

Local & Munl. (189 9) Department.
Plague.

MISCELLANEOUS.

G.O., No. 1118. P. Mis

DATED 21/7/89

[Despatch Abstract.]

Disinfection

Recording Sanitary Commissioner's
Circular regarding the use of electrolysed
sea water as a disinfectant.

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

Local & Munl. (1897) Department.

CURRENT No. 1944 P.

2/7/81

From

The Sanitary Commissioner
for Madras.

Order No. 1118. P. No. 21/7/81
Recorded. 18-7-99

No. 1853
5

Dated 13th July 1899.

Received 14-7-99

Registered 14-7-99

Enclosures 1

Spare copies. 2

656/99
17-7-99

H. M. M. M. M.

197/81

14/7/99

SUBJECT.

Forwarding for information
of Government 3 copies of the
Circular issued by him on the sub-
ject of the use of electrolysed
sea water as a disinfectant.

BACK PAPERS.

G.O.	No.	Department.	Date.
	758	P. m. i.	20-5-99
P. m. i.	308	d. i. - 2	29.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

CIRCULAR No. ¹⁶³²/_S

Disinfectants.

The following account of experiments conducted by Dr. Marsh at Mons. Haffkine's laboratory, Bombay, is, by order of Government, circulated for information : —

(2) "These experiments show that the mercuric perchloride solution must be well acidulated to render it effective under the circumstances found in actual practice locally. If this is done, Dr. Marsh estimates that it is possible, by using the solution freely so that the maximum effect is produced, to reduce the microbes present by 94 per cent. To effect this the 8 gallons have to be used for every 100 square feet of cowdunged floor, and this procedure is effective to a depth of $\frac{1}{16}$ of an inch. It is probable that microbes sheltered by leaves, paper, or hidden in cracks escape.

(3) "The use of electrolysed sea-water by itself is proved to be impracticable owing to the large amount required.

(4) "The combination of the two methods, *i.e.*, the use of perchloride solution after preliminary treatment with electrolysed sea-water appears to afford the best results as the microbes are reduced by 98 per cent when the disinfectants are allowed to act under the most favourable conditions. The probable reasons for this are enumerated on page 19 of the report. The amount of liquid required is 5 gallons of electrolysed sea-water and 8 gallons of acid perchloride solution for a floor measuring $13' \times 7\frac{1}{2}'$.

(5) "From the summary of results got by counting the numbers of colonies of microbes growing in agar plates, it appears that by perchloride solution only the microbes are reduced 65 per cent. below the average of occupied plague-infected rooms; by perchloride solution *plus* electrolysed water the microbes are reduced 93 per cent. below the average of occupied plague-infected rooms; by perchloride solution *plus* lime wash *plus* unroofing the microbes are reduced 83 per cent. below the average of occupied plague-infected rooms.

(6) "I would suggest that this very careful and laborious research be printed by Government and distributed for information. The Laboratory is now being constantly asked to give advice in such matters as disinfection (*vide* letter attached) and it would be advantageous to have researches like this available for the information of enquirers."

2. In reference to the above, the attention of all officers has already been drawn to the necessity for using the solution of perchloride of mercury in combination with hydrochloric acid (P.C., No. 308/24, dated 1st February 1899). It remains to be seen how far the employment of electrolysed sea-water in addition to this solution, which Dr. Marsh has shown to be of utility, is feasible in this Presidency. Its use would imply the possession of steam, water, or wind power, and a dynamo, with suitable electrolysers and sea-water. In the absence of sea-water, an imitation might be made by adding to each litre (= 1.76 pints or .220 gallons) of water 27 grammes (15.43 grains per gramme) of common salt, and 4 grammes of manganese chloride. It is calculated that to make 440 gallons of electrolysed sea-water per hour of a strength of .5 grammes per litre, 12 horse power per electrolyser is required. On the electric current being passed through sea-water, various oxygenated compounds of chlorine (chiefly hypochlorous acid) are formed, which readily part with their oxygen. With reference, therefore, to Hankin's observations upon the susceptibility of the plague microbe to oxidising agents, there are *a priori* grounds for considering electrolysed sea-water a suitable disinfectant for plague.

3. A series of experiments on electrolysed sea-water by a "Lancet Commission" some years back, showed that to be effective the strength of the solution ought not to be less than .75 grammes per litre, that in manufacture, after that strength had been reached, there was a greater proportional consumption of electricity than for strengths below this. Its instability precludes storage, and where distribution of

the fluid would necessarily be effected (in the absence of any special system of pipes as proposed by Mr. Hermite) by means of carts in a tropical climate, it would probably involve a constant tendency for solutions to depart from the standard. The "Lancet Commission" showed that, if through a solution of bleaching powder (chlorinated lime) carbonic acid gas be passed, a close imitation of electrolysed sea-water is produced, but that if required for use at once the addition of any acid to this solution would suffice, instead of the passing of carbonic acid. The use of this imitation of electrolysed sea-water is, therefore, open to any local body without its going to the expense of purchasing the machinery above alluded to.

4. The summary of Dr. Marsh's experiments above quoted gives no information as to the strength of the solution he employed, but affirms that, when electrolysed sea-water is used alone, it is not efficacious. It is presumed this statement is made in reference to the ready weakening of the solution in the presence of certain organic matters, and that the real efficacy of using the perchloride in combination results from the latter having a better chance of acting after combination with the organic matter has been effected by the former.* Yet, the "Lancet Commission" found electrolysed sea-water to act efficiently in the destruction of typhoid and cholera bacilli in broth cultures, whilst in sewage it considered that, judging from its action on the general mass of microbes, escape of cholera and typhoid bacilli would be "improbable." Be this as it may, the fact that mercury perchloride must be employed according to Dr. Marsh forbids the use of the imitation electrolysed sea-water, as the lime of the solution would be incompatible. Hence, the use of this method must be confined to localities where artificial sea-water can be made cheaply, or sea-water is available. In the case of Madras town, the purchase of a dynamo for use with an existing municipal engine, or the obtaining of the necessary current from the Electric Tramways Company ought to get over the difficulty of manufacture. In certain other coast towns, the former alternative ought to be possible. *If maintained of standard strength*, there can be no doubt of its efficacy as an useful disinfectant and excellent deodorant of drains.

5. It may here be stated that the Principal of the Mysore Government College, Bangalore, produced for a long period in his own laboratory electrolysed artificial sea-water (made by using twice the proportion of common salt to that found normally in sea-water) for the use of the city of Bangalore during the late epidemic. Dr. Srinivasa Rao, Bacteriologist to the Mysore Government, gave evidence on the subject before the Plague Commission. His experience differed from that of Dr. Marsh; he considered he secured absolute sterilization of earthen and of cowdung-plastered floors of the plague-infected huts—without the addition of perchloride of mercury. The strength (in chlorine) of the solution used in these experiments was not ascertained.

6. The evidence available at present is, therefore, contradictory, but, on the whole, points to the probability of electrolysed sea-water forming an important addition to disinfectants now in use during plague epidemics.

* Since this was in type, Dr. Marsh's report has been received. On this point, he states as follows:—

"The value of electrolysed sea-water as an adjunct of perchloride of mercury in the disinfection of native floors is, therefore, not so much because of any germicidal action it may exert as for its utility in oxidising and neutralising the chemical ingredients of the mud and cowdung which interfere with the efficiency of perchloride of mercury."

OFFICE OF SANY. COMM., }
MADRAS, 7th June 1899. }

W. G. KING, M.B., C.M., D.P.H., I.M.S., Lt.-Col.,
Sanitary Commissioner for Madras.

To all Collectors.

- „ the President, Municipal Commission, Madras.
- „ all District Medical and Sanitary Officers.
- „ all Medical Officers on Plague Duty.

No. 1853
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Office of Sanitary Commissioner,
Madras, 13th July 1899.

From

Lieut.-Colonel W. G. King, C.I.E., I.M.S.,
Sanitary Commissioner for Madras,

To

The Secretary to Government,
Local and Municipal Department.

Enclosures 3 Sir,

With reference to G.O.No: 758 P.Mis., dated 20th May 1899, I have the honour to forward herewith for the information of Government three copies of the Circular issued by me on the subject of the use of electrolysed sea-water as a disinfectant.

I have the honour to be,

Sir,

Your Most Obedient Servant,

W. G. King
M.B., C.I.E.,

Lieut.-Colonel, I.M.S.
Sanitary Commissioner for Madras.

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