ON THE ACTION OF IRON PIPES (RUSTED) UPON WATER CONVEYED THEREIN.

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That iron-oxide effects some changes upon certain constituents of drinking water, specially as regards the nitrates present, has long been known, and I lay claim to no originality in bringing the following observations before the Society of Public Analysts.

Nine months ago (March) the Public Water-supply of the Borough of Ramsgate was extended to the village of Minster, the latter place having previously derived its water for drinking purposes from private wells, most of which were polluted.

No sooner however had the Ramsgate supply reached Minster than complaints were made as to its character and appearance. It was very turbid, depositing ferruginous sediment, and when submitted to analysis was found to yield in addition to a considerable amount of combined chlorine "high figures" for "*Ammonia*," "*Oxygen absorbed*," and "*Nitrites*," and this state of things has now continued for several months.

Samples taken from the new supply at Minster were submitted to me, and I had some difficulty in convincing the senders that the appearance of the water was not due to sewage or organic impurity.

As my acquaintance with the Ramsgate water has extended over several years, and as the supply is very pure and uniform, ranking among first-class waters, I felt that a good opportunity presented itself for testing the action of iron pipes (presumably rusted) upon water of a known constant composition. Accordingly I had a number of samples taken all at one date, July 23rd last, and with as little interval between each as the distance would allow. Every care was used both in the collection of the samples and the analysis, which followed immediately. In the case of the *turbid* samples the clear supernatant water only was analysed.

None of these samples contained sufficient iron in *solution* to affect "ammonium sulphide solution."

Samples 1, 2, and 3 were taken from the old Ramsgate mains. Samples 4, 5, and

6 were taken at Minster after a run of from five to six miles through the new mains to the latter place, the pipes being four, five, and six inches in diameter.

PUBLIC WATER SUPPLY, RAMSGATE.

	Taken at Ramsgate (old mains).			Taken at Minster (new mains).		
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Appearance	clear	clear	clear	clear	very turbid	turbid
Combined Chlorine	5·60	5·60	5·25	5·53	5·88	5·60
Nitrogen as Nitrates and Nitrites	0·72	0·74	0·72	0·19	0·49	0·58
Ammonia	trace	trace	trace	0·0182	0·0168	0·0025
Albuminoid NH_3	0·0017	0·0017	0·0018	0·0016	0·0014	0·0022
Oxygen in 4 hours	·024	·024	·028	·090	·118	·068
Total Solids	35·70	35·63	36·19	29·89	34·79	34·72
Deposit	very slight	very slight	slight	slight	Iron-oxide	Iron-oxide
Nitrites	none	none	none	in quantity	in quantity	in quantity
Total Nitrogen in NH_3 Nitrates and Nitrites	0·720	0·740	0·720	0·205	0·504	0·582
Nitrogen Missing	—	—	—	0·522	0·223	0·145

N.B.—The figure for combined chlorine in the Ramsgate water fluctuates a little, and differs but little from what it was five years ago.

Omitting details common to both sets of samples, it will be observed that the nitrates have diminished considerably in the last set (4, 5, and 6). The ammonia has risen from traces in the first set to considerable amount in the latter, while nitrites appear in quantity in the latter, their amount being measured *practically* (minus a small deduction) by the oxygen absorbed.

Two questions present themselves. What has become of the missing nitrogen in the three last samples, and how may the small but distinct variations of combined chlorine be accounted for?

There is also a moral consequent upon the above, which was the chief reason for my bringing this matter before the Society.

How far is an analyst justified in pronouncing an opinion upon the purity of a drinking water in the absence of *all* information as regards the *origin* and mode of storage and conveyance of the same, or when such particulars are purposely withheld?

It would be interesting to know how the Minster supply would fare in the hands of an analyst who had been kept in ignorance of its antecedents.

In connection with this subject, viz., the effects of iron oxide upon water, perhaps the following analyses may be interesting, and they confirm some remarks by Dr. E. Frankland (*vide Water Analysis* p. 19).

The water from these wells has been a cause of unpleasantness between analysts in my own experience, very pure as it is.

WATER FROM "LOWER TERTIARIES," (THANET BEDS) BELOW "LONDON CLAY."
Taken from wells six miles N.N.W. of Canterbury.

	No. 1	No. 2
Appearance	very turbid	rather turbid
Combined Chlorine	7·14	7·14
Phosphates	very distinct traces	distinct traces
Nitrogen as Nitrates	0·02	0·02
Ammonia	0·1190*	0·0878*
Albuminoid Ammonia	0·0014	0·0019
Oxygen absorbed in 4 hours	·023	0·026
Total Solids	52·78	52·22
Deposit	chiefly Ferruginous	chiefly Ferruginous
Sulphates	present	present
Nitrites.. .. .	absent	absent

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(Conclusion of the Society's Proceedings.)