

THE WATER SUPPLY OF OUR GREAT CITIES. IV.

As the Schuylkill river is growing more and more corrupt, and as either the Schuylkill or the Delaware water would have to be pumped by expensive machinery to make it available for distribution, the citizens of Philadelphia have no alternative in securing an abundant, pure, and cheap water supply for the future, but to abandon both these rivers, and look for a source as near as hand as practicable, from which, by gravitation, the needed amount may be procured.

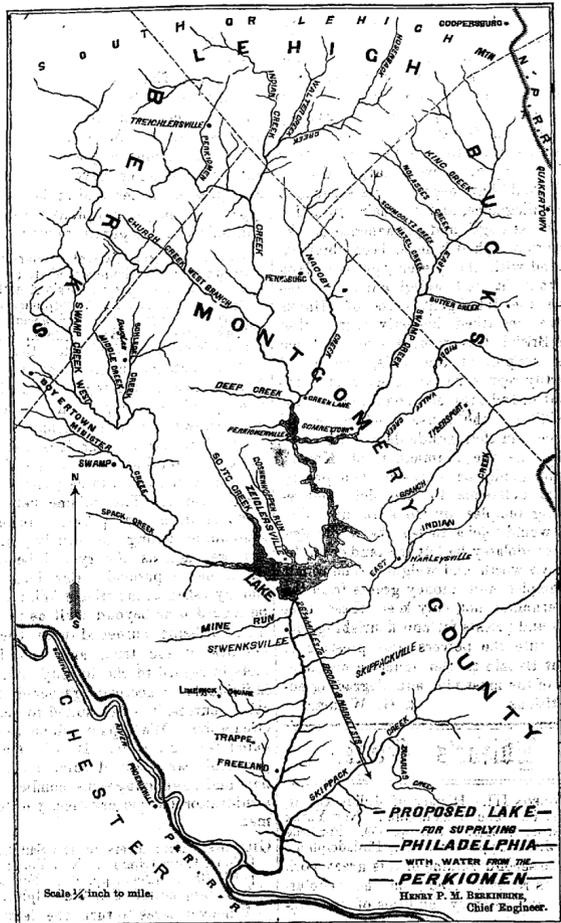
Now, Philadelphia is highly favored in being almost entirely surrounded by a well-watered, rolling country, rising, in some directions into heights far above the level of its built up portions. Streams of considerable volume rise in these high regions, and fertilize and give beauty to the picturesque valleys between. A dozen or more of these rivulets—they would be dignified as rivers, and their banks would be adorned by the castles of the nobility, and all the charms of poetic and classic imagery would be connected with them, if they were in England,—a dozen or more of them, tributaries of the Delaware and the Schuylkill, rise and flow in a course sufficiently near to the city to attract the eye of an engineer charged with the problem of supplying its population with water. Let us glance at these streams and test their capacities.

The chief engineer charges himself in his preliminary survey with the examination of all of these streams, which seemed to promise any important results. Commencing with tributaries of the Delaware, his report embraces remarks and suggestions upon the head waters of the five familiar streams, whose mouths are successively passed as we descend from the mouth of the Schuylkill to the mouth of the Brandywine, viz.: Cobb's, Darby, Crum, Ridley, and Chester creeks. They may all be classed together as of the same general character. With them, too, might be joined the classic waters of the Brandywine, which he does not mention. This stream, though further off in its general course than the others, yet stretches with its head waters far toward Valley Forge.

It is a stream naturally of remarkable purity and sweetness, whose qualities are well known and esteemed among the people and the manufacturers of Wilmington. Its waters might be reached and stored for the uses of our city at or near Downingtown. A stream so large and so available has obviously been left unmentioned by the engineer, on account of the vast manufacturing interests which would be destroyed by seriously diminishing the flow of its waters. But there is one objection alike applicable to the Brandywine and the five other tributaries of the Delaware, which have been mentioned; they all take their rise in Chester county, and from their sources to the points suitable for collecting their waters, they flow through some of the most highly cultivated and populous regions in the State or the country. Thus, one of the branches of Chester creek rises in the borough of West Chester, and receives all the drainage of that large and well-cultivated town; and all of them must more and more assume the characters of sewers of the populous and fertile districts through which they flow. The insignificance of these streams, too, is seen from the fact, that if the head waters of all of them, except the Brandywine, were united in one engineering scheme, mentioned as practicable, but not recommended by Mr. Birkinbine, the resulting supply would be but one hundred million gallons per day—an amount far justified in the great outlay required. If possible, we must build works which shall be sufficient for a generation or two to come; and it appears that if the demands of our city population for water increase for the next twenty-five years, at the rate they are now doing, we shall need at the expiration of that time, one hundred and fifty million gallons a day.

Passing now to the tributaries of the Schuylkill, and omitting the inconsiderable streams upon the western side, we come first to the romantic Wissahickon. This stream rises in Montgomery county, and after running a most picturesque course of nineteen miles southwardly, it enters the Schuylkill, four miles and a half above Fairmount dam. The capacity of this stream alone is but little over one-fifth of that of the five united tributaries of the Delaware already described. There is little danger, therefore, that its attractions as a resort for pleasure-seekers, or as a seat of numerous mills and factories, will be interfered with. Three other streams intervene before we reach the largest tributary received by the Schuylkill in all its course; a stream larger than all of the five tributaries of the Delaware combined. This is the Perkiomen, which takes its rise far away in the hill country of Berks county, among the wild and romantic glens of South Mountain. Touching upon portions of Lehigh and Bucks counties, and traversing the northern portion of Montgomery county in its course, it empties into the Schuylkill, three miles below Phoenixville.

This is a stream of the most interesting character. Its course is mainly through a rough, unproductive country, until within six or seven miles of its mouth. The rocky character of its banks protects it from the disturbing effects of freshets. It was after a season of protracted, heavy rain that we first visited this stream. A most excellent opportunity was afforded us of contrasting the widely-different effects of the freshet upon two streams in close proximity, but of widely different drainage. Our road lay across the Skippack, a large and sluggish tributary, which enters the Perkiomen near its mouth. This stream we found nearly the color of chocolate. In a few moments, we were crossing the main stream, on one of those magnificent stone bridges which, after nearly a hundred years, remain the delight of the traveller and the engineer alike. The contrast in the appearance of the stream was really astonishing. There it flowed, comparatively bright and pure, innocent of all signs of freshet, save in the fullness and rapidity of its waters, limpid as those of a mountain torrent. The reason for the difference is obvious. The Skippack flows through a cultivated region, the geological character of which is the presence of red shale, while the watershed of the main stream and higher tributaries of the Perkiomen is little cultivated, and is marked by hard sandstone and still harder trap-formation, the best guarantee in the world for the crystal purity of the water it retains. It is, of course, above the mouth of this turbid tributary,—to which we owe much of the discoloration of the Schuylkill during a freshet,—that the works for the supply of the city are contemplated. The area of surface drainage upon which we should thus depend, and from which the creek and its tributaries would gather up the rain-fall, would be no less than two hundred and twenty square miles. Plant one limb of the dividers at the point of junction of Bucks, Lehigh and Montgomery counties; extend the other limb westward, so as nearly to reach Boyerstown; with this radius of about eight miles, the circle drawn around the point of junction of the counties named, will indicate, with tolerable accuracy, the section of country, including the corners of Berks, Montgomery, Lehigh and Bucks counties, from which our city will draw the vital element so necessary to the wealth and prosperity of the prospective millions of its population. Compare these remote corners of territory with the districts through which flow the tributaries of the Delaware, already considered. A glance at the map will show that they are widely different in the single item of roads, being almost devoid of these means of communication; on the other hand, a perfect net-work of roads covers Chester county, in which all those six streams take their rise. Barren, rocky and broken, these out-of-the-way sections are avoided by the great currents of population, and seemed formed and located by the hand of Providence, so close to our doors, for the very purpose of treasuring up the dews and the rains, in diamond purity and healthfulness, for our use. Now let a line be drawn from the centre of our imaginary circle, out toward the ocean,—it will be seen that it may be extended due east, with room for a northward sweep, until it reaches the coast, without meeting any elevated land. Carry the outer end of the line downward, through ninety degrees of the compass, and you will find it still



passing successively over tracts of low and flat country, over which the winds from the rainiest quarters, northeast and southeast, can blow without interruption, and retain a large part of their stores of moisture, until they reach the hillsides and ravines of the South Mountain range, 900 feet above the tide. There they must yield up a portion of their treasures, and there the head waters of the Perkiomen are nestled, ready to receive their contents. The most satisfactory way to ascertain the amount of water which the Perkiomen could be relied on to supply, would be to measure the stream at the point where it is proposed to gather its waters. But this is an expensive undertaking, requiring the construction of a dam, for which the funds had not been appropriated by the Councils, and years of observation. Recourse must, therefore, be had to a system of calculations based upon the average annual rain-fall, over the region drained by the stream. The rain-fall of this comparatively uninhabited region is unascertained, but we have every reason to suppose it much larger than in the level regions to the east and the south. However, Mr. Birkinbine, to be on the safe side, has taken the average ascertained fall in this city, for the past thirteen years, about 45 1/2 inches per annum, as the basis of his calculations for the Perkiomen region. The next step in the process is to estimate the proportion of the rain-fall which actually passes into the channels of a stream in a given territory. This is a very difficult point to settle. There are losses by evaporation and by absorption into the soil and the vegetation of the country. The watershed of the Perkiomen is well-wooded and the evaporation is comparatively light; the banks are steep and the flow of water into the channels is rapid and large; the character of the underlying rock is retentive, so that a large part of the rain-fall is doubtless utilized and brought into the stream. Taking the average of a number of observations made in connection with the water supply of twelve cities of Great Britain, as a certainly safe guide, Mr. Birkinbine allows for the loss of half of the rain-fall in the region by evaporation, &c.; the remaining half leaves us a body of water nearly two feet in depth, spread over the 220 square miles of country drained by the head waters of the Perkiomen. A very simple calculation, then, brings us to the gratifying conclusion that there will be a daily average supply of 240 millions of gallons, which can be made available for the wants of the city; an amount sufficient to supply four millions of inhabitants with an average of sixty gallons of water each per day.

How, now, shall we gather up and put into available form this body of water, which, at the depth of two feet, and covering over two hundred square miles of territory, is of no possible use to us? Here again Providence has been at work to aid us, in the configuration of the surface and the geological character of the region. If we take a position on the banks of the stream, at a point 2 3/4 miles northwest of the corner of Broad and Market streets, we shall notice that directly across the path of the creek, enormous masses of trap rock have been forced up through the surrounding strata of sandstone, forming a range of hills four to five hundred feet above tide, and three hundred and fifty feet above the bed of the creek.

Through a gate or gap in these rugged hills, the Perkiomen has found its way into the more level country below. A survey of the region shows that these hills, stretching nearly due east and west, form the southern boundary of the available watershed of the stream; all the territory above them is of the geological character required for yielding pure water; below them an unfavorable change at once begins. An old copper mine, opened during the days of British rule, presents its mouth within a few rods of the Southern face of the ridge, directly upon the bank of the creek. Above the ridge, nothing more injurious than a small quantity of limestone and iron ore can be found. The Skippack creek, the first one below the trap, already furnishes a much deteriorated quality of water.

Now, when we remember that trap rock is one of the most impervious of all geological formations to water, we see that both in location and texture, this ridge of trap is a natural dike, behind which the waters of the Perkiomen may be gathered; it being necessary for us only to supplement nature's work, by building a dam of sufficient height across the gap, through which the stream now flows. Had nature chosen to continue her trap-dike, without a break, across the country, we should have had a ready-made Loch Katrine—a body of water, in fact, of nearly the same dimensions—within twenty miles of the city limits. She has come so near this beautiful and desirable result, as to invite us to complete her work, and Mr. Birkinbine proposes to the city to accept her invitation. Running a dam across the gorge, say eleven hundred feet long, about the length of that at Fairmount, and sixty-five feet high from the lowest point, or bed of the stream, we should soon collect a body of water covering an area of fifteen hundred acres. This lake would perform the part of an immense subsiding reservoir. Only the upper stratum of its waters, say twelve feet in depth, would be drawn off into the aqueduct. This twelve foot stratum, over an area of fifteen hundred acres, contains five thousand millions of gallons; a supply sufficient to last the city, at its present rate of demand, for two hundred days. Once full, there might be a drought extending through two thirds of the year, before the supply from this upper and purer stratum of the lake alone was exhausted. To-day we have room for storing a two days' supply in our existing reservoirs.

Herewith we give a map, prepared by the department, of the proposed lake and immediately surrounding country. In its largest dimensions, the lake will be nearly six miles long and over one mile broad. The gorge in the trap-dike is at the point where the waters of the lake are represented as entering the main stream, flowing southward. The turnpike road, on the right bank, passes through the gorge, crosses what would be the bed of the lake at its deepest part, and rises to the level of the northern shore, at Ziegler'sville. The narrow arms of the lake would be navigable to a distance of over three miles from the dam on the western, and over eight miles on the eastern arm. If a small steamer were allowed to ply on its surface, as we believe, under proper restrictions, it might be, excursionists might enjoy the novelty of a trip of the most romantic character for over twelve miles, upon an inland lake, within thirty miles of their doors. Huge strata of trap and sandstone would frown from the hillsides and through the wild forests lining its shores. A single wooded island would rise gently upon its bosom, and palisade rocks, one hundred feet high, would loom up at different points on the long and narrow eastern arm of the lake. At suitable distances from the edge of the waters, summer residences of most desirable character might be built, and Perkiomen Lake might thus present a combination of useful and beautiful qualities, scarcely rivalled by any like body of water in the world.

And then, in years to come, when four or five times as great a population is comprised within our ample limits as at present; when Philadelphia has grown to the proportions which her favorable position, her manufacturing facilities, her healthfulness, good order and unyielding loyalty promise, to give her, and toward which she is moving with increasing energy and rapidity, Perkiomen Lake will be pouring through the proposed aqueduct a daily supply of pure, unadulterated mountain water at the rate of sixty gallons for every man, woman and child of the millions of inhabitants, every day of their lives; and the city will gather into the treasury, after interest and all expenses are met, and at rates not at all burdensome to the consumer, the enormous net revenue of over ten thousand dollars per day, or four million dollars per annum. The time might come when, with republican munificence, she could make her water supply almost as free to her citizens as the light or the air of heaven.

There was a discovery made and considerably noised abroad, some years ago, that Philadelphia is built upon gold. It was true, only the minute proportion of the precious metal in the soil would not pay the expense of extraction. Here we have a plan which is equal in money value, and infinitely superior

in moral value, to the discovery of a real vein of gold running through the heart of the city; one which would contribute, if carried out, far more to the real prosperity of the city, and one, for the execution of which, posterity will be far more grateful to us of the present generation, than if we should transport a section of Montana territory to their doors,—a plan for furnishing an unfailing supply of pure water at a trifling cost to the people. The general supply of the cities of Christendom with abundant and good water might almost be accepted, especially in the light of Ezekiel's vision of the waters, (Chapter xvii.) as a millennial trait. At any rate, we may fairly quote and apply the final clause of the ninth verse: "Everything shall live whither the river cometh."

Religious Intelligence.

Accessions.—Nine persons were received on examination into the Twelfth Church, Baltimore, Maryland, on Sabbath week, two of whom were men of an advanced age. This makes twenty-one persons received into this communion by profession of faith since last April.—Presbyterian.

Licenses in Heathen Lands.—The Home and Foreign Record has the following item: "At a late meeting of the Presbytery of Saharanpur, three young men, after completing their prescribed trials, were licensed to preach the Gospel. The repeated licensure and ordination of native brethren in India that have been mentioned of late, is introducing a new power into our foreign work; for which the Church should be prepared. It is an increasing call upon her sympathy, her prayers, and her liberality. May she meet it in the spirit of the Master."

Greenville, Ohio.—The one Presbyterian Church in this place is a fusion of the two, Old and New School, not long since existing. The editor of the Presbyterian, who aided at their communion service, July 1, says that 52 persons were announced as added to the church since the last communion; most of them on examination. Several others have been, before the session as applicants or inquirers.

Great Britain.—The proceedings of the spring meeting of the Presbytery of the two Irish Synods in England, (the English and the United,) are largely reported in the Weekly Review. Among the items of general interest, we notice arrangements for the ordination by the London Presbytery; (E. P.) of Mr. D. Masson, who is about to proceed to Swatara, as one of the missionaries of the E. P. Church. In the U. P. Presbytery of Lancashire, a favorable report was presented of the prospects for a church edifice in Derby. Subscriptions to the amount of £300 have been obtained, and for the encouragement of the enterprise, a friend has made a conditional offer of £25 toward congregational expenses. The Moderator reported that, by order of Presbytery, he had visited Barrow, and declared the congregation there, a congregation of the U. P. Church. The erect church in Southwick, the estimated cost of which is £3000, a grant of £500 and a loan of £1000 was made from the Church Extension Fund. The minister of the church stated that £1000 had been subscribed on the ground, that their weekly offerings had been of late largely increased, their lecture hall filled up, and that everything was ripe for the proposed enterprise.

In Scotland, a conference of Ministers and Elders of the U. P. Church in and around Glasgow has recently been held, to devise means toward raising the stipends of ministers of the churches of the Glasgow Presbytery to a minimum of £150 with a manse. The fact was revealed that the compensation of twenty-three ministers of its churches falls below that sum.

The General Assembly of the Irish Presbyterian Church was much occupied with the subject of national education, which is at present the exciting topic, made such by the scheme of the Romanists to obtain from the Government exclusively Roman schools for their own children. The Church Extension Committee reported the formation of several new stations, and that others are in process of formation. There are prospects of new openings in the counties of Tipperary, Kilkenny and Wexford. Efforts are recommended, and indeed going forward, with some success, to induce the emigration of Presbyterian farmers from the North of Ireland and from Scotland, to the Southern counties, where farms are cheaper. The Moderator was directed to prepare and issue an address to the congregations, drawing special attention to the question of ministerial support, showing that it is the duty of every communicant who has a separate means of livelihood to contribute for the support of the ministry and the extension of the Church.

During the session Rev. Dr. Fish, of Paris, addressed the Assembly. In relation to Evangelical progress in France, he stated that Renan's new work on the Apostles was not selling, and that the publisher was in despair. Renan had demolished himself. There were now greater openings in France, for the spread of the Gospel than ever there were before. There was in the French mind a change for the better which was amazing. The French expected them to be in Paris next year at the great exhibition. The Protestants were to have a portion of the space set apart for the exhibition of idols and other objects of interest from among the heathen. In that exhibition they had permission to sell the Bible throughout the building, which was refused at the London Exhibition, and that, too, in Protestant England.

The Welsh body known as the Calvinistic Methodist, is virtually a member of the Presbyterian family. Its General Assembly was held in May. Progress has been made in Home work and in Foreign missions, including some improvements in the working of the latter. The Assembly recognized its Presbyterian affinity, by appointing delegates to the English Presbyterian Synod. Letters were read from two Associations of the Association of Ohio, the other from the Association of Pennsylvania, in which they sent a cordial greeting to the mother church at home. The Rev. Thomas T. Evans also addressed the Assembly. Much interest was felt in the welfare of their brethren on the other side of the Atlantic, and all rejoiced to find that they were still adhering, in the midst of the temptations of the new world, to the simple faith and religious life of their fathers.

Congregational.—Winnisimmet Church, Chelsea, Mass., in the first Sabbath of the

month received 108 members, 91 by profession, 35 of whom were heads of families. In Massachusetts, during the past year, 30 Orthodox Congregationalist ministers have been dismissed, 15 have died, 21 have been ordained, and 26 installed as pastors. Returns from 300 churches show aggregate contributions amounting to \$330,000.—The church in Claremont, N. H., has excluded a female for spiritualism, which, acting like leprosy upon the body, had completely subverted Christian faith.—Rev. Nathan Munroe, late editor of the Boston Recorder, died at his residence in Bradford, Mass., on the 8th inst., in the 63d year of his age. He was a good man, able as a writer, and faithful as a Christian.—At the recent meeting of the Delaware County (N. Y.) Association, reports of interesting revivals were received of most of the churches. The Sabbath-school was gathered in full force, and addressed by several of the ministers and delegates present.—Rev. T. J. Duray, D.D., pastor of the Reformed Church in New York, declines a call from the Park Street Church, (Cong.,) in Boston. He fears the climate of the latter city, and also thinks himself likely to do the most good where he is.—Congregational items from the Pacific coast are to the effect that Rev. Dr. Stone was installed over the First Church in San Francisco, on the 14th ult.; that church of 17 members was organized in Benicia on the 15th ult., and that a new church edifice at Copperopolis was dedicated on the 17th ult.

MARRIAGES.

PERRON-HALL.—In Auburn, N. Y. July 11, by Rev. Edwin Hall, D.D., Prof. JAMES K. PERRON, HALL, daughter of the officiating clergyman.

SMITH-ANDREWS.—July 11, by Rev. Charles A. Smith, D.D., Rev. AUGUSTUS SMITH to Miss LOUISA E. daughter of A. J. Andrews, all of West Philadelphia.

DEATHS.

VAUGHAN.—In Wilmington, Del., July 15, of inflammation of the brain, Dr. J. F. VAUGHAN.

Special Notices.

American Seaman's Friend Society.—The American Seaman's Friend Society provides for the temporal and spiritual wants of seamen through Chaplains, Missionaries, Sailors' Homes, and Sea Libraries. Funds are urgently solicited. Donations may be sent to L. P. HUBBARD, Financial Agent, 80 Wall St., New York. Rev. H. LOOMIS, Corresponding Secretary, S. H. HALL, D.D., Corresponding Secretary.

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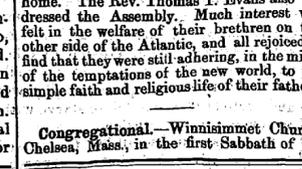
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