would be refused, upon request. The English physicians, says a recent medical writer of the highest authority, “have daily and hourly written out the causes of death, bringing the whole knowledge of the profession to bear upon this single point, as unpaid services. In the aggregate, this labor has been enormous, but it has been given, freely rendered, by the profession, to the government, without fee or reward. It may seem a plain, unconsequential

¹ We are convinced, after repeated attempts, that it is impossible to obtain accurate accounts of *past, unrecorded events*, concerning either the living or the dead. Hitherto, every trial to obtain the number of births, marriages, and deaths, a year or more after they happened, has been a failure. This conviction has been expressed in relation to the national census this year. A strong desire, however, existed in the Census Board, that measures should be provided for obtaining the information ; and a separate schedule in relation to deaths was prepared, at their request, for the purpose.

matter, this gratuitous return of the causes of death, but it makes up a bulk of unpaid service to the state, such as can be presented by no other body or profession in the empire.”¹

As to *marriages*, it is difficult to perceive a reason for going out of the State to be married, or for neglecting to have the marriage recorded, unless the parties are ashamed of the connection formed, or misapprehend the importance of the record to themselves personally, or to the public.

A new act relating to the publication of intentions of marriage was passed, March 28, 1850, which removes many of the salutary checks imposed by previous laws. Under this act, the parties, by entering their intentions in the office of the clerk, have permission to marry immediately, without the fourteen days' publishment heretofore required. Very properly, however, it does not supersede the necessity of entering the particulars concerning the parties, now required by law; and it imposes a penalty upon any one who does not give such information, whether married in the town or State, or not.²

¹ This duty is required by law in some places, under heavy penalties. The act in relation to public health in the city of New York, passed this year, has the following provisions:—

“SECT. 10. It shall be the duty of each and every practising physician in the city of New York,

“1. Whenever required by the Board of Health, or the Mayor and the Commissioners of Health of said city, to report to the City Inspector of said city, at such times, in such forms as said Board may prescribe, the number of persons attacked with any pestilential, contagious, or infectious disease, attended by such physician for the twenty-four hours next preceding, and the number of persons, attended by such physician, who shall have died in said city during the twenty-four hours next preceding such report, of any such pestilential, contagious, or infectious disease.

“2. To report in writing to the City Inspector, the Board of Health, or to the Mayor and the Commissioners of Health, every patient he shall have laboring under any pestilential, contagious, or infectious disease, and within twenty-four hours after he shall ascertain or suspect the nature of the disease.

“3. To report to the City Inspector, when required by the Board of Health, the death of any of his patients who shall have died of disease, within twenty-four hours thereafter such death shall have occurred, and to state in such report the specific name and type of such disease.”

“SECT. 27. Every practising physician who shall refuse or neglect to perform the duties enjoined on him by the tenth section of this title, shall be considered guilty of a misdemeanor, and shall also forfeit for each offence the sum of two hundred and fifty dollars, to be sued for and recovered by the Board of Health.”

² The following are the provisions of this act:—

SECT. 1. All persons intending to be joined in marriage, shall cause notice of their intentions to be entered before their marriage, in the office of the clerk, registrar, or other officer appointed for such purpose, of the city or town in which they may respectively dwell, (if within the State,) and if there be no such clerk in the place of their residence, the like entry shall be made with the clerk of an adjoining town.

SECT. 2. The clerk shall deliver to the parties a certificate under his hand, specifying the time when notice of the intention of marriage was entered with him, which certificate shall be delivered to the minister or magistrate in whose presence the marriage is to be contracted, before he shall proceed to solemnize the same.

SECT. 3. Whenever parties living in this Commonwealth shall go out of it for the purpose of having a marriage solemnized between them in another State, and a marriage shall be so solemnized, and they shall return to dwell here, they are hereby required to file a certificate or declaration of their marriage, including the facts concerning marriages now re-

Death affects the human race nearly according to a uniform law, modified in its operation only by exchange of circumstances; but it does not affect different ages alike, even if all other circumstances are the same. At some ages persons are much more liable to death than at others. Some, however, suppose that, in a school composed of youth, or in a manufactory composed of operatives of more advanced life, or in a prison or in the army, filled with persons in middle life, if the living to one death, or the average age at death, are the same as the whole population of the town or place where located, then their health would be the same; and if it differed, it would indicate a different degree of health. But it is not so. These are select lives, and they are governed by the laws of *their age* only, and not by those applicable to the whole population of the town, composed of persons of all ages. This matter is so little understood, and so many mistakes are made, even by eminent statisticians, that it should be clearly illustrated.

On returning to the table already given on page 35, the law of mortality is given for the whole of England, and for Surrey, one of the most healthy, and for Liverpool, one of the most unhealthy districts of England. Now let us suppose the existence of three communities, A, B, and C, each containing 1,000 persons, but differently constituted as to ages. In A there are 200 families, containing 100 persons between the ages of 30 and 40 years, 300 between the ages of 20 and 30; and each of these families contain, on the average, 3 children under 5 years of age. In B there are several boarding-schools, in the families connected with which there are 100 persons between 20 and 30 years, 300 scholars and other persons between 15 and 20, and 600 between 10 and 15. And in C, composed principally of elderly persons, there are 100 persons between 40 and 50 years, 300 between 50 and 60, 400 between 60 and

quired by law, with the clerk or registrar of the town or city where either of them lived at the time, within seven days after their return, under a penalty of ten dollars, to be recovered in the manner and to the uses specified in the third section of the "Act relating to the Registration of Births, Marriages, and Deaths," passed on the 2d day of May, 1849.

SECT. 4. The fee of the clerk or registrar for making the record of such marriage shall be fifty cents, to be paid by the said parties.

SECT. 5. So much of the seventy-fifth chapter of the Revised Statutes as is inconsistent with this act is hereby repealed: *provided, nevertheless*, that nothing herein contained shall be so construed as to modify or alter the provisions of the twenty-second section of the said seventy-fifth chapter, which relates to marriages among the people called Friends or Quakers, but the same shall remain in full force.

70, 150 between 70 and 80, and 50 between 80 and 90. And let us suppose that each of these communities have been subjected to the same sanitary laws, alternately, as the most healthy and the most unhealthy districts of England, as given in the table already referred to, and the result would be as in the following table :—

AGES.	Suppose the number and ages of the whole population in each of three different communities,—A, B and C,—are as follows :—			Subject these several populations, alternately, to the same rates of mortality in different localities, the number who would die,					
	In A.	In B.	In C.	In a healthy locality, would be			In an unhealthy locality, would be		
				In A.	In B.	In C.	In A.	In B.	In C.
Under 5,	600	-	-	24.73	-	-	86.23	-	-
5 to 10,	-	-	-	-	-	-	-	-	-
10 to 15,	-	600	-	-	1.90	-	-	3.78	-
15 to 20,	-	300	-	-	1.86	-	-	2.96	-
20 to 30,	300	100	-	1.90	.63	-	3.80	1.26	-
30 to 40,	100	-	-	1.00	-	-	2.16	-	-
40 to 50,	-	-	100	-	-	1.17	-	-	3.36
50 to 60,	-	-	300	-	-	6.85	-	-	15.91
60 to 70,	-	-	400	-	-	25.43	-	-	42.53
70 to 80,	-	-	150	-	-	23.01	-	-	31.11
80 to 90,	-	-	50	-	-	21.42	-	-	16.11
Total,	1000	1000	1000	27.63	4.39	77.88	92.19	8.00	109.02
Deaths in 100 living, or per cent.,				2.76	.43	7.78	9.22	.80	10.90
Or to the whole living, one in				36.19	232.55	12.84	10.84	125.00	9.17
The average age of each was				5.22	16.41	73.55	4.17	16.28	68.73

It appears from this table that in these three communities, under healthy circumstances, alike in all respects excepting age, the deaths were 27.63 persons, or 2.76 per cent., in A; 4.39 persons, or .43, or less than $\frac{1}{2}$ of 1 per cent., in B; and 77.88 persons, or 7.78 per cent., in C;—that there were living to 1 death, 36.19 persons in A; 232.55 persons in B; 12.84 persons in C;—and that the average ages at death of those who died were, 5.22 years in A, 16.41 years in B, and 73.55 years in C! And under unhealthy circumstances the facts as strikingly appear.

It may perhaps be said, that communities so constituted have never existed. They have not, exactly in this relation, but they may and actually do exist in some degree approximating to it. If so, nothing need further be given to illustrate

the incorrectness and even absurdity of using the average age at death, or the number of a population out of which one may die annually, alone, as accurate standards for sanitary comparisons. And it follows, also, that it is necessary, not only to know the number of the living at each age, but how much life is created and produced, or how many persons are born, on which the laws of mortality operate. By this knowledge alone we might estimate the number of deaths, and the average age at death, with considerable exactness.

The following principles may be considered as settled; though we have not space in this connection to illustrate them fully. They should govern all those who make sanitary surveys of different places or populations.

1. That a uniform law of mortality exists, which destroys more persons at one age than at another, in all other circumstances exactly similar; and that this law is modified in its operation in a healthy and in an unhealthy locality, only by its being less stringently regarded in the one than in the other.

2. That the generative power and ability to produce a healthy race is mainly ascertained by the number of marriages, the age at marriage, and the number of married persons living in the procreative ages, combined with other personal circumstances; and hence arises the sanitary importance of ascertaining in a census, as a characteristic of the population, the number of the married at different ages, and of recording each marriage and the age at marriage.

3. That when the number of births is great, the number of deaths is proportionally great, and the average age at death proportionally low; and that an excessive production of life is one of the *causes*, not *consequences*, of great mortality; and hence the number of births is a necessary element in estimating the sanitary condition of a population.

4. That the average age at death, as well as the aggregate number of a population out of the whole of which one dies annually, though interesting as a characteristic of the population, is a fallacious test of its sanitary condition; and cannot be employed alone, for that purpose, without leading to serious errors.

It can be applied, as an accurate test, only when the ages of the living inhabitants compared are alike.

5. That selecting a class of the population, such as the professional men, the tradesmen, the laborers, the rich, or the poor, and giving their average age, or the average number of years of life that either live less than the others, or that either lose more than the others, as a test of the sanitary condition of the class, may mislead the inquirer, and cannot be relied upon as an accurate test.

6. That the information concerning the rate of mortality supposed to have prevailed in past ages, when the calculations have been made upon the erroneous basis mentioned in the last two conclusions, cannot be taken as an exact test for comparison with the present age, without some allowance of error. Few observations concerning the living or the dead were made with accuracy in the olden times.

7. That the only accurate tests of measurement for one place are those founded on a joint comparison of the number of persons living at each age, with the number of deaths at the same age; or for different places, a comparison of the same facts regarding the population of the same ages in both places; or the same population, in two places, supposing it to be removed from the one place to the other.

8. That in estimating the effects of immigration and emigration on the sanitary condition of a population, the difference both between the ages of those who come in and those who go out, and the ages of the permanent population, must always be considered. Other circumstances being equal, a difference in this respect will produce a different rate of the whole mortality.

9. The same joint comparison should be made separately of the ages of the living and the ages at death of all who die, by each disease; in each season of the year; of each sex; of each occupation; and of those characterized by other circumstances. The number, as influenced by either of these circumstances, will be increased or diminished in proportion as more or less are found of one age more than of another. For this purpose

a variety of tables might be constructed to exhibit the facts in a condensed form.

10. That an accurate enumeration of the number, ages, &c., of living persons, and an accurate public registration of every birth, every marriage, and every death, with all the information desired relating to each, are absolutely essential as the foundation of every estimation of the sanitary condition of a population; and a sanitary survey, where this is wanting, can be of little value.

11. That for all practical purposes, as means of comparison, the living and the dead may be divided as to the ages, into decennial periods, or periods of ten years each, for those over twenty; into quinquennial periods, or periods of five years each, for those under twenty, and into each year of life for those under five years. This admirable division has been adopted in England, (see table, p. 34.) For special purposes three divisions should be made;—of those under 15, of those between 15 and 60, and of those over 60,—as the Dependent, the Productive and the Aged classes. The division, sometimes made between those under 20, and over 20, as “*boys and girls*,” and “*men and women* ;” or as “*children and adults*,” is indefinite, unmeaning, and useless; as are also the ages 4, 8, 14, 16, 21, and 45, which have been sometimes used as dividing points.

12. That to secure such uniformity at different places and at different times, in the abstracts of the facts concerning the living inhabitants, and the dead, that each may be accurately compared together, both should be made under the superintendence of one agency, and that agency should be the General Board of Health.¹

XV. WE RECOMMEND *that provision be made for obtaining observations of the atmospheric phenomena, on a systematic and uniform plan, at different stations in the Commonwealth.*

The atmosphere or air which surrounds the earth is essential to all living beings. Life and health depend upon it; and neither could exist without it. Its character is modified in various ways; but especially by temperature, weight, and com-

¹ Those who may wish further information on the subject of Registration of births, marriages and deaths, may consult the books already referred to, in notes pp. 30-36, 55, 128.

position; and each of these modifications have an important sanitary influence.

The *temperature* of the atmosphere is measured by the rise and fall of the mercury in the *thermometer*; and it varies greatly in different times and seasons, and in different places. In Massachusetts, it sometimes rises 100 degrees above; and sometimes sinks to 20 or more below zero. Health is often affected when extremes of heat or cold are long continued, or when the changes from one to the other are sudden.

The *weight* of the atmosphere is determined by the rise and fall of the mercury in the *barometer*. This rise and fall is about 3 inches—generally from 28 to 31. It is seldom more than 2 inches in the same locality; and sometimes not more than 1. In Massachusetts the rise has been known to be as high as 31.11, and the fall as low as 28.47, showing a difference of 2.64 inches. The weight of the atmosphere at the earth's surface is 14.6 lbs. to the square inch. Allowing the surface of a man's body of medium size to be 15 square feet, or 2160 square inches, he suffers the enormous pressure of 31,536 lbs., or more than 15 tons! It is, however, generally unperceived, because the pressure is equal, within and without. It is only by its *variations* that we are affected. But these variations, when analyzed, will appear immense. *Each fall or rise of one tenth of an inch indicates a difference of about 100 lbs.* A fall of $\frac{1}{10}$ of an inch shows the removal of a pressure of about 100 lbs.; $\frac{2}{10}$, 200 lbs.; $\frac{5}{10}$, 500 lbs.; 1 inch, 1,000 lbs.; 3 inches, 3,000 lbs., &c. If these variations were sudden, inconvenient and fatal consequences might follow. When the pressure is removed we do not feel light as we should do by the removal of the same number of pounds of iron or other substance; but we feel sluggish, heavy and spiritless, owing to the excessive expansion of the fluids of the vessels, the nerves, and other living fibres, produced by an excessive expansion and escape of a portion of the air incorporated within them.

The atmosphere is *composed* of two principal gases, and they exist in all places in nearly the same proportions—about four-fifths of nitrogen and one-fifth of oxygen. The latter is the principal supporter of life. Other gases may also be dif-

fused in greater or less quantities. Brand's Encyclopædia of Science states the average ordinary composition per cent. of the atmosphere as follows :—

	By Measure.	By Weight.
Nitrogen,	77.60	75.55
Oxygen,	21.00	23.32
Aqueous Vapor,	1.32	1.03
Carbonic Acid,	0.08	0.10
	<hr/> 100.00	<hr/> 100.00

Aqueous vapor exists in greater and more varied proportions than carbonic acid gas, though the quantity of that gas is very different at different times and places. Sulphuretted hydrogen, ammonia, and other gases, may also be diffused in quantities so great as to be detected by the senses, or by chemical analysis, or so minute and inodorous as to escape detection, and in either case may be the cause of disease. Some idea may be formed of the almost infinite divisibility of matter, diffused in the atmosphere, from the fact that the hound in the chase discerns the track of man and animals by the odoriferous particles thrown off from their foot-prints; and that we detect the odor of musk, notwithstanding the single grain from which it proceeds was deposited twenty years previous, and has since been constantly diffusing its particles in the surrounding atmosphere!

The atmosphere is corrupted in various ways. Man himself cannot breathe the same air twice with impunity. Every minute of every day he appropriates to the vitalization of his blood 24 cubic inches of oxygen, and supplies its place with 24 inches of carbonic acid gas. When present in large quantities, from whatever cause produced, carbonic acid gas is destructive of life. Charcoal burned in a close room is an illustration. Some other gases are also very destructive. The experiments of Thenard and Dupuytren proved that birds perish when the vapors of sulphuretted hydrogen and ammonia exist in the atmosphere to the extent of a fifteenth thousandth part; that dogs are deprived of life when the air contains a thousandth part; and that man cannot live when the air he breathes is im-

pregnated with a three-hundredth part; and suffers in corresponding degree when a less proportion of these poisonous gases exists. Persons frequently fall dead when entering a well, vault, tomb, sewer or other place, filled with these gases, or with stagnated air in which are diffused emanations from decomposing animal, vegetable or mineral substances.

Such are a few only of the facts which illustrate the important agency of the atmosphere in the animal economy. What that peculiar condition is which produces a specific disease, or what changes produce different diseases, are as yet unknown; it has not been ascertained, "because meteorological science, as connected with the propagation and spread of disease, is as yet in its infancy. We have, indeed, some knowledge of the influence of two of the obvious conditions, namely, those of heat and moisture; but of the action of the subtler agents, such as electricity and magnetism, the present state of science affords us little information. Still there are unequivocal indications that there is a relation between the conditions of the atmosphere and the outbreak and progress of epidemic diseases, though we are as yet ignorant of the nature of that relation."¹

"The earth, it is well known," says the Registrar General, "is surrounded by an atmosphere of organic matter, as well as of oxygen, nitrogen, carbonic acid, and watery vapor. This matter varies and is constantly undergoing transformations from organic into inorganic elements: it can neither be seen, weighed, nor measured. The chemists cannot yet test its qualities. Liebig, with all the appliances of the Giessen laboratory, cannot yet detect any difference between the pure air of the Alps, and the air through which the hound can tell a hare, a fox, or a man has passed; or the air which observation shows will produce small-pox, measles, scarlatina, hooping cough, dysentery, cholera, influenza, typhus, plague. These matters may either be in a state of vapor, that is elastic, or inelastic; or like water, they may exist in both states. They are most probably in the state of suspension; hang, like the smoke in cities, over the places in which they are produced, but are

¹ Report of the General Board of Health on Quarantine, p. 10.

spread and driven about like vesicular water in clouds. A stream of aqueous vapour of the same elasticity from the Atlantic, passing over England, is, in one place, perfectly transparent; in another, mist; in another, rain: so clouds of epidemic matter may fleet over the country, and in one place pass harmless by, in another destroy thousands of lives. The emanations from the living, the graves, the slaughter-houses, the heaps of filth rotting, the Thames,—into which the sewers still empty,—raise over London a canopy which is constantly pervaded by zymotic matters; in one season this, in another that, preponderating.”

Although we are as yet uninformed on this subject, it is unreasonable to suppose that we shall always remain so. It opens a vast field for examination, which is as yet almost entirely unexplored; but it promises results of great value and importance to science and to human life. The meteorological observations, which have hitherto been made in this country, have been published rather as contributions to general science, than to show their specific relation to health. In England, and in some places on the continent of Europe, these observations are made with more care, and for a more specific purpose. For several years past Mr. Glazier, director of the Royal Observatory at Greenwich, has published his meteorological observations and remarks on the weather, in connection with the returns of the Registrar General of births, marriages and deaths.

¹ In Edinburgh, particular attention has been paid to the influence of atmospheric causes on the production of disease. Dr. James Stark, in his Report on the Mortality of Edinburgh and Leith, for the last quarter of 1847, (pp. 4 and 5) says, that the “Influenza suddenly attacked great masses of the population twice during the course of November; first on the 18th, and again on the 28th of the same month. In both these cases it appeared after a keen frost, and an excessively damp thick fog, which came on rather suddenly after a few days of very mild weather. The disease was therefore clearly dependent on atmospheric causes.”

“Though influenza was so exceedingly general, it did not of itself materially increase the mortality during November; but this disorder and its atmospheric causes greatly increased the mortality of all other diseases. So much has this been the case, that from the 18th of November, when influenza first appeared, the mortality daily increased till it reached 61 deaths on the 30th day of the month. In fact, influenza and its atmospheric causes apparently attacked the weak point in every individual, be that the lungs, bowels, or other organs, and hastened to a fatal termination cases which, in ordinary seasons, might have survived for months or years.”

Again, in his Report for June, July and August, 1848, the same author says —“The influence of weather on disease was, however, still more strikingly manifested in regard to bowel complaints and affections of the organs of digestion, registered under the heads of diarrhoea, dysentery, cholera, teething, inflammation of the bowels, &c. During the heats of summer and autumn, these diseases in general become exceedingly prevalent and fatal, and it has been the too common belief that the use of fruit and vegetables was the cause of these affections. The mortality of these diseases, however, during the above months, most satisfactorily proves that these diseases do not depend on, or are caused by, the use of fruit

M. Quetelet, director of the astronomical observatory at Brussels, and other observers on the continent, have published similar observations. They afford an invaluable fund of information on the subject, and cannot fail to lead to important practical results.

We have supposed that a similar plan of observations might with advantage be introduced into our own State. Our desire has been that these observations should be made at six or eight different stations in the Commonwealth, on a uniform plan, in similar localities, at the same time of day, and by sets of similar instruments, each compared, corrected, and made to agree with a common standard; and that these observations should be analyzed, abstracted, combined, and published by a compe-

and vegetables as articles of diet, but that atmospheric agencies, and in especial, temperature, exert a most marked influence on their prevalence and fatality.

During 1847, when the mean temperature of these months was 59.09 degrees, the barometric pressure above the average, and the air very dry, the deaths above 60 rose to the proportion of 15 out of every 100 deaths at all ages. And during 1846, when the mean temperature was still higher, viz., 60.76 degrees, the barometric pressure above the average, and the fall of rain excessive, the proportion of deaths among the aged rose to 18 per cent. of the total deaths. The greatest absolute number of deaths, however, among the aged occurred during the three months of 1847, when the mean temperature was high and the atmosphere very dry. In former reports the baneful effects of a low temperature on the aged have been frequently pointed out. The facts, therefore, stated in this and former reports seem to warrant the conclusion that a mean temperature such as we have had this year, with a moderately moist condition of the atmosphere, and a low barometric pressure, are the conditions of the atmospheric phenomena which are most favorable to the health of those advanced in years. But, in fact, these are the conditions most favorable to life at all ages, seeing the above facts seem to prove that though excessive heat, generally speaking, is most baneful to certain classes of disease, even these, under the same temperature, are rendered more or less fatal according as the atmosphere is more or less dry or humid. Thus extreme heat with drought seems to cause a greater mortality among those laboring under diseases of the respiratory organs, and of the brain, as well as in all persons above 60 years of age, than when an equally high temperature is accompanied with considerable atmospheric moisture. On the other hand, bowel complaints and heart diseases seem to be more under the influence of temperature alone.

These facts relative to the influence of atmospheric agencies on disease might be rendered more tangible by arranging them in a tabular form. The following table, then, exhibits the influence of weather on disease, by showing the varying number of deaths in the population of Edinburgh from certain classes of disease during the months of June, July, and August of the years 1846, 1847, and 1848.

DISEASES.	1846.	1847.	1848.
	Heat great; moisture excessive; high barometric pressure. Mean Temperature, 60.76 degrees. Fall of Rain, 12.77 in. Mean Barom. 29.68 in.	Heat great; drought; high barometric pressure. Mean Temperature, 59.09 degrees. Fall of Rain, 4.07 in. Mean Barom. 29.70 in.	Heat moderate; moisture moderate; low barometric pressure. Mean Temperature, 55.79 degrees. Fall of Rain, 9.40 in. Mean Barom. 29.36 in.
Respiratory Organs, - - -	219	280	180
Bowel Complaints, &c. } - - -	{ 173	177	150
Or during August, } - - -	{ 81	71	33
Brain Diseases, - - -	116	120	79
Heart Diseases, - - -	29	26	21
Aged above 60, - - -	180	242	124
Or per centage of Aged to } total mortality, }	18	15	13

tent agency, and accompanied by such general remarks and deductions as they might suggest, in connection with the sanitary reports of the General Board of Health. To ascertain how far our plan was practical, and might be approved by competent judges, we addressed a communication to Wm. Cranch Bond, Esq., of the Cambridge Observatory. His communication appears in the appendix, together with an extract from the report of the Royal Observatory at Greenwich.

After the above was written, the legislature passed the following "Resolve relating to meteorological observations."

"Resolved, That his excellency the governor be authorized and requested to fix upon suitable stations, not exceeding twelve in number, in which shall be included the three Normal Schools and the three Colleges in this Commonwealth, where shall be deposited the instruments necessary for making systematic observations in meteorology, according to the plan recommended by the Smithsonian Institute, at an expense not exceeding one hundred dollars for each station, to be defrayed from the school fund, and that he be authorized to draw his warrant therefor accordingly."

If suitable agents are appointed under this resolve, our recommendation can be fully carried out without further legislation.

XVI. WE RECOMMEND *that, as far as practicable, there be used in all sanitary investigations and regulations, a uniform nomenclature for the causes of death, and for the causes of disease.*

In making a survey of different places, or different articles, it is proper that uniform names should be given to measures and weights; and that uniform instruments should be used. In a sanitary survey the causes of death and the causes of disease will be the principal objects of investigation; and it is expedient, and even necessary, that such names should be given to each as have a definite meaning and can be universally applied. They are the measures and weights,—the instruments by which the computations are to be made. Without such a uniform standard of comparison no just conclusions can be drawn. It would be equally proper to use Fahrenheit's thermometer in one place and Reaumur's in another, to estimate the compar-

ative temperature of the atmosphere ; or two different kinds of instruments as measures of weight and length, in other matters, as to use one name or classification of causes of death, or causes of disease, in one place, and a different name or classification for the same causes in another. Hence the reason for the above recommendation in a plan for a sanitary survey of the State will be apparent.

A report containing a nomenclature and classification of the *causes of death* was drawn up, and adopted by the National Medical Convention in 1847. Extracts from a revised copy, approved by the Massachusetts Medical Society, are inserted in the appendix. We hope that the directions and suggestions they contain will be carefully observed by all physicians, and others concerned in carrying the sanitary laws of the State into effect.

The *causes of disease*, in all sanitary inquiries, deserve equal, if not greater attention, than disease itself. They have been differently classified and named by different authors. By some they have been divided into *external* or *extrinsic*, and *internal* or *intrinsic*; by others, into *principal* and *accessory*; and into *remote* and *proximate*; and in other ways. Copland, (Diction. Vol. I, page 645,) divides them into four classes,—*predisposing*, *exciting*, *specific*, and *determining* or *consecutive* causes; and makes several sub-classes under each. Bigelow and Holmes (Marshall Hall's Practice of Medicine, Am. Ed. pp. 67–83) divide them into *general* and *specific* causes; and subdivide the former into *predisposing* and *exciting*, and the latter into *contagious* and *non-contagious*. Williams (Principles of Medicine, p. 23, Am. Ed.) divides them into *predisposing* and *exciting* causes; and makes a subdivision of the second into *cognisable* and *non-cognisable agents*. None of these classifications, however well they may be adapted for professional use, seem well designed for general sanitary purposes. They are not sufficiently clear to be generally understood and practically useful. Bigelow and Holmes say, this classification “must be considered convenient rather than strictly philosophical.” Even Williams himself says that “these divisions of causes are rather conventional and convenient than natural and philosoph-

ical ;" and every one who may examine them will probably come to the same conclusion. It is easy to perceive that one may be a predisposing cause in one case and an exciting cause in another ; and vice versa, according to circumstances.

As in the nomenclature and classification of causes of death it has been found difficult to make one which shall be universally approved, so in classifying the causes of disease the same difficulty may occur. Yet we deem it proper to recommend that all causes of disease should be divided into three general classes :—1. **ATMOSPHERIC** ; 2. **LOCAL** ; and 3. **PERSONAL**.

I. Under **ATMOSPHERIC CAUSES**, we would include those to which all persons in a country or district, in circumstances in all respects alike, are equally exposed. *Sub-classes* ; 1. Climate ; 2. Seasons ; 3. Winds and weather ; 4. Electricity ; 5. Atmospheric weight, temperature, moisture, and composition ; 6. Malaria ; 7. Unknown conditions of the atmosphere. What have been called epidemic causes of disease come under these classes.

II. Under **LOCAL CAUSES** we would include those to which persons living in a particular neighborhood or dwelling house, in circumstances in all respects alike, are equally exposed. *Sub-classes* ; 1. Elevation or depression of situation ; 2. Deficiency or impurity of water ; 3. Defective sewerage, drainage, and surface cleansing ; 4. Animal and vegetable effluvia ; 5. Confined and corrupted air ; 6. Irregular and imperfect supply of light and heat ; 7. Filthy or damp habitations ; 8. Existing contagious diseases ; 9. Unknown local causes. What have been called endemic causes of diseases come under these classes. We would, however, restrict them to a particular house, street, or neighborhood. When the influence spreads over a whole town or district, it becomes an atmospheric cause.

III. Under **PERSONAL CAUSES** we would include those which originate with the person alone, independent of atmospheric or local causes. *Sub-classes* ; 1. Hereditary constitution, organization or vitality ; 2. Acquired constitution, organization or vitality ; 3. Deficiency and excess in quantity, and improper kind of food ; 4. Improper quantity and kind of clothing ; 5. Occupations and habits ; 6. Excessive physical exertion ; 7. Excessive

mental action ; 8. Alienation of mind ; 9. Exposure ; 10. Personal contact with a diseased person, virus or poison ; 11. Violence and accidents ; 12. Unknown personal causes.

Atmospheric, and local, and personal contagion may exist as causes of disease. Some diseases can be communicated only by actual contact with another person, or with the poison of the disease of the person ; as itch, syphilis, necusia, &c. This is *personal contagion*. Others may be communicated either by contact with the air of the locality where the diseased person is or has been ; as small-pox, measles, &c. ; or with the poisonous emanations from decomposing animal or vegetable matters, or from other substances ; this is *local contagion*. Others may be communicated by contact with the atmosphere while in a peculiar condition ; as influenza, dysentery, cholera, &c. ; this is *atmospheric contagion*. All these kinds of contagion may exist, to a greater or less extent, and press upon us with greater or less power.

Atmospheric contagion is generally harmless unless attracted by local causes ; and if atmospheric and local contagion be combined, it may be successfully resisted by a person fortified with sufficient personal vitality. There seems to be a chemical affinity between the epidemic constitution of the atmosphere, and filth and unfavorable local circumstances, which combine readily with the conditions of the particular persons whom it affects ; and the combination gathers together the poison of disease in so great intensity that few who are exposed are able to resist it. Under such circumstances those who are healthy, and live temperately and regularly, often escape ; while the debilitated, intemperate, irregular livers, generally become victims ! An illustration of this fact may be drawn from the history of that terrible disease, the Asiatic Cholera,—a disease which derives its terrific power chiefly or entirely from the accessory or accompanying circumstances which attend it. It bounds over habitation after habitation where cleanliness abides ; and generally leaves unharmed those inmates who have preserved and improved their natural constitutions : whilst it alights near some congenial abode of filth or impurity, and finds sub-

jects prepared for easy conquest by previous violations of the laws of health and life.

Dr. Mitchell, of Philadelphia, suggests the "cryptogamous" origin of epidemic diseases, and some English periodicals have speculated on the alleged discovery of sporules or organic cells, as causes of cholera. But it would seem difficult to ascertain the cause of these causes, even if they are causes, (which is yet to be proved,) without looking to some peculiar antecedent atmospheric condition to account for their production.

If this were the proper place it would be easy to show that this classification is more natural, simple, comprehensive, and philosophical, and better adapted to general practical purposes, than the classifications in general use. The extracts we have already given under our XVth recommendation, prove that a similar distinction has been indirectly acknowledged by the best medical writers. Many other similar quotations might be given. We are aware that it may sometimes be difficult exactly to draw the line which separates atmospheric from local causes, though not, as seems to us, for general purposes, in the restricted sense in which we use the terms. It seems to us that any ætiologist would have more difficulty in drawing definite lines to separate contagious from infectious, or predisposing from exciting, or cognizable from non-cognizable causes of disease.

XVII. WE RECOMMEND *that, in laying out new towns and villages, and in extending those already laid out, ample provision be made for a supply, in purity and abundance, of light, air, and water ; for drainage and sewerage, for paving, and for cleanliness.*

It is a remarkable fact, that nearly the whole increase of the population of Massachusetts, during the last twenty years, is to be found in cities and villages, and not in the rural districts. The tendency of our people seems to be towards social concentration. And it is well to inquire what will probably be the consequences of these central tendencies ; and how, if evils are likely to arise from this cause, they may be avoided. It has been ascertained that the inhabitants of densely populated places generally deteriorate in vitality ; and that, in the

course of years, families frequently become extinct, unless recruited by a union with others from the country, or with other blood of greater vital force. This is a significant fact, which should be generally known. Cities are not necessarily unhealthy, but circumstances are permitted to exist, which make them so.

“Every population throws off insensibly an atmosphere of organic matter, excessively rare in country and town, but less rare in dense than in open districts; and this atmosphere hangs over cities like a light cloud, slowly spreading—driven about—falling—dispersed by the winds—washed down by showers. It is matter which *has lived*, is dead, has left the body, and is undergoing by oxidation decomposition into simpler than organic elements. The exhalations from sewers, churchyards, vaults, slaughter-houses, cesspools, commingle in this atmosphere, as polluted waters enter the Thames; and, notwithstanding the wonderful provisions of nature for the speedy oxydation of organic matter in water and air, accumulate, and the density of the poison (for in the transition of decay it is a poison) is sufficient to impress its destructive action on the living—to receive and impart the processes of zymotic principles—to connect by a subtle, sickly, deadly medium, the people agglomerated in narrow streets and courts, down which no wind blows, and upon which the sun seldom shines.

“It is to this cause that the high mortality of towns is to be ascribed; the people live in an atmosphere charged with decomposing matter, of vegetable and animal origin; in the open country it is diluted, scattered by the winds, oxydized in the sun; vegetation incorporates its elements; so that, though it were formed, proportionally to the population, in greater quantities than in towns, it would have comparatively less effect. The means of removing impurities in towns exist partially, and have produced admirable effects; but the most casual observation must convince any one that our streets were built by persons ignorant as well of the nature of the atmosphere, as of the mortality which has been proved to exist, and is referable to causes which, though invisible, are sufficiently evident.

“The occupations of men in towns are mostly carried on

in-doors, often in crowded workshops, while the agricultural laborer spends the greater part of the daytime in the open air. From the nature of the particles of animal matter thrown into the atmosphere, it is impossible to place the artisan in circumstances as favorable as the laborer; the sun and wind destroy and waft away the breath as soon as it is formed; but in the workshops of towns the men are shut from the sun, and no streams of the surrounding air carry off the steaming breath and perspiration, so that the mortality of workmen in the metropolis is much greater than the mortality of women at the corresponding ages.”¹

The different sanitary investigations in England have related principally to the subjects suggested in this recommendation; and facts have been brought to light, in relation to the manner in which many human beings live, that have made a profound impression upon the public mind.

“There are,” says Dr. Simon, “many, very many courts and alleys hemmed in on all sides by higher houses, having no possibility of any current of air, and (worst of all) sometimes so constructed, back to back, as to forbid the advantage of double windows or back doors, and thus to render the house as perfectly a *cul-de-sac* out of the court, as the court is a *cul-de-sac* out of the next thoroughfare.

“It is surely superfluous to observe that these localities are utterly incompatible with health. Among the dense population it is rare to see any other appearance than that of squalid sickness and misery; and the children, who are reproduced with the fertility of a rabbit warren, perish in early infancy. In the worst localities probably not more than half the children born survive their fifth year, and of the 3,799 deaths registered last year in the city of London generally, 1,410 were at or under seven years of age.

“The diseases of these localities are well marked. Scrofula more or less completely blights all that are born, often extinguishing life prematurely; in childhood, by hydrocephalus; in youth, by pulmonary and renal affections, which you read of as consumption and dropsy, often scarring and maiming where it

¹ Fifth Report of the Registrar-General, pp. 418, 419, 420.

does not kill, and rendering life miserable by blindness, decrepitude or deformity; often prolonging itself as an hereditary curse in the misbegotten offspring of those who, under such unnatural conditions, attain to maturity and procreation. Typhus prevails there, too, not as an occasional visitor, but as an habitual pestilence.

“It is impossible for me, by numbers, to give you an exact knowledge of the fatality of such spots, because, in the greater part of the city, hospitals, dispensaries, and private practice divide the treatment of the sick with the parochial officers, and diminish the returns of sickness which those officers would otherwise have to show. But this I may tell you, as an illustration of what I state, that in the few houses of Seven-Step Alley, there occurred last year 163 parochial cases of fever; in Princes Place and Princes Square, 176 cases; that behind the east side of Bishopsgate, in the small distance from Widegate Street to New Street, there were 126 cases; that behind the west side, from Primrose Street to Half-moon Street, there were 245 cases; that the parish of Cripplegate had 354 cases over and above the number (probably a very large one) treated by private practitioners, by hospitals, and especially by dispensaries. Similarly, though with less perfect information, I am enabled to trace fever to a terrible extent in very many other localities of the city, even on the verge of its better residences, and close behind its wealthiest thoroughfares.

“It was in districts such as these that, in 1665, the Great Plague of London found the readiest facilities for its reception; and it was by the destruction of such districts that the Great Fire of the following year rendered the utmost conceivable service to the sanitary progress of the people, and completed their emancipation from the horrors of an unparalleled pestilence. Long intervening years have sufficed to reconstruct these miserable habitations almost after their first type, and to reëxemplify all the evils which belong to them; so completely, indeed, that if the infection of that same plague should light again amongst us, I scarcely know why it might not traverse the city and decimate its population as quickly and as virulently as before. Meanwhile, however, typhus, with its kindred

disorders, and the occasional epidemics of influenza, cholera, and other diseases, maintain their attachment to the soil, and require no further reinforcement from the pestilence of other climates."

This picture is reproduced, sometimes with more frightful details, in very many places in Europe, and in this country—in *Massachusetts!* The evils which it portrays may not exist to so great extent with us, as in the ancient cities and populous places of the old world; but even here their magnitude is very much greater than is generally supposed. Places may be found in the cities and towns of this State, as we shall show further on, that are scarcely to be paralleled in England. This fact will be developed to the astonishment of any one who makes the examination. These evils seem almost inseparable from all densely populated places, so long as the people remain uneducated and not cared for. It is of the highest importance, then, that all proper sanitary measures should be adopted to prevent those calamities which have been suffered elsewhere, and which will inevitably increase with us, unless seasonably prevented.

1. "*Light,*" says the Liverpool Health of Towns Advocate, (p. 125,) "is necessary to health. Dr. Edwards, of Paris, has shown, that if tadpoles be deprived of light, they do not advance beyond that state of development, however well they may be fed, although they increase in size; and he thence concludes, 'that the action of light tends to develop the different parts of the body in that just proportion which characterizes the type of the species:' and that, in warm climates, 'the exposure of the whole surface of the body to light will be very favorable to the regular conformation of the body.' Baron Humboldt strikingly corroborates this opinion, for he says, after a five years' residence amongst many American tribes, 'I have not seen a single individual with a natural deformity.' *We may thus conclude that abundance of light is essential to the proper development of form in man:* and it follows, as a consequence, that if children, at the time of early growth, be deprived of this necessary agent, their development will be materially modified, and the foundation for a weak constitution will

be laid, and consequent incapacity for labor, and tendency to disease superinduced. Dr. Edwards gives it as his opinion that 'the want of sufficient light must constitute one of the external causes which produce these deviations of form in children affected with scrofula; which conclusion is supported by the observation, that this disease is most prevalent in poor children, living in confined and dark streets.'

"The opinions of Dr. Edwards are fully borne out by Mr. Ward, in his evidence before the Sanitary Commission. He says that his experience 'most strongly' bears out these statements; and that, 'from noticing hundreds of times the beneficial consequences of the alteration from darkness to light, and the evils resulting from the want of light, I am satisfied that it is a matter of the highest importance.'

"My advice to young people who are about to marry, and can afford only one or two rooms, is, to choose the largest room they can find, and in which they can obtain the greatest quantity of solar light; the amount of disease in light rooms, as compared with that in dark rooms, being infinitely less.'

"Other medical observers have arrived at similar conclusions. Sir James Wylie relates a remarkable instance in point, in regard to an extensive barrack in St. Petersburg, one side of which was exposed to the light, and the other was comparatively dark. The result to the soldiers living in the building was, that uniformly, for many years, there were three times as many taken ill on the dark side as were attacked on the light side of the barrack. We need hardly insist on the importance of these facts, as showing that the want of light predisposes to disease."

2. *Air.* We have already spoken (pp. 143-148) of this important element, and shall hereafter refer to works where the subject is fully discussed. Streets should be of sufficient width to permit a free circulation of air. Restrictions should be so imposed as to permit few lanes, alleys, and courts, and none that would so obstruct the circulation as to endanger the public health. Every place from which light is excluded, or into which pure air, in any desirable quantities, cannot at pleasure be introduced, should be pronounced unfit for habitation.

3. *Water.* "The following are the chief conditions in respect of water supply, which peremptorily require to be fulfilled:—

"1. That every house should be separately supplied with water, and that where the house is a lodging-house, or where the several floors are let as separate tenements, the supply of water should extend to each inhabited floor.

"2. That every privy should have a supply of water applicable as often as it may be required, and sufficient in volume to effect, at each application, a thorough flushing and purification of the discharge pipe of the privy.

"3. That in every court, at the point remotest from the sewer grating, there should be a stand-cock for the cleansing of the court; and

"4. That at all these points there should always and uninterruptedly be a sufficiency of water to fulfil all reasonable requirements of the population."¹

"We must have *soft* water. All hard waters are expensive, both for domestic consumption and manufacturing purposes. This hardness arises from the presence of earthy and saline substances, which decompose and destroy a certain quantity of soap in washing, and occasion a larger consumption of that article than necessary. It has been proved that the water which supplies Aberdeen contains only one grain per gallon of hardness, while that of Manchester contains fourteen grains. The water at present supplied to Liverpool contains rather more; but we may assume the hardness at fourteen grains per gallon. Now Dr. Playfair has shown that water with fourteen grains per gallon *destroys and renders useless* a quantity of the soap used for washing purposes, equal in value to 16s. 8d. a year, to a family of five individuals. If we assume the present population of Liverpool at 330,000, and suppose there were a supply of water, of the same quality now used, adequate to the wants of that population, there would be an extra expense of no less than £55,000 a year to the town, in addition to the wear and tear of clothes. Water, however, could not be obtained quite pure, but if it could be had with a hardness of two degrees a

¹ Dr. Simon's Report, p. 19.

gallon, *which we believe to be quite possible*, a saving would be effected to the town of nearly £50,000 a year; and this without taking into account the saving accruing in manufactories, steam boilers, breweries, &c. It is a low estimate, therefore, to state the *hard water tax* of Liverpool at £50,000 a year, every farthing of which is actually *thrown away, without any return whatever*. Now this sum represents a capital of *one million and a quarter sterling*, at four per cent.”¹

Several cities and villages in Massachusetts have constructed other works besides wells to supply them with water. Boston, by a structure that for artistic skill and thorough workmanship is probably unsurpassed any where, has introduced, at an expense to the city of about \$5,000,000, the water of Lake Cochituate, nineteen miles and a half distant; and it affords to every inhabitant an abundant supply of water of the best quality.

4. *Drains and Sewers* should be made to carry off water introduced in any way into cities and villages. If the surplus be permitted to remain, it often becomes stagnant and putrid, and is then a fruitful source of disease. “Without a system of drains, a large supply of water is rather injurious than otherwise; yet without a plentiful supply there can be no drainage at all.” Every city and village should be surveyed; and the elevations of the crossings of each street above a common level, and its descent to an outer termination, should be laid down and marked upon a public plan; so that all abutters, and others interested, may be guided to the proper construction of buildings with reference to drains and sewers. Some general, definitive plan should be fixed upon for each city and village, and when so fixed it should be uniformly carried out under one authority, as circumstances may require. Surface drains will answer for some localities, but underground sewers are generally to be preferred. Boston has about 35 miles of such sewers.

5. *Paving* is of great importance as a sanitary measure. The following are the conditions requisite for a good system:—

“1. Pavements should be made as impervious to fluids as possible, otherwise the subsoil remains moist, and becomes im-

¹ Liverpool Health of Towns Advocate, p. 131.

pregnated with matters deleterious to the purity of the atmosphere. All stone pavements should therefore be closely joined; and consequently those made of round boulders are inadmissible for sanitary purposes. Wood pavements are decidedly injurious to health. The street pavements in some of the Italian cities are better than ours for drainage. They consist of polygonal blocks of limestone, the joints of which are accurately fitted together with cement, so that the rain water flows off as easily as from the roof of a house, and there are neither ruts nor hollows. The old Roman pavements were similarly constructed.

"2. Great care should always be taken to prevent the formation of pits and hollows, which are always injurious to health, by permitting the retention of solid and fluid substances in a state of decomposition, and presenting great obstacles to cleansing.

"3. All courts and passages should be *flagged*; the common paving is inadequate for sanitary purposes in such localities.

"4. A complete reform should be effected in the manner of constructing street gutters. If any one will take the trouble to go through the town on a wet day, he will be astonished to find how many of these conduits have the property of retaining the water, instead of facilitating its passage into the sewer. It should never be forgotten that a badly made gutter is literally worse than none; for it only draws the foul water from the street nearer the doors of dwellings, while the spaces between the stones allow of its free passage into the subsoil, so as to render the houses more damp than they would otherwise be. Perfect smoothness, and proper adaptation of the stones, along with a proper *continuous* declivity, are indispensable requisites in a well made gutter."¹

6. *Cleanliness* in towns is of such immense importance to health, that it should constitute an indispensable part of sanitary police. The only safe rule is, to remove out of a town, and out of a house, all refuse as soon as it is produced. Refuse matters, either animal or vegetable, are constantly undergoing change, and giving out vapors and gases which, even in ex-

¹ Liverpool Health of Towns Advocate, p. 99.

trremely small quantities, are injurious to health, especially if they are constantly inhaled. Conclusive proofs of this fact exist. Wherever there is a dirty street, court, or dwelling-house, the elements of pestilence are at work in that neighborhood. The cause of many and many a case of typhus fever, cholera morbus, or other fatal diseases, in our cities, villages, and even in the rural and isolated dwellings of the country, may be traced to decayed vegetable matter, or other filth, in the cellar, in or around the house, or in the water used. The most perfect cleanliness is necessary in all places, but especially in confined localities, to preserve the public health; and nothing ought to be permitted to interfere with it. It must never be forgotten that we have to do with *life*. It is not a question of convenience, or personal annoyance, but one of health. No person, therefore, should be permitted, on any plea of interest, to tamper with this matter; and every nuisance that occasions filth in streets or courts, or that accumulates it on any other surfaces, should be abated; if not otherwise, by the arm of the law. It is sometimes necessary to constrain men to do what would be useful, and to avoid what would be injurious to them. No person should be permitted to contaminate the atmosphere of his own house, or that of his neighbors, by any filth or other substance dangerous to the public health. Such a person should be looked upon as worse than a highway robber. The latter robs us of property, the former of life.

XVIII. WE RECOMMEND *that, in erecting schoolhouses, churches, and other public buildings, health should be regarded in their site, structure, heating apparatus, and ventilation.*

To provide for all public buildings, where large numbers of people congregate, an abundant and constant supply of air, in its pure, natural state, and of a proper temperature, is a very important, though difficult matter. It is so, too, in regard to private dwellings. It has received much theoretical and practical attention, and very many schemes have been devised to attain the object. Which of them is to be preferred, or whether any one as yet known is unobjectionable in a sanitary view, we are unprepared to decide. If the measures here proposed should be adopted, the General Board of Health would become ac-

quainted with the different methods of constructing and ventilating public and private buildings, and would be able to recommend to the local Boards of Health, and to the people generally, those plans which seem best adapted to the circumstances of each case. Such information would be of great importance, whether regarded as contributing to the pecuniary or sanitary welfare of the people.¹

¹ "The importance of free ventilation will appear from the statement of a few simple facts:—

"The object of respiration is to bring the oxygen of the air in contact with the blood, by which the latter is deprived of its carbonic acid, and absorbs a new supply of oxygen. When the atmospheric air is taken into the lungs, it consists of about 79 per cent. of nitrogen, and 21 per cent. of oxygen, and nearly 1 per cent. of carbonic acid; when it is expelled, it is found to have lost about 9 per cent. of its oxygen, the place of which is supplied by an equal amount of carbonic acid. At the same time the blood has undergone an important change, from a dark purple hue, indicative of carbon, which is unfitted for the support of animal life, to a highly oxygenized fluid of a florid red color, carrying health and vigor to every fibre of the body.

"It is not our purpose to inquire into the manner in which these changes are effected; it is sufficient for us that they are produced, and that they are absolutely essential to the existence of animal life.

"As the rapidity with which the air is vitiated is not generally appreciated, the following calculations may not be unimportant: An individual breathes, on an average, from 14 to 20 times in a minute, and inhales from 15 to 40 cubic inches of air at each inspiration. According to Southwood Smith, it appears that in one minute an individual requires 616 cubic inches, or about 18 pints of air; and that, during the same space, 24 cubic inches of oxygen have disappeared, and been replaced by a like amount of carbonic acid; so that, in one hour, each adult person vitiates the air by the subtraction of 1440 cubic inches of oxygen. In one hour the quantity of air inspired amounts to 2 hogsheads, 20 gallons, and 10 pints; in one day, to 57 hogsheads, 1 gallon, and 7 pints; and, during the same period of time, 24 hogsheads of blood, or 1 hogshead each hour, and 144 ounces each minute, are sent to the lungs, to undergo the change already pointed out. Supposing 1 pint of air to be inhaled at each inspiration, which is very nearly the quantity, the amount decomposed is about one-fourth, or a quarter of a pint; so that each individual actually vitiates or poisons one-fourth of a pint of air every time he breathes. The rapidity with which this deteriorating process goes on is very clearly shown by placing a mouse under a large, tight glass jar, full of air. In a few moments it becomes uneasy, pants for breath, and in a short time dies in convulsions.

"There is another cause of deterioration of the air, not generally taken into account, which is of considerable importance. An adult gives off, by insensible perspiration, from 12 to 30 grains of vapor per minute; and it is ascertained that the air which has been some time in contact with the skin becomes chiefly carbonic acid gas. Tredgold states that it is desirable to change as much of the air of the room as the moisture given off would saturate in the same time. Accordingly, in a room at 60°, on the supposition, which is probably very nearly correct, that the moisture given off amounts to 18 grains, it will be necessary to change three cubic feet of air per minute for each individual in the room. If the temperature of the room be high, the exhalations of course will be in proportion.

"Our rooms and public halls have also to be lighted at night; and here is another source of deterioration of the air. Each gas-burner is found to consume as much oxygen as eight candles, and each candle renders about 300 cubic inches of air unfit for breathing every minute; so that two candles deteriorate the air as much as one individual. The total quantity of air, then, which will be vitiated by these causes, for each person, will be—

By respiration,	300	cubic inches per minute.
By exhalation,	5,184	" " " "
By lights,	432	" " " "

Total, 6,416 cubic inches,

Or nearly 4 cubic feet, per minute. It is necessary, therefore, in order to preserve the purity of the air, that the above quantity should be changed every minute. For example: If a room contains 200 people, there should be 800 cubic feet of air changed every minute, or more than would fill a room nine feet square and nine feet high; 400 people will require 1600 cubic feet of fresh air every minute. From the above estimates, any person may calculate the rapidity of deterioration in a close room, of given dimensions, occupied by a given number of individuals."—*Dr. Charles A. Lee: Am. ed. Copeland's Medical Dictionary, Vol. I, pp. 137, 138.*

XIX. WE RECOMMEND *that, before erecting any new dwelling-house, manufactory, or other building, for personal accommodation, either as a lodging-house or place of business, the owner or builder be required to give notice to the local Board of Health, of his intention and of the sanitary arrangements he proposes to adopt.*

The information which such a regulation might secure, would show the growth of a place, and the increase of house accommodations, but it would secure a much more important object. It would place within the possession of the local Board of Health a knowledge of the sanitary arrangements of every house. It is not intended that this regulation should interfere in the least degree with private rights, but confer a mutual substantial benefit. The Board of Health are supposed to possess a much better knowledge, generally, of the methods of constructing dwelling-houses, in regard to the particular sanitary objects they have in view, than the great mass of the people; and few persons, it is supposed, will be found, who will not feel grateful to them for any suggestion which might lead to real improvement. It is designed to be suggestive merely, not compulsory, unless a public injury is inflicted; then it will become the duty of the Board to interfere. A regulation similar to this exists in New York, Philadelphia, and many other places; and is found to work so well as to be worthy of general adoption.

XX. WE RECOMMEND *that local Boards of Health endeavor to prevent or mitigate the sanitary evils arising from overcrowded lodging-houses and cellar-dwellings.*

Such places are universally acknowledged to be incompatible with health. The hints already given, (p. 145,) have shown the destructive influence of corrupted air. Such air exists in these places, to a great extent, and its deleterious effects should by all proper means be avoided. This matter has attracted much though not the undeserved attention of different sanitary inquirers. Dr. James Stewart, of New York, in March, this year, procured a census of the cellar population of that city, and found that 18,456 persons lived in 8,141 rooms, in 3,741 separate basements. This is about 1 in 25, or 4 per cent. of

the whole population of the city.¹ The proportion of such inhabitants is believed to be nearly as great in Boston. In Lowell, and other places in the State, the same evil also exists. We are pleased that the present legislature, on the 21st of March, thought the subject of so much importance, as to pass the subjoined act. It gives all requisite legal authority to regulate the matter:—

“Whenever the Board of Health of any city or town shall be satisfied, upon due examination, that any cellar-room, tenement, or building, occupied as a dwelling-place within such city or town, is unfit for that purpose, and a cause of nuisance or sickness either to the occupants or to the public, such Board of Health may issue a notice in writing to such persons, or any of them, requiring them to remove from or quit such cellar-room, tenement, or building, within such time as the said Board of Health may deem reasonable. And if the person or persons so notified, or any of them, shall neglect or refuse so to remove and quit within the time mentioned, it shall be lawful for such Board of Health to remove them forcibly, and to close up such cellar-room, tenement, or building, and the same shall not be again occupied as a dwelling-place without the consent in writing of the Board of Health, under a penalty of not less than ten nor more than fifty dollars, to be recovered by indictment of the owner or owners, if they shall have knowingly permitted the same to be so occupied.”²

¹ A detailed account of the results of this highly commendable effort of Dr. Stewart, is being published, while this sheet is passing through the press, in several interesting and valuable articles. See the *New York Tribune*, June 5th, 13th, 19th, and July 9th.

² We are under great obligations to Dr. William H. Duncan, Medical Officer of Health of Liverpool, for the valuable communications on the subject of this recommendation, which are inserted in the appendix. The *Edinburgh Review* for January, 1850, (p. 217,) in allusion to this matter, says:—“It may seem hard to deprive the wretch of the bulk-head or empty cellar, which he is content to make his idle home; but it is one of those hardships with which acts of mercy often must begin. When the frightful demoralization of Liverpool was recently exposed, and it was shown that between thirty and forty thousand inhabitants of that fine city lived in dens called cellars, the bold resolution was taken of at once *amputating* this morbid mass, by rendering cellars illegal habitations. The operation commenced in 1842; and after about 3000 people were ejected, a more stringent method was adopted in 1847. The operation of removal—under the judicious management of Dr. Duncan, the Medical Officer of Health—was gradual, but systematic and steady; and near the end of 1849, 4700 cellars had been cleared of 20,000 inhabitants! Time enough has not elapsed to let the full effect of this bold measure be seen; but the officer of health has already had to report the significant fact, respecting one of the districts formerly most afflicted by poverty and disease, that, while the last epidemic preceding the clearance carried off 500 inhabitants, the cholera, which broke out during the time that the forced change of residence was in progress, slew the comparatively small number of 94.”

XXI. WE RECOMMEND *that open spaces be reserved, in cities and villages, for public walks ; that wide streets be laid out ; and that both be ornamented with trees.*

Such an arrangement would have a good effect upon the beauty and social enjoyments of the place ; but it would have a greater effect upon its general sanitary condition. Vegetation would absorb much of the carbonic acid gas which is produced in so great superabundance in populous places, and thus render the air more fit for respiration. Open spaces also would afford to the artizan and the poorer classes the advantages of fresh air and exercise, in their occasional hours of leisure.

XXII. WE RECOMMEND *that special sanitary surveys of particular cities, towns, and localities, be made, from time to time, under the direction of the General Board of Health.*

It is of great importance that the exact sanitary condition of every town in the State should be ascertained, that any causes unfavorable to health may be removed or mitigated. Partial attempts have been repeatedly made, by individuals and associations for a general or special purpose, to accomplish this object. Very limited success has, however, attended their efforts. Experience, thus far, has led to the conclusion that no plan can be successful and useful, unless conducted by competent men under the sanction of legal authority.

In 1839 and 1841, Dr. John D. Fisher, late of Boston, issued circulars to obtain information relating to the causes and fatality of consumption. Answers to this important circular were received from thirty-one individuals only.

In 1835, a committee was appointed to investigate the history of intermittent fevers in Massachusetts and New England generally, and a circular was issued and extensively circulated ; but two answers only were received. And in 1845, the Massachusetts Medical Society sent other circulars to the several towns in the State, but received a single answer only in return.

In 1830, the New York Medical Society issued a circular to the different county medical societies, soliciting information concerning the medical topography of that state. Replies relating to the following counties only have been received and

published:—Kings, in 1832; Saratoga, 1833 and 1848; Columbia, 1834; Madison, 1834; Onondaga, 1835 and 1849; Tompkins, 1836; Tioga, 1837; Binghamton, 1843; and Otsego, in 1848.¹

The American Medical Association, in 1848-9, made the most successful effort of the kind ever attempted in this country. Answers to their circular were received, giving sanitary sketches of Portland, Me., by Dr. J. T. Gilman; of Concord, N. H., by Dr. Charles P. Gage; of Boston and Lowell, by Dr. J. Curtis; of New York, by Dr. John H. Griscom; of Philadelphia, by Dr. Isaac Parish; of Baltimore, by Dr. James Wynne; of Charleston, S. C., by Dr. P. C. Gaillard; of New Orleans, by Dr. Edward H. Barton; of Louisville, by Dr. L. P. Yandell; and of Cincinnati, by Dr. J. P. Harrison. These papers, including the report of the committee, were published in the Transactions of the American Medical Association, (Vol. II, pp. 431-649,) and also in a separate volume. They are a highly valuable contribution on the subject.

Such surveys are exceedingly valuable and important, and it is desirable that they should be made, for general and not partial purposes, under the direction of the general and local Boards of Health, of several towns each year, until the exact sanitary condition of every part of the State shall be, as far as possible, definitely known. The annual reports of the local Boards of Health might furnish such additional information as would exhibit the changes or improvements which occur from year to year.

The matters which we recommend for consideration in such surveys, the mode by which they are to be conducted, and the manner of presenting the results to the public, may be ascertained by a careful examination of this report; and, especially, these recommendations; the circular; the special reports of the sanitary surveys, which may be found in the appendix; the reports to which we refer in the list of books there recommended; and the circumstances which will suggest themselves to intelligent local Boards of Health.

¹ Transactions of the New York Medical Society, Vol. I, pp. 30, 36, 174, 342, app. 41; Vol. II, p. 228; Vol. III, pp. 25, 151; Vol. V, p. 294; Vol. VII, pp. 61, 96, 131.