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ON THE GROWTH OF ALGÆ IN  
RESERVOIRS  
AND HOW TO TREAT IT

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(By JAMES FAULKNER.)

(This communication was read by Mr. James Shirra.)

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Metropolitan Water Supply, Sewerage & Drainage Dept.,  
31st May, 1910.

The President,

Western Australian Institute of Engineers,  
Engineering Association of N.S.W.

Sir,—

On Growth of Algae in Reservoirs and how to treat it.

For some years—more especially since the water from the Redan-street Artesian Bore has been in use—a growth of Algae (*Spirillum*) has developed in the service reservoirs in King's Park.

This always makes its appearance after the warm artesian water is put into use. The temperature is 100 degrees. The Algae quickly arrives at maturity, about the sixth day, and although it is harmless when it is decomposing (as it does every week), it imparts a violent taste and an aggressive smell to the water.

I had read papers dealing with the treatment of the water in impounding reservoirs for the destruction of the

Algae, but we have no trouble with our impounding reservoirs in this respect. There are various reasons to account for this.

The Algae will not grow in water that has not a stable level; the water at Victoria Reservoir only complies with this condition for a short time in the winter, when the temperature is too low to encourage the propagation of the Algae, and during the winter it does not grow in the service reservoirs. With the advent of the warm water, the conditions that favour the propagation of the Algae are in full force.

During the summer, the water is travelling out of the service reservoirs as fast as it is travelling in. With an impounding reservoir to treat, the conditions are different, as the water could be stopped from going into consumption during the treatment if you have service reservoirs to keep up the supply; but if it is the water in the latter that has to be treated, then the operation appears to be much more difficult, because this is the water that is going into direct consumption from the heart through the mains, which are the arteries, and is drawn off through the veins into the consumers' taps.

These considerations caused my early experiments to be of no effect, simply because I did not use a sufficient quantity of sulphate of copper to have any perceptible effect for fear that the consequences might be harmful to the consumers.

At the beginning of the summer of 1908 I asked the advice of the Government Analyst. He, after seeing the conditions under which the treatment would have to be carried out, advised that a dose of four ounces of the copper salts should be used to one million pounds of water (one hundred thousand gallons). The full dose was four pounds, costing 1s. 4d.

The salts were applied by enclosing them in a filter cloth and submerging this in one of the channels through which the warm water flows. It was gradually dissolved, the flow carrying it on into the reservoir, mixing the water thoroughly. This was quite successful. Within forty-eight hours the Algae, which was a brilliant green colour, turned to a shabby brown; it looked and felt like leather, the taste and smell had disappeared. There was often a green, oily appearance on the surface of the water. This was caused by myriads of fragments of the Algae. This also disappeared, leaving the water clear and limpid.

I found it necessary to dose the water every week during the summer, and there were no complaints during this period.

You will observe that a dose of the sulphate only prohibits the growth for one week. Though the Algae cannot propagate without water, it is also dependent for support from the walls, which are concrete—it will grow on iron as well; it does not appear to be able to grow in the water separated from the walls.

Noticing this fact, and also that where the salts came into contact with the concrete of the channel where it was applied to the water, a blue stain appeared, and that no growth was established on these spots, I concluded that a prepared or poisoned surface would prohibit the propagation of the Algae. To prove this, I had a portion of the west and east walls of No. 1 reservoir (which is used as a settling tank, and in which the water level varies only a few inches, and that very slowly) washed with water in which a few pounds of the copper salts had been dissolved. After it had dried, the water was allowed to rise, and the walls were kept under close observation. No growth appeared until the expiration of forty days; it, however, still grew on the

walls below the part which had been treated, but not to the same extent. It was, however, found necessary to treat the water once a week during the summer of 1908-9. There were no complaints of anything that could be put down to the presence of Algae in the water, and many searches were made by the Government Analyst for copper, but always with a negative result.

After my experience as herein, of the behaviour of the Algae, before commencing pumping for the season 1909-10 I had the walls of the service reservoirs to a depth of two feet from the surface washed with water that had a few pounds of the sulphate of copper dissolved in it. It was given ample time to dry. It was eighty days after commencement of pumping before any Algae appeared, and the growth has been very feeble all summer, though the continued hot weather was distinctly favourable for its propagation.

As the growth was still in evidence below the treated portion, the water was treated each week. It is no trouble, and the expense for the salts was only 30/- for the season, during which time nearly 500 millions of gallons were consumed. As during the previous summer, tests were made to see if copper could be detected in the water, with negative results.

And so we remove one of the principal objections to the use of artesian water; and, in the light of our greater knowledge of the quantity and quality available, we can almost say that there is under Perth an inexhaustible supply of water. To make it appreciated by the consumer, it is only necessary to recognise the water from this source as a part of the permanent supply to the metropolitan area, and we shall then do those things that are necessary to overcome the consumers' conservatism in this matter.

I can conceive cases where the water in a tank may be rendered undrinkable by the Algae without the assistance of artesian water, and it may be useful to a resident of the back-blocks who may use sulphate of copper for other purposes to know that if he puts 35 grains of the salt into 2000 gallons of water, mixes it well, and lets it stand for 24 hours—it is not absolutely necessary—it will then be quite fit and safe for use.

I have not thought it necessary to go into the reason why the water from one, two, or three bores out of six will cause or promote the growth. For the biological and chemical history of the Algae I refer you to the Government Bacteriologist and Analyst.

I have the honour to be, your obedient servant,

J. FAULKNER, Suptg. Engineer.