REPORT

OF

PROFESSOR W. R. NICHOLS,

ON THE

NEW BEDFORD WATER SUPPLY.

From the 10th Annual Report of the Acushnet Water Board, 1880.

MASS. INSTITUTE OF TECHNOLOGY,
CHEMICAL LABORATORY,
BOSTON, June 5th, 1879.

Wm. B. Sherman, Sup't Water Works, New Bedford, Mass.:

DEAR SIR,—The samples of water which you collected and sent to me have been duly examined, at least so far as the determination of the solid matter and the organic carbon and nitrogen. You are, no doubt, familiar with the reports of the Rivers Pollution Commission of Great Britain, and know that Frankland's method for obtaining indications of the amount of organic matter in water has been used in them. As no method is known by which we can determine the exact amount of "organic matter" present in a water, Frankland has devised this process by which we may determine the amount of two of the essential elements of organic matter, namely, the *carbon* and the *nitrogen*. The process is somewhat tedious and requires special apparatus and delicate manipulation, and consequently will hardly come into general use.

In considering the results obtained, in any case, several things must be borne in mind:

(1) As in other methods of analysis, we cannot compare together waters of different character; thus we cannot compare the results of the examination of a well-water with those obtained from the examination of a surface water. Each sort of water must be judged by a different standard.

(2) Any water is liable to variation from time to time, and a single sample does not give a complete idea of the character of the given water.

(3) In interpreting the results we must look not only at the *absolute amounts* of nitrogen and carbon, but also at the *relative proportion* in which they are present. Organic matter of vegetable origin contains a larger amount of *carbon* in proportion, while organic matter of animal origin contains a larger proportion of *nitrogen*.

The accompanying table will show the results of the examination of the New Bedford waters, and will give means for comparison.

TABLE I.

Examination of Various Waters by Frankland's Method.

[RESULTS EXPRESSED IN PARTS IN 100,000.]

Date.	Description.	Organic Carbon.	Organic Nitrogen.	Ratio. Carbon / Nitrogen.	Authority.
May, 1879,	New Bedford (4) Storage Reservoir,	0.790	0.098	8.1	W. R. N.
" "	(1) Street Main,	0.789	0.097	8.1	
" "	(2) Long Pond,	0.759	0.043	17.6	
" "	(3) Little Quittacas,	0.491	0.033	14.8	
Jan.-April, 1879,	Average 15 Samples Boston water,	0.420	0.052	8.1	
	Unpolluted rain water, average of 39 samples,	0.070	0.015	4.7	Rivers Pollution Commission.
	Unpolluted upland surface water, average of 195 samples,	0.322	0.032	10.0	
	Unpolluted deep well water, average of 157 samples,	0.061	0.018	3.4	
	Unpolluted spring water, average of 198 samples,	0.056	0.013	4.3	
Jan. 31, 1873,	Unfiltered Thames water, Lambeth Company,	0.325	0.076	4.3	
" " "	Southwark and Vauxhall Co.,	0.285	0.050	5.7	
Feb. 3, 1873,	Grand Junction Co.,	0.246	0.033	7 5	
1873,	Variation in filtered water of Lambeth Co., Average of 12 monthly samples,	0.206	0.040	5.1	
	Maxima,*	0.449	0.065	6.9	
	Minima,*	0.130	0.021	3.0	

*Of course, these maxima and minima are not at the same time. Thus the maximum amount of carbon may occur at a different time from the maximum amount of nitrogen.

It appears from the Table that while the total amount of organic matter in the Acushnet water is quite large as compared with the average of English surface waters, and with the Boston water, yet the large ratio of *carbon* : *nitrogen* would point to its being mainly of vegetable origin. I have examined a surface water used as a source of supply, but known to be polluted, where the ratio was as low as 2.5. It further appears that Long Pond and Little Quittacas are both superior to the Acushnet, and that the latter is the better of the two. Little Quittacas is also much less *colored* than either Long Pond or Acushnet.

In Table II, I have given the amount of solid matter obtained by evaporation of the waters and also the loss when the residues are ignited, the so-called "Organic and Volatile Matter."

Yours truly,

WM. RIPLEY NICHOLS.

TABLE II.

Examination of Water from New Bedford.

[results expressed in parts in 100,000.]

No.	Date.	Locality.	Solid Residue.		
			Inorganic.	"Organic and Volatile."	Total at 212° Fah.
4	May 31, 1879.	Storage Reservoir,	1.64	2.48	4.12
1	"	Street Mains,	2.40	2.40	4.80
2	"	Long Pond,	2.24	2.48	4.72
3	"	Little Quittacas,	1.92	1.44	3.36