

**Report on the quality and quantity of the water supplied to the metropolis in the year 1866, as compared with the year 1851 : and remarks on the advantages and difficulties of a constant supply / by H. Letheby.**

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# REPORT

ON THE

## QUALITY AND QUANTITY

OF THE

# WATER

SUPPLIED TO THE METROPOLIS IN THE YEAR 1866,  
AS COMPARED WITH THE YEAR 1851,

AND

REMARKS ON THE ADVANTAGES AND DIFFICULTIES OF

## A CONSTANT SUPPLY.

BY

H. LETHEBY, M.B., M.A., PH.D., &c.,

PROFESSOR OF CHEMISTRY IN THE COLLEGE OF THE LONDON HOSPITAL,

AND MEDICAL OFFICER OF HEALTH FOR THE  
CITY OF LONDON.

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LONDON:

M. LOWNDS, PRINTER, FENCHURCH STREET, CITY.

1866.

# REPORT

to a Meeting of the Committee of the  
of the City of London, 1855, at the  
of the City of London, 1855, at the

December 1855, 1855

## WATER

The Report of the Committee of the  
of the City of London, 1855, at the  
of the City of London, 1855, at the

The Medical Officer's Report on Water Supply  
to the Metropolitan Water Board, 1855, at the  
of the City of London, 1855, at the

## CONSTANT SUPPLY

It was Resolved and Ordered

That the Report of the Medical Officer of  
the City of London, 1855, at the  
of the City of London, 1855, at the  
of the City of London, 1855, at the  
of the City of London, 1855, at the  
of the City of London, 1855, at the

JOSEPH DAVY

Secretary to the Committee

*At a Meeting of the Commissioners of Sewers  
of the City of London, held at the  
Guildhall of the said City, on Tuesday,  
December 11th, 1866:—*

The Report of the Streets Committee, dated this day, was read.

The Medical Officer's Report on Water Supply to the Metropolis was also read.

IT WAS RESOLVED AND ORDERED—

That the Report of the Medical Officer of Health be printed, and a Copy sent to each Member of the Court and of the Court of Common Council, and to the Members of the Metropolitan Board of Works.

JOSEPH DAW,

*Principal Clerk.*





# REPORT

ON THE

QUALITY AND QUANTITY OF THE WATER  
SUPPLIED TO THE METROPOLIS IN THE YEAR  
1866, AS COMPARED WITH THE YEAR 1851.

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TO THE HONOURABLE STREETS COMMITTEE OF  
THE COMMISSIONERS OF SEWERS.

GENTLEMEN,

In accordance with your request I submit my report on the matter referred to in the letter from the Metropolitan Board of Works of the 30th of October last, respecting the present water supply to the metropolis; and asking for information thereon.



I may premise that I have for many years past regularly examined the quality of the water supplied by all the Water Companies to the metropolis, and the results have been published monthly by the Metropolitan Association of Medical Officers of Health.

The average of these results for the eleven months of the present year are shown in the Table No. I.; and they indicate a very satisfactory condition of the water supply, both as regards the quantity and chemical quality of the water.

At the present time, the average daily supply of water to the metropolis, is nearly 93 millions of gallons. This is at the rate of rather more than 200 gallons per house, or over 30 gallons per head. In the year 1851, when there was a Government Commission appointed to inquire into the condition of the Metropolitan Water Supply, it was found that the average daily supply to the whole of London, was only a little more than 45 millions of gallons. This was at the rate of about 19 gallons per head. In the course of sixteen years, therefore, the amount of water daily supplied to the metropolis, has been more than doubled; and the proportion per head has risen from 19 gallons to 30.



It appears also that the chemical quality of the water has notably improved. This will be evident from a comparison of the Tables No. I. and No. II.—the former of which shows the composition of the water in 1866, and the latter in 1851. At present the water derived from the Thames contains about  $19\frac{1}{2}$  grains of solid matter per gallon, of which a little less than 1 grain is composed of organic and other matters, which are volatile at a red heat. In 1851 the total amount of solid matter in the water from the Thames, ranged from 21 to nearly 23 grains per gallon; and of this from  $1\frac{1}{2}$  to 3 grains were volatile at a red heat. So also with regard to the water derived from other sources than the Thames, for it will be seen that the total amount of solid matter has been diminished about three grains per gallon; and the organic and other volatile constituents have been reduced from about three grains per gallon to one. There has, therefore, been a marked improvement in the quality of the water during that interval; and no doubt this has been effected by better methods of storage, as in covered reservoirs, and by very careful processes of filtration at the Companies' works. The total quantity of real organic matter in the water supplied to the metropolis at the present time is surprisingly small; for it does not in any case amount to three-quarters of a grain per gallon.



In the water derived from the Thames, it averages about six-tenths of a grain per gallon; in that supplied by the East London Company it is a little less than half a grain per gallon; in the New River water, it is only a quarter of a grain; and in that of the Kent Company it hardly amounts to the tenth part of a grain per gallon. It must be admitted, however, that in a sanitary point of view it is not so much the *quantity* of organic matter as the *quality* of it which determines the fitness of water for domestic purposes. In the present case, there is no evidence, chemical, physical, or pathological, that the organic matter in the water supplied to the metropolis is any other than the harmless products of vegetable and infusorial growths. Contrasted with the water obtained from the surface wells of London (see Table No. III.), the difference of quality is most striking; for not only is there an absence from the Companies' waters of the saline substances which are peculiarly characteristic of animal excreta, but the nature and amounts of the volatile matters, commonly called organic, are essentially different. I refrain from entering on the question which has called for this Report—namely, the observed relation or connection of the water-supply in any part of the metropolis with the recent epidemic, for I intend to make this the subject of a special



inquiry and Report to you; but I may state that while there is ample proof of the propagation of choleraic disease by certain well waters of London, there is at present no evidence that the public water supply has had anything whatever to do with the localisation or spread of the recent epidemic. Already in the Eastern parts of London, where the disease was most fatal, the Medical Officers of Health have reported to this effect, and have shown that the largest mortality from cholera was of persons who were not water-drinkers, and that teetotallers and others who drank largely of the East London water in its unboiled condition have been singularly exempt from the disease. At the City of London Workhouse at Bromley, where the inmates partook of well-water alone, there were 20 deaths from the epidemic in one week; whereas, at the East London Workhouse at Hackney, which is supplied with the East London Company's water, there has not been a single death from cholera. So also in the eastern part of the City of London, I have been unable to trace the least connection between the epidemic and the water-supply. As far, therefore, as medical observation has hitherto gone, there has been no proof of the soundness of the hypothesis which has led to these inquiries.

As regards the other question which has been



submitted to me—namely, the desirability of a constant supply as compared with an intermittent—there can be but one opinion: as an abstract question, indeed, it admits of no discussion; for it is admitted on all hands that a constant supply secures to us an unlimited quantity of water in its purest and most agreeable condition. But the practical difficulties of it in this metropolis are immense. At the present time there is hardly a house in London which has the fittings in a proper condition to receive it, and until this is altered it is vain to expect a constant service. The 15th Section of “The Metropolis Water Act of 1852” gives power to the inhabitants of any district supplied by a water company to enforce a constant supply, provided that four-fifths of the owners or occupiers of the houses on any main demand it in writing, and put their pipes, cocks, cisterns, machinery and arrangements of all kinds in proper condition to receive it. This is the first step towards the realisation of such an object; and the maintenance of a constant supply can only be by the strictest supervision, and by the most rigid enforcement of every obligation on the part of the owners of houses through the severest penalties. If indeed there be neglect or wilful derangement of the taps, cisterns or other machinery used in the water-service of any house



there will not only be an enormous waste of water and the depriving of others of it who are at a higher level, but there will also be great danger to property from the escape of the water and the flooding of houses. Anything indeed like the carelessness which now prevails in respect of the taps and fittings, would cause such a waste of water as no source of supply could maintain ; and I much doubt if the London public would submit to the strict supervision and the severe obligations which a well regulated constant supply demands. It is well enough to entertain the matter in its speculative and abstract relations as an unquestionable advantage, but it is another thing to fulfil the obligations which its practical adoption imposes. This is manifested by the disinclination of the occupiers of houses to avail themselves of the Act of Parliament by making proper provision for it ; for what could be easier, if a constant supply were really desired, then the specified legal process for obtaining it. I believe that the London water companies are not adverse to such a supply, but they very properly insist upon the conditions which are necessary for its adoption and maintenance ; for they look with alarm at the consequences of it with the present state of things. Whenever in the City we have guaranteed that there should be no waste of water, by providing a

waste-water-preventer ; we have met with no difficulty from the companies in obtaining a constant supply, and I submit a list of places (*vide* Table No. IV.) where the Commissioners of Sewers and the Jewish Board of Guardians have erected stand-pipes, with constant service, for the use of the poor. And I should regard it as an inestimable advantage, if, by such a service, we could everywhere abolish the filthy butts and cisterns of the lodging-houses of the City.

I remain, GENTLEMEN,

Your obedient Servant,

HENRY LETHEBY.

*Guildhall.*



# No. I.—*Composition and Quality of the Metropolitan Waters in the Year 1866.*

FROM THE ANALYSIS BY DR. LETHEBY, AS PUBLISHED IN THE MONTHLY RETURNS OF THE METROPOLITAN ASSOCIATION OF MEDICAL OFFICERS OF HEALTH:—

Population 3,067,536. Average Daily Supply 92,734,100 gallons=30·2 gallons per head.

NAMES OF WATER COMPANIES.	Total Solid Matter per gallon.	Loss by Ignition.*	Oxidisable Organic Matter.†	Hardness.		Average Daily Supply.
				Before Boiling.	After Boiling.	
	grains.	grains.	grains.	degrs.	degrs.	gallons.
THAMES WATER COMPANIES.						
Grand Junction .....	19·52	0·98	0·59	13·1	3·6	8,551,800
West Middlesex .....	18·95	0·96	0·59	13·0	3·4	8,102,300
Southwark and Vauxhall ..	19·77	1·04	0·62	13·0	3·6	12,367,000
Chelsea .....	19·16	0·86	0·53	13·0	3·6	7,748,000
Lambeth .....	19·63	1·04	0·66	13·0	3·6	8,694,100
OTHER COMPANIES.						
Kent .....	26·97	1·10	0·10	18·3	7·8	5,927,200
New River .....	18·61	0·91	0·25	14·1	4·1	22,729,700
East London .....	20·41	1·01	0·45	14·8	4·6	18,614,000

\* The loss by ignition represents a variety of volatile matters, as well as organic matter, as ammoniacal salts, moisture, and the volatile constituents of nitrates and nitrites.

† The oxidisable organic matter is determined by a standard solution of permanganate of potash—the available oxygen of which is to the organic matter as 1:8; and the results are controlled by the examination of the colour of the water when seen through a glass tube two feet in length and two inches in diameter.



No. II.—*Composition and Quality of the Metropolitan Waters, in the Year 1851, when the Water was not Filtered.*

FROM THE REPORT OF THE GOVERNMENT COMMISSION ON THE CHEMICAL QUALITY OF THE SUPPLY OF WATER TO THE METROPOLIS, IN 1851.

Population, 2,362,236. Average Daily Supply 45,885,900 gallons=19·4 gallons per head.

NAMES OF WATER COMPANIES.	Total Solid Matter per gallon.	Loss by Ignition.*	Oxidisable Organic Matter.	Hardness.		Average Daily Supply.
				Before Boiling.	After Boiling.	
THAMES WATER COMPANIES.	grains.	grains.	grains.	degrs.	degrs.	gallons.
Grand Junction .....	21·72	3·07	—	14·0	—	3,541,700
West Middlesex .....	22·67	2·75	—	14·6	5·5	3,334,000
Southwark and Vauxhall ..	21·08	1·51	—	15·0	—	6,013,700
Chelsea .....	21·28	2·38	—	14·4	—	3,940,700
Lambeth .....	20·40	2·59	—	14·2	—	3,077,300
OTHER COMPANIES.						
Kent .....	29·71	2·61	—	16·0	—	1,079,300
New River .....	19·50	2·79	—	14·9	4·1	15,435,600
East London.....	23·51	4·12	—	15·0	—	9,036,000

\* The loss by ignition represents a variety of volatile matters, as well as organic matter, as ammoniacal salts, moisture, and the volatile constituents of nitrates and nitrites.



III.—*Composition of the Waters of the Pumps and Surface Wells of the City of London.*

NAMES OF PUMPS.	Carbonate of Lime and Magnesia.	Sulphate of Lime and Magnesia.	Alkaline Chloride.	Alkaline Nitrate.	Silica and Alumina.	Organic and other Volatile Matter.	Total per Gallon.
	grs.	grs.	grs.	grs.	grs.	grs.	grs.
dgate .....	23·43	15·63	13·17	19·37	0·96	4·87	77·43
dgate High Street .....	25·30	24·30	20·70	24·20	1·12	8·13	103·75
rtholomew Lane .....	21·70	16·17	15·47	16·50	0·97	4·56	75·37
singhall Street .....	21·17	25·20	12·73	13·60	0·97	6·30	79·97
ll Yard, Gracechurch Street ..	19·29	12·80	19·11	19·58	1·00	8·22	80·00
shops gate Church .....	22·60	21·20	18·20	17·33	1·10	6·23	86·66
shops gate St., by Dunning's Alley	32·23	33·54	22·43	16·06	1·50	9·07	114·83
w Churchyard .....	25·80	19·13	18·47	12·87	1·00	5·43	82·70
wling Square .....	18·67	26·20	11·17	9·13	1·00	4·93	71·10
de Lane .....	14·53	23·07	25·53	24·27	0·93	6·87	95·20
nnon Street West .....	14·80	13·73	10·87	25·53	1·00	5·10	71·03
equer Yard, Dowgate Hill ....	20·53	16·43	11·87	16·57	1·03	7·03	73·46
ck and Hoop Yard, Houndsditch	19·93	17·33	13·03	21·90	1·00	5·60	77·79
rnhill .....	22·13	18·20	10·70	16·23	1·20	5·37	73·83
ee Church Lane .....	21·07	9·43	6·70	7·17	0·87	2·56	47·80
nchurch Street .....	21·77	20·23	14·50	21·33	0·87	7·23	85·93
ildhall .....	12·90	8·65	4·30	3·05	0·95	2·90	32·75
ildhall Buildings .....	13·37	4·40	3·40	2·76	0·60	2·10	26·63
tter Lane .....	16·57	15·53	7·47	10·53	0·97	5·33	56·40
eat St. Helen's .....	15·47	10·83	6·50	12·27	0·76	3·50	49·33
lf Moon Passage .....	16·40	13·00	17·23	15·00	0·87	3·50	66·00
rald's College Yard .....	14·57	21·90	15·87	30·50	0·93	5·86	89·63
ney Lane Market .....	16·10	10·50	9·23	6·63	1·10	3·27	46·83
l Lane .....	15·70	19·50	15·73	22·63	1·30	5·44	80·30
nmonger Lane .....	19·27	30·60	13·57	15·07	1·26	6·90	86·67
adenhall Market .....	16·63	23·97	38·60	29·13	1·07	5·53	114·93
tle Britain .....	25·27	29·93	13·83	6·42	1·43	8·27	85·17
ories .....	21·93	21·70	15·46	29·00	1·23	6·63	95·97
lton Street, Cripplegate .....	33·63	37·84	22·93	23·50	1·33	8·34	127·57
tre Square .....	17·23	10·33	7·27	6·03	0·97	4·37	46·20
wgate Market .....	19·73	14·14	13·70	14·70	1·30	6·83	70·40
l Jewry .....	18·50	15·20	7·70	13·33	0·94	4·93	60·27
Mary-Axe .....	23·47	19·93	12·57	20·74	1·13	5·53	83·37
Nicholas Olave Churchyard ..	21·03	29·17	31·87	38·36	1·20	8·10	129·73
Paul's Churchyard .....	20·60	15·20	9·47	20·80	1·10	4·10	71·27
st London Water Company ....	12·00	2·42	1·32	1·52	0·50	0·80	18·56
w River Water Company .....	11·49	1·94	1·06	2·05	0·42	0·90	17·86



No. IV.—*List of places in the City of London where a constant supply of water from the New River or East London Water Companies' Mains, has been furnished through Stand-pipes, for the service of Houses in the occupation of the Poor.*

STAND-PIPES WITH "WASTE PREVENTERS."

IN LIEU OF CITY PUMPS.

Aldgate.  
Aldgate High Street.  
Cock and Hoop Yard, Houndsditch.  
Bishopsgate Street, by Dunning's Alley.  
Creechurch Lane, Leadenhall Street.  
Half Moon Passage, Gracechurch Street.  
Leadenhall Market.  
Minories.  
Milton Street, Cripplegate.  
Mitre Square.  
Newgate Market.

OTHER COURTS.

Three King Court, Minories.  
Maidenhead Court, Moor Lane.  
Bridgewater Place, Fann Street.  
Plough Court, Fetter Lane.  
Holborn Buildings.  
Montague Court.  
Sharp's Court.

STAND-PIPES WITH "SELF-CLOSING TAPS."

Gravel Lane.  
Hutchinson Street or Avenue.  
Stoney Lane.  
Middlesex Street.  
Petticoat Square.  
Harrow Alley.  
Widegate Street.  
Artillery Lane.  
Cutler Street.

Total 27.



