THE KIND OF WATER SCRANTON DRINKS

VIEWS OF A CHEMIST AS TO ITS PURITY.

Dr. Chamot, of Cornell, at the Instance of the Green Ridge Woman's Club, Tells What He Thinks of Our Water Supply in the Light of Personal Examination and Scientific Analysis.

The following correspondence, published by request, is self-explanatory and of general interest:

Cornell University, Chemical Department: Laboratory of Sanitary Chemistry and Toxicology.
Ithaca, N. Y., Dec. 20, 1899.

The Green Ridge Women's Club, Scranton, Pa.

Ladies:—In accordance with the wishes of your corresponding secretary, Mrs. Dounce, I have visited the system of water works controlled by the Scranton Gas and Water company and have examined the water sheds of the sources of supply. I have the honor to submit to your consideration the following brief report of the results of the investigation:

LAKE SCRANTON.

Only a hasty examination was possible in the time at my disposal. As far as could be judged from such a cursory inspection, the surroundings, with the exception of the objectionable features mentioned below, are excellent. An effort is evidently made by the water company to maintain all in proper condition.

Almost midway between the head and foot of this lake a small brook empties. This brook is said to be the outlet of an upper reservoir and has upon its banks a large barn and several cottages, all within sight from the lake drive-way. Believing from appearances that the waters of the stream might possibly be polluted, a sample was taken for analysis, at a point in mid-stream about fifty feet from the drive-way encircling the lake; this sample is designated as Sample I in the analyses appended to this report.

It will be seen that the results of the analysis justify the apprehensions stated. The stream at the time and point of sampling was undoubtedly polluted; it is by far the worst of the samples examined. Whether this pollution is the result of the barn, etc., up stream, or of other sources yet more distant or is due to the backing up of roadside drainage, I do not consider myself now in possession of sufficient facts to state.

No other evident sources of pollution could be detected in passing around the lake, save the most reprehensible practice of draining the roadside ditches into the reservoir. It is a matter of great surprise that any company should permit any such serious and obvious source of contamination to exist. Even if we assume that, with the relatively immense body of water in the lake, a little wash and drainage from a road is probably harmless; from an aesthetic point of view the water can hardly be said to be drinkable. Moreover the harmlessness of this small amount of filth in the great dilution of the lake is open to question.

Sample II was taken from the head of the lake just to one side of the gate-house. The results of the analysis show but little evidence of the contaminating influences just discussed, hence it is evident that the great bulk of water discharged into the reservoir is above reproach and that this pure water so dilutes the impure as to render the presence of the latter non-evident. The vestiges of contamination can be detected only in the number of anaerobic forms present, the slight production of hydrogen sulfid, the amount of free ammonia, etc.

RESERVOIRS LYING IN THE VALLEY OF ROARING BROOK.

Reservoir No. 7, as it is called by the keeper of the toll gate—the lowest reservoir of the water system, and said to be the distributing reservoir of the city supply—is admirably situated and is well cared for. Nothing objectionable could be detected in the surroundings. Samples of the water were taken, and appear in this report under the designation of Sample III. The analytical results show that the impurities present in the water of the reservoir above and discharging into No. 7, have not wholly disappeared. This latter reservoir, lying between Elmhurst and Moscow or more properly at Elmhurst, is the most unsatisfactory of all examined. It is not as well cared for as those before mentioned, nor are its surroundings free from objection. Around it can be seen an aggravated case of deliberate roadside drainage into a water supply. It is also quite obvious that part of the drainage of Moscow (not necessarily its sewage) must find its way into the brook and thus into the pond. The results of the analyses bear out this assertion. Samples from the Elmhurst reservoir are designated as Sample IV, and were taken at the foot of the pond midway across the dam.

The necessity of returning to Ithaca with the samples taken, in order that reliable results might be obtained, prevented the visiting of the third and uppermost basin—Lake Henry.

ANALYTICAL RESULTS.

In the analyses which follow all the tests made have not been given, data of minor importance being omitted. Results stated are averages.

Sample I—
Free ammonia—trace.
Albuminoid ammonia—0.125 parts per million.
Nitrogen as nitrites—0.010 parts per million.
Nitrogen as nitrates—1.537 parts per million.
Chlorin as chlorids—4.800 parts per million.
Total solid residue—71,000 parts per million.
Colonies on gelatine plates in air at 20 degrees Centigrade, 3,328 per cubic centimeters.
Colonies on gelatine in an atmosphere of hydrogen, 1,275 per cubic centimeters.
Colonies on glucosed-gelatine (method of Beyerinck), 94 per cubic centimeters.
In Dunham's solution gives indol in all dilutions, in all tubes.
Gas formed in all fermentation tubes in amount and character to that given by fecal organisms.
Strong production of hydrogen sulfid by method of Schardinger, this points to presence of putrefactive bacteria.
Growth in phenolized Dunham's solution of 42 degrees Centigrade, and tubes all yield test for indol. Evidence of presence of fecal bacteria.
Bacteria forms found in polluted waters observed in abundance.

Sample II—
Free ammonia—0.135 parts per million.
Albuminoid ammonia—0.085 parts per million.
Nitrogen as nitrites—None.
Nitrogen as nitrates—0.170 parts per million.
Chlorin as chlorids—2.220 parts per million.
Total solid residue—48,000 parts per million.
Colonies on gelatine plates in air, 39 per cubic centimeter.
Colonies on gelatine in an atmosphere of hydrogen, 24 per cubic centimeter.
Colonies on glucosed-gelatine, 2 per cubic centimeter.
In Dunham's solution indol formed in one tube only.
No gas formed in fermentation tubes.
Slight production of hydrogen sulfid.
No growth in phenolized Dunham's solution at 42 degrees Centigrade.
Bacterial forms are those found in upper layers of soil, pollution species being practically absent. The one case of indol production and the formation of some hydrogen sulfid can be taken as a measure of the excessive dilution of any contaminating material finding its way into the reservoir.

Sample III—
Free ammonia—None.
Albuminoid ammonia—0.120 parts per million.
Nitrogen as nitrites—None.
Nitrogen as nitrates—0.060 parts per million.
Chlorin as chloride—2.300 parts per million.
Total solid residue—66,000 parts per million.
Colonies on gelatine plates in air, 56 per cubic centimeter.
Colonies on gelatine in an atmosphere of hydrogen, 23 per cubic centimeter.
Colonies on glucosed-gelatine, 1 per cubic centimeter.
In Dunham's solution traces of indol in some cases, but not in all.
No gas formed in fermentation tubes.
Moderate production of hydrogen sulfid.
No growth in phenolized Dunham's solution.
Bacterial forms resemble those of Sample IV, but are much less numerous, soil organisms predominate among those not to be classed as water bacteria.

Sample IV.
Free ammonia—trace.
Albuminoid ammonia—0.127 parts per million.
Nitrogen as nitrites—trace.
Nitrogen as nitrates—0.320 parts per million.
Chlorin as chlorids—2.330 parts per million.
Total solid residue—57,000 parts per million.
Colonies on gelatine plates in air, 1,026 per cubic centimeter.
Colonies on gelatine in an atmosphere of hydrogen, 520 per cubic centimeter.
Colonies on glucosed gelatine, 220 per cubic centimeter.
In Dunham's solution indol formed in all tubes.
Gas formed in all fermentation tubes.
Strong production of hydrogen sulfid.
Slight growth in phenolized Dunham's solution at 42 degrees Centigrade, and traces of indol formed.

Results seem to indicate the presence of fecal bacteria and those of putrefaction, hence the conclusion that the water is contaminated by drainage waters.

Any further remarks upon the analyses seem superfluous, since a comparison of the results of the bacteriological examinations will show striking differences.

Respectfully submitted.
(Signed) E. M. Chamot, B. S. Ph. D.

It is proper to say that the barn referred to in the beginning of the foregoing letter has been removed and its place taken by planted trees, thus doing away with any possibility of infection from that source.

PROVIDENCE WATER COMPANY.

The Green Ridge Women's Club, Scranton, Pa.

Ladies:—I have the honor to submit herewith the second half of the report of the results of the examination of the water supply of your city, which I was requested by your corresponding secretary to investigate in detail. The present report has to deal with the system of water works of the Providence Water company.

The water works of this company can, for convenience of discussion, be divided into four heads.

1. Artesian wells at Chinchilla.
2. Scott reservoir and its watershed and that of its discharge stream.
3. Summit Lake, its watershed and that of its discharge stream.
4. Chinchilla or distributing reservoir.

ARTESIAN WELLS.

There being no reason for doubting the purity of this source of supply, no examinations of the water of these wells were made. It is more than probable that if the artesian well water was led into a clean, properly constructed and protected reservoir an excellent water supply would result. Whether this supply would be of sufficient quantity to furnish the present consumers on the line with proper amount of water, is another question to be answered only by gauging the wells and reservoir.

SCOTT RESERVOIR.

This is nothing more than a shallow pond. Inasmuch as its supply seems to be quite limited and there is but little evidence of much work having been expended on it, it is scarcely entitled to be called a reservoir; certainly not at the time of my visit. It is my opinion that this pond is too shallow to prove a satisfactory source of supply during the summer months when the amount of water flowing in and out is doubtless very small, thus giving rise to more or less stagnation. Under such conditions it is to be expected that the water would become unsuitable for use owing to its acquiring an unpleasant taste and smell, due to the development of various low forms of plant life. Such water, while not necessarily harmful, is generally undrinkable because of its nauseous odor. The character of the pond bed—old stumps, mud, etc.—would have a tendency to aggravate the trouble. There are, however, some far more objectionable features about this pond, namely the presence on its banks close to the water's edge, of barns, barn yards, houses, etc., much of the drainage of which must, perforce, eventually reach the water in the pond. The situation can best be summed up by the statement that Scott reservoir and its discharge stream shows either negligence or indifference on the part of the water company.

SUMMIT LAKE.

The condition of Summit Lake is somewhat better than that of the reservoir just discussed, yet here, too, the supply appears to be limited and stagnation liable to result during the warm months. On Jan. 5 the water was very low and I was informed that it had been so for some months; this may account for unsatisfactory condition of the water as shown by the analysis. It should be noted, however, that the analytical results indicate that the water of Summit Lake is the best of the three samples taken from the system of the Providence Water company. The sample taken for analysis was procured near the foot of the pond through a hole in the ice. The results of the examination will be found under the designation of Sample A in the data appended to this report.

Summit lake discharges into a small stream, which, flowing down the valley finally reaches the lower reservoir at Chinchilla. In the course of its journey it receives several tiny brooks. This whole system from the pond down is indescribably bad. The sources of gross pollution which have been permitted to exist are almost beyond belief. The amount of filth carried down by the stream must be excessive at certain seasons of the year. Cattle and pigs are allowed to wallow in it, barnyards, pig pens and outhouses are drained into it, household waste is thrown into it; in fact, a worse state of affairs is hard to imagine. With such evidences of pollution there is no need of an analysis to lead to the conclusion that the water from this supply is to be condemned as unfit for household use. The running of the discharge stream of Summit lake into the Chinchilla reservoir should be prohibited until all sources of contamination are removed. That the analysis of this stream (sample B) does not show the excessive pollution that might be expected from the environment, is to be explained by the fact that owing to the very cold weather there was little chance of the usual drainage reaching the stream. Sample B was taken a short distance along the point where the stream crosses the road near the culvert of the Delaware, Lackawanna and Western railroad.

RESERVOIR AT CHINCHILLA.

But little need be said concerning this reservoir; it is here that the last mixing of the waters from various sources takes place. The effects of sedimentation and the diluting action of the artesian well water can be seen in the analysis given under the head of Sample C. At present the water is contaminated with the polluted waters of the streams discussed above. There is only one conclusion possible and this is that the water should not be used as long as the streams in their present conditions discharge into the Chinchilla reservoir. The placing of all this system of water works in proper condition for safe use will prove an undertaking of some magnitude.

ANALYTICAL RESULTS.

Sample A, Summit Lake—
Free ammonia—0.030 parts per million.
Albuminoid ammonia—0.326 parts per million.
Nitrogen as nitrites—None.
Nitrogen as nitrates—0.400 parts per million.
Chlorin as chlorides—3.050 parts per million.
Total solids residue—55,000 parts per million.
Colonies on gelatine plates in air at 20 degrees centigrade, 150 per cubic cent.
Colonies on gelatine in an atmosphere of hydrogen, 82 per cubic cent.
Colonies on glucosed gelatine, 16 per cubic cent.
Moderate gas production in Smith tubes at 36 degrees centigrade.
In phenolized Dunham's solution at 42 degrees centigrade, growth in one tube.
Strong production of hydrogen sulfid.

Sample B, Stream from Summit Lake—
Free ammonia—0.025 parts per million.
Albuminoid ammonia—0.063 parts per million.
Nitrogen as nitrites—0.005 parts per million.
Nitrogen as nitrates—1.052 parts per million.
Chlorin as chlorids—5.566 parts per million.
Total solid residue—68,000 parts per million.
Colonies on gelatine plates in air 1,370 per cubic cent.
Colonies on gelatine in an atmosphere of hydrogen, 118 per cubic cent.
Colonies on glucosed gelatine, 132 per cubic cent.
In Dunham's solution, indol produced in all dilutions.
Gas formed in Smith tubes in amount and character to that produced by fecal bacteria.
In phenolized Dunham's solution, growth in all tubes with formation of indol.
Excessive production of hydrogen sulfid.
Water is bad, unfit for household purposes.

Sample C, Distributing Reservoir, Chinchilla—
Free ammonia, 0.035 parts per million.
Albuminoid ammonia, 0.128 parts per million.
Nitrogen as nitrites, trace.
Nitrogen as nitrates, 1.234 parts per million.
Chlorin as chlorids, 3.625 parts per million.
Total solid residue, 73,000 parts per million.
Colonies on gelatine plates in air, 444 per cubic cent.
Colonies on gelatine in an atmosphere of hydrogen, 56 per cubic cent.
Colonies on glucosed gelatine, 90 per cubic cent.
In Dunham's solution gives indol only when considerable water used.
Moderate gas production in part of Smith tubes inoculated.
Strong production of hydrogen sulfid, more than in A, less than B.
In phenolized Dunham's solution, slight growth, trace indol.

Water slightly contaminated or, to put it differently, the polluting material is much diluted.

GENERAL CONCLUSIONS.

The results of the examination of the water supplies of your city, as reported, leads to the conclusion that the system of the Scranton Gas and Water company is to be preferred to the other and upon these grounds:

1. There is evidence of a greater care and desire to improve faulty conditions.
2. The actual supply of water is larger, hence there is less opportunity for stagnation in the reservoirs.
3. Taken as a whole the watersheds involved are better.
4. Save for the probable drainage into the Elmhurst reservoir and impure stream flowing into Scranton Lake there are no apparent sources of gross pollution.
5. The sources of pollution noted in my report can probably be readily checked or even removed.

The supply of the Providence Water company, on the other hand, is inferior because, among other things:

First, the supply is limited, hence any possible contamination is of greater significance; second, the watersheds of the source of supply are in a filthy condition; third, the company is evidently careless in the supervision of its water works; fourth, it will be a rather difficult undertaking to effectually remove the existing nuisances.

Respectfully submitted,
(Signed) C. M. Chamot, B. S., Ph.D.

NEW YORK FASHIONS.

Spring Wools—Plaids—Dots and Stripes—Mercerized Cotton Fabrics—Spring Millinery—Mammoth Roses and Poppies—Chiffon More in Demand Than Ever.

Special Correspondence of The Tribune.

New York, Feb. 2.—The fresh, gay colors of spring and summer fabrics are displayed to especial advantage when contrasted with the wintry aspect on the outside of the show window. Passersby, enveloped in furs, and amid scurrying snow flakes, feel a breath of spring as they pause to admire varied flowers, intricate scroll patterns, embroidered dots or leaves, wide or narrow stripes in a thousand different hues, or roses strewn among white satin lines; all of which find expression in silks, challies, wools, crapes, Jacquards, dimities, muslins, percales or lawns. On the other hand are highly finished cloths for tailor suits, and also checks or hair-line stripes in soft grays or browns, which are more serviceable than faced cloths, and at the same time less pretentious.

HEAVY GRAY CLOTH

with a plaided wrong side is particularly adapted to golf skirts, this material requiring no lining, but special mention should be made of cravenettes, as this admirable class of dress goods becomes each season more in vogue. They lead for outing wear, because absolutely waterproof, and this without the slightest mixture of rubber, the yarn being made rain-repellent by a special process. Cravenettes come in fine weaves of cheviot, serge, camel's hair, sateen, prunnella, soleil and wale-cord. There is nothing in the appearance of these goods to indicate the waterproofing process. Much favor is predicted for soft, woolly camel's hair plaids in delicate shades and large patterns, for skirts, waists and sometimes entire costumes, but there is always some uncertainty regarding plaid, and unless a wardrobe is varied, it becomes an injudicious purchase. Black crepons cannot be displaced, and on mohair, a silk weave of the crepon order appears, at the same time there is no irregularity of surface, and veiling, berege, very sheer poplins or other light fabrics, show similar designs in exquisite harmonies, or self colorings.

CRAPE SURFACES

bring out the beauties of small silk embroidered leaves, dots, checks or stripes, and of the latter the category is endless, varying from the hair-line to the inch-broad, in plain satin, ribbon, the puckered styles, or the crepon weave. The Madras goods intended for shirt waists afford a greater opportunity for combinations of style and color than can be found elsewhere. Irish linen, as soft and fine as silk, is also a beautiful material for the same purpose, but too recherche to ever become common. Dotted or striped Swiss muslin is in great demand, being suitable for many different occasions, and easily laundered.

THE BEAUTY AND EXCELLENCE

of mercerized cotton goods, shown by Lord & Taylor, seem to threaten the overthrow of foulard silks, and it is really difficult to tell one from the other, so perfect is the gloss and softness of the cotton fabric, both materials coming in similar designs. "All over" patterns are in overwhelming favor, usually white figures or dots on a contrasting ground, and blue, all the lavender tints, or black and white, are so far the predominating colors.

CHIFFON IS A FRAIL FABRIC,

but upon that and the leaf rest the main structure of spring millinery, and the extent to which the former has been used is but little compared with coming demands. Huge choux (rosettes) will adorn hats, tucked chiffon will be rolled into the shape of the breast feathers which have curled around winter hats and called "chiffon plumes," and exquisite roses or other high-grade flowers are made of chiffon, with the edges doubled under, which is a necessity. Stylish flowers are very, very large, roses, poppies or sunflowers often measuring six inches, and combined with tinted leaves in huge sprays. A novel idea is chiffon leaves, supported by the finest possible colored wire, and on these leaves are stamped very minute brown leaves.

ALL THIS IS FAVORABLE TO THE MILLINER,

as it requires the most skilled workmanship to turn out a stylish hat, and as dampness is fatal, a constant renewal is requisite. A pretty novelty is the "owl chrysanthemum," made by setting two large chrysanthemums, back to back, the yellow calyx at each side forming the eyes. Orchids or lillies are also in favor because large. About two hundred and fifty shades are shown in velvets, chiffon and ribbons, consequently there is no lack of variety. A large toque, turned up at one side, bids fair to be the season's leading shape, and this is called by some houses the "Hobbs" hat, admitting of many modifications, and several mammoth flowers, supplemented by velvet, will find a resting place on the left side of the "Hobbs" hat.

RATHER LARGE FLATS

of gossamer straw will be caught up anywhere that may suit the milliner's ideas, then others will take a dip over the forehead and up at the sides. Tuscan yellow is very prominent in the coloring of hats, then comes rose-pink, light blue, white and, last of all, black, of which there must be a goodly proportion, for elderly or middle-aged persons. The "pastel shades" are quite prominent, but as they are very trying, many bright hues will be necessary to bring about the contrast requisite for good taste.

Fannie Field.

An Afterthought.

"That was a pleasant afterthought of yours," remarked the old preacher who had listened to a sermon by one of his youngest brethren, "when you drew upon the analogies of nature to prove the immortality of the soul."

"An afterthought?" said the younger clergyman, in some perplexity.

"Yes. You thought of it about twenty-four hundred years after Socrates."—Chicago Tribune.