

HISTORY

OF

THE CITY OF NEW HAVEN

TO

THE PRESENT TIME.

BY AN ASSOCIATION OF WRITERS.

EDITED BY

EDWARD E. ATWATER,

AUTHOR OF HISTORY OF THE COLONY OF NEW HAVEN.

WITH BIOGRAPHIES, PORTRAITS AND ILLUSTRATIONS.



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the chief promoter of a plan for mutual city insurance.

For several years he served in the Governor's Foot Guard, rising to the rank of Major. While in command he quelled, with admirable tact and prompt decision, a riot growing out of popular feeling against the Medical College.

Judge Boardman repeatedly represented the town in both branches of the State Legislature, and was once Speaker of the House. His last service in the House was in 1851. In 1840 he was chosen to fill the vacancy in the United States House of Representatives caused by the resignation of the Hon. William L. Storrs. Shortly afterward he was elected to represent this district in the Twenty-sixth Congress, and served through the sessions of that body with great distinction. During the last twenty-five years of his life he retired from public service, and devoted himself almost exclusively to his domestic affairs and to the management of his large property.

On the 28th of July, 1857, he married Miss Lucy M. Hall, of Poland, Ohio.

He was especially interested in the prosperity of religious and charitable institutions, and gave to them liberally of his time, his money, and his sympathies. He was an efficient member of the Episcopal Church, and was Junior Warden of Trinity Church at the time of his death. He was frequently chosen as delegate to Episcopal conventions, both local and national, and always asserted a commanding influence in church councils. Trinity College honored him with the degree of A.M. in 1845, and of LL.D. in 1863. Of that institution he was a Trustee, and also of various educational, ecclesiastic, and eleemosynary foundations.

Judge Boardman contributed largely to the success of the New Haven Water Company after the city refused to build the water-works. Of that Company he was a Director, and for a number of years its President. He held similar positions in the Gas Company, the State Hospital, the Tradesmen's Bank, and the New York and New Haven Railroad Company.

In general he was quick to espouse the cause of public improvement, and gave of his time and means to every enterprise that promised to develop and build up the community. He was a conscientious steward of his ample fortune, scrupulously honest—a clear-headed, resolute, sincere man. He had a nervous, vigorous organization, both mental and physical. His nature was of that positive kind which possesses the elements of great personal power. Popular clamor and opposition could not shake his independence of thought and action. An ideal presiding officer, he has been seen to take the chair of an assembly when two-thirds of those present were hostile to the purpose of the meeting, and by his dignity and fearless address carry the business to a successful termination. He supported the cause of the Union with all the ardor of his being, and during his last hours was heard to exclaim, "Sustain the Government."

He died peacefully on the 27th of August, 1871, at the ripe age of seventy-seven years.

Judge Boardman was above the average stature, and of fine presence and bearing. Under a decided and sometimes brusque manner, there was concealed unusual tenderness of spirit. He was an appreciative neighbor, a genial companion, and a loving friend. "Those who knew him best, loved him best."

CHAPTER XXVIII.

WATER SUPPLY.

BENEATH the plain on which New Haven is built, is a plentiful supply of good water. In some places wells are twenty and even twenty-five feet deep; but elsewhere the water rises quite near to the surface. At the corner of the Green, where the town pump assuages the thirst of the multitude, the water level is about four feet lower than the sidewalk. Tradition reports that in the seventeenth century a stream flowed constantly from the Green to the Cutler corner, and thence diagonally, across the Lamberton Quarter, to East Creek. At the same time, copious springs gushed from the bank between George street and West Creek.

The level of the water is, of course, in consequence of the removal of forests, somewhat lower at the present day than it was two centuries ago. The reduction of inequalities in the surface of the ground has also tended to deprive us of the sparkling springs at which our forefathers quenched their thirst.

Wells were the main dependence of the inhabitants of our town for drinking water during more than two centuries. It was not till New Haven had become a manufacturing city, and felt the need of water for the production of steam in her workshops, that reservoirs were constructed and pipes laid for the introduction of a more plentiful supply than could be drawn from wells.

The increasing compactness of the city, and the substitution of a railroad for the Farmington Canal, forced upon thoughtful citizens thoughts of fire, and of the means of putting it in check.

The New Haven Water Company was incorporated in 1849. It made little progress, however, toward the creation of water-works for several years, during which the public mind was agitated with debate whether it was better that the city, in its corporate capacity, should provide water, or leave it to be provided by the company, which, having procured a charter for that purpose, had not yet

begun the construction of its works. At a city meeting, held June 1, 1852, a resolution was passed appointing a committee to inquire and report the most feasible method of supplying the city with water for the extinguishment of fires and other purposes. A careful investigation was made of the various sources of supply around the city, and trustworthy information was furnished to the committee in regard to the amount of water required, the capacity of the streams, and many other facts indispensable to a proper conception of the magnitude and great importance of the project.

The report of the committee was printed and ready for circulation in February, 1853, and its merits were thoroughly discussed by the friends and the opponents of the measure. The committee recommended,

First.—To procure a supply of water for the city, to be brought at the expense of the city from the Quinnipiac or the Mill River.

Second.—To instruct the committee to make application to the Legislature for such addition to the charter of the city as to provide for the transfer of the rights and privileges of the New Haven Water Company to the city, and any other matters proper to carry into effect the objects expressed in the first proposition.

A city meeting was held March 21, 1853, to take action on the report, at which Mayor Skinner, chairman of the committee, made a full statement of the objects of the meeting, and of the course taken by the committee. A resolution was then passed that an adjourned meeting be held on the 26th day of the same month, to vote by ballot on the propositions presented by the committee. Accordingly on the 26th of March the ballot was taken, and the city voted, by a large majority, in favor of both propositions.

In accordance with this vote, a Board of Water Commissioners was appointed and organized which, after an examination occupying five months, aided by celebrated engineers, adopted a plan and consummated a contract for water power, lands, etc., with Mr. Eli Whitney.

Meanwhile opposition to the construction of water-works by the city increased, till, on a petition to the General Assembly that another ballot should be taken, a bill passed that body ordering a new ballot and requiring a three-fifths vote in its favor to make it binding. On the 17th of July, 1854, this ballot was taken, and the proposition that the city should build the water-works was defeated by a large majority.

Of course nothing more was done by the city, except to satisfy Mr. Whitney for the failure of the Water Commissioners to fulfill their contract.

The introduction of water into the city being thus left to private enterprise, the New Haven Water Company, which from the first had maintained its organization, again came to the front. The original corporators assigned the charter, in 1856, to Eli Whitney, who petitioned the General Assembly in the name of the Company for suitable amendments, and having obtained them reorganized the Company. It was principally due to his energy and

assumption of pecuniary responsibility, in behalf of what was then considered a doubtful enterprise, that the works were finally constructed, Mr. Whitney advancing to the Company more than \$75,000.

The plan of the works was greatly enlarged beyond that which had been proposed by the city's engineer. The dam at Whitneyville creating the lake is thirty-five feet high and thirty-two feet thick at its base. In anticipation of its construction and the flowage it would cause, twenty buildings and three bridges were removed. The covered bridge of one hundred feet span was taken up whole and placed on abutments about forty feet high, a quarter of a mile up the stream from where it originally stood. Long lines of highway were also changed to avoid flowage.

The contractors for the construction of the works were Eli Whitney and Charles McClellan & Son. The sum paid them was \$350,000, of which \$150,000 was in cash, \$100,000 in bonds, and \$100,000 in stock.

The Company and contractors had unusual trials and difficulties, owing to the persistent efforts of opponents, who tried to obtain a rival charter with intent to supply the city from the Orange Hills.

The construction was commenced in the spring of 1860, under the charge of Mr. J. W. Adams as chief engineer and Mr. Thomas N. Doughty as his assistant. Water was introduced into the distributing mains on the 1st of January, 1862. The length of mains laid down at that date was 17 $\frac{3}{10}$ miles. The Company has now more than one hundred miles of pipe.

Mill River is the source from which the supply was at first obtained. It has a watershed of fifty-six square miles, and affords a daily amount throughout the year of 120,000,000 gallons. Since then two additions have been made to the supply. First, the franchises of a rival company owning the lakes in Maltby Park, west of the city, were purchased, and afterward, in view of the increase of population, the waters of Saltonstall Lake were acquired and added to the bountiful sources already at command. The additions were made in view of prospective, and not of present need. Mill River would of itself, with sufficient reservoirs, supply a city of 100,000 inhabitants.

Soon after the introduction of water into its pipes, the Company made a contract to supply water for all the occasions of the city, including those of the Fire Department, for the period of twenty years. This contract provided that the city at any time during the continuance of the contract, after ten years from the date thereof, might purchase the water-works, by paying an amount equal to the capital stock paid in and invested, together with interest of ten per cent. per annum on the same, less all dividends declared by the Company, and the city thereupon assuming the payment of all the bonds and other liabilities of the Company. This contract being made in 1862, the public mind was greatly agitated at the period of twenty years during which the city had the option of purchase drew toward an end. The same difference of opinion

existed as twenty years before in regard to the comparative desirableness of water-works owned by the city and water-works owned by a chartered corporation. The question was submitted to a popular vote, and the majority decided that the water-works should not be purchased by the city. This decision of the city not to buy, released the water company from all obligation to sell; and the two parties now make such terms as they can with one another, the water rent of the city increasing from time to time with the increase of population. At present the annual payment is \$16,000.

The different sources from which the Company derives its supply, all afford pure, agreeable and salubrious water. In the summer of 1865 there was a disagreeable taste and odor. Upon investigation it was discovered to be due to the use of water which had stood too long in the reservoir. The impartation of motion soon corrected the evil, and there has never been any serious complaint since then of the quality of the water. On the contrary, those who have observed the effects of the city water upon the human system, generally concur in the opinion that it is more favorable to health than that which our fathers drew from

The old oaken bucket, the iron-bound bucket,
The moss-covered bucket which hung in the well.

The effect of the water, by reason of its purity and softness, on steam boilers, is such as to prevent the formation of scale and keep the interior perfectly clean, thus greatly economizing the use of fuel.

The quality of the water, which the friends of the Company were delighted to find so excellent when only Mill River was drawn from, has not deteriorated since the lakes have been added to the supply. Citizens of New Haven may well congratulate themselves, not only on the abundance of water with which the city is blessed, but on its excellent quality, whether compared with that which quenched the thirst of their predecessors, or with that which is offered them when visiting in other cities.

The Hon. Erastus C. Scranton was the first President of the Water Company, but was obliged by the pressure of other duties to resign the office before the works were built. He was succeeded by Mr. David Cook, by whom the first printed report of the Board of Directors is signed. When the second annual report was issued, in 1864, the Hon. William W. Boardman was President, and he continued in the office till 1868, when he was succeeded by Mr. Henry S. Dawson, who has been President of the Company from that time to the present.

BIOGRAPHY.

HENRY SHEPARD DAWSON,

the son of a farmer, was born in New Hartford, Conn., July 3, 1813. His father's given name was Holt, his mother's maiden name, Irene Shepard. He lost his father when twelve years of age, and ever after supported himself.

On June 4, 1836, he married Miss Elizabeth Alling, of Orange. They had nine children, of whom only two survive, Sidney Holt, born in 1842, and Augustus Edward, born in 1844.

Mr. Dawson learned the trade of a hat finisher, at which he worked as a journeyman in eight different States, and in Washington when Andrew Jackson was President. He was a merchant in Plymouth Hollow for two years; and in 1841, when twenty-eight years of age, entered as a clerk in his brother's store on State street, New Haven. In connection with his nephew, B. H. Douglass, he bought out his brother. The firm Dawson & Douglass continued for many years in the business of general merchandise and manufacturers of confectionery, and were also engaged in the West India trade, running for eight years from one to three vessels to Porto Rico and San Domingo. From \$30,000 per annum their business increased to \$800,000.

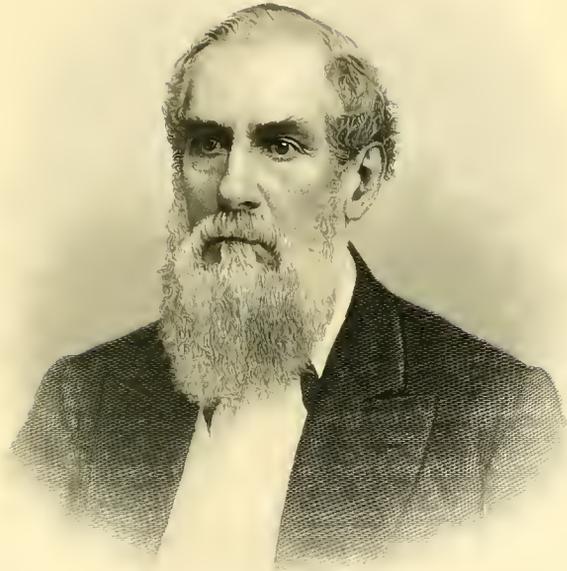
With an ardent, philanthropic nature, with faith in God and faith in man, Mr. Dawson early identified himself with public enterprises. He was the first President of the Derby Railroad, a work vitally important to the prosperity of the city. Since 1866 he has been President of the New Haven Water

Company, though for years previously he had been its Vice-President, and its success was doubtless due as much to his efforts as to those of any other person. It so absorbed him that he gave up his lucrative mercantile business, selling out to Mr. Douglass, and resigned his railroad presidency to devote his entire energies to the Water Company.

The original charter of the Water Company was granted in 1849, and a number of the ablest business men attempted to build water-works, but failed in getting the stock subscribed, the people lacking faith. In 1853 the charter was altered to enable the city to build them. After accepting this, the city finally refused to order the issue of its bonds through which alone the work could be prosecuted. Several more years elapsed and nothing was done, and it seemed as if New Haven was doomed to stagnate through the supineness of her people, and remain little more than an academic town, while smaller towns, through the introduction of water power, were becoming hives of manufacturing industry and places of general thrift.

While the prospects were so gloomy for the future of the city, seven gentlemen met, in 1859, in a private parlor, for one more effort. All honor to their names! They were Henry S. Dawson, Henry G. Lewis, E. C. Scranton, James F. Babcock, Minott A. Osborn, David Cook, and David G. Peck. Of these, Messrs. Dawson and Lewis alone are living.

After a very great effort on the part of these gentlemen, the stock was subscribed. The contract for the construction of the works was made in the



A. J. Dawson

spring of 1860, when suddenly the claims of a rival company were sprung upon them, and a conflict for the mastery began, which continued until after water was introduced in the city in 1862. It was only by indomitable pluck, hard work, anxious days and sleepless nights, that Mr. Dawson and his associates saved the city from the sore disaster of the ruin of this most beneficent institution.

From the knowledge gained in his early experiences, Mr. Dawson sympathizes with struggling working people, and he has unbounded faith in and for the masses. He has lately established a charity called "The Bread Fund," by a gift of \$1,000 to the city, which is characteristic of him. This is a nucleus. He hopes and believes that this fund will ultimately reach a large amount, so large that at a future day the poor may be fed and clad by the free-will offerings of their more fortunate, prosperous fellow-citizens without begging and without a resort to taxation, thus creating peace and good-will between all classes.

During the most distressing period of the rebel-

lion, when the hearts of multitudes were in anguish as to the result, Mr. Dawson's faith never forsook him; but his patience did when McClellan, with his magnificent army of 200,000 men, lay idle for month after month before Washington, under pretense of guarding the city. At this juncture he wrote to President Lincoln to call for 25,000 volunteers over forty-five years of age, to go to Washington, equipped at their own expense, asking only their food of the Government, while they would defend the city and allow the army to move upon the enemy. Had the call been made, he would have been one of the volunteers.

Mr. Dawson has filled many positions in the city government, and has always proved true to his trusts. He is exactly six feet in height, full-chested, of extraordinary personal agility, and his eyes are intensely black and sparkling, while their brows are heavy, dark and overhanging; his beard is long, white and flowing; his countenance patriarchal, impressive and quickly responsive to every shade of emotion, whether it be joy, sadness, sympathy or indignation.

CHAPTER XXIX.

SEWERAGE.

TWO kinds of drainage are essential to the health of a city. A porous soil is favorable to a dry atmosphere and thus to health. But, however dry the soil of a city may be by nature, there must be some means devised, as the city increases in population, of removing the dampness and filth produced by so many animal organisms; or else, however dry the soil may have been originally, the air is poisoned more and more, from day to day, till a pestilence depopulates the city.

New Haven has by nature a dry soil, and till the middle of the present century had so sparse a population that there was little need of sewerage. There were indeed at an early date some subterranean sluices, by means of which a heavy rainfall could be conducted into the two creeks which nature had provided for the drainage of the town plat.

The sewerage of the city which its increasing population required, commenced with the introduction of the Mill River water in 1861. A sewer discharging into the harbor was immediately constructed through State and George streets, at the expense of the city.

The introduction of water through our streets, says Mayor Welch, in his address to the Common Council, in 1862,

will give rise to the important subject of sewerage, and will demand at the hands of the Council the greatest consideration. The construction of the George street sewer, though at heavy expense, will be of great benefit to all living on that slope of the city. Accurate surveys have established that by connecting sewers the drainage from State, Church, College, and numerous streets may be turned into the main channel.

George street sewer was built under a supposed public

necessity, and therefore was paid for entirely from the city treasury. As other sewers, if ordered, may not come under like influences, and as we have no law assessing benefits on adjoining proprietors for sewer work, it is a proper subject for inquiry whether a public law is not required whereby a part of the cost may be assessed to adjoining land-owners, and the balance paid by the city?

The George street sewer having been constructed at the expense of the city, without any assessment on private property, a charge was made of fifty dollars for each connection with it, whenever it was opened for the benefit of an adjoining proprietor.

We have said above that the sewerage of the city commenced with the introduction of the Mill River water. The George street sewer was intended as the commencement of a system; but it was soon seen that some much more extensive plan must be devised to answer the requirements of the whole city, especially in view of its prospective increase.

The plain on which New Haven is built has but little elevation above the level of the sea, and is of considerable extent. These features of the site made the drainage of the city a comparatively difficult problem, and the municipal authorities wisely sought the best professional advice. Noticing that Chicago had similar, though still greater, natural difficulties to surmount, and hearing that the sewers of Chicago, though not yet completed, had already improved the sanitary condition of that city, they employed Mr. E. S. Chesbrough, C. E., then City Engineer of Chicago, to prepare a plan for a system of sewers adapted to the peculiar requirements of New Haven.

Mr. Chesbrough forwarded to Mayor Lewis a pre-

liminary report on the 4th of March, 1871, and a final report on the 30th of December, 1872.

The preliminary report assumes that the following objects are essential in any plan that might be adopted, viz.:

First.—Undoubted efficiency in the works as far as they may be carried out, to meet existing demands.

Second.—Capability of further extension to meet future demands, without rendering useless important portions at first constructed.

Third.—The least possible expenditure compatible with the foregoing essentials; and

Fourth.—The consequent use, as far as practicable, of existing sewers.

During the interval between the two reports, sewer work was prosecuted in accordance with these views, so that every sewer laid, whether large or small, contributed toward the completion of the system.

The general plan recommended by Mr. Chesbrough, and adopted by the city authorities, is thus described in his final report.

The area of the present corporate limits of New Haven between Mill and West Rivers, is about thirty-eight hundred acres. A small portion of this area, about two hundred acres bordering West River, and about one hundred acres bordering Mill River, is salt marsh.

The topography of the city is such as to afford facilities for the construction of an excellent system of drainage at a very reasonable expense. The locations of the railroads, particularly the Derby road and the Northampton road, render necessary a modification of what would otherwise be the most natural and efficient plan.

The surface drainage of the eastern portion of the city, comprising an area of about eight hundred acres, flows into Mill River. That of the central district, about twelve hundred acres, flows southerly into the harbor. The western district, an area of about sixteen hundred acres, is drained by the West River.

There is a very small area in the northern part of the city, the surface drainage of which flows at first northerly, but it passes into Beaver Pond Brook and ultimately into West River.

The elevation of the central portion of the city—for instance, Church street between the Post Office and the City Hall—is about twenty feet above tide. The elevation of College street directly in front of the principal College buildings, is about forty feet above tide. This plain rises very gradually in a northerly direction. The elevation of the summit between the harbor and West River is about forty-five feet above tide at the intersection of Orchard street and Whalley avenue.

Prospect Hill in the eastern district rises to about one hundred and fifty feet above tide-water, but the drainage of this part of the city is so simple and obvious, that it is hardly possible to adopt any other plan for it than the correct and natural one. The details of such a plan must be left till the streets are laid out.

For convenience in describing and understanding the plan of drainage, the area of the city has been divided into five drainage districts. The boundaries of these are as follows:

District No. 1 is bounded on the west by Olive street as far as Chapel street and by the Northampton Railroad from Chapel street to Trumbull street, thence by a line running to the junction of Sperry and Goffe streets, thence by Webster and Winter to Charles street, thence by a line running to the junction of Dixwell avenue and Shelton avenue, and thence by Shelton avenue to Ivy. It is bounded on the north by Ivy street and Highland avenue to the summit of Prospect Hill. This district comprises all the city limits on the east side of Prospect Hill as far as Mill River. It is bounded on the east by Mill River, and on the south by the harbor.

District No. 2 is bounded on the west by West River; on the north it extends very nearly to the northern line of the

city. It is bounded on the east by District No. 1, as far as Sperry street, and by Sperry, Garden, Gill and Day streets to West George street; and on the south by West George street and Derby avenue.

District No. 3 is bounded on the north and east by Districts No. 1 and No. 2, on the south by the Derby railroad; and on the west by Daggett street to Congress avenue, Vernon street to Davenport avenue, Hubbard and Howe streets to George street, and by George street to Day street. It is proposed to locate the outlet for this district along an extension of Meadow street to the channel of the harbor.

District No. 4 is bounded on the north by District No. 2; east by District No. 3; on the south by the Derby Railroad; and on the west by West River.

District No. 5 embraces all that part of the city south of the Derby Railroad.

The foregoing description gives, in the language of the report itself, a general outline of the districts, without defining exactly the bounds of each. Slight changes have since been made in the boundaries of the districts thus outlined; and another district was necessarily added to the system to provide for Fair Haven, which was comprehended within the city limits after Mr. Chesbrough began his studies.

The sewage of District No. 1 is discharged into the harbor at the foot of East street through a sewer which is built out to the channel on piles, the bottom being of plank, the sides of stone, and the arch of brick.

By an ingenious contrivance the East street sewer is relieved in case of a heavy rainfall by a sewer which crosses it at Laurel street and empties into Mill River. The contrivance consists of a dam which confines the sewage water, and forces it to flow through the East street sewer till the depth of water increases to twenty-three inches, when it overflows the dam and passes off into the river, so diluted with rain water as to be harmless.

Two other overflows have recently been constructed to relieve the East street main, one at Grand street and one at Greene street; the latter of creosoted wood where it is beneath the Foundry of Messrs. Wheeler & Mallory.

There being no opportunity of relieving the main outlet in District No. 3 by an intercepting sewer, the whole volume of sewage from the central part of the town is brought under Meadow street, and under the track of the Consolidated Railroad to deep water in the harbor, where it is discharged through an outlet six feet in diameter.

The three remaining districts of the five included in Mr. Chesbrough's plan were to have their respective outlets into West River; and the plan included several such auxiliaries as District No. 1 has in the Laurel street overflow. Some changes have been made in the details of the plan as the work proceeded, the chief of which provides that the Boulevard sewer by the side of West River, shall discharge, not into West River, but into deep water on the east side of Oyster Point. This sewer, the construction of which is already commenced, is to reach from Oyster Point along the western slope of the city to Westville, and is of greater size at its lower end than any other in the city, its transverse diameter at the outlet being seven feet and its height five feet nine inches.

District No. 6 comprehends the territory between Mill and Quinnipiac Rivers. It was not included in the plan of Mr. Chesbrough, because it was not within the limits of the city when the matter was submitted to his consideration. The present plan includes for this district two main sewers, one discharging at the foot of James street, and the other at the foot of Poplar street, the latter being already constructed as far north as Grand street. Both these sewers are to be relieved by overflows into the two rivers which inclose the district.

When the sewers which the Chesbrough plan, as thus supplemented by the studies of our own engineers, contemplates are all built, New Haven will possess the means of a very efficient drainage. Already the sanitary condition of the city is improved by what has been done since 1861. One after another, masses of filth are removed; and by connection with the sewers, one house after another escapes the disagreeable and dangerous gases which in the olden time rose from every homestead, however inimical to filth its inhabitants might be.

In some parts of the city, sewerage has been made to contribute to surface drainage. For example, Commerce street was laid out where the bed of West Creek once was, and but for precautions taken, the earth with which the bed of the old creek was filled and raised to the desired level, would have been continuously moistened by the springs which had fed the creek with little streams from the east and from the west. Rows of draining tile were laid to intercept these streams and conduct the water immediately to the sewers, and with such success that few streets are drier than that which marks the course of the creek through which the first planters of New Haven sailed as far up as the foot of College street.

Study of the sewerage of the city brings to view many ingenious devices and inventions of the civil engineers who conduct this subterranean work. A sewer-well is a device for discharging into a deep sewer one which is much nearer the surface of the ground. Such a well makes it possible to place a sewer only twelve or fifteen feet below the surface, which but for such an expedient must have been put at twice the depth. The cost of construction and of making connections is of course much less than if the sewer were twice as deep.

Several contrivances have been devised for cleaning and flushing the sewers. A wooden cylinder is used for removing the constantly increasing sediment and the hard substances which by accident sometimes lodge in the sewers which are too small for the passage of a man. The cylinder being an inch less in diameter than the caliber of the tube, rises to the top when a cistern full of water is dropped through a man-hole behind it, and thus causes the water to scour the bottom of the sewer, the cylinder being kept under control by a cord reeled off at the surface. By this contrivance such velocity is given to the water that neither sediment nor brick-bat can remain in place. Brick sewers are cleaned by means of a specially designed truck,

made adjustable to fit any size and shape, which runs through the sewer and transports the obstructive matter gathered by the workman to man-holes, where the buckets are hoisted out.

All sewers having an interior diameter of 24 inches or more are built of brick. Those between 15 and 24 inches are of brick or of vitrified stoneware, at the discretion of the engineer, taking into consideration the prices of materials and the particular requirements of the locality; brick sewers being more expensive, but preferable in damp places, because the material, though not sufficiently porous to allow the escape of sewage, is always slowly, but surely, drawing off into the sewers from the earth above them, the excess of moisture. The smaller sewers are now made of vitrified stoneware, the use of cement pipes having been abandoned.

Some of the streets in New Haven have so little elevation above the level of the sea, that the engineers have not been able to give the sewers as high a grade as is desirable. Of the sewers now built, that in East Water street, between Franklin and East street, has the least grade, there being but one foot fall in a length of 1,093 feet. The main outlet sewer on the extension of East street has a grade of one foot fall in 1,000 feet. The Boulevard sewer is to have in the lower part of its course only one foot fall in 2,500 feet. Experience has shown that the East street sewer is kept clean by the action of the tide; and it is confidently expected that Neptune will considerably render a similar service to the western side of the city when the Boulevard sewer invites him to enter.

The aggregate length of sewers constructed to January 1, 1886, is forty-four miles.

When the George street sewer was built, there was no law authorizing the city to assess upon adjoining proprietors any part of its cost. A difficult part of the problem of sewerage was to determine what part of the cost should be borne by the public and what part by the owners of the land specially benefited. It was finally settled that one-half of the whole cost should be paid out of the public treasury, and the other half assessed on the owners of the property whose value was enhanced by the sewers. But as large sewers were necessary in some streets and small sewers were sufficient in other streets, the expense of the whole system was estimated, and the aggregate divided by the number of feet. One half of this quotient, the other half being paid by the city, was the sum to be assessed on adjoining proprietors for every foot of sewer in front of their premises. By this rule the average cost of sewers, with all their appurtenances, being about \$7 per foot, \$1.75 is assessed on land-owners on each side of a street for every foot of sewer, an equitable rebate being allowed on corner lots which have been previously assessed.

Maps are kept in the office of the City Engineer which show in every street the location, size, and material of the sewer; the grade of the street and of the sewer; the depth of such sewer below the surface of the street; and the height above mean

high water. Such a map shows the location of the man-holes, basins, culverts, and hubs for house connections, and indicates whether such connections have been put in. Distances are accurately marked on the map, so that by measurement from the curb-stones and from the man-holes, any hub can be found with the least digging possible in the case.

The Hon. Henry G. Lewis was the Mayor of New Haven when Mr. Chesbrough was employed to devise a system of sewerage. The city is greatly indebted to Mr. Lewis for the foresight which pro-

vided the system, and the persistent energy with which the work of construction was prosecuted till the tide of public opinion had risen to strong approbation.

Mr. Charles E. Fowler was City Engineer, or, as the officer was then styled, City Surveyor, and had charge of the work of construction till his lamented death. Mr. A. B. Hill, C. E., who had been his assistant, became his successor, and still superintends this, as well as other departments of public works.

CHAPTER XXX.

HEALTH.

BY PROFESSOR WILLIAM H. BREWER.

THE town of New Haven is a healthy one, and its death rate very low as compared with other places of its size. This has been the case as a whole since there have been any statistics kept, and all the data we have indicate that this has been so ever since its first settlement. This fact might also be legitimately inferred from the nature of its site and the character of its people.

SOIL AND TOPOGRAPHY.

The natural features of soil, climate, topography, exposure and position are all favorable to health.

The bay and harbor open southward to the Sound, which is here more than twenty miles wide, giving us free circulation of air in that direction, and in summer a maritime climate. The town incloses the bay from the old Light-house to West River, but most of the population live on a sandy plain or terrace not over fifty feet above tide-water, between the West and Quinnipiac Rivers. This plain extends southward across West River to the Sound, and northward into Hamden; and, taken as a whole, with its immediate surroundings forms a rather well-defined topographical region, having a distinctive character and most uncommon interest.

The sandy terrace spoken of is bounded on the east by the sandstone and trap ridges of East Haven, granite forming the rocky shore from Morris Cove to the old Light-house. On the west it is bounded by the rounded, wooded hills which constitute the Woodbridge plateau; hills of moderate height, and consisting geologically of highly metamorphic rocks which are much folded and contorted. On the north it is bounded by the Mount Carmel range, a trap ridge, which is in places over eight hundred feet in height.

Along the northern borders of the town, rising abruptly from this plain, are the four well known trap hills, or "Rocks," having wooded slopes on their far sides, but presenting bold precipices and picturesque crags toward the city.

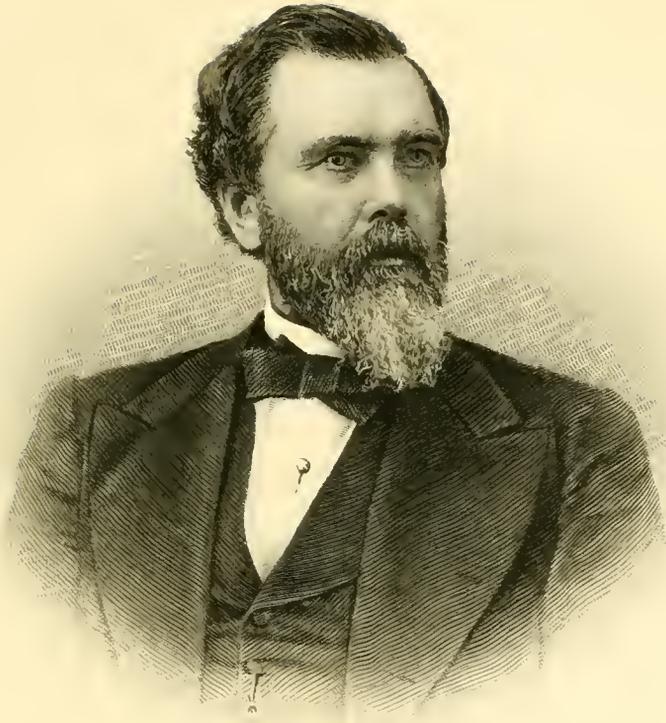
East Rock, three hundred and sixty feet high, lies between the Quinnipiac and Mill Rivers, rising

almost in a single crag on its front, and extending northward a few miles as a low sandstone ridge. Immediately west of this is Mill Rock, two hundred and twenty-five feet high, Mill River flowing in the narrow gorge between the two and which is here dammed, forming the Whitney Lake, New Haven's present chief water supply.

Pine Rock rises from the plain a mile and a half farther west, and is two hundred and seventy-one feet high, and a scant mile still farther west, and separated from it by Wilmot's Brook, is West Rock. This is four hundred and five feet high, and extends northward some miles as a bold, rocky, wooded ridge, throwing off a spur on the eastern side which curves around to Mount Carmel, and thus forms the northern boundary of this distinctive region. West River flows along the west base of this ridge.

Beaver Meadows, or Beaver Ponds, is a narrow, peaty swamp which occupies a remarkable depression in the plain between Pine and Mill Rocks, whose bases are a mile apart. This depression in the plain is a mile and a half long and from a few rods to one-fourth of a mile wide, mostly occupied by a deep, peaty bog, the bottom of which is below the sea level, and the existence and character of which is a problem to both sanitarians and geologists. It is apparently the remains of an old river channel, left unfilled when the great glacier left the valley at the time the region was wrought into its present shape. It is fed by pure springs; a considerable stream issues from it; and its sides are mostly abrupt, rising to the level of the dry sandy terrace above, which extends northward around these isolated hills and is continuous with the Hamden plains.

Several low, rounded, gentle ridges, composed of soft coarse red sandstone, of triassic age, running in a general north and south direction, rise from the general level of the plain. One stretches northward from East Rock into Hamden, and two others extend southward from Mill and Pine Rocks into the city. The origin of these ridges is as interesting as their aspect is picturesque. The general features of this plain were determined, topographically, by the great glacier which, in a former geological



Henry G. Lewis

period, came from the far north, down the Connecticut Valley and passed out off the coast, and which ground and scoured away the softer sandstones, while the harder trap rock resisted the abrasion. These two sandstone ridges stretch southward from Mill and Pine Rocks, just as on a planed board one sometimes sees a minute ridge of wood stretch from a slightly projecting nail which nicked the planing tool. Beaver Hill, a hundred feet high, south of Pine Rock and Prospect Hill, a hundred and fifty feet high, in the shelter of Mill Rock, were thus left by the great glacier which planed away the sandstone on either side.

At the time of the settlement, two small streams, which have now disappeared, crossed a part of the plain included within the city.

West Creek flowed where Commerce street now is, crossing Chapel street near Park street, and vessels could then come up to above High street. The stream first disappeared at its upper part as the town grew, but between George and Oak streets it remained as a foul sluggish stream with swampy sides, a vexatious source of ill-health for some 240 years. The trouble lingered until about a dozen years ago, when a sewer was laid in its bed, the swamps were drained and filled up, and Commerce street laid out on its site, since which it has entirely disappeared as a surface stream.

Between the head of this stream and the Beaver Meadows, there was formerly a series of remarkable depressions, to which the name "Kettle Holes" have been given by geologists, their bottoms occupied by peaty swamps or water, some of which have been troublesome sanitary problems, but as the city has spread about them they have been, or are being, filled up or drained.

Another small stream, called East Creek, came down north of the present cemetery. This channel was enlarged into the Farmington Canal in 1828, which twenty years later gave way to the tracks of the Canal Railroad. In the old bed of this stream the railroads pass through the heart of the city, under the streets. The natural waters are now carried off through the sewers, so that the stream has disappeared from the surface.

But these two old water-courses have been long-standing problems in the sanitation of the city, making the sewerage much more difficult, and in one way and another have had a curious and permanent influence on the history of the place. They, in fact, determined the whole street plan of the city. Between them the original nine squares were laid out, and the direction of all the streets of the city, except those on Oyster Point, bears some natural relation to them.

The sand and gravel of the plain are deep and stratified, and make dry building sites and dry streets. Good water can be found at a moderate depth, and wells constituted the only water supply for more than 200 years, and there are still nearly 3,000 in use in the town.

While this dry sandy soil is in many ways favorable to health, and was of even greater relative value in the earlier history of the place than now, it has also its disadvantages. Its porous char-

acter made cesspools so easily effective for concealing filth, that it delayed the time of sewerage the city until the increasing soil pollution showed itself in a positive way on the health of the community and in the character of the diseases, and since the introduction of city water has made sewers a sanitary necessity.

The growing city has encroached on the bay. Streets now exist where formerly vessels went, and some sanitary problems incident to these made-lands are in store for the city to solve in the future.

The native trees are mostly those incident to a dry, deep soil, the oak, chestnut, elm, ash, maple, etc., and in the streets of the city the American elm flourishes with especial luxuriance. As might be expected from the varied topographical features, the local flora is very rich in species, embracing as it does both coast and inland vegetation. A catalogue prepared by local botanists enumerates more than 1,200 species of flowering plants growing spontaneously in the vicinity, a very unusual number to be found in one place, and amounting to nearly one-half of all the kinds which are found north of Virginia and east of the Mississippi.

Salt meadows lie on either side. Those on West River formerly extended up three miles from the bay, through which the stream sluggishly meandered, but a dike built a century or more ago has restricted the area, and the stream is now being straightened. Those on the Quinnipiac are much more extensive.

The city is sheltered from the full force of the winter winds by the high rocks and ridges which inclose it on the north and northwest, and with the southerly and southwesterly winds of summer tempered by the Sound and the ocean beyond, the climate is mild and salubrious.

Such are the chief natural features of the region, which, if considered in detail, are wonderfully varied. In fact, I know of no other city in the whole wide world that has such a variety of topographical and geological features in its immediate vicinity. Excepting limestone, all the other great classes of rock which go to make up the crust of our planet are found here—granite, sedimentary sandstone, eruptive dikes, and metamorphic rocks of great variety of texture and composition. And the surface topography furnishes almost every kind of feature known to map-makers—coast and inland, sandy beach and rocky shore, salt-water bay and fresh-water land-locked lakes, both natural and artificial. There are sluggish rivers winding through low salt meadows, and sparkling brooks leaping in bright cascades in the rocky hills; natural streams, artificial canals, and dry water-courses; there are barren sands and fertile valleys; there are rugged, though low, mountains and monotonous plains; there are gentle slopes, picturesque precipices and grand crags; there are rolling hills and abrupt steeps; there are woodlands, and fields and gardens, and farms and orchards, and all the features incident to a large city and its approaches by land and water, with its roads and railroads, and bridges and cuts, and embankments and wharves; there are deep navigable waters and shallow sand-

bars, and overflowed tide-lands and rocky reefs, and beyond all the broad blue Sound, stretching away to the horizon. In short, there is almost every variety of feature, except glaciers and perpetual snow, which a topographer is ever called upon to portray on a map, and all within five miles of the City Hall. This wonderful variety of geological structure and topographic feature, imparts peculiar picturesqueness to the landscape, and perhaps no other drives in the country of equal length present such a number and variety of striking and beautiful views as those in East Rock Park.

These picturesque and beautiful natural features have their healthful influences, and I doubt not are one important reason why this is a healthy city.

EARLY HEALTH HISTORY.

The early health history must needs be very incomplete, from the scarcity of data. The healing art was crude, medical science in its mere infancy; sanitary science, as we now know it, had no existence, and official records relate to other matters. Without vital statistics we can have only a crude means of comparing the health of different places at one time, or of the same place at different periods, and such statistics are entirely lacking until after the Revolutionary War. In 1672, an act was passed in the colony providing for a record of the births and deaths, but it was not enforced, and it appears to have been dropped from the statute books with the revision of 1702.

In the *Connecticut Journal* of March 18, 1789, a medical man recommended that "an accurate register of the bills of mortality" be kept, as such a record "has been found to be of great utility in most civilized countries," but nothing came of it until many years later. Private letters, diaries, etc., give incidental mention of particular years when some specially dreaded disease became epidemic, or when there was more general sickness than usual, or when an unusual number of the better known citizens died, and these mere glimpses contain about all that is now known of the matter for the first hundred and sixty years of the colonial history.

The local newspapers give curiously little information on this point; only an occasional mention of some prevailing epidemic, which it assumes its readers know all about, is all that we find until the yellow fever epidemic of 1794, which occupies more attention; the official action regarding it is published, and the next year tables of deaths begin to be published.

Noah Webster published, in 1799, "A Brief History of Epidemic and Pestilent Diseases," in which there are many detached bits of information as to epidemics in New Haven. The Medical Society which was organized in the last century, began to keep a list of deaths some time after 1800, which list is said to be still in existence, but it was necessarily very imperfect. In 1799 the Connecticut Academy of Arts and Sciences was organized, and one of its first works was to issue a circular asking for information pertaining to the town. As a result of this, Rev. Timothy Dwight,

President of Yale College, prepared "A Statistical Account of the City of New Haven." This paper appears to have been in preparation for many years, and was first published in 1811. It has been made more accessible by republication in the City Year Book for 1873, pp. 417 to 476. In this he appears to have collected all the information accessible, both as to epidemic years and death statistics. He collected the tables printed in the newspapers for the preceding sixteen years, and gives other figures where he can get them. Some of the church societies had kept lists of their burials, and he prints that of the First Society for the twenty-four years from 1763 to 1786 inclusive.

Inasmuch as most of the early lists related to burials, it often includes persons who lived out of the town, but who worshiped in it during their lives and were buried here, and thus went to swell the list.

A new settlement has many conditions favorable to health, unless the natural features are bad. The colonial stock was a hardy and vigorous race of men, and their simple and regular lives, as well as moral habits, were favorable to health. The sparse population escaped the dangers incident to crowding, the soil was not yet saturated with the filth incident to long occupation, and various other conditions lessened the dangers to which the older and denser communities of Europe were then subject. Filth diseases were less liable to break out, and contagious diseases were easier controlled.

There were some special dangers, but they were more than counterbalanced by the advantages. The hardships of the times were less destructive to life than is popularly believed, but the clearing up of the forest and disturbing a new soil brought malarial diseases; but in fact these appear to have been no more severe than have visited the town within the last twenty years. If the death rate was high at times, and epidemics raged which are now almost unknown, it is because our modern knowledge has given us better control over them, and this town was then no worse off than the rest of the world.

There was then a much greater difference between the mortality of different years than now. Certain of the zymotic diseases, then known under the general term of "fevers," often became epidemic and very fatal, and our health history, until the present century, consists almost entirely of the mention of the exceptional years of much sickness. These diseases, mostly arising from local causes, were often very local, so a bad year in one town might not be a bad one in another not far away. They were usually attributed to atmospheric influences beyond our control.

In 1647 there was a "malignant fever" here. In 1655 "a faint cough" was so prevalent throughout New England that few persons escaped, "occasioned by a strange distemper of the air." In the spring of the same year, Mr. Davenport writes that "the winter hath been extraordinarily long and sharp and sickly among us," and that his own family had been spared "from the common sickness in this town." Trumbull says that there was